Ngapaeruru-1
Exploratory Well Drilling and Testing

WASTE MANAGEMENT PLAN

Tag Oil Limited and Apache Corporation NZ LDC
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Approved for release by:

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Document Control

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1 INTRODUCTION

1.1 Background

TAG Oil Ltd (TAG) and Apache Corporation NZ LDC (Apache) have established a joint venture partnership (The Joint Venture) to explore on-shore petroleum resources within three Petroleum Exploration Permit (PEP) areas on the East Coast of the North Island. As part of Phase 1, the Joint Venture proposes to drill, complete and test an exploration well on a property on Ngapaeruru Road, approximately 17km east of Dannevirke in the Tararua District (Figure 1). The wellsite is referred to as the Ngapaeruru-1 wellsite.

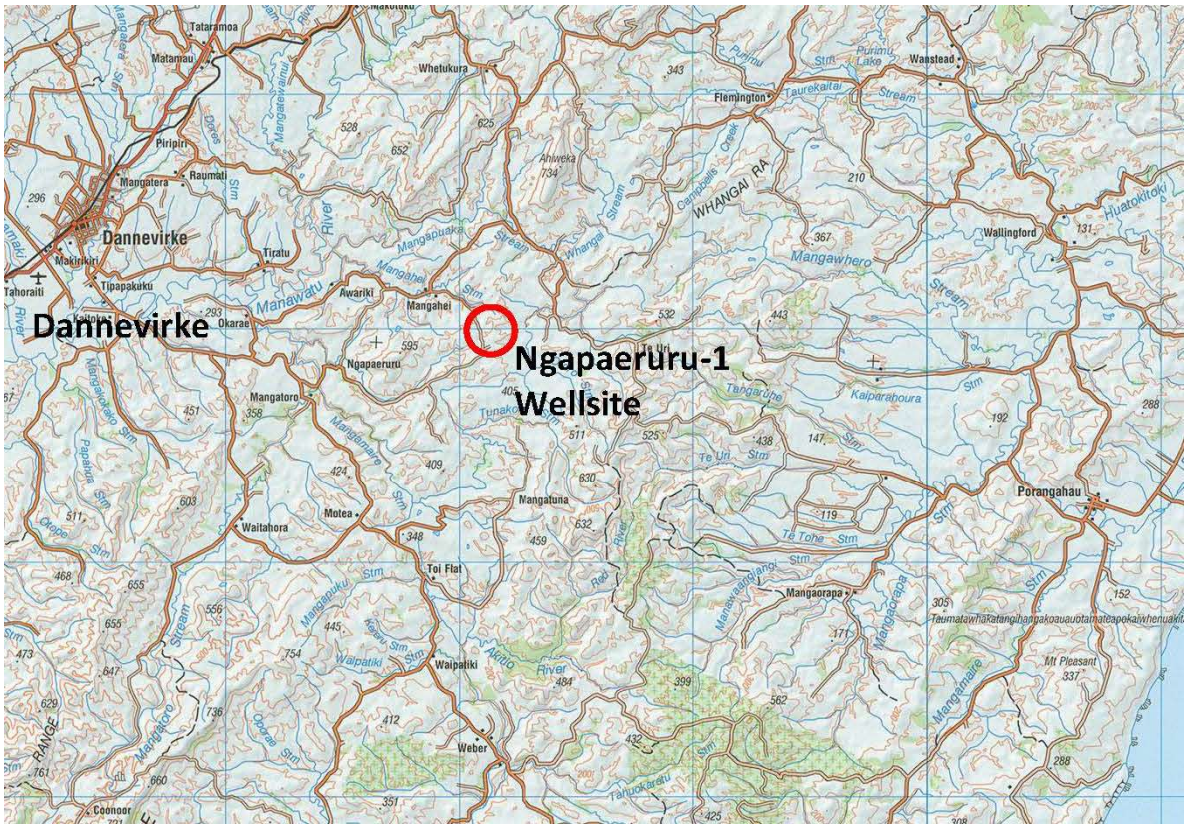


Figure 1: Locality Plan for Ngapaeruru-1 Wellsite

This document is the Waste Management Plan ("WMP") for the Project. This WMP is part of a suite of Management Plans that are appended to the AEE supporting the resource consent applications for the project.

