

BTW Company Limited
Brown Road Landfarm
Monitoring Programme
Annual Report
2009-2010
Technical Report 2010–59

ISSN: 0114-8184 (Print)
ISSN:1178-1467 (Online)
Document: 778400

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November 2010

Executive summary

BTW Company Limited operate a drilling waste landfarm located on Brown Road at Waitara, in the Waiongana catchment. The Company holds a resource consent to allow it to discharge drilling cuttings, muds and fluids onto and into land via landfarming. This report for the period July 2009-June 2010 describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

The Company holds 1 resource consent, which includes a total of 29 conditions setting out the requirements that the Company must satisfy. The consent was changed on 4 February 2010 resulting in a reduction to 25 conditions. This consent allows the Company to discharge contaminants onto and into land.

The Council's monitoring programme for the year under review included 4 inspections, collection of four soil samples and a review of monitoring data received from the Company.

The monitoring indicated that there appears to be no adverse environmental effects due to activities at the site. Concentrations of contaminants in the surface soil meet the required consent conditions, with the exception of hydrocarbons for recent disposals. Further monitoring of the site will ensure that any consent limits exceeded, are complied with prior to surrender.

During the year, the Company demonstrated an overall high level of environmental performance and compliance with the resource consent. There were no incidents recorded by the Council that were associated with consented activities at the site.

This report includes recommendations for the 2010-2011 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is the Annual Report for the period July 2009-June 2010 by the Taranaki Regional Council describing the monitoring programme associated with the resource consent held by BTW Company Limited [BTW], to operate a drilling waste landfarm situated on Brown Road at Waitara.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consent held by BTW that relates to the discharge of drilling waste in the Waiongana catchment. This is the fourth Annual Report to be prepared by the Taranaki Regional Council to cover the Company's discharges and their effects.

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 consent held by BTW, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted at the Company's site.

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 in the 2010-2011 monitoring year.

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

1.1.3 The Resource Management Act (1991) and monitoring

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

- (a) the neighbourhood or the wider community around a discharger, and may include cultural and 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 (eg, recreational, cultural, or aesthetic);

(e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Taranaki Regional Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the Resource Management Act to assess the effects of the exercise of consents. In accordance with section 35 of the Resource Management Act 1991, the Council undertakes compliance monitoring for consents and rules in regional plans; and maintains an overview of 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 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 against the consent holder 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

The Brown Road Landfarm is located on Brown Road, Waitara on the property of Papawai Holdings Limited (Figure 1).



Figure 1 Aerial photograph showing the location of Brown Road Landfarm

The land farming operation is being used to assist the conversion of unstable shifting sands to productive pasture. Landfarming is a technology that uses natural and assisted bioremediation to reduce the concentration of petroleum compounds through degradation.

Waste drilling material is produced during well drilling for hydrocarbon exploration. Drilling fluids transport cuttings from the drill bit to the well surface for disposal; control in-well pressures; support the sides of the hole and prevent the ingress of formation fluids; and lubricate and cool the drill bit and drill pipe in the hole.

Cuttings are produced as the drill bit penetrates the underlying geological formations. They are brought to the surface in the drilling fluid where they pass over a shaker screen that separates the cuttings and drilling fluids. The drilling fluids are recycled for reuse within the drilling process, but small quantities of drilling fluids

remain adhered to the cuttings. The cuttings and smaller particle material from the drill fluid treatment units drain into sumps. If sumps cannot be constructed corrals or special bins are used. During drilling this material is the only continuous discharge. Drilling fluids may be intentionally discharged in bulk, for changes to the drilling fluid programme.

Oil and gas wells may be drilled with either synthetic based mud (SBM) or water based mud (WBM). More than one type may be used to drill an individual well. In the past, oil based muds (diesel/crude oil based) have also been used. Their use has declined since the 1980s due to their ecotoxicity, they have been replaced by SBM. Barium sulphate is added to most drilling muds as a wetting and weighting agent.

Oily wastes generated from hydrocarbon exploration and production activities generally consist of: sludge and wax removed from tanks and separators; slops oil from wellhead cellars; oily formation sand; and contaminated ground material from leaks and spills.

The landfarming process has typically been used in the Taranaki region to assist the conversion of sandy coastal sites prone to erosion into productive pasture. Landfarming uses natural and assisted bioremediation to reduce the concentration of petroleum compounds through degradation. Basic steps in the landfarming process:

1. Drilling waste is transported from wellsites by truck (cuttings) or tanker (liquids). It may be discharged directly to land or placed in a dedicated storage pit.
2. The required area is prepared by scraping back and stockpiling existing pasture/topsoil and leveling out uneven ground.
3. Waste is transferred to the prepared area by excavator and truck and spread out with a bulldozer. Liquids may be discharged by tanker or a spray system.
4. Waste is allowed to dry sufficiently before being tilled into the soil to the required depth with a tractor and discs.
5. The disposal area is leveled with chains or harrows.
6. Stockpiled or brought in topsoil/clay is applied to aid stability and assist in grass establishment.

Fertiliser may be applied and the area is sown in crop or pasture at a suitable time of year.

Consent 6867-1 allows for the disposal of both WBM and SBM. Oily wastes were added in the changes to the consent on 4 February 2010.

When disposal is complete, the area will continue to be used for grazing following stabilisation and re-grassing.

1.3 Resource consents

1.3.1 Discharges of wastes to land

Sections 15(1)(b) and (d) of the Resource Management Act stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is

expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

BTW holds discharge permit **6867-1** to cover the discharge of drilling cuttings, muds and fluids from hydrocarbon exploration drilling operations with water based muds, and drilling cuttings from hydrocarbon exploration drilling operations with synthetic based muds, onto and into land via land farming. This permit was issued by the Taranaki Regional Council on 27 April 2006 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2020.

Conditions 1 and 2 relate to exercise of the consent in accordance with the application documentation and best practicable option.

Condition 3 requires the provision of a management plan to be reviewed annually.

Conditions 4 to 6 relate to notification and analysis requirements.

Conditions 7 and 8 relate to record keeping and reporting.

Conditions 9 to 17 state the discharge limits.

Conditions 18 to 26 state the receiving environment limits.

Conditions 27 to 29 relate to archaeological remains and lapse and review provisions.

The permit is attached to this report in Appendix I.

Discharge permit **6867-1** was varied on 4 February 2010 to include the following changes:

- allow mixing of different waste types,
- remove the chloride and nitrogen loading limits and consequently reduce the maximum application thickness from 150 mm to 100 mm,
- reduce the buffer distance to the Tasman sea from 100 m to 50 m,
- increase the maximum stockpiled volume from 2,000 m³ to 6,000 m³, and
- allow for the disposal of oily wastes,
- so that the consent purpose is now - To discharge drilling wastes [consisting of drilling cuttings and drilling fluids] from hydrocarbon exploration activities with water based muds and synthetic based muds, and oily wastes from hydrocarbon exploration and production activities, onto and into land via landfarming.

Condition 1 sets out definitions.

Condition 2 concerns adoption of the best practicable option.

Condition 3 requires a management plan.

