Methanex Motunui and Waitara Valley Combined Monitoring Programme Annual Report 2014-2015

Technical Report 2015-90

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Executive summary

Methanex New Zealand Limited (Methanex) operates methanol production facilities located at Motunui and Waitara Valley, in the Waitara River catchment. This report for the period July 2014 to June 2015 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess Methanex's environmental performance during the period under review, and the results and environmental effects of Methanex's activities.

Methanex holds 11 resource consents, which include a total of 111 special conditions setting out the requirements that Methanex must satisfy. Methanex holds two consents to allow it to take and use water from two abstraction points on the Waitara River. Six consents allow the discharge of effluent /stormwater into the Manu and Waihi Streams; an unnamed tributary of the Waitara River; and the Tasman Sea via the Waitara marine outfall. Methanex also holds two consents to discharge emissions into the air at its sites. Finally, one consent provides for a structure in the Waitara River associated with the water take.

During the monitoring period, Methanex demonstrated an overall good level of environmental performance at its Motunui site and a good level of environmental performance at its Waitara Valley site.

The Council's monitoring programme for the year under review included four site inspections, continuous self monitoring by Methanex (specifically involving analysis of water samples collected for physicochemical analysis), review of regularly provided consent holder data, two inter-laboratory comparisons and one inspection relating to the Resource Management (for Measurement and Reporting of Water Takes) Regulations 2010.

The monitoring showed that Methanex operated both plants in accordance with the requirements of their resource consents. As in previous years, the facilities were well managed and a high level of housekeeping was maintained. There were two similar incidents recording non-compliance in respect of Methanex's plants during the period under review. These related to the discharge of wastewater from pipelines between the plants and the Waitara marine outfall. Both incidents resulted due to the aging pipeline infrastructure which Methanex have been upgrading and servicing in recent years. The appropriate response and mitigation measures were applied by Methanex.

During the year, Methanex demonstrated an overall good level of environmental performance and a high level of administrative performance with the resource consents at both the Motunui and Waitara Valley facilities.

For reference, in the 2014-2015 year, 75% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 22% demonstrated a good level of environmental performance and compliance with their consents.

This report includes recommendations for the 2015-2016 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2014 to June 2015 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Methanex New Zealand Limited (Methanex). This company was formed on the first of January 2015, when the two previously separate Methanex companies (Methanex Motunui Limited and Methanex New Zealand Limited) were amalgamated.

Methanex operates a methanol production facility located on the coast at Motunui, close to Waitara (the Motunui plant), and a second plant located 2.5 km south east of the mouth of the Waitara River (the Waitara Valley plant). Both plants are situated in the Waitara River catchment. Together these plants can produce up to 6,500 tonnes of methanol a day.

This report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Methanex that relate to abstractions and discharges of water within the Waitara River catchment, and the air discharge permits held by Methanex to cover emissions to air from their sites.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Methanex's use of water, land and air.

The Council began reporting its monitoring of Methanex in 1990. This report is the 35th report to be prepared by the Council to cover Methanex's various consented activities and their environmental performance.

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 RMA and the Council's obligations and general approach to monitoring sites though annual programmes, the resource consents held by Methanex in the Waitara River catchment, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted in Methanex's sites.

Section 2 presents the compliance monitoring of the Motunui site during the period under review, including scientific and technical data. Thereafter the results are discussed, together with their interpretations, and their significance for the environment.

Section 3 presents the compliance monitoring of the Waitara Valley site during the period under review, including scientific and technical data. Thereafter the results are

discussed, together with their interpretations, and their significance for the environment.

Section 4 presents a summary of recommendations to be implemented in the 2014-2015 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

(a) the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
(b) physical effects on the locality, including landscape, amenity and visual effects;
(c) ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
(d) natural and physical resources having special significance (for example recreational, cultural, or aesthetic);
(e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the consent holder during the period under review, this report also assigns a rating as to Methanex's environmental and administrative performance.

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. **Administrative performance** is concerned with Methanex's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with

regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment .The Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

- **Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self reports, or in response to unauthorised incident reports, but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

  For example:

  - High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
  - Strong odour beyond boundary but no residential properties or other recipient nearby.

- **Improvement required:** Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

- **Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

- **High:** The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

- **Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

- **Improvement required:** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

- **Poor**: Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2014-2015 year, 75% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 22% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Historical overview and process description

Historical overview

The Motunui facility was constructed in 1983 and was originally operated by the New Zealand Synthetic Fuels Corporation to produce petrol from natural gas, during the 'Think Big' era. The decision to build the plant was made under the *National Development Act 1979*. New Zealand Synthetic Fuels Corporation operated two production units, Methanol 1 and Methanol 2 as well as a gasoline to methanol plant. At that stage, crude methanol was an intermediate product in the process.

From 1995 to 2004 the Motunui plant ran at close to full production. Around the end of this period, shifts in world demand favoured the production of high grade methanol and this became more profitable for Methanex than its current operation of conversion of methanol to petrol. As a consequence the synthetic petrol part of the plant was de-commissioned and dismantled in October 2008 following a four year period during which the plant had remained idle. One production unit, Methanol 2, was restarted in 2008 and the restart of Methanol 1 took place in 2012. Presently the plant operates at full capacity.

The Waitara Valley plant was originally established by Petralgas Chemicals NZ Limited (a 50:50 New Zealand government and Alberta Gas partnership) in 1983 as a self-contained facility to convert gas from the offshore Maui field into high grade methanol. Subsequently the plant changed ownership to Petrocorp and Fletcher Challenge Methanol until 1994 when Methanex Motunui Limited gained ownership of the plant. In 1989, a second distillation tower was installed at the plant to enable crude methanol supplied from the Motunui plant to be processed into high grade methanol at the Waitara Valley plant. The construction of two methanol distillation towers at the Methanex Motunui site in 1994 and 1995 led to modifications of the Waitara Valley plant, to allow transfer of crude and refined methanol between the two

sites and the port. The Waitara Valley plant which had continued to operate between 2004 and 2008 while production at the Motunui facility had ceased, was laid up in November 2008 soon after the restart of the larger Motunui facility. The Waitara Valley site retained importance as a storage facility and a load out site for product going by truck to Tauranga. A restart of the Waitara Valley plant took place in October 2013.

Methanol manufacture
Production of methanol from natural gas (sourced from various Taranaki fields) involves a three stage process. A brief outline of the methanol production process is given below:

- **Phase 1: Reforming**
  Natural gas entering the plant undergoes a preparation treatment involving the removal of contaminants (such as sulphur) prior to the reforming process. The processed gas is then mixed with steam (processed from water taken from the Waitara River) at approximately 500 °C, before being passed through a reformer containing a nickel catalyst at 900 °C. The heat is achieved by burning fuelgas, a mixture of natural gas and waste gases from within the process. Waste heat is recovered for steam generation before the flue gases are discharged to the atmosphere at about 110 °C. A synthesis gas is produced in the reformer which contains hydrogen, carbon dioxide, carbon monoxide, methane and nitrogen.

- **Phase 2: Compression and synthesis**
  The next phase of the process requires the synthesis gas produced in the reformers to be pressurised (1,500 kPa to 8,600 kPa). The synthesis process involves changing the synthesis gas through a further chemical reaction to a form of crude methanol. This reaction involves the channelling of compressed gas into a methanol converter containing a copper/zinc catalyst which yields crude methanol.

- **Phase 3: Distillation**
  The distillation process is a low-pressure process, whereby the crude methanol is purified to form chemical grade methanol. There are two distillation towers at the Waitara Valley plant and two at the Motunui plant which are used to carry out this process.

1.3 Resource consents

1.3.1 Water abstraction permit

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Methanex currently holds a consent for a flood control structure in the Waitara River.

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Methanex currently holds two abstraction consents for the Waitara River.

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

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

Sections 15(1)(b) and (d) of the RMA 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. Methanex no longer holds a consent for the discharge of contaminants onto land as sludge disposal is undertaken as a permitted activity under the Regional Freshwater Management Plan .

A summary of the consents presently held by Methanex in relation to activities at its Motunui and Waitara Valley sites is given in Table 1 below. Where separate consents are held for the same activity at the different sites, these consents typically share similar or identical conditions. Further detail on Methanex's consents is provided in section 2 and 3 of this report. A copy of each of the consents can be found in Appendices I and II.