The purpose of this WMP is to identify and define the set of environmental performance measures, procedures and plans that will apply to the management and disposal of waste materials associated with the wellsites.

Wastes are defined in this Management Plan as those materials that will be used or produced at the wellsite that cannot practicably be reused at the site and must be disposed of or recycled off-site, in an environmentally responsible manner. These materials include:

- Drill cuttings (i.e. the rock etc removed from the well as part of the drilling process)
- Excess fluids from well drilling, clean up and completion activities
- Contaminated stormwater and other fluids captured within bunded areas at the wellsite
- Any material resulting from clean-up of spillages, if they occur
- Sewage
- Miscellaneous refuse (e.g. packaging materials, food waste, and other refuse that cannot be recycled)

Clean stormwater is excluded from the definition of wastes, and will be managed and disposed of in accordance with the Stormwater Management Plan for the project.

1.2 Other Management Plans

This document complements, and should be read in conjunction with, the Joint Venture's other Management Plans for the wellsite projects:

- Hazardous Substances Management Plan
- Spill Control Management Plan
- Transportation Management Plan
- Stormwater Management Plan

1.3 Variations To This Management Plan

This Management Plan shall be varied if required, with any such variations ensuring that the objectives and environmental performance measures that are set out below can and will be met. A copy of any variation shall be provided to the Tararua District Council and Horizons Regional Council prior to it being implemented.

2 OBJECTIVES

The objectives of this Waste Management Plan (WMP) are:

- To minimise waste generation as much as is practicable, and to recycle wastes where practicable.
- To manage waste materials on the wellsite in a manner that ensures adverse environmental effects are avoided.
- To dispose of waste materials in a manner that ensures adverse environmental effects are avoided.