Conditions 4 and 5 relate to notification and sampling requirements prior to discharge.

Conditions 6 and 7 relate to monitoring and reporting.

Conditions 8 to 14 specify discharge limits.

Conditions 15 to 23 specify receiving environment limits.

Conditions 24 and 25 concern archaeological remains and consent review.

The permit is attached to this report in Appendix I.

1.4 Monitoring programme

1.4.1 Introduction

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

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

The monitoring programme for the Brown Road Landfarm consisted of four primary components.

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

The Brown Road Landfarm was inspected four times during the monitoring period. The main points of interest were the land disposal processes and its effect upon soil quality and pasture establishment, together with potential or actual discharges of contaminated stormwater to receiving water courses. The immediate area was surveyed for environmental effects.

1.4.4 Chemical sampling

The Council collected four composite soil samples from disposal areas at the site. These were analysed for chloride, conductivity, hydrocarbons, sodium and total soluble salts.

1.4.5 Review of analytical results

The Council reviewed soil sampling results and the annual report provided by the Company.



Photograph 1 Waitui-1 SBM pit

2. Results

2.1 Inspections

2 November 2009

Previous cells containing muds had been re-contoured and material looked to be incorporated well, pasture was yet to be sown. New cells had been dug, there were two WBM and two SBM cells for Mangahewa 3, and two WBM cells for KA8/12/15. The SBM cell for Mangahewa 3 had a small volume of hydrocarbon on the surface, the pit was quite full with approximately 30 cm freeboard. Should the cell overflow it would have been unlikely to reach any water body. The drain to the west of the cells was inspected and appeared to be alright. All 200L drums at the site were secure, all had lids in place. General housekeeping was satisfactory.

11 December 2009

All pits looked good, no new ones appeared to have been dug since the last inspection. A small volume of windblown surface oil was present on the Mangahewa 3 SBM pit, with approximately 30 cm of freeboard at the lowest point. There was no evidence of overflow found. A WBM unloading operation was occurring during the inspection, all muds were found to be directed into a holding pit. All 200L drums were found to be stored on their sides with lids in place. The pasture area in the paddock opposite was developing very well. General housekeeping at the site was excellent. Drains to the west of the site were inspected, no detrimental effects from the site activities were found.

7 January 2010

An inspection was undertaken during a spreading operation. It was outlined by the spreading operator that; after the topsoil was scraped away the liquid portion of the mud was applied first using a spray tanker, the rest of the mud was then applied using a trailer. The mud was then blended and contoured before having the top soil relayed. To improve the soil of the exposed area, clay was being used from an excavated pile in an adjacent paddock. The lower part of the soil profile was comprised mainly of sand and it was thought that using the clay would encourage pasture growth. It was also outlined that salt resistant seeds were being used to avoid patchy growth. The area to the north of the pits where the mud was being applied was approximately 1.5 m above the iron pan, the area to the south of the pits was only approximately 0.3 m above the iron pan. It was likely that sand would be brought into the area to increase the soil profile if spreading was to occur. Two SBM pits had been emptied onto the paddocks and were awaiting blending, all other pits looked good. Two trailer loads of mud were delivered to the site during the inspection, all muds were directed to a holding pit. Fertiliser was being added to the area previously blended and the pasture looked healthy. The drain to the west of the holding pits was inspected and essentially dry, no evidence of effects from the site activities was found. General management of the site activities was excellent.

27 April 2010

No odours were found to extend beyond the boundary. All pits were quite full, some signage had faded/was incomplete (McKee), Waitui 1 and McKee pits had been dug through at the far ends, so that effectively SBM from all pits had mixed to some degree. There was some surface sheen and oil on the ponded water within the pits. Pasture growth in the most recent application area appeared very healthy as did the

earlier application areas. No effects from the site activities were found in the drain nearby.



Photograph 2 B4 and B10 areas, view south to mountain

2.2 Results of discharge monitoring

BTW provided pre-disposal sampling results for wastes received at the site during the monitoring period. These results are included in Appendix III. Compliance with limits specified in the consent is summarised in Table 1 for wastes which were landfarmed.

Table 1 Summary of discharge compliance

Area ref	Waste description	Date farmed	Volume (m ³)	Area (m ²)	Application depth (mm)	TPH (mg/kg)	Chloride loading (kg/ha)	Nitrogen loading (kg/ha)
	<i>Consent limits</i>				150 (100) 50	<50,000 >50,000	800	200
B5	Mangahewa D SBM	8 Sep - 10 Dec 2009	1,208.4	15,036	120	38,000	951	1,675
	Mangahewa D WBM		599			27,000		
	Mangahewa D WBM fluids		239.5		-			
B6a B6b	Mangahewa C WBM	11 Oct - 19 Oct 2009	913.5	6,378	143	220	2,489	1,629
B7	KA 6/11 WBM	2 Sep - 15 Sep 2009	57	517	110	85	34	866
B8	Mystone A WBM	8 Sep - 10 Dec 2009	32	409	78	<60	16	196
B9	KA 8/12/15 WBM	8 Sep - 10 Dec 2009	85	577	147	<60	46	1,288
B10	Mangahewa C SBM	19 Oct - 22 Dec 2009	1,251	12,210	102	42,000	498	1,477
B11	Waitui 1 WBM	8 Jan - 22 Feb 2010	839.5	5,657	148	240	631	631

Bold type indicates non-compliance

Note: on 4 February 2010 chloride and nitrogen loading limits were removed from the consent and the maximum application depth was reduced to 100mm

All disposal areas complied with the limit on waste application thickness. Landfarming of the B11 area was already underway when the limit was reduced. Both the chloride and nitrogen loading criteria were exceeded in the B5, and B6a/B6b areas. The B5 loadings do not include the WBM fluids, as no separate analysis was provided. It is expected that they would have raised the chloride loading in particular, as WBM fluids typically have a high chloride concentration. The nitrogen loading limit was also exceeded in B7, B9 and B10.

Previous monitoring at landfarming sites has shown that loading limits are seldom complied with. In coastal locations, adverse effects on groundwater due to leaching of chloride and nitrogen are expected to be minimal. The Council allowed landfarm operators at such sites to vary their consent conditions, but has implemented a programme of biological soil monitoring to determine the effects of high loadings (particularly chloride) on soil health.

2.3 Results of receiving environment monitoring

On 20 April 2010 four composite soil samples were collected by sub-sampling to a depth of 250mm at 10-15m intervals (dependant on the length of the transect) along transects between the centroids of certain disposal areas. The results are presented in Table 2.

Table 2 Results of Council sampling on 20 April 2010

Disposal Area	Chloride (mg/kg DW)	Conductivity (mS/m)	Hydrocarbons (mg/kg DW)	Sodium (mg/kg)	Total soluble salts (g/m ³)
<i>Consent limits</i>	700*	400	4,178*	460*	2,500*
B11 Waitui-1 WBM	53.2	48.4	140	61.3	379
B10 Mangahewa-C SBM	201	145	10,400	97.2	1135
B6a,B7,B8,B9 WBM	16.2	26.9	23	16.2	210
B5 Mangahewa-D SBM	190	147	2,700	166	1150

* limits applies prior to surrender

The only limit which has been exceeded is the hydrocarbon surrender criteria for the B10 Mangahewa C SBM disposal area.

