

TAG Oil (NZ) Limited  
Sidewinder Wellsite (Exploration)  
Monitoring Programme Report  
Technical Report 2010–105

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## Executive summary

TAG Oil (NZ) Limited established a hydrocarbon exploration site located on Upper Durham Road, Inglewood, in the Waitara catchment. The site is called Sidewinder (ex Broadside). This operation took place from September 2010 - June 2011.

This report for the period September 2010 - June 2011 describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance in relation to drilling operations at the Sidewinder well during the period under review, and the results and environmental effects of the Company's activities.

TAG Oil (NZ) Limited holds a total of 4 resource consents, for the activities at the Sidewinder well, which include a total of 46 conditions setting out the requirements that the Company must satisfy. TAG Oil (NZ) Limited holds consent 7597-1 to allow it to take and use water, consent 7595-1 to discharge treated stormwater into land and into the Piakau 1 stream, consent 7600 to take groundwater encountered when drilling for and producing hydrocarbons, and consent 7596-1 to discharge emissions to air from flaring at this site.

The Council's monitoring programme for the year under review included 19 inspections of the site and surrounding environment, and 1 water sample collected for physicochemical analysis. There were no biomonitoring surveys of receiving waters, and no ambient air quality analyses due to an absence of observable effect in receiving environments.

Monitoring of the site and surrounding environment showed that good processes and procedures were implemented. A strong focus on health and safety of all persons on site, as well as the environment ensured that the site was always clean and tidy. Bunding of both wet and dry chemicals/hazardous substances was an important and integral consideration when setting up the site. Most chemicals were stored within bunds in low traffic areas. Goods stored within the bunded areas were often covered to stop the product getting wet. As a result of stormwater entering one of the bunds on site during operations, the integrity of this bund was compromised in order to release stormwater.

Any spills on site were quickly cleaned up to avoid the potential for a contaminant to travel via surface water. Throughout the monitoring period the wellsite's stormwater system, consisting of a ring drain and two skimmer pits was dry most of the time. The receiving surface water body was visually inspected for contaminants during some visits. One water sample was taken because there was a discharge of stormwater from site during an inspection.

Staff on site were cooperative with requests made by officers of Taranaki Regional Council, with any required works being completed quickly and to a satisfactory standard.

There was 1 Unauthorised Incident (UI) recorded during the period under review. The incident involved the discharge of diesel to land from a storage tank overflow pipe.

Drilling fluids and cuttings were disposed of off-site by contractor to the Wellington Disposal Site at Waitara. Flaring was carried out on site during production testing activities.

During the period, the Company demonstrated a good level of environmental performance and compliance with the resource consents.

Production testing at the site is ongoing to evaluate the productivity of hydrocarbons. This report includes recommendations for future drilling operations at this and other sites.



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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 September 2010 - June 2011 by the Taranaki Regional Council on the monitoring programme associated with resource consents held by TAG Oil (NZ) Limited in relation to exploration activities at the Sidewinder wellsite. TAG Oil (NZ) Limited operates a wellsite situated on Upper Durham Road at Inglewood, in the Waitara catchment.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by TAG Oil (NZ) Limited that relate to exploration activities within the Waitara catchment at the Sidewinder wellsite.

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 TAG Oil (NZ) Limited's use of water, land, and air, and is the first report by the Taranaki Regional Council for the site.

### **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 TAG Oil (NZ) Limited 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 wellsite during exploration activities.

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

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

Section 4 presents recommendations to be implemented for future drilling operations.

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 socio-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 (e.g. 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 performance of resource users against regional plans and consents. Compliance monitoring, (covering both activity and impact monitoring) also enables the Council to continuously assess its own performance in resource management as well as that of resource users particularly consent holders. It further 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 performance

Besides discussing the various details of the performance and extent of compliance by TAG Oil (NZ) Limited in the catchment 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 trivial (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 year were negligible or minor at most, items of concern were resolved positively, co-operatively, and quickly, the Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices, 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.

- **improvement desirable** indicates that the Council may have been obliged to record a verified unauthorised incident involving significant environmental impacts, and/or abatement notices may have been issued; there were adverse 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 end of the period under review.
- **poor** performance is used when there were grounds for prosecution or infringement notice.

## 1.2 Process Description

TAG Oil (NZ) Limited holds a 10 year petroleum exploration permit (no. 38748) to mine Oil, Condensate, LPG, Petroleum and Gas within a 32 square kilometre (km) area. The Sidewinder wellsite has been established in order to explore, evaluate and produce hydrocarbons from within the Mt Messenger formations below.

The Sidewinder wellsite is located approximately 5km south of Inglewood. Access to the site is off Upper Durham Road via State Highway 3.

The Sidewinder wellsite was established in 2010 and involved the removal of topsoil to create a firm level platform on which to erect a drilling rig and house associated equipment. Site establishment also involved the installation of:

- A wastewater control and storage system
- A system to collect and control stormwater and contaminants
- A flare pit
- Other on-site facilities such as accommodation, parking and storage.

The Sidewinder wellsite currently has a total of 6 wells (4 wells of which two have been sidetracked). The wells were drilled to a target depth of approximately 1500m - 2000m.

### 1.2.1 Management of stormwater, wastewater and solid drilling waste

The Sidewinder wellsite is adjacent to the Piakau Stream. The stream emanates from the slopes of Mount Taranaki and flows east where it joins the Waitara River.

Management systems have been put in place to avoid any adverse effects on the surrounding environment from the wellsite exploration and production activities. There are several sources of water and solid waste material which require appropriate management. These are:

- Stormwater from 'clean' areas of the site [e.g. parking areas] which run off during rainfall. There is potential that this runoff will pick up small amounts of hydrocarbons and silt due to the nature of the activities on site;
- Stormwater which collects in the area surrounding the drilling platform and ancillary drilling equipment. This stormwater has a higher likelihood of contact with potential contaminants, particularly hydrocarbons;
- Produced water which flows from the producing formation and is separated from the gas and water phase at the surface;

- Drilling water [brought onto the site for making muds] which is surplus;
- Drill cuttings, muds and residual fluids which are separated from the liquid waste generated during drilling; and
- Drilling cement prepared and used on site.