Table 1 Summary of consents presently held by Methanex

Consent	Purpose	Site to which the consent relates
0820-2	Water take from Waitara River	Motunui
0822-2	Discharge uncontaminated stormwater to Waihi and Manu streams	Motunui
0825-3	Discharge uncontaminated stormwater to an unnamed tributary of the Waitara River	Motunui, at the Motunui intake
0827-3	Discharge wastewater to an unnamed tributary of the Waitara River	Motunui, at the Motunui intake
3400-2	Discharge treated wastewater and stormwater to the Tasman Sea	Motunui
4042-3	Discharge contaminants to air	Motunui
0801-2	Water take from Waitara River at two locations	Waitara Valley
0802-2	Discharge stormwater to the Waitara River	Waitara Valley
3399-2	Discharge treated wastewater and stormwater to the Tasman Sea	Waitara Valley
3960-2	Construct rock groyne in the Waitara River	Waitara Valley
4045-3	Discharge contaminants to air	Waitara Valley

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets out obligations upon the 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 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 Motunui and Waitara Valley sites previously ran from 1 January to 31 December. In 2013 the programme was amended and now runs from 01 July to 30 June. As a result of this change some of the required information obtained from the consent holder has not been received within the 2013-2014 monitoring year. This information has been reported on in this 2014 -2015 compliance monitoring report.

The monitoring programme for both sites consisted of four primary components.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

Both the Motunui and Waitara Valley sites were inspected four times during the monitoring period. An additional inspection of only the Waitara Valley facility was undertaken at the end of the monitoring period to determine compliance with the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010. Site visits mainly involved compliance inspections and the taking of split samples for inter-laboratory comparisons.

With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and

supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Data review

Methanex undertakes a significant amount of self-monitoring of environmental performance. The data gathered is reported to the Council on a monthly basis, and is reviewed by the Council to determine compliance with resource consent conditions.

The raw water abstraction rate from two locations on the Waitara River for the Motunui plant was measured continuously. Monthly reports detailing wastewater and stormwater discharge rates, volumes and composition were provided by Methanex to the Council. Plant effluent was monitored for a number of parameters with frequencies ranging from continuously (flow and pH) to monthly (trace metals).

These regular records provided to the Council are detailed in Table 2.

Table 2 Regular consent holder monitoring reporting requirements

Consent	Reporting Requirement	Provision to the Council	
		Frequency required by consent	Frequency provided by consent holder
0820-2	Abstraction rate and volume	Yearly	Monthly
0801-2			
0802-2	Testing of stormwater quality	Consent not exercised	
0822-2	Testing of stormwater quality	Not specified	Monthly
3399-2 3400-2	Testing of treated waste and stormwater	Yearly	Monthly
	Records of volumes and rate discharged	Monthly	
	Records of chemical dosing	Yearly	
4045-3	Air quality monitoring	3 Yearly	3 Yearly
4042-3		2 Yearly	2 Yearly

Methanex is also required to provide the Council with several reports addressing various receiving environments, site activities and investigations. These reports are outlined below. Details of the reports received during the 2014-2015 monitoring year (which relate to both plants) may be found in the Motunui and Waitara Valley results sections of this report.

Air emissions

Methanex is required to supply Council with a report every two years addressing air emission issues from the Motunui plant. This report is a requirement of consent 4042-3 (granted in April 2008).

The Waitara Valley consent has similar requirements but different time frames. Consent 4045-3 requires a three yearly report on technological advances regarding various emissions (including the cooling tower plume), an inventory of emissions from

the distillation tower, energy efficiency improvements and any other matters relating to the mitigation of emissions.

Methanex reports on emissions from both sites in a biennial report. A biennial report for 2010 and 2011 was received in August 2012. A second biennial report was received in April 2015 covering the 2012 and 2013 calendar years. The next biennial report is expected in 2016 and should cover the monitoring, developments and investigations undertaken in 2014 and 2015.

Methanex is also required to supply Council with a report every five years addressing advances in technology to minimise the effect of the Motunui plant's water vapour plume. This report is a requirement of consent 4042-3 (granted in April 2008). The most recent report was received in October 2014, and the next report will be due in 2019.

Water take from the Waitara River
Methanex is required to supply Council with a report every two years addressing the programme Methanex has in place to reduce their use of water. This report is a new requirement of consent 0820-2 and 0801-2 (granted in April 2008). The most recent report was received in December 2014. The next report is due in 2016. These reports cover developments and initiatives over the two preceding years.

Methanex is also required to supply Council with a report every five years showing the results of the testing of the water take pipeline. This report is a new requirement of consent 0820-2 and 0801-2 (granted in April 2008). The first report was due in 2013.

Contingency plans
Consent 3399-2 and 0822-2 both require the provision of a contingency plan by Methanex to the Council. It is required that these are maintained and consent 3399-2 specifies that the contingency plan should be reviewed every two years. These plans were received by the Council in September 2014 and a review of these is expected again in 2016.

Marine outfall
Every five years Methanex is required to supply Council with certification of the integrity and dilution performance of the marine outfall pipe. This is a pipe that provides for the discharge of wastewater/stormwater approximately 1,250 m offshore from the mouth of the Waitara River in the Tasman Sea. The marine outfall report is a new requirement of consent 3400-2 and 3399-2 (granted in April 2008). The first report was due in 2013. Methanex have had discussions with Council with regard to this work due to a number of issues. This report was received during the 2013-2014 monitoring period.

Treated stormwater and wastewater annual report
Methanex is also required to supply Council with a report annually addressing their waste treatment discharges. This is a requirement of consent 3400-2 and 3399-2 (granted in April 2008). The last report covered the 2014 calendar year, and was received in April 2015. An agreement was reached with the Council that as monthly reports are supplied by Methanex there would be no requirement for an additional annual report as effectively the collation of the monthly reports equate to annual reporting.

1.4.5 Inter-laboratory comparisons

On two occasions during the monitoring period samples from the Motunui and Waitara Valley methanol plants were taken by the Council and Methanex simultaneously. Both laboratories analysed the samples for parameters relevant to the consents and the results were compared.

2. Motunui

2.1 Process description

The Motunui facility (photo 1 and figure 1) has two production units. The Methanol 2 plant was restarted and began to produce methanol in October 2008 after lying idle for four years. The Motunui Methanol 1 plant began producing Methanol again in July 2012. Increased monitoring was implemented during that restart. The monitoring was reduced back to normal levels during 2013-2014 and has continued as such during the current monitoring period.

Photo 1 Cooling towers and distillation stacks at the Methanex Motunui plant

Figure 1 presents the layout of the site and references various components that will be referred to in this report.

2.1.1 Water discharges

There are various sources of wastewater from processes associated with the methanol manufacturing activities at the site, including water treatment wastes, boiler, cooling tower and other blowdowns, sewage, process effluents and stormwater.

- Sludge removed from the clarifiers is allowed to settle in the sludge lagoons. The water from this process is either allowed to evaporate or is discharged via the outfall.
- Naturally occurring dissolved salts in the abstracted river water are removed using ion exchange resins. Process boiler condensates for reuse also go through ion exchangers to remove trace minerals. The resins are regenerated using sulphuric acid and sodium hydroxide. The waste flow is neutralised prior to discharge via the outfall.
- The on-site boilers are fed with demineralised water with added deposit and corrosion control agents. To prevent a build-up of contaminants in the boiler water a portion of the boiler water is continuously removed (blowdown) and replaced

with fresh treated water. This wastewater goes to the blowdown pond and is discharged via the outfall.

- The cooling towers function by the evaporation of treated clarified river water. Dissolved river salts could build up rapidly in the water and therefore substantial quantities (about one seventh of the volume) is blown down during each recirculation cycle. The cooling water blowdown may contain corrosion inhibitors, dispersants, surfactants, biocides and antifoams. This wastewater also goes to the blowdown pond and is discharged via the outfall.
- Process wastewaters from the methanol plant saturators and miscellaneous wastes from gauge glasses, sample connections, pump pads, vessel drains and the like.

Those process effluents that require treatment are diluted with other cleaner waste streams and are passed through a trickling filter and activated sludge system before being discharged via the ocean outfall.

Historically, domestic effluent was pumped to a New Plymouth District Council (NPDC) sewer line for treatment at the Waitara Wastewater Treatment Plant (WWWTP). Thereafter the treated wastewater was discharged to the Tasman Sea via the Waitara marine outfall. In the 2013-2014 monitoring period, major work was undertaken to convert the WWWTP to a pump station. The Waitara pump station was commissioned on 15 October 2014 at which point pumping of Waitara municipal sewage to the New Plymouth Wastewater Treatment Plant (NPWWTP) commenced, and treatment and discharge of municipal sewage to the Tasman Sea via the Waitara marine outfall ceased.

Stormwater from the processing areas of the site that has the potential to be contaminated, drains into the stormwater pond under gravity and is then pumped to the effluent treatment plant and discharged via the marine outfall. Stormwater from the tankage area is pumped over into the process sewers which flow to the storm pond. The stormwater falling on the non-process areas of the western half of the site (Figure 1) is directed by "v" ditches running alongside the roads to a dam known as the Duck Pond and then out to the Tasman Sea via the Manu Stream. Stormwater falling on the eastern side of the site is directed to unnamed tributaries of the Waihi Stream via outfalls and a small sedimentation pond.

Sludge from the storm pond, off-spec pond and blow down pond stored in lagoons 2, 3, and 4 was removed during 2006. The sludge in lagoon 1 was removed later after drying out over the 2007 summer. All of the sludge was disposed of at Redvale landfill at that time.