BTW carried out an extensive programme of receiving environment monitoring and these results are included in Appendix VI. The Kowhai wellsite drilling wastes were landfarmed between October 2006 and January 2007 by Swift Energy NZ Ltd. There had been no further landfarming at the site until the 2009-2010 year. BTW's monitoring indicates that many of the recent disposals have hydrocarbon concentrations in the soil which exceed the surrender limits, this is not unexpected. It is noted that some parameters specified in the consent have not been tested for. These include conductivity, sodium, sodium absorption ratio, soluble salts and barium. There is no consent condition relating to barium, but it is a contaminant of concern. The Canadian Environmental Quality Guideline interim soil quality criteria for agricultural land use of 750 mg/kg, is considered the most appropriate reference.

Table 3 shows the level of compliance with the analytical consent limits, for the Kowhai disposal areas at the end of the 2009-2010 monitoring period.

The results listed are the most recent for each parameter, given that concentrations in the soil will typically reduce over time.

Table 3 Compliance of Kowhai disposal areas to end 2009-2010

Parameter	Consent condition	Consent limit	Area and mud type			
			B1	B2	B3	B4
			WBM	SBM	WBM	SBM
Total Recoverable Metals	15					
Arsenic		20	2.9	<2	<2	2.4
Cadmium		3	<0.10	<0.10	<0.10	<0.10
Chromium		600	15	16	13	19
Copper		140	22	26	20	26
Mercury		1	<0.10	<0.10	<0.10	<0.10
Nickel		35	4.7	6.6	2.6	3.4
Lead		300	9.9	8.5	7.3	8.2
Zinc		300	87	120	86	120
Conductivity (mS/cm)	16	4	0.23	0.14	<0.02	<0.02
Sodium Absorption Ratio (SAR)	17	18	0.4	0.5	0.3	0.5
*Total Petroleum Hydrocarbons	22					
C7-C9		120	<8.4	<8.0	<8.0	<8.1
C10-C14		58	<20	1,500	<20	2,500
C15-C36		4000	<30	4,800	33	8,400
TPH	10	50,000 (5%)	<60	6,300	<60	11,000
*BTEX	22					
Benzene		1.1	<0.050	<0.050	<0.050	<0.050
Toluene		68	<0.050	<0.050	<0.050	<0.050
Ethylbenzene		53	<0.050	<0.050	<0.050	<0.050
o-xylene		48	<0.10	<0.10	<0.10	<0.10
m & p-xylene		48	<0.050	<0.050	<0.050	<0.050
*PAH	22					
Benzo[a]pyrene (BAP)		0.027	<0.028	<0.024	<0.024	<0.027
Napthalene		7.2	<0.14	<0.12	<0.12	<0.14
Pyrene		160	<0.028	<0.024	<0.024	<0.027
*Chloride	23	700	7.3	18	10	350
*Conductivity (mS/cm)	23	2.9	0.23	0.14	<0.02	<0.02
*Soluble Salts (g/100g dry wt)	23	0.25	0.08	0.05	<0.05	<0.05
*Sodium	23	460	-	-	-	-
Barium (guideline)	N/A	750	178	1400	655	2500

* prior to expiry/surrender

Units mg/kg dry wt unless stated otherwise

Exceedances shown in bold type

Further degradation of hydrocarbons is needed for the SBM areas B2 and B4 to achieve compliance with the consent surrender limits. Also, barium concentrations in these areas exceed the guideline. No sodium analysis has been provided.

2.4 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 2009-2010 year, there were no incidents recorded by the Council that were associated with the Brown Road Landfarm.

3. Discussion

3.1 Discussion of plant performance

Inspections found that housekeeping and management of the site was excellent. The Company notified the Council of site operations, provided an updated site management plan, and carried out monitoring and annual reporting for the monitoring period. Some important items to note with changes to the consent in February 2010 are:

- Concerning the mixing of different waste types. That systems are in place, to collect the data necessary to calculate mass loadings of contaminants in landfarmed areas, this relies on adequate pre-disposal waste sampling and waste densities to convert volumes landfarmed to weights landfarmed.
- Though the chloride and nitrogen loading limits were removed, analysis for chlorides and nitrogen in the wastes is still required by the consent, to allow investigation of effects on soil quality.

3.2 Environmental effects of exercise of consents

Monitoring indicates that there appears to be no adverse environmental effects due to activities at the site. Levels of contaminants in the surface soil meet the required consent conditions, with the exception of hydrocarbons for recent disposals. Further monitoring of the site will ensure that any consent limits exceeded are complied with prior to surrender.

It is noted that there is no fresh surface water in the immediate vicinity that is likely to be affected by activities at the site. Due to the sites close proximity to the Tasman Sea no sampling of groundwater was carried out to assess effects.

3.3 Evaluation of performance

A tabular summary of the Company's compliance record for the year under review is set out in Tables 4 and 5.

Table 4 Summary of performance for Consent 6867-1 to 4 February 2010. To cover the discharge of drilling cuttings, muds and fluids from hydrocarbon exploration drilling operations with water based muds, and drilling cuttings from hydrocarbon exploration drilling operations with synthetic based muds, onto and into land via land farming

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application documentation	Inspections and liaison with consent holder	Yes
2. Best practicable option to be adopted	Inspections and liaison with consent holder	Yes
3. Current management plan in place	Provision of management plan	Yes
4. Notification at least 48 hours prior to transfer of waste to disposal site	Notifications received	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Notification at least 12 hours prior to discharging stockpiled material onto or into land	Notifications received	Yes
6. Provide chemical analysis of waste prior to disposal, for hydrocarbon content greater than or equal to 5%	Analysis received	Yes
7. Keep records relating to wastes, areas, compositions, volumes, dates, treatments and monitoring	Company records	Yes
8. Report on records in condition 7 to Council by 31 July	Provision of report	Yes
9. Keep areas for stockpiling and disposal of water based drilling wastes separate from synthetic mud based drilling waste. Keep stockpile and disposal areas for individual wells separate	Company records and inspection	Yes
10. Discharge depth limited to 150mm for waste with hydrocarbons < 5%, or 50mm for waste with hydrocarbons > 5%	Company records and inspection	Yes
11. Incorporation into soil as soon as practicable so that top 250mm layer contains less than 5% hydrocarbons	Inspection and sampling	Yes
12. Cover with topsoil and revegetate as soon as practicable	Company records and inspection	Yes
13. No discharge within 25m of a water body, property boundary or within 100m of the Tasman Sea	Inspection	Yes
14. Consent applies only to wastes generated in Taranaki	Company records	Yes
15. Maximum volume of stockpiling 2000m ³ . discharge within two months of arrival on site	Company records and inspection	Yes
16. Maximum rate of chloride application shall not exceed 800 kgCl/ha/yr	Company records	No 2 breaches
17. Maximum rate of nitrogen application shall not exceed 50 kgN/ha/yr up to a limit of 200 kgN/ha/yr	Company records	No 5 breaches
18. Levels of metals in soil must comply with Ministry of Health guidelines	Sampling	Yes
19. Conductivity must be less than 400 mS/m. If background conductivity exceeds 400 mS/m, then increase shall not exceed 100 mS/m	Sampling - not completed	No