Important requirements of site establishment are to ensure that the site is contoured so that all stormwater and any runoff from 'clean' areas of the site flow into perimeter drains. The drains direct stormwater into a skimmer pit system on site consisting of two settling ponds. Any hydrocarbons present in the stormwater float to the surface and can be removed. The ponds also provide an opportunity for suspended sediment to settle. Treated stormwater is then discharged from the wellsite overland and into the Piakau Stream.

Drilling mud, cuttings and water brought to the surface during drilling operations were separated out using a shale shaker. The drilling mud and some of the water was reused in the drilling process. Cuttings were collected in bins located at the base of the shaker and disposed of off site.

Drilling cement is pumped down the well for the purpose of supporting the casing. Cement trucks are located on site where the cement is produced and then pumped via pipes into the well.

### 1.2.2 Flaring from exploration activities

It is possible that flaring can occur via the following activities:

- well testing and clean-up; and
- production testing
- emergencies; and
- maintenance and enhancement activities [well workovers]

Flaring was carried out on site during the testing phase of the Sidewinder 1 well.



**Figure 1** Aerial photograph showing approximate location of the Sidewinder wellsite

## **1.3 Resource consents**

### **1.3.1 Background**

TAG Oil (NZ) Limited holds 4 resource consents related to exploration activities at the Sidewinder site. All 4 of the consents were granted on 11 February 2010. The consent applications were processed on a non-notified basis as TAG Oil (NZ) Limited had obtained the landowners approval as an affected party, and the Council was satisfied that the environmental effects of the activity would be minor.

Copies of the consents and the Council reports describing the associated activities are contained in Appendix I to this report.

Site construction was permitted under Rule 25 of the Regional Fresh Water Plan for Taranaki.

The consents are discussed below.

### **1.3.2 Water abstraction permit**

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

TAG Oil (NZ) Limited holds water permit **7597-1** to take and use water for hydrocarbon exploration activities at the Broadside- 1 wellsite. This permit was issued by the Taranaki Regional Council on 11 February 2010 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2027.

Special condition 1 requires that no more than 350 cubic metres of water is taken over a 7 day period, at a rate not exceeding 5 litres per second.

Special condition 2 requires a record of abstraction to be maintained.

Special condition 3 states the consent holder must adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment.

Special condition 4 requires the intake to be screened to avoid the entrainment of fish.

Special conditions 5 and 6 relate to the lapse and review of the consent.

A copy of the permit is attached to this report in Appendix I.

### **1.3.3 Water discharge permit (treated stormwater)**

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.

TAG Oil (NZ) Limited holds water discharge permit **7595-1** to discharge treated stormwater and treated production water from hydrocarbon exploration and production operations at the Broadside - 1 wellsite onto and into land in the vicinity of the Piakau Stream. This permit was issued by the Taranaki Regional Council on 11 February 2010 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2027.

Special condition 1 stipulates that TAG Oil (NZ) Limited must adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment.

Special condition 2 states that the catchment area must be less than 0.36Ha.

Special condition 3 states that 7 days notice shall be given before site works and drilling commences.

Special condition 4 states that a contingency plan must be maintained that details measures and procedures to prevent, remedy or mitigate the effects of spills or the discharge of contaminants.

Special condition 5 states that the stormwater system must be constructed, managed and maintained as approved.

Special condition 6 states that all site water and uncontaminated production water must be treated via the stormwater system before being discharged.

Special condition 7 states that hazardous substances must be contained in a double skinned tank, or banded with drainage to sumps and not to the stormwater system.

Special conditions 8, 9 and 10 relate to the discharge of treated stormwater into the receiving waters.

Special conditions 11 and 12 relate to record keeping and procedural matters associated with the issuing and continuation of the consent.

A copy of the permit is attached to this report in Appendix I.

#### **1.3.4 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.

TAG Oil (NZ) Limited holds air discharge permit **7596-1** to discharge emissions to air from flaring of the hydrocarbons associated with well clean up and well testing associated with exploration activities at the Broadside- 1 wellsite. This permit was issued by the Taranaki Regional Council on 11 February 2010 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2027.

Special condition 1 states that flaring shall not occur for more than 30 days per zone for each well.

Special condition 2 states that Taranaki Regional Council must be notified 24 hours before the initial flaring of each zone.

Special condition 3 states that residents within 1000m of the wellsite must be notified 24 hours before the initial flaring of each zone.

Special condition 4 states Taranaki Regional Council must be notified prior to alterations to plant equipment or processes if quality or nature of flare emissions is to change.

Special condition 5 states that wind direction and speed must be taken into account when flaring.

Special condition 6 requires liquid and solid separation to reduce smoke emissions.

Special condition 7 requires Taranaki Regional Council to be notified if liquid and solid separation cannot be maintained.

Special condition 8 states that no liquid or solid hydrocarbons shall be combusted through the gas flare system.

Special condition 9 requires gas to be combusted to reduce smoke emissions.

Special condition 10 states the consent holder must adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment.

Special condition 11 states that only product from the well can be combusted.

Special conditions 12, 13, 14, 15 and 16 relate to the control of emissions to air from the flare.

Special conditions 17, 18 and 19 relate to the recording and reporting of flare data and information.

Special conditions 20 and 21 relate to the lapse and review of the consent.

A copy of the permit is attached to this report in Appendix I.

### **1.3.5 Groundwater abstraction permit**

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

TAG Oil (NZ) Limited holds discharge permit 7600-1 to take groundwater that may be encountered as produced water during hydrocarbon exploration and produced operations at the Broadside-1 wellsite.

This permit was issued by the Taranaki Regional Council on 11 February 2010 under Section 87(d) of the Resource Management Act. It is due to expire on 1 June 2027.