With the plant running at full production again, two of the four previously emptied sludge ponds are being used only for dewatering the less contaminated river-silt backwash from the Waitara River water. The other two sludge ponds will be used to keep more contaminated waste streams separate.

Figure 1 Motunui site layout and water sampling site locations

2.1.2 Emissions to air

The major sources of emissions to air are shown in Figure 2. The greatest quantities of air discharges from the Methanex complex were emitted from the reformer stacks when the plant recommenced production. The flue gases are the products of combustion reactions within the steam reformers. They comprise gases typical of any combustion processes based on natural gas i.e. nitrogen passing through the process unchanged from the atmospheric air drawn in to support combustion, water (from oxygen in the air reacting with hydrogen in natural gas), carbon dioxide (created similarly) and residual oxygen. There are also traces of nitrogen oxides due to atmospheric nitrogen oxidising in the heat of the reformers.

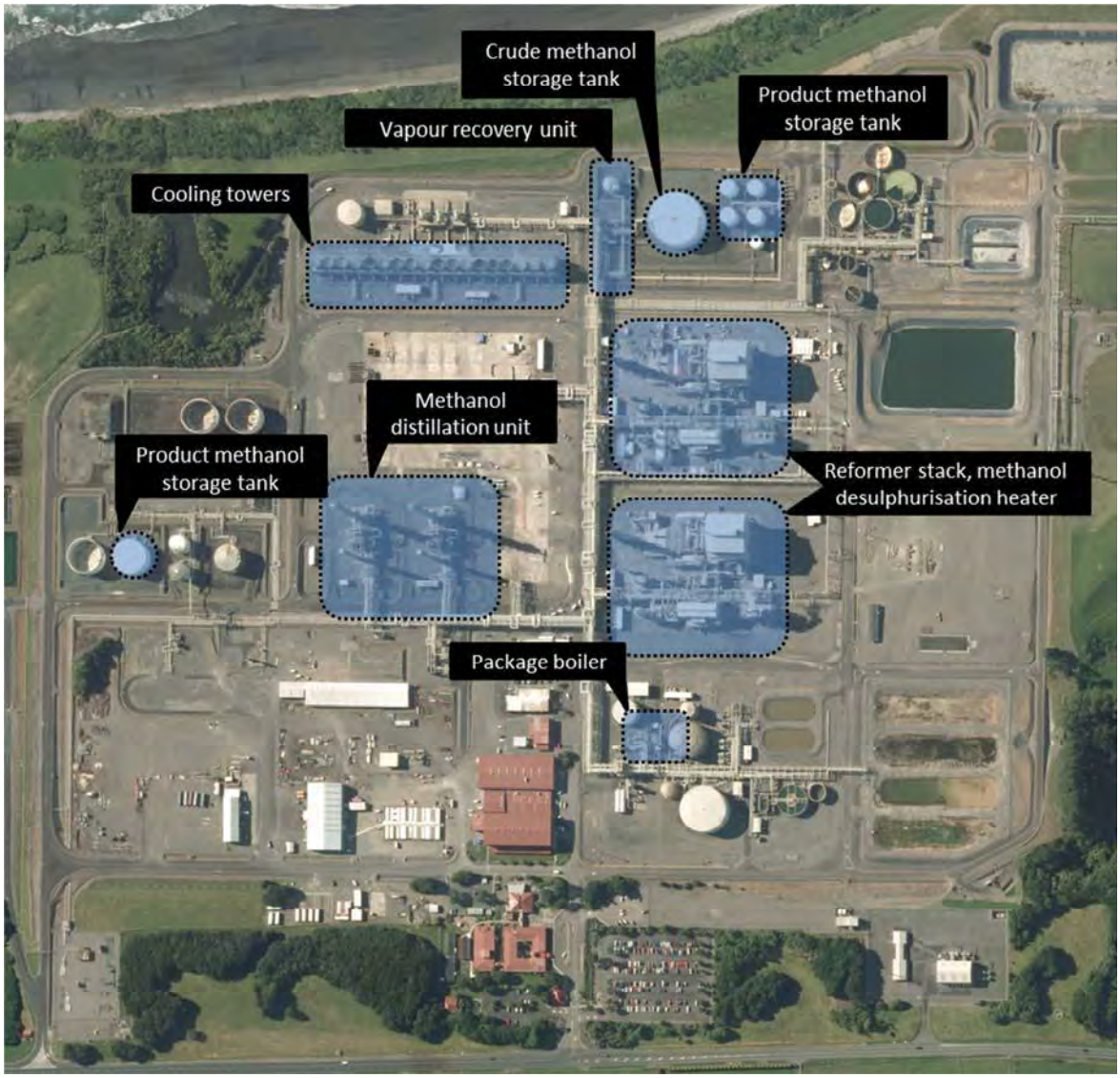

Figure 2 Major process air emission sources at the Motunui plant

Energy efficiency and usage

The integrated nature of the plant allows energy recovery and utilisation. At the same time, a large amount of energy is required to drive some of the reactions and refining stages. The volume of gas that may be accessed as raw feedstock by Methanex is fixed by the capacity of the feedstock systems, so that increased productivity and profitability are determined by in-house efficiency and loss control. More specifically,

as in-plant efficiency increases, then the amount of carbon dioxide emitted as an exhaust gas per unit of product decreases.

The feedstock gas is preheated by excess heat recovered from other parts of the process, before being reformed to synthesis gas by the injection of steam and with additional heat energy generated by burning both natural gas and waste streams. The exhaust flue gases also have heat recovered from them, to preheat the feedstock gas and to raise steam.

The reaction of the synthesis gas over a catalyst to produce methanol releases heat, which is captured via heat exchanges for use elsewhere. Unreacted synthesis gases are bled off to avoid accumulation and are burnt in the reformer as fuel.

Distillation of the methanol to a chemical-grade (high purity) standard requires heat energy, partly supplied from the reformer process. Purge gases and liquids from the distillation process are recovered for further distillation, with any residues ("fusel oil") being burnt as fuel.

Initiatives to improve energy efficiency undertaken by Methanex have included communication sessions with shift workers to identify energy saving opportunities in addition to constant monitoring of energy performance.

2.1.3 Solid waste

Sludge from the clarifiers has been removed periodically, while the only opportunity to clean and remove sludge from the blowdown pond, cooling tower sump and off-spec pond is when the entire plant is shutdown, as these facilities are in constant use. The solid wastes are placed in the sludge lagoons at the south eastern corner of the site and are allowed to dry. The dried sludge and on occasion spent catalyst and resin, have in the past been disposed of to land in a consented area owned by Methanex just outside the site boundary fence, northwest of the plant site. The last sludge disposal occurred in 2000.

In 2004 the majority of the sludge disposal area was sold to Shell Todd Oil Services and has since been used as part of the Pohokura production station development. With the restart of the Motunui plant two of the four sludge lagoons are used to dewater river silt from the clarifiers. This sludge is kept separate from other more contaminated material (for example the solid waste cleaned from the other effluent ponds and spent ion exchange resins) so that it can be disposed of more easily. The lagoons have a large storage capacity and therefore disposal of dewatered sludge will occur on an infrequent basis.

2.2 Resource consents

Methanex currently holds six resource consents for the operation of its Motunui petrochemical plant. A summary of the requirements imposed by each of the consents is provided in Sections 2.2.1 to 2.2.4 and copies of the resource consents are included in Appendix I.

A list of the consents currently held by Methanex during the monitoring period in relation to the Motunui plant is given in Table 3 below.

The early consents for this site were granted to New Zealand Synthetic Fuels Corporation Limited as National Development (New Zealand Synthetic Fuels Corporation Limited) Order 1982 under the *National Development Act 1979*. In May 1993, the consents were transferred to Methanex Motunui Limited, following the merger of Fletcher Challenge Methanol and Methanex Corporation Canada.

Table 3 Consents held in relation to the Motunui plant, July 2014 - June 2015

Consent	Granted	Review date	Expiry date	Purpose	Volume (m^3/day)
0820-2	29/04/08	30/06/15	1/06/21	Water take from Waitara River	33,600
0822-2	29/11/12	1/06/15	1/06/27	Discharge uncontaminated stormwater to Waihi and other streams	-
0825-3	31/03/08	1/06/15	1/06/21	As above	-
0827-3	31/03/08	30/06/15	1/06/21	As above	-
3400-2	29/04/08	30/06/15	1/06/21	Discharge treated plant effluent and contaminated stormwater to Tasman Sea	12,096
4042-3	12/02/08	30/06/18	1/06/28	Discharge to air from methanol and gasoline manufacture	-

Historical consents
Consent 1244 for the abstraction of groundwater of up to a maximum of 5,184 m^3/day (60 l/s) expired on 1 June 2009. The consent was issued for the purpose of the site de-watering to minimise the risk of substrate liquefaction in the event of seismic activity. Methanex ceased exercising this consent on 5 December 2004 and with current scientific knowledge, the abstraction is no longer considered necessary for stability of the plant during seismic activity. Redundant infrastructure pertaining to this consent may still be seen around the Motunui site.