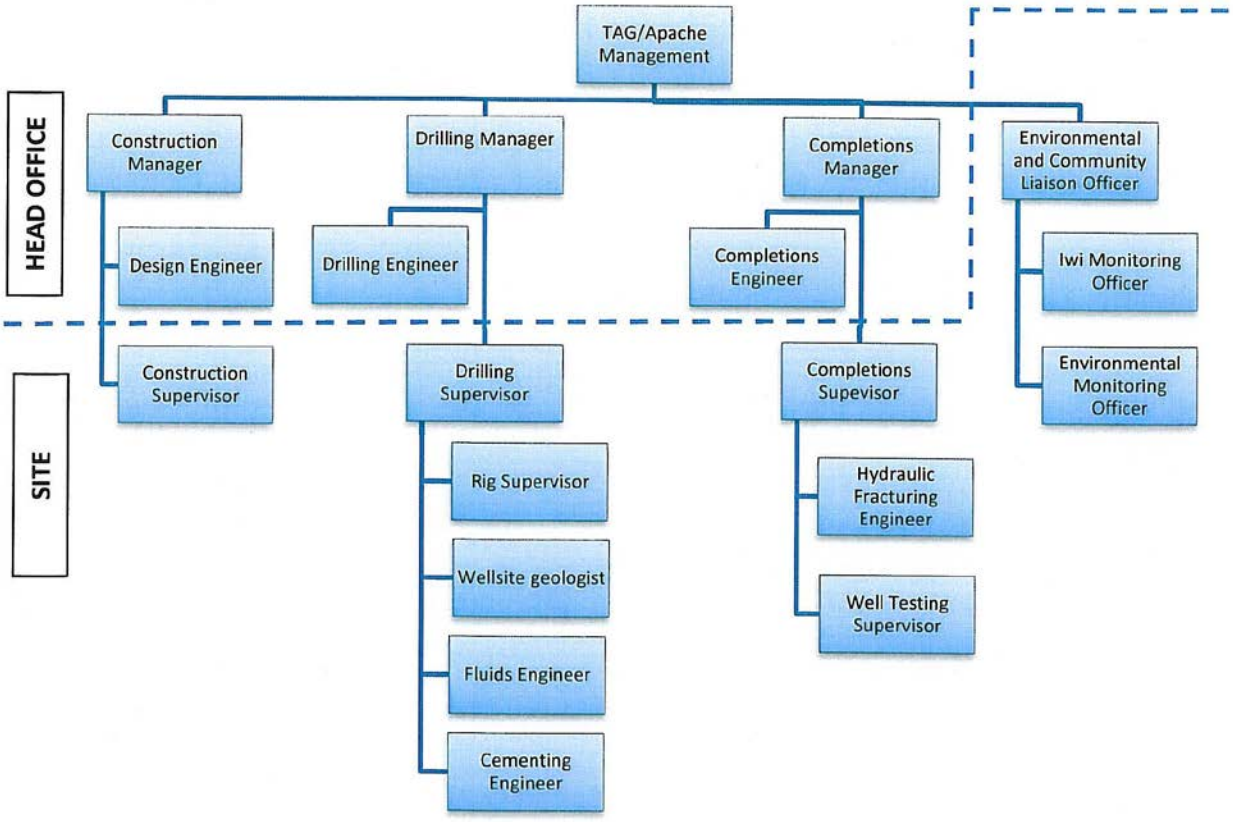
3 ENVIRONMENTAL PERFORMANCE MEASURES

The Joint Venture shall comply with the Environmental Performance Measures specified below during all activities associated with the well exploration project:

- The Drillings Supervisor shall have overall responsibility for the management and disposal of wastes at the wellsite during the drilling phase, and the Completions Supervisor shall have that responsibility during the Completions Phase, in accordance with this Waste Management Plan.
- Site personnel shall be appropriately trained in the correct handling of wastes.
- All waste shall be managed in a manner that avoids any adverse environmental effects at the wellsite.
- Waste generation shall be minimised, and waste material shall be reused on site as much as is practicable.
- Wastes shall be recycled off-site where practicable.
- All waste shall be disposed of at appropriate and consented waste disposal or recycling facilities.
- All waste removed from the site shall be transported in a manner that avoids any adverse environmental effects, including effects on people.
- The types and volumes/weights of waste transported off the site shall be recorded.
- The appropriate disposal of wastes shall be verified in writing by the facilities receiving those wastes.

4 ROLES AND RESPONSIBILITIES

The key personnel involved in the Project are shown in the chart below. Those that have particular responsibilities relevant to waste management are discussed below.



4.1 Drilling Supervisor And Completions Supervisor

The Drilling Supervisor (DSV) has the overall responsibility for the management and disposal of wastes at the wellsite during the well drilling phase, in accordance with this Waste Management Plan. The DSV shall pass this responsibility to the Completions Supervisor for the completions phase. Specific responsibilities include but are not limited to:

- Ensure the appropriate storage and handling equipment is present on site for waste management, and that such equipment is in good working condition for the duration of the project.
- Ensure that containers are appropriately secured, segregated and labelled onsite.
- Ensure that staff are aware of the potential risks associated with hazardous wastes in terms of health, safety and the environment.
- Ensure that no waste is discharged at the site.
- Complete appropriate waste manifests for transport of wastes from site.
- Maintain a log of all wastes transported from site.
- Be familiar with and ensure site compliance with any HSNO Regulations and documentation.

- Coordinate spill response and clean-up in accordance with spill procedures (refer to Spill Control Management Plan).

4.2 Contractors For Drilling Waste Management Services

The Joint Venture will require a fluids service company to co-ordinate all drilling fluid and drilling waste management so that one contractor assumes management on behalf of the Joint Venture for all the processes involved in removing the cuttings from the wellbore. The fluids service company will provide specialist services in drilling waste collection, management and disposal. That company shall be required to be familiar with and comply with all aspects of this Management Plan.

4.3 All Personnel

Whilst the DSV/Completions Supervisor has overall responsibility for waste management at the wellsite, all personnel involved in the project have a responsibility to ensure that:

- The generation of waste is minimised, reused and recycled as much as practicable.
- Waste is segregated appropriately. For example:
    - Hazardous waste is to be segregated from non-hazardous waste.
    - Hazardous waste is to be segregated from other incompatible hazardous waste (i.e., oxidisers must be kept separate from flammables).
    - Recyclable wastes are to be segregated.
- Waste is appropriately secured and stored with properly labelled containers.
- In the event of a waste spill, such a spill will be reported and immediately contained / cleaned up in accordance with the Spill Control Management Plan.