Special condition 1 states that abstraction must not cause more than a 10% lowering in the static water level of any bore.

Special condition 2 states that the abstraction must not cause salt intrusion into any freshwater aquifer.

Special condition 3 states the consent holder shall provide to Taranaki Regional Council a summary well log to a depth of 1000m.

Special condition 4 states that the consent holder must maintain records of abstraction.

Special conditions 5 and 6 relate to the lapse and review of the consent.

A copy of 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 exploration oil wells consists of up to six primary components. They are:

- Programme liaison and management
- Site inspections
- Chemical sampling
- Solid wastes
- Air quality monitoring
- In-stream Ecological surveys

The monitoring programme for the Sidewinder wellsite focused on site inspections, chemical sampling and air quality monitoring. However, the six components of wellsite monitoring are discussed below.

### **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, or new consents, advice on the Council's environmental management strategies and the content of regional plans, and consultation on associated matters.

#### **1.4.3 Site inspections**

Site inspections are undertaken to ensure that good environmental practices were adhered to and resource consent special conditions were complied with.

The Sidewinder site, adjacent land and streams were inspected 19 times through the site construction, drilling and flaring phases.

During the site set-up and drilling phase of operations, particular attention is paid to the stormwater system and bunding of chemicals to ensure that every practicable step has been taken to stop contaminants discharging from site.

The inspections also provide an opportunity for monitoring officers to liaise with staff about on site operations; monitoring and supervision; discuss matters of concern; provide advice and information; and resolve any issues in a quick and informal manner.

#### **1.4.4 Chemical sampling**

The Taranaki Regional Council undertook sampling from the site for physiochemical analysis.

#### **1.4.5 Solid wastes**

During exploration activities on the site WBM drill cuttings, were removed from the site by contractor to the Wellington Disposal Site (land farm) at Waitara.

#### **1.4.6 Air quality monitoring**

Air quality monitoring is usually carried out in association with the well clean-up phase, where flaring can cause smoke emissions, as well as observing any miscellaneous emissions.

#### **1.4.7 Ecological surveys**

Ecological surveys were not required owing to the distance of the discharge to any surface waterbodies.

## 2. Results

### 2.1 Water

#### 2.1.1 Inspections

Inspections paid special attention to the ring drains, mud sumps, treatment by skimmer pits and the final discharge point from the skimmer pit on to land and then into water. At each visit to the site, an inspection was also made of the water take to ensure that the Council's conditions for abstraction as a permitted activity were adhered to.

During each inspection the following were checked and noted:

- weather;
- flow rate of surface waters in the general vicinity;
- flow rate of water take;
- whether pumping of water was occurring;
- general tidiness of site;
- ring drains;
- hazardous substance bunds;
- treatment by skimmerpits;
- drilling muds;
- drill cuttings;
- mud pit capacity and quantity contained in pit;
- sewage treatment and disposal;
- cementing waste disposal;
- surface works;
- whether flaring was in progress, and if there was a potential for flaring, whether the Council had been advised;
- discharges and surface waters in the vicinity for effects on colour and clarity, aquatic life and odour;
- site records; and
- general observations

Inspections of the wellsite were undertaken on the following dates (main points noted during each visit are also indicated):

#### **17 September 2010**

The site was currently being prepared with trucks and cranes unloading equipment onto the site.

The skimmer pits appear to be working well however they were not discharging at time of inspection. The ringdrain appeared to be working well.

There was only one underground sewer tank which will be emptied daily. The tank has a ballcock shut off valve to prevent it from overflowing.

The layout and design of the chemical bund was discussed to prevent soluble chemicals from entering the ringdrain.

**21 September 2010**

The site was clean and tidy. The chemical bund has yet to be completed however only small amounts of chemicals on site at time of inspection. Chemicals were covered with a tarpaulin. The ringdrain and skimmer pits were working well with clear water discharging. The sewer tank was empty.

**28 September 2010**

Site was clean and tidy and well managed. Minor amounts of chemicals on site were covered with tarpaulins. A moderate spill had occurred resulting in drilling mud entering the ring drain. The mud had not reached the skimmer pit. The skimmer pits were discoloured but not discharging. It was stated that the drilling mud will be cleaned up this week as operations are coming to a close. The target depth has been reached. The sewer system appeared to be operating without problem.

**9 February 2011**

Works have begun to get the site ready for drilling. The site has been enlarged. New ring drains have been formed. The skimmer pits are going to be enlarged. Two goose neck pipes have been installed between skimmer pits and two exit pipes have been installed on the second skimmer pit. Clinton Carré (Council Inspector) spoke with Ricky Taplin (Redback Contracting) regarding the bunding of chemicals/mud tanks. The entrance to the site will be reformed once all equipment is on site so that stormwater is directed to the ring drains. The site was dry at the time of inspection.

The following action is to be taken: Ensure that the spill contingency plan is updated to include the new site layout.

**15 February 2011**

The site was in a very clean and tidy state. The skimmer pits were empty and the ring drains dry. Most hazardous chemicals were contained within an earth bund. Good systems were in place at time of inspection. It was noted that a section of the ring drain was blocked with earth from the flare pit. This may cause flooding in a high rainfall event. It was noted that some hazardous substances were not bunded.

The following action was to be taken: Ensure that the ring drain is not blocked. Ensure that the 44 gallon diesel tanks are bunded. Ensure that all hazardous substances, if spilt, drain to a sump or other appropriate recovery system, and not to the ring drain.

**21 February 2011**

Skimmer pits and ring drains were dry. Sewage tanks and associated pipe work were not leaking. The section of ring drain near the flare pit had been unblocked. The flare pit had been reformed. A flare pipe for the second well had been installed. Chemical bunding on site looked good. A small sump had been dug in the bund that contains liquid chemicals. A discussion took place with Andy (HSE) regarding Halliburton's practices surrounding cleaning pipes and containment of any discharged product to land. It was discussed that all discharged product from Halliburton pipes should be contained and not enter the ring drain.