Consents 3400, 0820, 0825, 0827 and 4042 were due to expire during 2008 and 2009. These consents were renewed in 2008. Consent 0822 expired and was renewed in 2012. Consents 1244 and 1245 related to taking ground water and discharging ground water to the Waihi and other streams for the purpose of ground stabilisation and protecting the plant against seismic hazards. These consents expired in 2009 and were not renewed. Consents 4543 and 4640 related to air emissions from the methanol distillation process. These were surrendered by Methanex as they were superseded by the new air discharge consent 4042-3.

2.2.1 Water abstraction permits

Methanex holds one consent to abstract surface water for use at the Motunui site as described below.

Consent 0820-2: Abstraction from Waitara River
Methanex holds water permit **8020-2** for the abstraction of water from the Waitara River for use in the Motunui methanol production plant. This permit was issued by the Council on 29 April 2008 under Section 87(d) of the RMA. It is due to expire on 01 June 2021.

The point of abstraction is on the true right bank, 10 km from the sea. River flow volumes are measured at the Bertrand Road gauging site two kilometres downstream of the abstraction point.

The original Consent 0820-1 was granted in October 1981. A variation to the consent was granted in December 1986, permitting an additional 130 l/s. Additional requirements imposed by the conditions of the variation related mainly to monitoring and provision of information. Consent 0820-1 expired on 12 March 2009 and was superseded by renewed consent 0820-2.

A further variation to this consent was granted on 15 November 2005 to allow Methanex to supply water abstracted under this consent to Shell Todd Oil Services for their horizontal directional drilling associated with the development of the Pohokura field. The purpose of the varied consent was changed, however the conditions of the consent remained the same.

Consent 0820-2 includes seven special conditions.

Special conditions 1 and 2 of this renewed consent set out a maximum rate of abstraction of 1,400 m^3/hr (approximately 390 l/s) when the flow rate of the Waitara River measured at Bertrand Road is greater than 4,600 l/s. No water is to be taken when the river falls below this level.

Special condition 3 requires the installation and maintenance of a water meter and specifies the technical requirement around this.

Special condition 4 requires the consent holder to avoid, remedy and mitigate any adverse effects as a consequence of exercising the consent.

Special condition 5 requires screening of the intake structure to prevent the entrainment of fish.

Special condition 6 and 7 are lapse and review provisions.

2.2.2 Water discharge permits

Methanex currently holds four consents to discharge water from the Motunui site, as described below.

Consent 0822-2: Discharge of uncontaminated stormwater to an unnamed tributary of the Waihi Stream
Consent 0822-1 expired in March 2012 and a renewal, consent **0822-2** presently provides for the discharge of stormwater from the plant site. This permit was issued by the Council on 29 November 2012 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

The original consent 0822-1 was granted on 25 May 1981 and was due to expire on 12 March 2012.

Special condition 1 of the original consent required that any stormwater originating from process or tankage areas, or areas where the level of contamination or likely contamination is significant, shall be retained in the stormwater holding pond for treatment and discharge via the marine outfall.

In 2005, during the period that the site was not operating, Methanex sought a change in special condition 1 of consent 0822-1. This was to allow for free draining of uncontaminated stormwater from the entire site as the site power was to be isolated and all other services to the site disconnected or decommissioned including the on-site wastewater treatment plant.

The requested change of wording to the condition enabled stormwater from the listed areas to be discharged into the Waihi and other streams but ensured that when the plant was operating again, the stormwater would be treated and discharged via the marine outfall.

With the renewed activity at the plant all stormwater from the processing and tankage area is again controlled in holding ponds and discharged via the marine outfall at Waitara.

Through the renewal of this consent the number of special conditions was reduced from 26 to nine. The pH range was changed from 6.5-9.3 to 6-9.5 following discussions with Council regarding the natural fluctuations of pH. In addition the consent defines the catchment areas for the collection of stormwater as: 240,000 m^2 for the tributary of the Waihi Stream and 294,000 m^2 for the Duck Pond which feeds the Manu Stream.

Special condition 1 requires that the best practicable option is adopted at all times.

Special condition 2 specifies the catchment area.

Special condition 3 requires the maintenance of a contingency plan.

Special condition 4 requires the preparation of a stormwater management plan.

Special condition 5 requires that the constituents of the discharge shall meet certain standards.

Special conditions 6 and 7 place restrictions on changes in water quality of the tributaries of the Waihi Stream or Manu Stream.

Special condition 8 relates to changes in chemical use or processes around the site that could affect the nature of the discharge.

Special condition 9 is a review provision.

Consent 0825-3: Discharge of stormwater from water supply headworks to Waitara River tributary

The original consent (consent 0825-1) granted in 1982, provided for the discharge of up to 2,000 m^3/day of stormwater, including emergency water treatment plant overflow, from a water supply headworks to an unnamed tributary of the Waitara River off the end of Tikorangi Road. The stormwater enters the small tributary via an energy dissipation structure about 50 metres from the river. A new consent was issued on 8 September 1993 for a period until 12 March 2009. That consent was again renewed in March 2008 (consent **0825-3**). It is to be reviewed in 2015 and will expire in 2021. Consent 0825-3 differs from the earlier consent in that it does not limit the volume or rate of water discharged but instead limits the increase in turbidity of the receiving waters to no more than a 50% increase after reasonable mixing.

Special condition 1 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 2 requires that the consent be exercised in accordance with the documentation supplied in support of the application.

Special condition 3 limits an increase in turbidity in receiving waters.

Special condition 4 and 5 are lapse and review provisions.

Consent 0827-3: Discharge of wastewater from water supply headworks to Waitara River tributary

The original consent was granted in 1982 and a new consent was issued on 8 September 1993 for a period until 12 March 2009. Consent 0827-2 provided for the discharge of up to 1,000 m^3/day of wastewater containing settled solids, including solids generated by cleaning a water supply line, from a water supply headworks to an unnamed tributary of the Waitara River off the end of Tikorangi Road. The wastewater enters the small tributary via an energy dissipation structure about 50 metres from the river.

A special condition in consent 0827-2 required that the timing of scouring or cleaning operations coincide with periods of high turbidity in the river. In contrast, the current renewed consent (consent **0827-3**) requires a limit of a 50% increase in turbidity as measured in NTU after a reasonable mixing zone in the receiving waters. The consent was renewed as consent 0827-3 on 31 March 2008 with the intention of a review in 2015 and expiry in 2021.

Special condition 1 limits the maximum daily discharge to 1,000 m^3/day.

Special condition 2 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 3 requires that the consent be exercised in accordance with the documentation supplied in support of the application.

Special condition 4 limits an increase in turbidity in receiving waters.

Special condition 5 is a review provision.

Consent 3400-2: Discharge of plant effluent to Tasman Sea
Coastal consent **3400-2** provided for the discharge of up to 12,096 m^3/day of treated wastewater and stormwater from the manufacture of methanol and synthetic gasoline. The discharge is into the Tasman Sea via a pipeline extending about 1,250 metres off shore from the Waitara River mouth. The maximum rate of discharge is 140 l/s. The previous consent 3400-1 also provided for inclusion of up to 1,000 m^3/year of treated water draw-off from gasoline storage tanks at the Omata tank farm, however this has been removed from the consent 3400-2 granted in 2008.

The consent was varied on 18 July 2012 following problems that year with restricting levels of the bacterium *Legionella* to safe numbers (<10 cfu/100 ml). The variation included a new condition to allow the maximum daily limit of the water treatment chemical 'Spectrus CT1300' to be increased to 40 kg/day if a spike in the numbers of the bacteria *Legionella* is detected. This was to ensure that future outbreaks of *Legionella* could be effectively controlled and also allowed for increased dosing when the Methanol 1 plant was brought online. The variation was granted on 18 July 2012 and the consent is due to expire in June 2021.

Special condition 1 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 2 requires the consent holder to keep records of the volume of effluent and provide these to the Council on a monthly basis.

Special condition 3 limits the volume and rate of the discharge.

Special condition 4 requires a minimum initial dilution factor to be met.

Special condition 5 limits the concentration of suspended solids.

Special condition 6 and 7 require certain water quality parameters to be met.

Special condition 8 limits what water treatment chemicals may be used and their relative dosing limits.

Special conditions 9 to 12 and 14 discuss the requirements of Methanex to advise the Council of any proposed changes in water treatment or cleaning chemicals, or equivalent chemicals, in order that limitations may be placed on their discharge, if necessary, for protection of the receiving waters.

Special condition 13 specifies the sampling point for condition 5, 6, 7 and 8.

Special condition 15 outlines what effects the discharge may not give rise to after a mixing zone of 200 metres.