Condition requirement	Means of monitoring during period under review	Compliance achieved?
20. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Sampling - not completed	No
21. Total dissolved salts in surface water or groundwater shall not exceed 2500 g/m ³	No fresh surface water in vicinity, groundwater not analysed	N/A
22. Disposal of waste shall not lead to contaminants entering surface water	No fresh surface water in vicinity	N/A
23. No adverse impacts on groundwater of surface water	No fresh surface water in vicinity, groundwater not assessed	N/A
24. No adverse effects on surface water	No fresh surface water in vicinity	N/A
25. Prior to expiry, cancellation, or surrender of consent soil hydrocarbon content must comply with MfE guidelines	Sampling prior to surrender	N/A
26. Prior to expiry, cancellation, or surrender of consent these levels must not be exceeded: a) conductivity, 290 mS/m b) dissolved salts, 2500 g/m ³ c) sodium, 460 g/m ³ d) chloride, 700 g/m ³	Sampling prior to surrender	N/A
27. Notification of discovery of archaeological remains	None found	N/A
28. Consent lapses after 5 years unless exercised	Consent exercised	N/A
29. Optional review provision re environmental effects	Next optional review in June 2014	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good

Table 5 Summary of performance for Consent 6867-1, from 4 February 2010. To discharge drilling wastes [consisting of drilling cuttings and drilling fluids] from hydrocarbon exploration activities with water based muds and synthetic based muds, and oily wastes from hydrocarbon exploration and production activities, onto and into land via landfarming

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Definitions which apply to the consent	Not applicable	N/A
2. Best practicable option to be adopted	Inspections and liaison with consent holder	Yes
3. Current management plan in place	Current plan approved 25 March 2010	Yes
4. Notification 48 hours prior stockpiling	Notifications received	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Notification 48 hours prior landfarming	Notifications received	Yes
6. Keep records relating to wastes, areas, compositions, volumes, dates, treatments and monitoring	Company records	Yes
7. Report on records in condition 6 to Council by 31 August	Report received 2 September 2010	Yes
8. Discharge depth limited to 100mm for waste with hydrocarbons < 5%, or 50mm for waste with hydrocarbons > 5%	Company records and inspection	Yes
9. Single application of wastes to each area of land	Company records and inspection	Yes
10. Incorporation into soil as soon as practicable so that top 250mm layer contains less than 5% hydrocarbons	Inspection and sampling	Yes
11. Re-vegetate landfarmed areas as soon as practicable	Company records and inspection	Yes
12. No discharge within 25m of a water body, property boundary or within 50m of the Tasman Sea	Inspection	Yes
13. Consent applies only to wastes generated in Taranaki	Company records	Yes
14. Maximum volume of stockpiling 6000m ³ . discharge within eight months of arrival on site	Company records and inspection	Yes
15. Levels of metals in soil shall comply with guidelines	Sampling	Yes
16. Conductivity must be less than 400 mS/m. If background conductivity exceeds 400 mS/m, then increase shall not exceed 100 mS/m	Sampling - not completed	No
17. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Sampling - not completed	No
18. Total dissolved salts in surface water or groundwater shall not exceed 2500 g/m ³	No fresh surface water in vicinity, groundwater not analysed	N/A
19. Disposal of waste shall not lead to contaminants entering surface water	No fresh surface water in vicinity	N/A
20. No adverse impacts on groundwater of surface water	No fresh surface water in vicinity, groundwater not assessed	N/A
21. No adverse effects on surface water	No fresh surface water in vicinity	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
22. Prior to expiry, cancellation, or surrender of consent soil hydrocarbon content must comply with MfE guidelines	Sampling prior to surrender	N/A
23. Prior to expiry, cancellation, or surrender of consent these levels must not be exceeded: a) conductivity 290 mS/m b) dissolved salts 2500 g/m ³ c) sodium 460 mg/kg d) chloride 700 mg/kg	Sampling prior to surrender	N/A
24. Notification of discovery of archaeological remains	None found	N/A
25. Optional review provision re environmental effects	Next optional review in June 2014	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

During the year, the Company demonstrated an overall high level of environmental performance and compliance with the resource consent.

3.4 Recommendations from the 2008-2009 Annual Report

In the 2008-2009 Annual Report, it was recommended:

THAT monitoring of consented activities at the Brown Road Landfarm in the 2009-2010 year be amended from that undertaken in 2008-2009, by increasing the number of inspections from a minimum of two, to four per year, and by collecting four soil samples for analysis.

This recommendation was implemented.

3.5 Alterations to monitoring programmes for 2010-2011

In designing and implementing the monitoring programmes for discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring discharges and effects, and subsequently reporting to the regional community, 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 discharging to the environment.

It is proposed that for 2010-2011, the programme be changed from that for 2009-2010 by including biological soil monitoring to determine whether high chloride loadings are having a detrimental effect on soil health. Also that soil sampling not be carried out to help offset the cost of biological soil monitoring.

Recommendations to this effect are presented in Section 4 of this report.

4. Recommendations

1. THAT monitoring of the Brown Road Landfarm in the 2010-2011 year be altered from that in 2009-2010, by including biological soil monitoring, and not collecting any soil samples.

Glossary of common terms and abbreviations

The following abbreviations and terms may be 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
BTEX	MAH's benzene, toluene, ethylbenzene and xylene
bund	a wall around a tank to contain its contents in the case of a leak
CBOD	carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate
cfu	colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample
COD	chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction
Condy	conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
Cu*	copper
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m ³ s ⁻¹)
DO	dissolved oxygen
DRP	dissolved reactive phosphorus
<i>E.coli</i>	<i>escherichia coli</i> , an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample
Ent	enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample
F	fluoride
FC	faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample
fresh	elevated flow in a stream, such as after heavy rainfall
g/m ³	grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures
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
MAHs	monocyclic aromatic hydrocarbons, molecules consist of a single six-sided hydrocarbon ring
MfE	Ministry for the Environment
mS/m	millisiemens per metre

mixing zone	the zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point
NH ₄	ammonium, normally expressed in terms of the mass of nitrogen (N)
NH ₃	unionised ammonia, normally expressed in terms of the mass of nitrogen (N)
NO ₃	nitrate, normally expressed in terms of the mass of nitrogen (N)
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water
O&G	oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons)
OW	Oily waste
PAHs	polycyclic aromatic hydrocarbons, molecules consist of more than two six-sided hydrocarbon rings
Pb*	lead
pH	a numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5
Physicochemical	measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment
PM ₁₀	relatively fine airborne particles (less than 10 micrometre diameter)
resource consent	refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15)
RMA	Resource Management Act 1991 and including all subsequent amendments
SBM	Synthetic based mud
SS	suspended solids
SQMCI	semi quantitative macroinvertebrate community index;
Temp	temperature, measured in °C (degrees Celsius)
TPH	total petroleum hydrocarbons
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
WBM	Water based mud
Zn*	zinc

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

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

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Taranaki Regional Council, 2009: Origin Energy Resources NZ Ltd Brown Road Landfarm Monitoring Programme Annual Report 2007-2008. Technical Report 2008-82.