Discussed spill contingency plan with Andy (HSE). The Regional Council had concerns that containing a spill from containment point 4 (Piakau Stream) was not practical due to steepness of bank and another downstream containment point

should be sought. Carlos Kazianis (Operations Manager) to be contacted to discuss further.

The following action is to be taken: Ensure that all hazardous substances are banded.

### **28 February 2011**

The site was clean and tidy. Fuel drums and chemicals were banded. The skimmer pits were dry, as were most of the ring drains. No incidents had been reported over the past week. A pipe connecting the ring drain was partially blocked with soil but this was immediately unblocked when noticed during inspection. The site was being well managed.

### **8 March 2011**

The skimmer pits were near full and had been discharging due to the high volume of rain over the preceding few days. The quality of discharge from the second pond looked to have been poor with high silt and sediment content in the water. This would have made no difference to the quality of the stream as the streams were running high. The ponds were not discharging at time of inspection.

The pipe linking the ring drain at the entrance to the site did not appear to be working effectively and water was discharging over the drain. Dams had been placed inside the ring drain to direct water flow in the opposite direction until the pipe is fixed. During heavy rainfall the bunds filled up with water and a pipe was placed in the bank of one bund to release water. The flooding of bunds was creating a hazard for staff and compromising the quality of product. It was discussed that a raised flat area of the site may resolve the current problem of flooding.

The site was clean and tidy with all chemicals banded at time of inspection.

### **9 March 2011**

Taranaki Regional Council were advised of a diesel spill at the Sidewinder wellsite. A site visit was conducted and it was observed at that time that most of the diesel had been removed from the site. Sawdust had been placed on the ground to soak up any remaining fuel. The incident was reported to have occurred at approx 3am and was a result of negligence by the person operating the fuel pump. Ricky Taplin from Redback was called to suck some of the diesel from the ground. The sawdust was to be removed and the ground beneath it scraped. It was likely some diesel still remained underneath the fuel tank and nearby containers. Staff on site were advised to check the skimmer pits for hydrocarbons when it rains next. The diesel had not entered any ring drains and was contained within the area around the bulk fuel tank. It was stated by staff on site that a float switch may be installed to stop the day tank from overflowing, or the overflow pipe may be redirected back into the main bulk fuel tank.

### **25 March 2011**

The ring drains, skimmer pits and site in general were dry. Since the diesel spill incident the overflow from the day tank had been redirected back into the main tank. 4 spill kits had been purchased and placed around the site. A pipe linking the ring drain was blocked with metal at time of inspection. Staff were advised to clean away the metal as heavy rainfall was expected and flooding may occur if nothing

was done. This was actioned whilst the council Officer was still on site. No oil or chemical spills were observed.

Consent conditions were being complied with at time of inspection.

#### **28 March 2011**

Site inspection was conducted following heavy rain. Site was wet in places but mainly dry. Some water was contained within the ring drain. The first skimmer pit was 3/4 full but had discharged into the second pond at some point. No stormwater discharged from the site. The site is clean and tidy. A bund had been placed beside the BOP with a drain to the cellar to stop drilling mud from spreading. Dry chemicals were covered. Consent conditions are being complied with at time of inspection.

#### **6 April 2011**

Following a heavy period of rain an inspection found the site to be complying with all consent conditions. The ring drains were mostly dry. The first skimmer pit was full and had discharged into the second pit. No stormwater had discharged offsite. No hydrocarbons appeared to be present on the surface of the pits. No spills were observed and the site was tidy.

#### **15 April 2011**

During the site inspection it was observed that two incidents had occurred. The first involved a diesel spill onto the site. Following an investigation into the cause of the spill it was revealed that the water tank overflowed the previous night. It was assumed that diesel from the header tank which spilt approximately 4 weeks earlier had entered the water tank and remained there until the water tank overflowed. It was observed that both clear yellow diesel and an orange yellow mousse were observed on the ground in/around the water/fuel tank. The fuel had reached the ring drain.

The second incident involved cement being spilt onto the ground and into the ring drain. A significant amount of cement was spilt. It was believed that this was a result of washing down the cementing equipment. There was also evidence that the cement tanks may have overflowed to ground. Photos were taken.

The following action was to be taken: Ensure that all excess diesel and cement is soaked up and disposed off. Remove the top layer of affected ground from the site and scrape the ring drains to remove any contaminated soil. Ensure that the ring drains and skimmer pits are regularly monitored for hydrocarbons and discolouration.

#### **19 April 2011**

Following heavy rain the ring drains were wet with pools of stormwater in low areas. The first skimmer pit was full and the second pit three quarters full. It appeared that the pits were permeable as water seeped into the ground. The pits were very discoloured and appeared high in suspended solids. The area where the diesel spill occurred had been cleaned up with no signs of any diesel getting into the skimmer pits. Sawdust had been placed on the ground in the location where the drilling mud/cement washings discharged to ground and where access is difficult to remove. The site in general was clean and tidy. Consent conditions are being complied with.

**28 April 2011**

The ring drains were damp and contained stormwater in places. The skimmer pits had been discharging due to heavy rainfall. The first skimmer pit had been half emptied to mitigate any potential adverse effects on the environment. The second pit was not discharging at time of inspection but had been. The grassy area around the discharge point was covered in silt. It appeared that the stormwater soaked into the ground before travelling to the stream. The site was clean and tidy. Bunding had been put in the area where the diesel spill occurred two weeks ago as diesel was observed to be entering the ring drain. Consent conditions were being complied with at time of inspection.

**5 May 2011**

The site was clean and tidy. It was raining at the time of inspection and the ring drains were in use. No hydrocarbons appeared to be present in the ring drains. Both skimmer pits were full and discharging. It appeared that a hydrocarbon sheen was present on the surface of the second skimmer pit and was also discharging to land. One water sample was taken to check whether condition 8 of consent 7595-1 was being complied with. All systems, processes and procedures appeared to be working. One issue of concern that was raised with TAG Oil staff on site was whether the bulk fuel tank was double skinned. This was to be confirmed.