Special condition 16 requires a contingency plan, to maintained and put into operation in the event of spillage, accidental discharge, or pipeline failure.

Special condition 17 states discharge of domestic sewage is not a permitted activity under this consent.

Special condition 18 requires Methanex to notify the Council at least seven days prior to the consent first being exercised.

Special conditions 19 and 20 require reports to be received from Methanex. Methanex must certify the structural integrity and dilution performance of the outfall at least every five years. An annual report on the performance of the effluent disposal system is also required and must detail compliance with conditions of the consent.

Special conditions 21 and 22 deal with the lapse and the review provisions of the consent.

Other consents to discharge from the Waitara Outfall
Historically consent 3400 was one of several resource consents that provide for the discharge of wastes via the Waitara marine outfall. Methanex had originally planned to have its own marine outfall. The local iwi, Te Atiawa, fought against this decision, and won a change to have the effluent discharged through a renovated joint outfall at the mouth of the Waitara River.

Four separate but contemporaneous consents were granted in October 1989 for a period until 2008. The consents had identical conditions in respect of the outfall itself, contingency plans, annual reports, and investigation and remedy of unauthorised discharges. The conditions on effluent composition differed, except for those relating to the municipal and meatworks effluents, which passed through the same effluent plant.

In recent years, the discharges at the outfall have originated from three sources, these being the two Methanex sites and the WWWTP. The latter was constructed in 1991 and 1992 by NPDC and AFFCO (a meat-works Company which used the outfall until 1997). It is located on Queen Street in Waitara, and was used to treat both domestic and meat-works effluent which had previously been discharged through the outfall with minimal treatment.

In 2007, Methanex applied for replacement consents for the discharge of wastewater to the marine environment via the marine outfall from its Waitara Valley and Motunui Methanol production sites. After researching options, Methanex opted to proactively install its own on-site sewage treatment system for the Waitara Valley plant that enables discharge of the treated effluent to land. In 2011 the system was installed and commissioned and has worked successfully since, with the purified effluent being disposed of directly on-site. Subsequently, Methanex has now voluntarily surrendered consent to discharge sewage from the Waitara Valley plant to the marine environment.

Methanex and NPDC have a joint agreement to oversee the refurbishment and maintenance of the outfall (previously the responsibility of the Waitara Outfall Management Board which was disestablished in 2010). During 1991, the Waitara Outfall Management Board undertook a refurbishment of the outfall to provide a 25 year life period and to improve the initial dilution. This process included the insertion of an impervious plastic liner through the pipeline, improvement of the stability of the pipeline on the seabed, and installation of a new diffuser.

NPDC is now the owner and administrator of the outfall, and Methanex has a contract in place with NPDC for access to discharge through it. NPDC retains responsibility for the maintenance of the outfall.

During the 2013-2014 and early 2014-2015 monitoring periods, NPDC converted the WWWTP to a transfer pump station (and associated pipeline infrastructure) that redirects wastewater to the NPWWTP. The Waitara pump station was commissioned on 15 October 2014. Thereafter the marine outfall was no longer used by NPDC for the regular discharge of treated wastewater. Therefore for the majority of this monitoring period only Methanex holds resource consents to regularly discharge treated process water from its two sites, via the Waitara marine outfall, and the on-going discharge from the Waitara marine outfall presently contains no sewage. NPDC however still holds a consent for the discharge of partially treated municipal sewage, however this consent will only be exercised as a contingency during unusually high volume flows of wastewater such as exceptional stormwater infiltration.

Key discharge consents associated with the Waitara marine outfall are summarised in Table 4 below.

Table 4 Discharges from the Waitara Outfall

	Consent holder	Effluent source	Volume m^3/day	Current status
3397-2	New Plymouth District Council	Treated domestic, minor industrial and stormwater	11,950 (previously 7,258)	This consent will be surrendered upon completion of the redirection of waste to NPWWTP as well as the completion of required compliance monitoring.
7862-1	New Plymouth District Council	Screened and disinfected municipal wastewater	Limited period not volume	The discharge was permitted during conversion of the WWWTP to the Waitara pump station. Since the conversion has occurred, no further discharges under this consent are permitted.
7861-1	New Plymouth District Council	Screened untreated municipal wastewater	Limited period not volume	This consent became active upon the commencement of pumping to the NPWWTP. This discharge is only permitted in the event of high rainfall events when the instantaneous inflow to the Waitara pump station exceeds 280 l/s, or when the inflow to the pump station exceeds 18,800 m^3 in the previous 24-hour period, or when the storage tanks at the Waitara pump station are full and the inflow to the Waitara pump station exceeds the transfer pumping rate of 140 l/s.
3398-2	Anzco Foods Waitara Limited	Treated wastes arising from food manufacturing and associated activities	12,960	As of July 2009, Anzco Foods Waitara Ltd discharge under a trade waste agreement with NPDC. They withdrew their application for consent renewal on 23 July 2010.
3399-2	Methanex Motunui Limited	Methanol plant (Waitara Valley)	5,000	Presently exercise this consent.
3400-2	Methanex Motunui Limited	Methanol plant (Motunui)	12,096	Presently exercise this consent.

The Council reports separately on the results of the compliance monitoring programmes implemented in respect of the outfall (in the New Plymouth District Council Waitara Waste Water Treatment Plant and Marine Outfall Monitoring Programme reports).

2.2.3 Air discharge permits

Methanex holds one air discharge consent for the Motunui site.

Consent 4042-3: Discharges to air from the Motunui methanol plant
Methanex holds air consent **4042-3**, to cover the discharge of emissions to air from activities associated with the production of methanol (and previously gasoline) at the Motunui site.

The Council issued this permit on 23 March 1994 as a resource consent under Section 87(e) of the RMA. A minor variation to remove requirements relating to carbon dioxide emissions was granted on 6 April 2005. It was due to expire on 1 June 2009 but has been renewed, the new consent (4042-**3**) commenced on 12 February 2008 and expires in June 2021.

There are 17 special conditions attached to this consent.

Special condition 1 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 2 requires that the consent be exercised in accordance with the documentation supplied in support of the application.

Special condition 3 requires that emissions are minimised.

Special condition 4 sets out requirements if certain alterations are made to the plant.

Special condition 5 requires that the consent holder commission reports detailing the technology available in regards to minimisation of the adverse effects of the water vapour plume from the cooling tower. These are to be supplied to the Council every five years.

Special condition 6 requires that another report be prepared and supplied to the Council every two years detailing how emissions from the plant may be minimised or mitigated and containing an inventory of these emissions. It also requires that improvements in energy efficiency be detailed in the report.

Special condition 7 to 10 limits the ground level concentrations of methanol, carbon monoxide, and nitrogen dioxide.

Special condition 11 requires that the consent holder compile and maintain an inventory of emissions discharged from the site and include this with the reporting set out in special condition 6.

Special condition 12 restricts offensive or objectionable odour at or beyond the property boundary.

Special condition 13 restricts significant adverse ecological effects.

Special condition 14 – 17 refer to the monitoring, review and lapse of the consent.

2.2.4 Discharge of wastes to land

Methanex currently does not hold any consents to discharge sludge waste onto or into land, all sludge is currently held in purpose-built lagoons for dewatering and later disposed of appropriately to land as permitted by Rule 29 of the Regional Fresh Water Plan for Taranaki (RFWP).

2.3 Results

2.3.1 Site inspections

Site inspections are an important part of the monitoring programme, allowing discussion of Methanex's resource consents and relevant environmental issues. A Council report is written following each site inspection.

Council officers carried out four compliance monitoring site inspections on 21 October 2014, 20 February, 09 April and 22 July 2015 as well as two compliance monitoring sampling visits for the purpose of collecting a split sample on 21 October 2014 and 26 May 2015. The July 2015 inspection is reported on in this report as it was scheduled to occur as a component of the 2014-15 compliance monitoring programme, but was delayed due to internal staff commitments near the end of the financial year. Much of the discussion recorded from that site visit is relevant to compliance matters considered in this report.

The compliance monitoring site inspections considered the chemical dosing systems as well as effluent and stormwater treatment and monitoring systems. The condition of any detectable emissions to air were also noted at each inspection, with particular reference to the cooling tower and the reformer. The methanol storage tank area and oil storage were also inspected during the visits. Methanex no longer has a large waste oil container, instead small waste oil drums and empty drums are stored in the waste oil storage area.

21 October 2014 at 1330hrs
An inspection of both the Motunui and Waitara Valley facilities was undertaken by Council staff, accompanied by Gary Rielly and Ben Lawn (Methanex personnel). The Motunui site was inspected first and the following observations were made:

The sludge ponds were inspected and no issues noted.

Pond 3 has been cleaned out and contained some rainwater, the other ponds still contained some sludge/silt but levels were low and no further action was required.

The stormwater and cooling tower blow down ponds were inspected and no issues were noted. Levels of both ponds were relatively low, water was greenish brown, some gulls and ducks were present.