These responsibilities shall be made clear to all personnel by the DSV/Completions Supervisor.

5 WASTE STREAMS

5.1 Overview

The main waste streams associated with the project will be the waste drilling fluids and cuttings arising directly from drilling operations. In addition, there will be a number of discharges and solid wastes associated with the operation of the rig. These wastes will be collected, segregated and removed from site for disposal at a consented facility, which will be located outside the Manawatu-Wanganui Region (either the Waikaikai Farms disposal site, north-west of Patea [Taranaki Regional Council consent 5956-1], or the BTW Brown Road site near Waitara [Taranaki Regional Council consent 6867-1], depending on the nature of the waste). The following list provides a summary of these wastes:

- Drilling wastes
- Excess cement and drilled cement (including cement 'interfaces')
- Rig floor drainage
- Cement unit wash water
- Spill clean-up materials (if any)

In addition to these wastes, the following waste streams will be disposed of as follows:

- Sanitary wastes (i.e. sewage) will be disposed of at a consented sewage treatment facility
- Unrecyclable non-hazardous wastes (e.g. food residue, packaging materials etc) will be disposed of at a refuse transfer station or consented landfill

The waste disposal sites for each of the above waste streams are summarised in Section 7 of this Management Plan.

5.2 Waste Products

5.2.1 Drilling Waste

In the context of this Management Plan, drilling waste specifically refers to the following materials:

- Drill cuttings, cement and associated chemicals removed by the drilling operation.
- Drilling fluid adhering to the drill cuttings / cement when it is separated from the drilling fluid.
- Unwanted or non-recyclable solids and fluids used when drilling. These will normally be restricted to dewatering effluents, cement-related products, lost circulation materials incorporated into the drilling fluid, and spacer train volumes used for well clean-up.
- Other inputs into the Drilling Mud system – on a daily basis these mainly consist of minute quantities of oil and grease, predominantly pipe dope (threading compound), which either leak into the mud system or are squeezed out of threads due to excess application. During tripping and casing setting operations the relative proportion of pipe dope to cuttings

increases, but the overall amount is negligible in terms of its percentage relative to the total volume of drill cuttings and adhering mud.

- Drilling operations generate swarf (metal shavings and other metal debris) from the metal tubulars. It is standard practice to remove the metal not screened out by the shakers with magnets placed at several points in the mud processing system. [The shakers are a series of trays with sieves or screens that vibrate to remove cuttings from the drilling fluid.] The metal thus screened out will end up as drilling waste, although quantities are negligible.

- Drilling mud contaminated with dirt (i.e., any drilling mud that is spilled and cleaned up).

Detail on the management of drilling wastes is provided in Section 6 below.

5.2.2 Excess Cement and Drilled Cement

Cementing of casing strings and use of cement plugs to barrier off part of a well or formation can be a periodic contaminant of drilling fluids. Excess material flushed or drilled out is "drilling waste" and requires disposal. Drilled cement is assimilated with cuttings or waste fluid and can be disposed of either by blending back into the system if possible, or by adding to the drill cuttings waste for disposal offsite.

5.2.3 Rig Floor Drainage

The rig floor will be bunded and any waste collected in the bunds (including captured rainwater) will be drained to a waste vessel and pumped back into the mud system or into the cutting bins if heavily contaminated and removed from site for disposal at the Waikaikai Farms disposal facility.

5.2.4 Cement Unit Washwater

Cement Unit Washwater will be collected in a bunded area and removed from site for disposal at the Waikaikai Farms disposal facility.

5.2.5 Rainwater collected within bunded areas

Rainwater collected within any other bunded areas (e.g. the chemical storage area) will be inspected and, if it is clean, be released to the stormwater system (refer to the Stormwater Management Plan). Any contaminated stormwater will be pumped out using the vacuum truck kept at the site and disposed of either at a consented sewage treatment plant (possibly the Dannevirke sewage treatment plant, depending on the level of contamination). In the event that this rainwater has been contaminated by a spill, the liquids will be removed and disposed of as described in Section 5.2.6 below.