**10 May 2011**

Drilling has finished with most staff offsite. Works will commence to de-rig and move to the Cardiff (Cheal 3) wellsite tomorrow. Both skimmer pits were full; the ring drains contained clear stormwater. Consent conditions were being complied with at time of inspection.

**18 May 2011**

Meet on site with Ricky Taplin to discuss cleaning up the site post exploration drilling. The site was inspected. It was noted that the D tank had been removed and the surrounding area cleaned. The area where the mud tank/Halliburton truck were located had been cleaned, however the stormwater in the ring drain adjacent to this area was grey in colour. Hydrocarbons were observed discharging into the ring drain at the south west corner of the site. It was believed this is residual diesel from an earlier spill. The first skimmer pit had a hydrocarbon sheen on it.

Ricky Taplin stated he would scrape the area where the diesel was seen, clean out the ring drains and pump and clean out the first skimmer pit.

**15 June 2011**

Ring drains on site were mostly dry. The skimmer pits were not discharging at time of inspection and looked clear. Two unbanded pallets of KCL were located to the west of the site. They were immediately banded upon request. Flaring of gas was not taking place at time of inspection. Al Paterson (Tag Oil employee) advised that the wooden pallets were going to be removed from the flare pit.

**2.1.2 Results of abstraction and discharge monitoring****Discharge monitoring**

One observation of stormwater/contaminants discharging offsite was observed on 5 May 2011. Although not mentioned within the inspection report, the

stormwater/contaminant discharged onto land from the second skimmer pit and flowed in a southerly direction towards and into the Piakau Stream. A water sample was taken at the point where stormwater discharges to land from the second skimmer pit, in order to confirm whether condition 8 of consent 7595-1 was being complied with.

Table 1 below shows the concentration limits set by consent 7595-1 as well as the actual concentration of constituents sampled on 5 May 2011.

**Table 1** Concentration limits

| Constituents begin monitored | Conc. Limits of constituents | Sample results 5 May 2011 |
|------------------------------|------------------------------|---------------------------|
| pH                           | Within the range 6.0 to 9.0  | 7.2g/m <sup>3</sup>       |
| Chloride                     | Conc. <50mg <sup>3</sup>     | 75.9g/m <sup>3</sup>      |
| Hydrocarbons                 | Conc. <15gm <sup>3</sup>     | 2.2g/m <sup>3</sup>       |
| Suspended Solids             | Conc. <100gm <sup>3</sup>    | 160g/m <sup>3</sup>       |

The results show that the concentration of hydrocarbons and pH of the water discharging from the skimmer pit were within the limits set by condition 8 of consent 7595-1.

The results also show that the level of chloride and suspended solids in the water sample was higher than the concentrations permitted by condition 8 of consent 7595-1. Actions arising from this incident are discussed in Section 2.5.



**Photo 1** Water sample collected at the discharge point from the skimmer pits

**Abstraction monitoring**

As mentioned above, consent 7597-1 permitted TAG Oil (NZ) Limited to take and use water from the Piakau Stream. This consent was not exercised as it was found that water could not be pumped from the stream to the storage tank using conventional practices due to the height of the stream bank. Instead, water was abstracted from an unnamed tributary of the Piakau Stream, as permitted by rule 15 of the Regional Fresh Water Plan.

**2.1.3 Results of receiving environment monitoring**

All sewage generated on site was directed for treatment through a septic tank system and removed by contractor to a licensed facility. No leaks were observed in the pipe work and no overflow of sewage occurred from the septic tanks.

Cementing wastes were directed into the mud pits.

No biomonitoring was undertaken at the Sidewinder wellsite during the period September 2010 to May 2010, as it was believed they were not required. Based on the observations of visual inspections.

**2.2 Air****2.2.1 Inspections**

Air quality monitoring inspections were carried out in conjunction with general compliance monitoring inspections.

Flaring occurred at this wellsite during the period of monitoring.

**2.2.2 Results of discharge monitoring**

Flaring was carried out on site during the production testing phase of the Sidewinder wellsite. Notification of initial flaring from the Sidewinder 1 well was received by Taranaki Regional Council on 5 December 2010. Neighbours were also notified of TAG Oil (NZ) Limited's intentions to flare. Flaring occurred on 6 days for a total of 80.78 hours. No pilot flame was maintained between flaring operations.

At the time of writing, wells 2, 3, and 4 were being cleaned, perforated and tested to evaluate the likelihood of each well producing hydrocarbons. During this process condition 2 of Resource Consent 7596-1 was not complied with because Taranaki Regional Council did not receive notification of flaring from these wells. A letter of explanation was received and accepted. Notification of flaring was received on 8 June 2011, with further notification of flaring on 13 June 2011.

Assessments made by officers of the Council during site inspections included confirming the site layout, particularly the flare pit location, the provision of liquid separation equipment on the well head flow line, and the logging of any flaring or emission incidents.

From observations during site inspections it appeared that special conditions relating to the control of emissions to air from the flare were complied with.

Chemical monitoring was not taken during compliance monitoring inspections. No objectionable or offensive odours, smoke or dust were found during the inspections.

All other conditions attached to air discharge permit 7596-1 were complied with and no effects were observed. No complaints were received.

### **2.2.3 Other ambient monitoring**

No other ambient air sampling was undertaken, as the controls implemented by TAG Oil (NZ) Limited did not give rise to any concerns with regard to air quality.

## **2.3 Land**

### **2.3.1 Land status**

The well site was constructed on sloping land between two streams. Earthworks were required to construct the site, by removing top soil to create a flat level surface. Geotextile matting was laid to stabilise the site. The land has not been reinstated.

## **2.4 Contingency plan**

The Company has provided a general contingency plan with site specific maps which covers all onshore sites that they operate. The contingency plan has been reviewed and approved by officers of Taranaki Regional Council.

## **2.5 Register of incidents**

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.