The effluent outfall auto sampler was inspected and found to be working, the pH was 8.01 and the temperature was 4.0 °C.

The cooling tower was operational, the plume condition was fine and no odours or other effects were noted.

Methanol 1 was inspected and was found to be tidy, with no evidence of any recent spills and no rubbish or debris. All water treatment chemicals were stored securely and bunding was satisfactory.

The discharge point into the Waihi Stream was inspected and found to be okay, there was significant algal cover in the settling pond, the final discharge point was discharging clear water at a moderate flow. The Duck Pond was also inspected and found to be reasonably full, the water was brown and turbid, with a very slight trickle discharge leaving the pond. The maintenance contractors had recently sprayed for gorse and pampas and had sprayed near the stream bed. Methanex staff were advised to talk to the contractors about spraying too close to the bed to avoid any potential impact on water leaving the site.

Overall, the site was well managed and tidy.

20 February 2015 at 1415hrs
An inspection of the Methanex facilities at Motunui and Waitara Valley was conducted by Council staff with Ben Lawn (Methanex). The Motunui site was inspected first and the Waitara Valley plant thereafter. The following observations were recorded at the Motunui plant:

The sludge lagoons were inspected and no issues noted. One lagoon was operational. Sludge was last spread to land in 2014.

The stormwater pond was inspected and it appeared to be in a satisfactory state with a low water level.

The cooling tower blow down pond was relatively full. At the time of inspection Methanex were not pumping to the outfall as they had recorded high pH values. They were recirculating and dosing the pond to address this. The off-spec pond was not in use and contained a low level of rainwater. Methanex staff indicated that it needed to be relined. No non-compliance issues were noted with regards to these ponds.

The effluent outfall auto sampler was inspected and found to be working although the fridge needed to be replaced and was reading 9.4 °C, the pH was 7.24 at 23.4 °C.

The cooling tower was operational and the plume condition was fine with no odours or other effects noted. Methanex staff indicated that maintenance on one tower was presently underway.

At the time of the inspection, Methanol 1 was shut down due to a pipeline leak that had resulted in health and safety concerns for the plant staff. Both plants were briefly looked at while travelling around the site and were found to be tidy, with no evidence of any recent spills and no rubbish or debris. There were no concerns noted with regards to the storage or placement of water treatment chemicals noted during the site visit.

No issues were identified with regards to the methanol storage tank bunds. Methanex staff indicated that these were inspected once a year for structural integrity and that new HSNO requirements involved permeability testing which meant that Methanex

needed to line these bunded areas with HDPE lining. They have scheduled this to occur with one bunded area to be lined per year until completion.

While on site it was noted that one flare pilot was in use, but no flaring was occurring and the other flare was redundant.

The discharge point into the Waihi Stream was inspected and found to be okay, the settling pond appeared stagnant, and there appeared to be no discharge of stormwater to the stream. The Duck Pond was also inspected and found to be reasonably full, the water was brown and turbid, a discharge was not evident at the time of inspection. Due to the low water level, the screening was exposed and there appeared to be some washout of the concrete or substrate between it and the stream bed. This was not of significant concern with regard to potential environmental effects.

Overall, the site was well managed and tidy.

09 April 2015 at 1100hrs
An inspection of the Methanex facilities at Motunui and Waitara Valley was conducted by Council staff with Ben Lawn (Methanex). The Waitara Valley plant was inspected first. The Motunui site was inspected thereafter and the following observations were made:

The sludge lagoons were inspected and no issues noted. The lagoons were relatively empty and there was no evidence of sludge build up along the edges. There were some ducks and plovers present on and around these lagoons.

The stormwater pond was inspected and the pond appeared to be in a satisfactory state with a low water level and no sheen or scum on the edges. The liner was exposed and appeared to be in a good condition. There were a few ducks on this pond.

At the time of inspection a pipe was discharging into the cooling tower blow down pond. There were no issues of concern noted by the inspecting officers. There was no sheen or build up along the edges of the pond although there was some organic foaming and ponding at the baffle. A slight gassy odour was detected.

The off-spec pond was not in use and contained a low level of rainwater. The liner was exposed and according to Methanex staff the liner of this pond is in a compromised condition. A number of gulls were present on and around the off-spec pond and there was no sheen or build up of scum evident. No non-compliance issues were noted with regards to any of these ponds.

The effluent outfall auto sampler was inspected and found to be working. The fridge had been replaced and was reading 5.8 °C, the pH was 7.63.

The cooling tower was operational. Due to the overcast and rainy conditions, the plume condition was not relevant and no odours or other effects were noted. Methanex staff indicated that maintenance on one tower was presently still underway and this would be a long term project. Earlier it had been mentioned that the plant had exceeded its originally anticipated life span of 25 to 30 years and for this reason a number of areas had been inspected and various maintenance was ongoing and necessary around the plants.

Both plants were briefly looked at while progressing around the site and were found to be tidy, with no evidence of any recent spills and no rubbish or debris although due to the wet conditions at the time of the site visit, spills were unlikely to be noticed by inspecting officers. There were no concerns noted with regards to the storage or placement of water treatment chemicals.

No issues were identified with regards to the methanol storage tank bunds. Methanex staff had previously indicated that these were inspected once a year for structural integrity and that new HSNO requirements involved permeability testing which meant that Methanex needed to line these bunded areas with HDPE lining.

There was no flaring occurring while Council officers were on site.

The discharge point into the Waihi Stream was inspected and found to be discharging with a good flow. The ponded water above the discharge point was dark grey. There was no sheen or foaming noted and the boom was clear of obstructions with only a small amount of leaf debris in this area.

The Duck Pond was also inspected and found to be reasonably full, the oil boom was intact and clear of obstructions. The stream was full of weed. The water in the stream appeared to be dark brown coloured, turbid and of minimal flow. No sheen, scum build up or foaming was evident. The screens were intact and the bottom of the screens was not exposed as previously. Methanex staff had investigated the purpose of the screens and it was found that in the past hay bales could be inserted between the screens to act as a filter for the discharge. This function is no longer used.

Overall, the site was well managed and tidy.

22 July 2015 at 0900hrs
An inspection was undertaken of the Methanex facilities at Motunui and Waitara Valley was conducted by Council staff with Gary Rielly and Ben Lawn (Methanex). The weather conditions at the time of the site visit were fine, with a cool southerly breeze. The Motunui site was inspected first and the Waitara Valley plant thereafter.

Council officers discussed the pipeline inspection and maintenance programme with Malcolm Kelsen (Pipeline Integrity Supervisor). Referring to consent 0820-2; special condition 4 (testing and reporting of pipeline integrity), low-pressure stormwater and raw water pipelines are managed under the same guidelines as high-pressure petrochemical pipelines. Routine monitoring includes ground walks, helicopter fly-overs and regular ultrasonic tests. Methanex is currently investigating use of 'intelligent pigging' or cameras to survey water and waste pipeline integrity. The Waitara Valley to Waitara raw water pipeline has been fully checked by camera; while the Motunui to Waitara raw water pipeline has had line walks and ultrasonic testing of vent relief devices. Pressure leak tests of raw water pipeline integrity were not feasible because the results were very subjective, unreliable and problematic; and it is not possible to pinpoint the exact location of the pressure drop (leakage). Methanex has thoroughly investigated options for inspections and is currently working on finding most practical option (e.g. 'intelligent pigging' or flow correlation i.e. flow in/flow out). A practical solution may be to replace the existing Motunui intake structure (Plant 61) flow meter being telemetered back to the Motunui control room.

Sludge lagoons 1 and 2 contained water with between 2 and 3 metres freeboard and neither were discharging. Lagoon 3 was empty. Sludge is spread onto Methanex farmland as required.

The storm pond was inspected and the pond liner was noted to be in good condition. No odour was detected.

The cooling tower blow-down appeared to be in good condition with no issues detected.

As in previous inspections, it was noted that the off spec pond was not in use. A new liner is scheduled to be installed at the end of the year.

The Waihi Stream was in low flow at the time of inspection. It was running clear and uncoloured with an estimated flow rate of 0.5 L/s.

A major refurbishment of the cooling tower was still underway, Cell 1 was complete. Bunds and surrounds were noted to be clear of obstructions. There was found to be no spillage around the Lube oil skids and the area was found to be very tidy.

The Duck Pond was discharging at the time of inspection. The discharge was clean, clear and uncoloured. The sluice grates were clear of obstructions.

The composite sampler (outfall effluent) was inspected and it was noted that pH was 8.34 and the temperature was 3.1 °C.

Methanol storage tanks: The bunds around these tanks were dry. It was noted that all bunds are permeability tested (these bunded areas are to be fitted with an HDPE liner over the next 5 years).

The pilot flare was operating.

No odours were detected around the plant perimeter.