Taranaki Regional Council, 2010: Origin Energy Resources NZ Ltd Drilling Waste Landfarms Monitoring Programmes Annual Report 2008-2009. Technical Report 2009-90.

Appendix I

**Resource consent held by
BTW Company Ltd**



**TARANAKI
REGIONAL
COUNCIL**

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

Please quote our file number
on all correspondence

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

Name of
Consent Holder: BTW Company Limited
P O Box 551
Taranaki Mail Centre
NEW PLYMOUTH 4340



Change To
Conditions Date: 4 February 2010 [Granted: 27 April 2006]

Conditions of Consent



Consent Granted: To discharge drilling wastes [consisting of drilling cuttings and drilling fluids] from hydrocarbon exploration activities with water based muds and synthetic based muds, and oily wastes from hydrocarbon exploration and production activities, onto and into land via landfarming at or about (NZTM) 1704006E-5683454N

Expiry Date: 1 June 2020

Review Date(s): June 2012, June 2014

Site Location: Brown Road, Waitara
[Property owner: Papawai Holdings Limited,
C/- GL & HM Rogers]

Legal Description: Pt Sec 1 Matataiore Blk & Pt Sec 50 Papawai Blk Waitara
W Dist Blk I SD

Catchment: Tasman Sea
Waiongana

*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 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. For the purposes of this consent the following definitions shall apply:
 - a) stockpiling means a discharge of drilling wastes from vehicles, tanks, or other containers onto land, but without subsequently spreading, or incorporating into the soil within 24 hours of such discharge; and
 - b) landfarming means the discharge of drilling waste onto land, subsequent spreading and incorporation into the soil, and includes any stripping and relaying of topsoil.
2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

Management plan

3. The consent holder shall maintain, to the written satisfaction of the Chief Executive, Taranaki Regional Council, a landfarming and stockpiling management plan to demonstrate the activity will be conducted to comply with all of the conditions of this consent. The management plan shall be reviewed annually and shall include as a minimum:
 - a) control of site access;
 - b) procedures for notification to the Taranaki Regional Council of disposal activities;
 - c) procedures for the receipt and stockpiling of drilling wastes onto the site;
 - d) methods used for the mixing and testing of different waste types;
 - e) procedures for landfarming drilling wastes [including means of transfer from stockpiling area, means of spreading, and incorporation into the soil];
 - f) procedures for sowing landfarmed areas;
 - g) contingency procedures;
 - h) sampling regime and methodology; and
 - i) post-landfarming management, monitoring and site reinstatement.

Notification and sampling requirements prior to discharge

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, [by emailing worknotification@trc.govt.nz.] at least 48 hours prior to permitting drilling wastes onto the site for stockpiling, from each well drilled. Notification shall include the following information:
 - a) the consent number;
 - b) the name of the well[s] from which the waste was generated;
 - c) the type of waste to be stockpiled;
 - d) the volume of waste to be stockpiled; and
 - e) for oily wastes the concentration of total petroleum hydrocarbons [C_6-C_9 , $C_{10}-C_{14}$, and $C_{15}-C_{36}$], polycyclic aromatic hydrocarbons [PAH], and benzene, toluene, ethylbenzene and xylenes [BTEX].

5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, [by emailing worknotification@trc.govt.nz.] at least 48 hours prior to landfarming stockpiled material. Notification shall include the following information:
 - a) the consent number;
 - b) the name of the well[s] from which the waste was generated;
 - c) the type of waste to be landfarmed;
 - d) the volume and weight of the waste to be landfarmed;
 - e) the concentration of chlorides, nitrogen and total petroleum hydrocarbons hydrocarbons in the waste; and
 - f) the specific location and area over which the waste will be landfarmed.

Monitoring and reporting

6. The consent holder shall keep records of the following:
 - a) wastes from each individual well [including records of all additives used at the wellsite during the drilling process];
 - b) composition of wastes, including concentrations of chloride, nitrogen and total petroleum hydrocarbons;
 - c) stockpiling area[s];
 - d) volumes of material stockpiled;
 - e) landfarming area[s], including a map showing individual disposal areas with GPS co-ordinates;
 - f) volumes and weights of wastes landfarmed;
 - g) dates of commencement and completion of stockpiling and landfarming events;
 - h) dates of sowing landfarmed areas;
 - i) treatments applied;
 - j) details of monitoring, including sampling locations, sampling methods and the results of analysis;

and shall make the records available to the Chief Executive, Taranaki Regional Council.

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7. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, by 31 August of each year, a report on all records required to be kept in accordance with condition 6, for the period of the previous 1 July to 30 June.

Discharge limits

8. For the purposes of landfarming, drilling wastes shall be applied to land in a layer not exceeding:
 - a) 100 mm thick for wastes with a hydrocarbon concentration less than 50,000 mg/kg dry weight; or
 - b) 50 mm thick for wastes with a hydrocarbon concentration equal to or greater than 50,000 mg/kg dry weight; and
 - c) in a rate and manner such that no ponded liquids remain after one hour, for all wastes;prior to incorporation into the soil.
9. An area of land used for the landfarming of drilling wastes in accordance with condition 8 of this consent shall not be used for any subsequent discharges of drilling waste.
10. As soon as practicable following the application of drilling wastes to land, the consent holder shall incorporate the material into the soil to a depth of at least 250 mm so that the hydrocarbon concentration at any point in the soil/waste mix is less than 50,000 mg/kg dry weight.
11. As soon as practicable following landfarming, areas shall be sown into pasture [or into crop]. The consent holder shall monitor revegetation and if adequate establishment is not achieved within two months of sowing, shall undertake appropriate land stabilisation measures to minimise wind and stormwater erosion.
12. No discharge shall take place within 25 metres of a surface water body, property boundary, or 50 metres of the Tasman Sea.
13. The exercise of this consent is limited to wastes generated within the Taranaki region.
14. The stockpiling of material authorised by this consent shall be limited to a maximum volume of 6,000 m³ at any one time on the property. In any case all stockpiled material must be landfarmed within eight months of being brought onto the site.

Receiving environment limits

15. At any time the levels of metals in the soil shall comply with the guidelines for heavy metals in soil set out in Table 7.1, Section 7 of the "Guidelines for the safe application of biosolids to land in New Zealand" [MfE and NZWWA 2003].
16. The conductivity of the soil layer containing the discharge shall be less than 400 mS m⁻¹, or alternatively, if the background soil conductivity exceeds 400 mS m⁻¹, the application of waste shall not increase the soil conductivity by more than 100 mS m⁻¹.