Incidents may be alleged to be associated with a particular site. If there is 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 period under review, there were two recorded unauthorised incidents recorded by the Council that were associated with the Sidewinder wellsite. These and other incidents not recorded as UI's are discussed below.

### **8 March 2011 – Bunding of dry chemicals**

As a result of heavy rainfall on/about 8 March 2011, stormwater became trapped within the bund housing dry chemicals, causing product to flood. So that water could be released a section of the bund was removed. To prevent the bund from flooding again a drain pipe was inserted into the bund wall. A plate placed over the drain pipe was available in the event that spilt product needed to be contained.

### 9 March 2011 – Diesel spill

A self notification was received on 9 March 2011 from staff on the Sidewinder wellsite regarding spilt diesel. The incident happened whilst transferring diesel from a bulk storage fuel tank to a smaller tank that sits above both the bulk fuel and water tanks. It was reported that a lack of attention caused the spill.

The spill was contained on site and in accordance with special condition 1 of consent 7595-1 and section 2 of the Resource Management Act, all practicable steps were taken to prevent and minimise any adverse effect on the environment. This was achieved through cleaning up the spilt diesel, monitoring the ring drains and skimmer pits for hydrocarbons.



**Photo 2** The bulk fuel, water tank and smaller fuel tank above the water tank

### 15 April 2011 – Diesel spill

A compliance monitoring inspection on 15 April 2011 found further diesel was discharging from the area around the bulk fuel tank to the ring drain. It was determined that diesel had entered the open top water tank (which sits below the small diesel tank) during the 9 March 2011 incident. The water tank had overflowed spilling the diesel to ground. Once again all steps were taken to clean up the diesel and ensure it did not discharge off site.

No further diesel spills should occur when transferring diesel from the bulk storage tank to the smaller tank because the overflow pipe has been redirected back to the bulk storage, thereby creating a closed circuit.

No enforcement action was taken by the Council in regards to this matter.

### 15 April 2011 – Cement spill

Another incident involved cement from the Halliburton cement truck discharging to ground and into the ring drain. An investigation found that at the completion of

cementing a well the truck was washed down and all pipes/tanks flushed. As a result of this process a small volume of cement remaining within the pipes was discharged to ground.



**Photo 3** Location of Halliburton truck and surrounding area with cement on the ground

The spill was contained on site and in accordance with special condition 1 of consent 7595-1 and section 2 of the Resource Management Act, all practicable steps were taken to prevent and minimise any adverse effect on the environment. This was achieved through applying sawdust to the spilt cement and removing as much as practicable and removing cement from the ring drains.

#### **5 May 2011 – Constituents in stormwater**

On Thursday 5 May 2011, during routine monitoring, a physiochemical water sample from the skimmer pits was taken. Results showed that the concentration of chloride was 75.9g/m<sup>3</sup> and the concentration of suspended solids was 160g/m<sup>3</sup>, which was in contravention of special condition 8 of Resource Consent 7595-1.

A letter of explanation was received by Taranaki Regional Council on 31 May 2011. An investigation by TAG Oil found that two incidents had occurred on site that may have contributed to the increase in chlorides and suspended solids in the stormwater.

The first incident occurred on 30 April 2011 in which a mud spill was observed. The second incident occurred on 4 May 2011. This incident involved the transfer of potassium chloride to holding tanks via a 40m hose. Upon completion of the transfer the hose was disconnected. The remaining fluid within the hose was left to empty into the ring drain, which in turn made its way to the skimmer pits.

### 3. Discussion

#### 3.1 Discussion of plant performance

Of the four resource consents relating to the Sidewinder wellsite, only consents 7595-1 (stormwater) and 7596-1 (flaring) were actively monitored. No water was taken from the Piakau 1 Stream during the monitored period as permitted by consents 7597-1, and consent 7600-1 was not exercised as no groundwater was encountered during exploration operations.

TAG Oil (NZ) Limited provided TRC with the following plans and information in compliance with the consents:

- A spill contingency plan for accidental spillage or discharge of contaminants;
- Maximum stormwater catchment area;
- Advice of drilling mud's and fluids' components;
- Information about processes and procedures on site;
- Final site layout plan;
- Notification of the various stages of activity.

##### **Consent 7596-1 – Flaring discharge**

Most conditions of resource consent 7596-1 were complied with during the monitoring period. Special condition 3 (notification of flaring) was not complied with, however a letter of explanation was received and accepted.

##### **Consent 7595-1 – Stormwater discharge**

Most conditions of resource consent 7595-1 were complied with during the monitoring period. Special condition 7 and 8 were not complied with.

Special condition 7 states:

*“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.”*

TAG Oil and Ensign staff have put a lot of time and resources into containing any spills at their source and ensuring contaminants did not leave the site. Examples include placing bunds around chemicals and the mud tank, placing absorbent pads on the ground to stop the flow of contaminants, and pumping out the skimmer pits to stop contaminants discharging from site.

However, unfortunately the Halliburton cement truck and associated equipment was overlooked as a potential source of contaminant. The discharge of cement to the ring drain on 15 April 2011 was a direct result of bunding/sumps not being in place as required by condition 7. Following this incident on site procedures were discussed with TAG Oil and Halliburton staff in order ascertain how the spill occurred and how it could be prevented in the future.

Since these discussions a tank/sump has been purchased and will be used to contain cement discharged from the truck during the wash down/flushing process.

It has also been discussed that a bund should be placed around the truck to contain and direct any contaminants to the sump as shown in photos 5 and 6 below.



**Photo 4** Bunding/containment around the Halliburton cement truck

Special Condition 8 states:

*“Constituents in the discharge shall meet the standards shown in the following table.*

| <b>Constituent</b>                    | <b>Standard</b>   |
|---------------------------------------|---|
| <i>pH</i>                             | <i>Within the range 6.0 to 9.0</i>                        |
| <i>suspended solids</i>               | <i>Concentration not greater than 100 gm<sup>-3</sup></i> |
| <i>total recoverable hydrocarbons</i> | <i>Concentration not greater than 15 gm<sup>-3</sup></i>  |
| <i>chloride</i>                       | <i>Concentration not greater than 50 gm<sup>-3</sup></i>  |

*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.”*

The incident that occurred on 4 May 2011, involving the transfer of potassium chloride, appears to be the most likely cause of the increase in chlorides and suspended solids in the stormwater discharge. This spill appears to have been avoidable and is a direct result of human error. Following correct procedures and installing bunding around the mud tanks may have stopped this incident from occurring.