The Methanol production units were inspected. The lube skids were tidy with no spillage. It was noted that stormwater and wastewater drains were clearly marked. Chemical bunding was noted to be in place and drain valves were closed.

Council officers spoke with Methanex staff regarding recent environmental incidents reporting and response procedures. The incident register was sighted. This was from Methanex's global database, and last incident reported on was in regards to the sulphuric acid spill at Waitara Valley methanol plant. The Council are notified of any incidents as part of Methanex's standard operating procedures and investigations are undertaken with further action being followed up on. It was also advised that the health and safety team conduct internal peer-reviews of the incident reports each week. Overall, the site was well managed and tidy.

During this inspection, the Council officers visited site where leak from wastewater pipelines occurred at corner of SH3 (Main Road north) and Pohokura production station entrance (GPS E1710702/N5683045). The leak had been repaired, with no environmental issues considered likely or evident at the site.

Methanex staff agreed to supply the Council with photos taken of the areas inspected. These were received the following day.

Overall site housekeeping had continued to be of a high standard for the monitoring period of July 2014 to June 2015. Methanex staff were cooperative and the site looked to be well managed. There was no evidence noted during the site visits of non-compliance with the Methanex Motunui consents.

2.3.2 Production unit restart programme

The Motunui Methanol 2 production unit was restarted and began to produce methanol in October 2008. Methanol 1 was brought online in July 2012.

During 2013 Methanol 2 was briefly shut down between September and November for maintenance work. Production continued through this time by Methanol 1.

During 2015 Methanol 1 was briefly shut down to address a pipeline leak which had resulted in certain health ands safety concerns.

2.3.3 Surface water

2.3.3.1 Surface water abstraction monitoring by Methanex

Consent 0820-2 to take water from the Waitara River requires abstraction rates of less than 1,400 m^3/hour. All records provided by Methanex for the Motunui abstraction, show rates below the allowable maximum level.

Consent 0820-2 specifies that no water may be taken when the flow of the Waitara River at the Bertrand Road gauging station falls below 4,600 l/s. The Waitara River flow did not fall below this level during the 2014-2015 monitoring period. Appendix III shows the hydrographs for the Waitara River at Bertrand Road for the monitoring period.

Pipeline integrity report
Condition 4 of Consent 0820-2 requires that Methanex undertake testing of the intake to the plant every five years to establish pipeline integrity. This work was due to be completed during 2013. Methanex are presently investigating methods to undertake this effectively without damaging the existing infrastructure. They have remained in regular communication with Council on this matter.

Water use reduction report
The Council received a report from Methanex in December 2014 relating to water use reduction at the Motunui plant during the 2012 and 2013 calendar years. This report is a requirement of condition 4b of Consent 0820-2 (Motunui). It is attached to this compliance monitoring report as Appendix IV.

In their report Methanex recognise both the environmental and economic benefits of reducing their water usage. A number of initiatives were undertaken during the period that was reported on. At Motunui the dearators in both Methanol 1 and Methanol 2 were replaced resulting in significant water use reduction.

Resource Management (Measurement and Reporting of Water Takes) Regulations 2010

During the previous monitoring period, Council officers attended a verification of the accuracy of the Motunui raw water flow meter which confirmed compliance with Resource Management (Measurement and Reporting of Water Takes) Regulations 2010. Methanex staff have been in ongoing discussion with the Council on attaining compliance with the regulations at their facilities.

2.3.3.2 Effluent monitoring

For the majority of the period July 2014 to June 2015 the Motunui plant was operating at full production capacity, with both of its two reformer units operating.

Effluent monitoring data gathered by Methanex was sent to the Council on a monthly basis. The data is made up of continuous online data, laboratory analysis of a 24-hour composite effluent sample and mass discharge of water treatment chemicals calculated by Methanex using chemical consumption data.

Photo 2 The Motunui plant's blow down pond (decommissioned flare 2 can be seen in the background)

Continuous measurement

Flow and pH are measured by online analysers, and recorded continuously. The figures reported to the Council are daily averages (m^3/h), daily maximum (l/s) and daily volume (m^3/day) for flow, and minima, maxima and daily averages for pH. A summary of this data is presented in Table 5.

Table 5 Summary of the Motunui plant's monitoring results of plant effluent during 2014-2015 (Consent 3400-2)

	Unit	Minimum	Maximum	Consent limit	Number of breaches
Continuous measurement					
Flow (daily average)	m^3/day	n/a	7,260	12,096	0
pH	-	6.25	8.95	6-9	0

	Unit	Minimum	Maximum	Consent limit	Number of breaches
Daily measurement					
Chemical oxygen demand	g/m^3	<10	100	200	0
Methanol	g/m^3	<2	<2	15	0
Suspended solids	kg/day	<6	138	500	0
Petroleum hydrocarbons	g/m^3	<1	5	10	0
Monthly measurements					
Copper	g/m^3	<0.05	<0.05	0.50	0
Nickel	g/m^3	<0.02	<0.10	1.00	0
Zinc	g/m^3	<0.10	0.11	1.00	0

A proportional sampler is used to create a daily composite sample representative of the daily flow of plant effluent. This is analysed by the Methanex laboratory, to determine compliance with their discharge consent 3400-2. A summary of this data is included in Table 5 above.

On numerous occasions a visual check of the effluent sample indicated hydrocarbons were present, however subsequent sampling showed that the hydrocarbon concentrations were within consent limits.

Chemical dosing rates

Consent 3400-2 (for discharge of process waste from the Motunui site) sets mass discharge limits on the water treatment chemicals used on the site. Methanex calculates water treatment chemical mass discharge rates using chemical consumption data. A summary of this data for the monitoring period is presented in Table 6.

Table 6 Summary of Motunui chemical discharge data (calculated) for July 2014 to June 2015

Consent 3400-2 (special condition 8)					
Chemical	UNIT	Minimum	Maximum	Average	Consent Limit
Gengard GN8020	kg/day	54	128	95	300
Spectrus BD1500	kg/day	19	32	25	200
Inhibitor AZ8104	kg/day	48	73	58	300
Steamate NA0880	kg/day	3	27	18	40
Cortrol OS 7780	kg/day	24	60	41	400
Optisperse HTP 7330	kg/day	16	66	42	120
Optisperse HTP 73611	kg/day	23	89	37	120
Foamtrol AF2290	kg/day	0	0	0	40
Betz Dearborn AE1115	kg/day	5	31	20	60
Flogard MS6209	kg/day	9	39	21	40
Spectrus CT1300	kg/day	6	20	11	20
Spectrus NX1100	kg/day	0	0	0	50
Klairaid PC 1190P	kg/day	39	97	74	600

There were no breaches in chemical dosing limits during the monitoring period at this site.

Equivalent Chemical
On 1 September 2014 Methanex applied for approval to change one of the water treatment chemicals used in the cooling system at the Methanex Motunui site. This was the most recent of a number of similar applications that have occurred in the past. These changes are necessary as more effective, efficient and safer chemicals become available are adopted by the industry.

Specifically the new application was to supplement the use of Steamate NA0880 with Steamate PAS6074 to perform a new project at the plant. These chemicals are used as pH controllers to reduce steel corrosion. The proposed supplementary chemical was indicated to be essentially the same as the existing chemical with similar functionality. Methanex requested a short term use of the new chemical, which would temporarily change the maximum dose rate from 40 kg/day to 59 kg/day for the trial period only. The consented discharge limit for Steamate NA0880 was 40 kg/day. It was clarified that the limit is based on a 'worst case scenario' whereby 100% of the material dosed into the cooling system is discharged through the Waitara outfall. In actuality, approximately 90% of this chemical is broken down to CO, CO2, H2 and N2 in the reformer unit prior to discharge. Methanex provided information detailing the dosing plan and the theoretical passage of Steamate PAS6074 and NA0880 through the Motunui cooling process. The information provided indicated that if 60 kg/day of Steamate PAS6074 were to be dosed into the system, 54 kg would be reformed to CO, CO2, H2 and N2, leaving 6 kg of Steamate PAS6074 that may end up in the final discharge. The flow at the outfall is approximately 160 m^3/hr; Methanex calculated a maximum concentration of Steamate PAS6074 in the discharge to be 0.002 mg/l (based on 60 kg dose rate).

With reference to condition 11 of Consent 3400-2, Council accepted the assessment that these chemicals were the equivalent of the existing chemicals and no review of conditions on consent 3400-2 was required in respect of the discharge of water treatment chemical Steamate PAS6074. However by the end of the monitoring period, Methanex had not undertaken the project requiring the new chemical and subsequently they have advised the Council that this project was never commissioned and therefore the replacement was no longer required. Hence Methanex is maintaining their original use of Steamate NA0880.