5.2.6 Spills

The Spill Control Management Plan addresses the response to any spills, if they occur. Any spill clean-up materials will be removed from the site for disposal at an appropriate facility. The facility that is used will depend on the nature of the spill clean-up material, as discussed in the Spill Control Management Plan.

5.2.7 Sanitary Waste

Sanitary waste (including 'grey water') will be collected in septic tanks installed on site for the project. Waste will be collected and taken for disposal at a consented sewage treatment facility (probably the Dannevirke sewage treatment plant).

5.2.8 Recyclable material

Recyclable material (e.g. clean paper, plastics, glass, cans and scrap metal) will be segregated and stored in recycling bins and taken to a consented recycling facility for disposal (probably the Dannevirke refuse transfer station).

5.2.9 Non-hazardous Refuse

Food waste and other general, non-hazardous refuse that cannot be recycled will be discharged into a segregated, covered waste bin and collected and taken for disposal at a consented landfill (probably the Dannevirke refuse transfer station, or the Bonnyglenn landfill at Marton).

5.3 Hazardous Wastes

All hazardous waste shall be accurately labelled and signed off prior to leaving the site in accordance with the following table (refer also to Section 7):

HAZARDOUS SUBSTANCES			
SUBSTANCES	EXAMPLE	PRETREATMENT/NOTE	DISPOSAL OPTION
Explosive	Black Powder		Return to supplier
Gases	Compressed air Ammonia Acetylene Liquid nitrogen		Cylinder returned to manufacturer or supplier
Flammable Liquids	Alcohol, ester, ethenes Hydrocarbons, ketones Solvents general Fuel	Halogenated solvents (TCE/TCA) should be stored separately from other solvents as only incineration fitted with scrubbers can accept halogenated hydrocarbons	Recycle when possible by distillation
Oils	Lubricating oil Hydraulic oil	Leakage from rig equipment to be captured onboard storage tanks.	Disposal at consented approved facility
Spontaneous combustibles	Celluloid scrap Charcoal/animal vegetable Lithium catalyst Phosphorous, yellow	NA	Return to supplier
Oxidising Agents	Chlorates and perchlorate Hydrogen peroxide Nitrate Permanganates Inorganic peroxides	Only for lab use	Return to Supplier

HAZARDOUS SUBSTANCES			
SUBSTANCES	EXAMPLE	PRETREATMENT/NOTE	DISPOSAL OPTION
Corrosive Materials	Alkalis, caustics Ammonia soln	Low volumes in drilling fluid	Return to supplier
Batteries		Contains HM and Acids	Disposal at consented approved facility
Empty containers of Haz materials		Segregated on site	Disposal at consented approved facility
Medical Waste		Segregated on site	Disposal at consented approved facility

6 DRILLING WASTE MANAGEMENT

6.1 Process Planning

Volumes of drilling waste will be minimised in the following manner:

- Recycling of re-usable drilling fluid and removal of solid drilling waste at the rig-site will be maximised by optimised operation of solids removal.
- All mud-coated cuttings will be processed to remove excess 'oil on cuttings' prior to disposal. The fluids contractor will monitor % base fluid retention on cuttings (ROC) to ensure OOC% (Oil On Cuttings) is as low as reasonably practicable.
- Any fluid recycled on the rig site will be reused for building of new drilling mud provided it conforms to the required properties for drilling. If not required at the wellsite, the fluid will be stored for use on another well, or sold back to the drilling fluids service company at the conclusion of the project, or disposed of at the Waikaikai Farms disposal facility.

6.2 Drilling Waste Management Equipment Design / Layout

Mud-contaminated cuttings will be separated from the drilling fluid by a series of solids removal devices. The primary devices are 2 x shale shakers fitted with fine mesh screens, through which fine solids will be removed from the mud system for disposal. A centrifuge will then be used to remove finer solids from the active drilling fluid system. All attempts will be made to minimise the OOC% on both the shale shaker discharge as well as the centrifuge effluent to keep the waste streams generated as dry as possible.