TAG Oil’s letter dated 31 May 2011 stated that an investigation into this incident revealed the need for both procedure amendments and new equipment requirements. The following procedures have implemented for the Sidewinder site.

- A bunding, with a mini sump, has been installed around the storage tanks, so any further spills are able to be contained and vacuumed.
- TAG Oil will have the drilling fluid engineer take physiochemical water samples from the skimmer pit every second day. This will be to ensure that special condition 8 of resource consent No.7595-1 is met prior to any discharge.
- If it is found the water in the skimmer pits does not comply with this condition, the water will be vacuumed and disposed of in a Taranaki Regional Council approved dump site.

### 3.2 Environmental effects of exercise of consents

TAG Oil (NZ) Limited provided the following plans and information in compliance with the consents:

Contingency plan for accidental spillage or discharge;  
 Advice of drilling mud's and fluid's components;  
 Final site layout plan;  
 Notification of the various stages of activity.

All staff co-operated and if any works were requested these were promptly carried out.

There were no abatement notices issued. Two Unauthorised Incidents (UI) were recorded by the Council in relation to the operations occurring at the Sidewinder wellsite.

All stormwater was directed to the skimmer pits. Additional bunding was constructed around the chemical storage area and other areas where there was a possibility of contaminants entering stormwater.

The nearest residence was approximately 750m away over sloping land. Bunding, earthworks and good site location around helped prevent any visual off site effects and noise problems for the neighbours.

No complaints were received during the exercise of these consents.

### 3.3 Evaluation of performance

A tabular summary of the Company's compliance record for the year under review is set out in Tables 2 and 3.

**Table 2** Summary of performance for Consent 7595-1 - to discharge treated stormwater and treated production water from hydrocarbon exploration and production operations at the Sidewinder - 1 wellsite onto and into land in the vicinity of the Piakau Stream

| Condition requirement                  | Means of monitoring during period under review | Compliance achieved? |
|--|--|----------------------|
| 1. Best practicable options            | Undertaken                                     | Yes                  |
| 2. Stormwater catchment area           | Site constructed as planned                    | Yes                  |
| 3. Notification, commencement of works | Received                                       | Yes                  |
| 4. Contingency planning                | Received                                       | Yes                  |
| 5. Design and maintenance              | In accordance with information submitted       | Yes                  |
| 6. Stormwater discharge treated        | Treatment system installed                     | Yes                  |
| 7. Hazardous storage area              | Containers double skinned, banded to sumps     | No                   |
| 8. Concentration limits                | Water samples taken to confirm                 | No                   |

| Condition requirement   | Means of monitoring during period under review | Compliance achieved? |
|---|--|----------------------|
| 9. Temp. increase of stream   | Record stream temperature                      | Yes                  |
| 10. Effects in receiving water  | Inspect stream for effects                     | Yes                  |
| 11. Site reinstatement  | Notification given                             | N/A                  |
| 12. Consent lapse   | Consent is or is not given effect              | N/A                  |
| Overall assessment of consent compliance and environmental performance in respect of this consent |  | <b>Good</b>          |

N/A = not applicable

**Table 3** Summary of performance for Consent 7596-1 - to discharge emissions to air from flaring of the hydrocarbons associated with well clean up and well testing associated with exploitation activities at the Sidewinder wellsite

| Condition requirement  | Means of monitoring during period under review | Compliance achieved? |
|--|--|----------------------|
| 1. Flaring not to occur more than 15 days per zone           | Inspections of records                         | Yes                  |
| 2. Notify Council prior to flaring                           | Notification received                          | No                   |
| 3. Notify residents prior to flaring                         | Residents notified                             | Yes                  |
| 4. No alteration to plant equipment or processes             | No alteration                                  | Yes                  |
| 5. Regard for prevailing or predicted wind                   | Inspections of records and site                | Yes                  |
| 6. Liquid and solid separation and recovery                  | Inspections of records                         | Yes                  |
| 7. Separation failure  | N/A  | N/A                  |
| 8. No liquid or solid hydrocarbon to be flared               | Inspections of site and records                | Yes                  |
| 9. Minimise smoke emissions                                  | Inspections of site and records                | Yes                  |
| 10. Adopt best practicable option                            | Inspections of site                            | Yes                  |
| 11. Only treated substances from well stream to be combusted | inspections of site and records                | Yes                  |
| 12. No offensive smoke or odour beyond boundary              | Inspections of site and records                | Yes                  |
| 13. Smoke emissions not to exceed 1 on Ringelmann scale      | Inspections of records                         | N/A                  |
| 14. Control all emissions of carbon monoxide                 | Inspections of records                         | N/A                  |
| 15. Control all emissions of nitrogen oxides                 | Inspections of records                         | N/A                  |

| Condition requirement   | Means of monitoring during period under review | Compliance achieved? |
|---|--|----------------------|
| 16. No toxic emissions at or beyond the boundary  | Inspections of records                         | N/A                  |
| 17. Analysis of typical gas and condensate from field   | Inspections of records                         | N/A                  |
| 18. Record of smoke emissions   | Inspections of records                         | N/A                  |
| 19. Log of all flaring  | Inspection of records                          | N/A                  |
| 20. Consent lapse   | N/A  | N/A                  |
| 21. Review, amend, delete or add  | N/A  | N/A                  |
| Overall assessment of consent compliance and environmental performance in respect of this consent |  | Good                 |

During the period, TAG Oil (NZ) Limited demonstrated a good level of environmental performance, although compliance with the resource consents needs to be improved.