Consent 6867-1

17. The sodium absorption ratio [SAR] of the soil layer containing the discharge shall be less than 18.0, or alternatively if the background soil SAR exceeds 18.0, the application of waste shall not increase the SAR by more than 1.0.
18. The exercise of this consent shall not result in a level of total dissolved salts within any surface water or groundwater of more than 2500 gm³.
19. The exercise of this consent, including the design, management and implementation of the discharge [including but not limited to stockpiling on land and/or discharge onto and into land], shall not lead or be liable to lead to contaminants entering a surface water body.
20. The exercise of this consent shall not result in any adverse impacts on groundwater as a result of leaching, or on surface water including aquatic ecosystems, and/or result in a change to the suitability of use of the receiving water as determined by the Chief Executive, Taranaki Regional Council.
21. The exercise of this consent shall not result in any of the following effects on surface water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
 - 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.
22. At the time of expiry, cancellation, or surrender of this consent the levels of hydrocarbons in the soil shall comply with the guideline values for sandy soil in the surface layer [less than 1 metre depth] set out in Tables 4.12 and 4.15 of the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand [Ministry for the Environment, 1999].
23. At the time of expiry, cancellation, or surrender of this consent soil parameters shall not exceed the following limits: conductivity, 290 mS/m; total dissolved salts, 2500 mg/kg; sodium, 460 mg/kg; and chloride, 700 mg/kg.
24. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive, Taranaki Regional Council, has considered: tangata whenua interest and values, the consent holder's interests, the interest of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisation or consent has been obtained.

Review

25. 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 2012 and/or June 2014, 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, or to take into account any Act of Parliament, regulations, national policy statement, and national environmental standard which is relevant to this consent.

Signed at Stratford on 4 February 2010

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: BTW Company Limited
P O Box 551
Taranaki Mail Centre
NEW PLYMOUTH 4340

Consent Granted
Date: 27 April 2006

Conditions of Consent

Consent Granted: To discharge drilling cuttings, muds and fluids from hydrocarbon exploration drilling operations with water based muds, and drilling cuttings from hydrocarbon exploration drilling operations with synthetic based muds, onto and into land via land farming at or about (NZTM) 1704006E-5683454N

Expiry Date: 1 June 2020

Review Date(s): June 2008, June 2014

Site Location: Brown Road, Waitara
[Property owner: Papawai Holdings Limited,
C/- GL & HM Rogers]

Legal Description: Pt Sec 1 Matataiore Blk & Pt Sec 50 Papawai Blk Waitara
W Dist Blk I SD

Catchment: Waiongana
Tasman Sea

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

www.trc.govt.nz

Doc# 633607-v1

General conditions

- a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4184. In the case of any contradiction between the documentation submitted in support of application 4184 and the conditions of this consent, the conditions of this consent shall prevail.
2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

Management plan

3. Prior to the exercise of this consent, the consent holder shall provide, to the written satisfaction of the Chief Executive, Taranaki Regional Council, a landspreading and incorporation management plan to confirm that the activity will be conducted to comply with all of the conditions of this consent. The management plan shall be reviewed annually and shall include as a minimum:
 - a) land spreading and incorporation procedures [any stockpiling, means of spreading, means of soil incorporation and tilling to the preferred target depth of 250 mm];
 - b) procedures for notification to Council of disposal activities;
 - c) sampling regime;
 - d) contingency procedures;
 - e) post-spreading management and site reinstatement and monitoring for up to five years; and
 - f) control of site access.

Notification and sampling requirements prior to discharge

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours, but not more than 10 days, prior to commencement of each operation involving transfer of wastes from a drilling waste holding receptacle, to the discharge site for discharge onto or into land via stockpiling, spreading, tilling and/or layering from each well drilled.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 12 hours prior to discharging stockpiled material onto or into land.
6. Prior to discharge of wastes with hydrocarbon content equal to or greater than 5%, from wells drilled with water based muds or synthetic based muds, the consent holder shall provide the Chief Executive, Taranaki Regional Council, with a representative chemical analysis of the wastes, including the results of leachate testing. This condition does not apply to the stockpiling of wastes.

Monitoring and reporting

7. The consent holder shall keep records of the following:
 - a) wastes from each individual well [including records of all additives used at the wellsite during the drilling process]
 - b) stockpiling area[s]
 - c) discharge area[s] including a map and GPS co-ordinates
 - d) composition of material [including concentrations of nitrogen, chloride, and total hydrocarbons]
 - e) volumes of material stockpiled
 - f) volumes of material discharged
 - g) dates and times of commencement and completion of discharge and stockpiling events
 - h) treatments applied
 - i) sampling, analysis and results of monitoring

and shall make the records available to the Chief Executive, Taranaki Regional Council, upon request.

8. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, by 31 July of each year, a report on all records required to be kept in condition 7, and on compliance with conditions of the consent.

Discharge limits

9. The consent holder shall ensure that areas used for the stockpiling and discharge of water based drilling wastes are kept separate and distinct from areas utilised for the stockpiling and discharge of cuttings from wells drilled with synthetic based muds. Further, stockpile and discharge areas for individual wells shall be kept separate and distinct.

10. The rate of discharge shall be limited to:
 - a) an application depth of 150 mm for water based drilling wastes and drilling cuttings from wells drilled with synthetic based muds with hydrocarbon content less than 5%; and
 - b) an application depth of 50 mm for water based drilling wastes and drilling cuttings from wells drilled with synthetic based muds with hydrocarbon content equal to or greater than 5%.
11. As soon as practicable following discharge, the consent holder shall incorporate the material into the soil to a depth of at least 250 mm so that the hydrocarbon content in the soil/waste mix is less than 5% anywhere in the 250 mm layer below the topsoil layer for water based drilling wastes and drilling cuttings from wells drilled with synthetic based muds.
12. As soon as practicable following discharge and incorporation, the discharge area shall be covered with topsoil, and resown into pasture [or into crop]. If revegetation cannot be established within two months of the discharge, the consent holder shall undertake appropriate land stabilisation measures to minimise wind and/or stormwater erosion.
13. No discharge shall take place within 25 metres of a water body [as defined in section 2 of the Resource Management Act 1991], 100 metres of the Tasman Sea, or 25 metres of property boundaries.
14. The exercise of this consent is limited to wastes generated within the Taranaki region.
15. The stockpiling of material authorised by this consent shall be limited to a maximum volume of 2000 cubic metres at any one time on the property. In any case all stockpiled material must be discharged onto and into land within two months of being brought onto the site.
16. The maximum rate of chloride application shall not exceed 800 kg Cl/ha/year.
17. The maximum rate of nitrogen application shall not exceed 50 kg N/ha/application up to a limit of 200 kg N/ha/year.

Receiving environment limits

18. At any time the levels of metals in the soil shall comply with the guidelines for heavy metals in soil set out in Table C, Section 9 of the Department of Health's Guidelines for the Disposal of Sewage Sludge to Land [1992].
19. The conductivity of the soil layer containing the discharge shall be less than 400 mSm⁻¹, or alternatively, if the background soil conductivity exceeds 400 mSm⁻¹, the application of waste shall not increase the soil conductivity by more than 100 mSm⁻¹.
20. The sodium absorption ratio [SAR] of the soil layer containing the discharge shall be less than 18.0, or alternatively if the background soil SAR exceeds 18.0, the application of waste shall not increase the SAR by more than 1.0.