6.3 Estimated Drilling Waste Quantities

Drilling waste being discharged will comprise the following:

- Rock removed in the action of drilling
- Mud products used to drill the well and retained on cuttings and
- Minor quantities of other materials used in drilling operations e.g., cementing products, drill pipe / casing thread compound (pipe dope) and materials used to combat loss of fluid to formations.

The following figures present an estimation of total volume and weight of mud-coated cuttings to be removed when drilling each section. Mud retention varies according to many factors and centrifuge discharge retention is much higher than screened cuttings retention (due to fine particle size), but anticipated factors are identified for each section.

Estimated approximate cutting volumes for each well site

Hole Size Inch	Started depth m	Finished Depth m	Hole Volume m3	Estimated Cutting Volume m3	Mud Type
26"	0	10	3.4	6.8	WBM
17.5"	10	500	75.9	151.8	WBM
12.25"	500	950	34.2	68.4	SBM
8.5"	1000	1895	34.6	69.2	SBM
		Totals	148.1	296.2	

Estimated cutting volumes by mud type

1. For WBM for 26" and 17.5" section	158.6	m3	(997.41	BBLs)
2. For SBM 12.25" and 8.5" section	137.6	m3	(865.48	BBLs)

Cutting volume is based on a factor of 2 x hole volume (worst case for planning purposes).

6.4 Waste Management Logistics

6.4.1 Primary Discharge Procedure

The primary discharge process is for solids from the shale shakers to be fed directly into a dedicated cuttings skip. WBM (Water Based Mud) cuttings will be skipped ready for disposal. SBM cuttings will be processed through a centrifuge to reduce OOC% and then transferred to a secondary bunded, lined SBM cuttings skipped storage area to be held on site.

Once the storage area is filled to an acceptable level and/or at an appropriate time, the cuttings will be removed for disposal. Note: the storage area shall not be filled past the maximum acceptable level. This shall be monitored by the DSV.

6.4.2 Documentation for Transport of Cuttings

Accompanying each load of WBM or SBM coated cuttings for transport to the disposal site will be a cuttings manifest, filled out and completed at the wellsite and signed off by the DSV. This documentation is necessary for receipt of the cuttings at the disposal site and so as to track quantities removed from the drilling site for disposal.

6.5 Sampling Frequency And Reporting Procedures

The Fluid Engineers will be responsible for testing the mud-coated cuttings prior to disposal. Primary sampling requirements are as follows:

6.5.1 Base Fluid retention on Cuttings (ROC)

Fluids Engineers will provide daily reports identifying % base fluid on Cuttings (ROC, OOC) on both Shale Shaker and Centrifuge discharge.

6.5.2 Volume of Mud coated cuttings discharged

Fluids Engineer will maintain as part of their daily reporting requirements, a spreadsheet identifying cumulative volumes of mud coated cuttings collected for disposal.

7 SUMMARY OF WASTE DISPOSAL SITES

The proposed waste disposal sites for each waste stream are summarised in the following table.

WASTE	PROPOSED DISPOSAL SITE*
Drill cuttings, cement, drilling fluids	Waikaikai Farms site, Taranaki
Waste water-based drilling mud	Waikaikai Farms site, Taranaki
Waste synthetic-based drilling mud	Waikaikai Farms site, Taranaki
Rig floor drainage	Waikaikai Farms site, Taranaki
Cement unit wastewater	Waikaikai Farms site, Taranaki
Completions wastes	Brown Road site, Taranaki
Contaminated rainwater	Dannevirke sewage treatment plant, or similar STP, unless contamination is significant, in which case the disposal facility will depend on nature of contamination
Spills	Will vary, depending on nature of spill
Other hazardous wastes	Refer to table in Section 5.3, and Spill Control Management Plan
Sewage	Dannevirke sewage treatment plant, or similar STP
Recyclable waste	Dannevirke refuse transfer station
General refuse	Dannevirke refuse transfer station, or Bonnyglenn landfill at Marton

*Alternative disposal sites may be used, provided they have current resource consents and are appropriate for the waste product.