During the period under review there was one recorded unauthorised spill/discharge to a surface water body. All Taranaki Regional Council requirements were adhered to swiftly and without question. The site was neat, tidy, and well maintained. Staff on site were cooperative with requests made by officers of TRC, and any required works were carried out quickly and to a satisfactory standard.

### 3.4 Exercise of optional review of consent

Condition 13 of consent 7595-1, condition 21 of consent 7596-1, and condition 6 of consents 7597-1 and 7600-1 allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the 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.

Based on the results of monitoring during the period under review it is considered that there are no grounds that require a review to be pursued.

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

## 4. Recommendations

1. THAT this report be forwarded to TAG Oil (NZ) Limited, and to any interested parties upon request.
2. THAT TAG Oil (NZ) Limited be asked to inform the Council of the intention to either drill, test or undertake reinstatement.
3. THAT the current level of monitoring during exploratory drilling be continued for all similar operations.
4. THAT TAG Oil (NZ) Limited take steps to ensure that ALL hazardous substances are stored in double skinned containers or directed to sumps and not to the ring drain, to ensure compliance with conditions 7 and 8 of consent 7595-1.

## Glossary of common terms and abbreviations

The following abbreviations and terms may have been 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   |
| BOP              | blow out preventer   |
| 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   |
| 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 <sup>3</sup> | grammes per cubic metre, and equivalent to milligrammes per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures                                      |
| 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 <sub>4</sub>  | ammonium, normally expressed in terms of the mass of nitrogen (N)  |

|                  |   |
|------------------|---|
| NH <sub>3</sub>  | unionised ammonia, normally expressed in terms of the mass of nitrogen (N)  |
| NO <sub>3</sub>  | 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 <sub>10</sub> | 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 subsequent amendments  |
| SS               | suspended solids,   |
| 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



**Appendix I**  
**Resource consents held by**  
**TAG Oil Ltd**  
**Sidewinder Wellsite**





**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: TAG Oil (NZ) Limited  
P O Box 262  
STRATFORD 4352

Decision Date [Change]: 14 January 2011

Commencement Date [Change]: 14 January 2011 [Granted: 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 onto and into land in the vicinity of Piakau Stream 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

Tributary: Waitara  
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 [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 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](mailto: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 submitted in support of the consent application [application 6415], in particular, section 8.1 of the Assessment of Environmental Effects.
6. All stormwater and produced water shall be directed for treatment through the stormwater treatment system identified in condition 5 before being discharged.
7. 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.

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 <sup>-3</sup> |
| total recoverable hydrocarbons | Concentration not greater than 15 gm <sup>-3</sup>  |
| chloride                       | Concentration not greater than 50 gm <sup>-3</sup>  |

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.

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](mailto:worknotification@trc.govt.nz).
12. 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.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 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 14 January 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: TAG Oil (NZ) Limited  
P O Box 262  
STRATFORD 4352

Decision Date  
[Change]: 4 February 2011



Commencement  
Date [Change]: 4 February 2011 [Granted: 11 February 2010]

**Conditions of Consent**

Consent Granted: To discharge emissions to air from flaring of the hydrocarbons associated with well clean-up and well testing associated with exploration activities at the Sidewinder wellsite 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]

*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. Flaring shall not occur on more than 15 days, cumulatively, per zone for each well [with a limit of 1 zone per well], for up to four wells.

#### Information and notification

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 24 hours before the initial flaring of each zone being commenced. Notification shall include the consent number and a brief description of the activity consented and be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
3. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to all residents within 1000 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.
4. No alteration shall be made to plant equipment or processes which may substantially alter the nature or quantity of flare emissions or other wellsite emissions, including but not limited to the recovery of produced gas, other than as authorised by this consent, without prior consultation with the Chief Executive, Taranaki Regional Council.

#### Flaring

5. Other than for the maintenance of a pilot flare flame, the consent holder shall have regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects.
6. All gas that is flared during well clean-up, drill stem testing, initial testing, well workovers, or production testing, or at any other time, must first be treated by effective liquid and solid separation and recovery, to ensure that smoke emission during flaring is minimised.
7. If separation required by condition 6 cannot be implemented or maintained at any time while there is a flow from the well, whether natural or induced, then the consent holder shall immediately advise the Taranaki Regional Council by phoning the Council and advising the Compliance Manager, or his delegate; and shall in any case re-establish liquid separation and recovery within three hours.

At the grant date of this consent, the Council's phone number is 0800 736 222 [24 hr service].

8. Subject to special condition 7, no liquid or solid hydrocarbons shall be combusted through the gas flare system.
9. The gas shall be combusted so that emissions of smoke are minimised.
10. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare or any other emissions to air from the Beluga-1 wellsite [including use of a separator during well clean-up].
11. Only substances originating from the well stream and treated as required by conditions 6, 7, 8, 9, and 10 shall be combusted within the flare pit.
12. 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.
13. The opacity of any smoke emissions shall not exceed a level of 1, as measured on the Ringelmann Scale, for more than 4 minutes cumulative duration in any 60 minute period.
14. 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 [ $\text{mg}/\text{m}^3$ ] [eight-hour average exposure], or 30  $\text{mg}/\text{m}^3$  one-hour average exposure] at or beyond the boundary of the property where the wellsite is located.
15. 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 property where the wellsite is located.
16. 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 1/30<sup>th</sup> 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].

### Recording and reporting Information


17. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C<sub>8</sub> or higher number of compounds.
18. Each time there is visible smoke as a result of the exercise of this consent, the consent holder shall record the time, duration and cause. The consent holder shall make the record available to the Chief Executive, Taranaki Regional Council, upon request.
19. The consent holder shall record and make available to the Chief Executive, Taranaki Regional Council, logs of all flaring, including time, duration, zone, and volumes of substances flared.

### Lapse and Review

20. 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.
21. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for any of the following purposes:
  - a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; 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.

Signed at Stratford on 4 February 2011

For and on behalf of  
Taranaki Regional Council

  
\_\_\_\_\_  
Director Resource Management