Consent 6867-1

21. The exercise of this consent shall not result in a level of total dissolved salts within any surface water or groundwater of more than 2500 gm³.
22. The exercise of this consent, including the design, management and implementation of the discharge [including but not limited to stockpiling on land and/or discharge onto and into land], shall not lead or be liable to lead to contaminants entering a surface water body.
23. The exercise of this consent shall not result in any adverse impacts on groundwater as a result of leaching, or on surface water including aquatic ecosystems, and/or result in a change to the suitability of use of the receiving water as determined by the Chief Executive, Taranaki Regional Council.
24. The exercise of this consent shall not result in any of the following effects on surface water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
 - 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.
25. Prior to the expiry, cancellation, or surrender of this consent the levels of hydrocarbons in the soil shall comply with the guideline values for sandy soil in the surface layer [less than 1 metre depth] set out in Tables 4.12 and 4.15 of the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand [Ministry for the Environment, 1999].
26. Prior to the expiry, cancellation, or surrender of this consent soil parameters shall not exceed the following limits: conductivity, 290 mSm⁻¹; total dissolved salts, 2500 gm³; sodium, 460 gm³; and chloride, 700 gm³.
27. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive, Taranaki Regional Council, has considered: tangata whenua interest and values, the consent holder's interests, the interest of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisation or consent has been obtained.

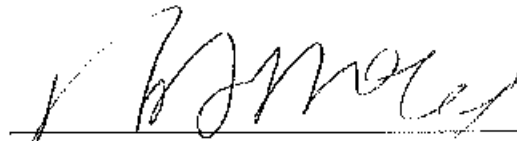
Consent 6867-1

Lapse and review

28. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.
29. 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 2008, and/or June 2014, 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, or to take into account any Act of Parliament, regulations, national policy statement, and national environmental standard which is relevant to this consent.

Transferred at Stratford on 15 July 2009

For and on behalf of
Taranaki Regional Council



Director-Resource Management

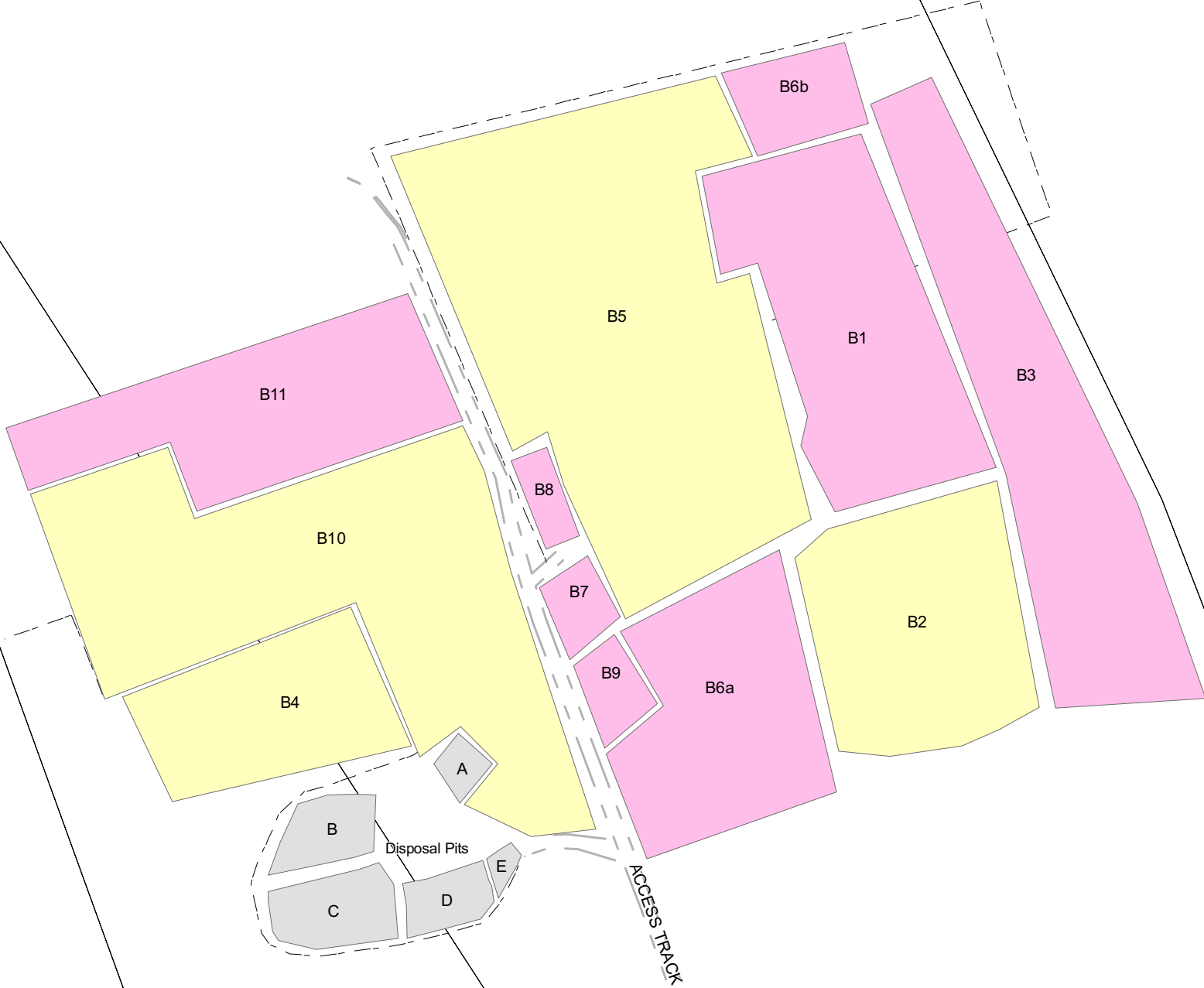
Appendix II

Map of disposal areas

1704000

1704200

ID	MudType	Date Farmed	Well Name	Easting	Northing	Area m ²
B1	WBM	Oct 2006	Kowhai	1704171.22	5683468.63	6802
B2	SBM	Oct 2006	Kowhai	1704191.71	5683371.48	5754
B3	WBM	Jan 2007	Kowhai	1704229.00	5683456.00	7906
B4	SBM	Jan 2007	Kowhai	1703977.51	5683344.84	3795
B5	SBM	Nov 2009	Mangahewa D	1704089.00	5683476.00	15036
B6a	WBM	Oct 2009	Mangahewa C	1704124.00	5683349.00	5151
B6b	WBM	Oct 2009	Mangahewa C	1704150.00	5683554.00	1227
B7	WBM	Oct 2009	KA 6/11	1704076.00	5683382.00	517
B8	WBM	Oct 2009	Mystone A	1704064.00	5683417.00	409
B9	WBM	Oct 2009	KA 8/12/15	1704087.00	5683354.00	577
B10	SBM	Jan 2010	Mangahewa C	1704016.00	5683392.00	12210
B11	WBM	Feb 2010	Waitui-1	1703991.00	5683418.00	5657



5683600

5683600

5683400

5683400

5683200

5683200

Legend	
	Disposal_Pits
	SBM
	WBM
	Fence
	Track

GENERAL NOTES:
1. Coordinates are in terms of NZGD 2000 Transverse Mercator

Disclaimer:
Boundary information has been imported from external sources.
Areas and dimensions may be subject to scale error.
Use of this drawing for other purposes is at the user's risk.
Print from PDF: scale not accurate.

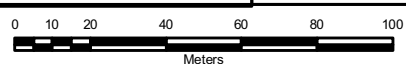


Cnr Courtenay & Eliot Sts.
P.O. BOX 551, New Plymouth 4340
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E-mail: survey@btwcompany.co.nz
Web: www.btwcompany.co.nz

**BROWN ROAD DISPOSAL SITE
SITE PLAN SHOWING
AREA'S OF DISPOSAL**

No.	DATE	BY	CHD	DESCRIPTION
2	11/05/10	PT	DR	Add labels to disposal pits.
1	16/02/10	PT	DR	Make changes to area calculations.

DRAWN BY	THOMPSON	03/09/09
CHECKED BY	RILEY	17/09/09
PROJECT No.	09252	
LOCATION	WAITARA	
ORIGINAL SIZE	A3	
SCALE	1:2,000	



DRAWING No. **09252-04-GIS** REV **2**

Appendix III

Pre-disposal results

Brown Road Landfarm pre-disposal results for 2009-2010

Area Well	B5 Mangahewa D WBM	B5 Mangahewa D SBM	B6 Mangahewa C WBM	B7 Ka 6/11 WBM	B8 Mystone A 1 WBM	B8 Mystone A 2 WBM	B9 KA 8/12/15 WBM	B10 Mangahewa C SBM	B11 Waitui WBM	B12 Mangahewa C Frac water - Pit A	B12 Mangahewa C Frac water - Pit E	MPS/PT/Waitui 1 OW	McKee A OW	Port Taranaki Oily sand	McKee PS1 OW	Sump sludge OW
Sample Date	16/09/2009	16/09/2009	22/10/2009	16/09/2009	28/07/2009	28/07/2009	22/10/2009	04/12/2009	06/01/2010	10/05/2010	10/05/2010	03/06/2010	01/12/2009	01/03/2010	30/03/2010	19/05/2010
Date Registered	17/09/2009	17/09/2009	28/10/2009	17/09/2009	29/07/2009	29/07/2009	28/10/2009	07/12/2009	07/01/2010	12/05/2010	12/05/2010	08/06/2010	05/12/2009	02/03/2010	01/04/2010	21/05/2010
Lab Number	727517.1	727517.2	738714.2	727517.3	712328.1	712328.2	738714.1	749893.1	756496.1	791608.2	791608.1	798646.1	74978.1	770958.1	780307.1	794412.1
Chloride (mg/kg dry wt)	1500	47	1,100	20	12	28	33	300	250			910	3,400	9.8	1,480	197
Density g/mL at 20°C												1.7				
Dry Matter (g/100g)	74	88	79	77	51	49	47	81	85			72	68	83	53	9.6
pH										5.9	5.3					
Total Nitrogen (g/100g dry wt)	0.073	0.088	0.072	0.051	<0.050	<0.050	0.093	0.089	<0.050			0.52	0.19	0.065	0.194	0.19
Gluteraldehyde (g/m3)										<0.02	0.072					
Arsenic	2.3	<2.0	2.2	<2.0	2.8	<2.0	2.2	<2.0	<2.0			5	3.5	<2	1.03	<1.0
Cadmium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			<0.10	0.79	0.24	0.70	1.26
Chromium	14	11	11	12	19	19	12	10	8.5			17	23	6.8	22	3.8
Copper	23	18	23	29	110	68	35	21	19			21	79	20	56	15.5
Mercury	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			<0.10	3.3	<0.1		
Lead	4.5	1.8	3.2	2.3	11	6.7	5.0	3.5	2.1			11.4	72	11	27	7.9
Nickel	12	5.7	6.5	8	20	14	5.9	5.6	6.1			15	12	4.7	12.2	4.9
Zinc	86	75	74	72	74	58	67	73	57			65	240	60	490	670
Barium												5000				
Boron	<20	<20	<20	<20	<20	<20	<20	<20	<20			<20	47	<20	13.6	<10
Vanadium	210	210	220	200	100	110	220	200	160			<100		130	<50	<50
Total C7-C9	18	8.5	<8.2	<8.8	<14	<15	<15	<86	<8.2			300	24,000	<8.9	55,000	2,600
C10-C14	5700	8500	36	<20	<20	<21	<20	7,600	61			23,000	65,000	37	70,000	13,800
C15-C36	20000	30000	180	72	<60	<30	<30	35,000	180			62,000	210,000	<36	174,000	182,000
Total petroleum hydrocarbons	27000	38000	220	85	<60	<60	<60	42,000	240			75,000	300,000	<60	300,000	198,000
BTEX Screen (mg/kg dry wt)																
Benzene	<0.058	<0.050	<0.051	<0.055	<0.096	<0.11	<0.11	<0.050	<0.050			5.7	330	<0.050	1,930	<5
Toluene	<0.058	<0.050	<0.051	<0.055	<0.096	<0.11	<0.11	<0.050	<0.050			20	1,800	<0.050	9,000	19
Ethylbenzene	<0.058	<0.050	<0.051	<0.055	<0.096	<0.11	<0.11	<0.050	<0.050			2.9	280	<0.050	1,530	<5
m & p-xylene	<0.12	<0.10	<0.11	<0.11	<0.20	<0.21	<0.22	<0.10	<0.10			19	2,200	<0.10	10,000	28
o-xylene	<0.058	<0.050	<0.051	<0.055	<0.096	<0.11	<0.11	<0.050	<0.050			5.6	530	<0.050	2,600	73
Acenaphthene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			0.56	17	<0.028	18.4	<2
Acenaphthylene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			0.14	11	<0.028	14.9	<2
Anthracene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	5.5	<0.028	6.2	<2
Benzo[a]anthracene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			0.05	4.2	0.029	4.1	<2
Benzo[a]pyrene (BAP)	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	0.85	0.054	0.40	<2
Benzo[b]fluoranthene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	3.6	0.064	4.0	<2
Benzo[g,h,i]perylene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	0.45	0.045	<0.4	<2
Benzo[k]fluoranthene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	0.67	<0.028	0.74	<2
Chrysene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			0.11	7.2	0.03	7.5	3
Dibenzo[a,h]anthracene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	0.38	<0.028	<0.4	<2
Fluoranthene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			0.24	12	0.056	13.6	6
Fluorene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			3.5	140	<0.028	193	22
Indeno[1,2,3-c,d]pyrene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			<0.04	<0.35	0.032	<0.4	<2
Napthalene	<0.15	<0.13	<0.14	<0.14	<0.23	<0.24	<0.24	<0.15	<0.14			10.9	1,000	<0.14	1,840	14
Phenanthrene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	0.040	<0.028			4.8	200	0.03	320	46
Pyrene	<0.029	<0.026	<0.028	<0.028	<0.045	<0.048	<0.047	<0.029	<0.028			0.35	15	0.083	13.2	7

Appendix IV

Post landfarming results