Marine outfall report
A five-yearly report on the structural integrity of the Waitara marine outfall was received from Methanex on 3 February 2014. This is a requirement of special condition 19 of Consent 3400-2. OCEL consultants have been contracted by NPDC (who retain responsibility for maintenance of this structure) to inspect and maintain the structure. Significant maintenance of the structure took place in 2012 and 2013 following the OCEL report finding various potential risks associated with the structural integrity of the outfall and its ability to resist the impact of a 100 year environmental event. Work undertaken to address the issues has included the removal of tube worm growth and the replacement of tie-down straps. A modelling exercise was carried out to determine the dilution performance of the outfall which was found to be within compliance limits as per special condition 4 of Consent 3400-2. The next report will be due in 2019.

Contingency plan
In accordance with consent 3400-2 and 0822-2, Methanex is required to maintain a comprehensive contingency plan for the Motunui site, which would be put into

operation in the event of spillages, accidental discharges or pipeline failure. Methanex provided a revised plan including a 'Specific Response Procedure', a 'Notification of Environmental Exceedances Procedure', and a 'Reporting of Environmental Exceedances Procedure' for the Motunui plant in November 2009. These spill contingency planning documents were found to be satisfactory. Consent 3400-2 requires revision of the spill contingency planning every two years. Methanex provided a revision of their contingency plan in June 2010 and May 2012. The 2014 contingency plan was received by the Council in September 2014. This contingency plan was reviewed by Council officers and found to be satisfactory.

2.3.3.3 Uncontaminated stormwater

Stormwater outlets for uncontaminated stormwater are situated in the Waihi catchment on the eastern side of the plant and at the sea cliff via the Duck Pond on the northern side of the plant (Figure 1).

Photo 3 The Duck Pond sampling point at the Motunui plant

Photo 4 The Waihi stream sampling point at the Motunui plant

Weekly grab samples of the stormwater discharges were taken and analysed for four water quality characteristics by Methanex staff. The values of these four parameters provide an indicator as to whether or not the discharge was contaminated. The results of the Methanex stormwater monitoring for July 2014 to June 2015 are summarised in Table 7 below.

Table 7 Summary of Motunui stormwater monitoring data for 2014-2015

Consent 0822-2					
Parameter	**Unit**	**Minimum**	**Maximum**	**Average***	**Consent limit** ***Guideline***
Duck Pond (photo 1)					
pH	**-**	6.50	7.70	7.14	**6 - 9.5**
Petroleum hydrocarbons	**g/m^3**	N/A	0	N/A	**<5**
Conductivity at 25°C	**µs/cm**	69.0	132.0	101.3	***300 max****
Total suspended solids	**g/m^3**	<6	70.0	9.0	**100 max**
Visual hydrocarbons	**# Pass / # Fail**	Tests passed: All	Tests failed: 0	----	**PASS**
Waihi Stream (photo 2)					
pH	**-**	6.30	**10.40**	6.79	**6 - 9.5**
Petroleum hydrocarbons	**g/m^3**	N/A	0	N/A	**<5**
Conductivity at 25°C	**µs/cm**	47.00	**314.00**	181.87	***300 max****
Total suspended solids	**g/m^3**	<6.00	42.00	2.09	**100 max**
Visual hydrocarbons	**# Pass / # Fail**	Tests passed: All	Tests failed: 0	----	**PASS**

Numbers presented as less than a number are divided in half for averages.
* Guideline value, not a consent requirement.

Duck Pond discharge
The quality of the stormwater discharge from the Duck Pond was well within the agreed guideline or consent limit for uncontaminated stormwater on each monitoring occasion.

Waihi Stream
With the exception of one pH value, the water samples analysed from the Waihi Stream monitoring site were well within agreed limits required by the consent. Methanex reported the high pH value to the Council and suggested that it may be attributed to natural fluctuations due to algal proliferation in the stream. The stream is located in a relatively small catchment and at the time was at low flow. Following advice from the Council, Methanex tested the discharge for alkalinity and found these values to be typical. The Council was satisfied that the high pH was likely due to natural events and not as a result of Methanex's activities.

Moderately high conductivity readings (exceeding the guide of 300 µS/cm) for the Waihi Stream were noted on occasion. These exceedances were relatively insignificant and Consent 0822-1 does not set a limit for conductivity. Previously Methanex initiated

an investigation programme which included setting up four monitoring boreholes around underground sumps to monitor groundwater quality.

2.3.3.4 Inter-laboratory comparisons

On two occasions during the monitoring period, the Council carried out inter-laboratory comparisons on both the composite outfall sample and the plant stormwater. The results of the inter-laboratory comparisons, which also serve the purpose of compliance monitoring checks, are shown in Table 8 and Table 9. Results from both laboratories for the Motunui effluent samples met the consent limits during the monitoring period. A comparison of the laboratory results showed there were some minor variation in values determined by the laboratories, these discrepancies were considered to be within a reasonable range and therefore presented no cause for concern.

Table 8 Inter-laboratory comparison of Motunui outfall composite sample results

Motunui Outfall - IND003005 (Consent 3400-2)						
Parameter Unit		**Consent limits**	**21 October 2014**		**26 May 2015**	
			Methanex	**TRC**	**Methanex**	**TRC**
Ammonia as N	mg/l		<0.1	0.097	0.9	0.824
Chemical oxygen demand	mg/l	200	29	20	19	24
Conductivity @ 25 °C	µs/cm		1750	1738	1180	1177
Copper	mg/l	0.5	<0.05	0.01	<0.05	0.02
Methanol	mg/l	15	<2	<1	<2	<1
Nickel	mg/l	1.0	<0.10	<0.02	<0.1	<0.02
pH		6.0-9.0	8	7.8	7.5	7.5
Total hydrocarbons	mg/l	10	<1	<0.5	<1	0.8
Total suspended solids	mg/l	daily discharge <500kg	<6	3	10	4
Zinc	mg/l	1.0	<0.1	0.064	<0.1	0.073
Turbidity	NTU		2.2	1.4	4.3	2.5

Table 9 Results of Motunui stormwater inter-laboratory comparison between Methanex and the Council

Motunui plant stormwater (Consent 0822-2)						
Parameter	**Unit**	**Consent limits**	**Duck Pond**		**Waihi Stream**	
			Methanex	**TRC**	**Methanex**	**TRC**
21 October 2014						
Ammonia as N	mg/l		<0.1	0.004	<0.1	0.147
Conductivity @ 25ºC	µs/cm	300*	109	103.4	233	226.6
Copper	mg/l		<0.05		<0.05	<0.01
Nickel	mg/l				<0.10	<0.02
pH		6.0-9.5	7.2	7.3	6.4	6.5
Total hydrocarbons	mg/l	5	<1	<0.5	<1	<0.5
Total suspended solids	mg/l	100	7	6	<6	<2
Zinc	mg/l		<0.1	0.012	<0.1	0.087
Turbidity	NTU		7.5	7.2	1.1	0.64
Zinc filtered	mg/l			0.010	<0.1	0.084
26 May 2015						
Ammonia as N	mg/l		0.3	0.165	<0.1	0.05
Conductivity @ 25ºC	µs/cm	300*	127	126.5	269	264
Copper	mg/l		<0.05	<0.01	<0.05	<0.01

Motunui plant stormwater (Consent 0822-2)						
Parameter	**Unit**	**Consent limits**	**Duck Pond**		**Waihi Stream**	
			Methanex	**TRC**	**Methanex**	**TRC**
Nickel	mg/l			<0.02	<0.10	<0.02
pH		6.0-9.5	6.9	6.9	6.4	6.6
Total hydrocarbons	mg/l	5	<1	<0.5	<1	<0.5
Total suspended solids	mg/l	100	12	8	7	<2
Zinc	mg/l		<0.10	0.041	<0.10	0.04
Turbidity	NTU		5.9	5	0.86	0.42
Zinc filtered	mg/l			0.021	<0.10	0.041

* Not a consent limit, but a guideline limit

Results from each laboratory for stormwater discharges met the consented water quality criteria on all occasions.

Overall there was good agreement between the inter-laboratory analytical sample results.

2.3.3.5 Methanex Motunui annual report

Condition 20 of consent 3400-2 requires Methanex to provide the Council with an annual report on its wastewater treatment and disposal system, including monitoring results of the discharge and compliance with the consent.

Annual reports for July 2014 to June 2015 were received by Council via monthly reports, and fulfil this consent requirement. In addition to this Methanex provided an annual summary report for the 2013 and 2014 calendar year. These were received in December 2014 and April 2015 respectively.

2.3.4 Air

2.3.4.1 Inspections

During the monitoring period the Council did not receive any complaints regarding odour or other discharges to air from neighbours. No effects on the receiving environment beyond the plant perimeter were detected during any of the site inspections.

2.3.4.2 Consent requirements

Plume abatement report
Condition 5 of resource consent 4042-3 required a report, outlining options for reducing the adverse effects of the cooling tower plume. The consent specified that these reports should be provided in February 2009 and every five years thereafter. The most recent report was received in October 2014.

The report was produced by Worley Parsons and considered two options, retrofitting of an additional structure (a helper cooling tower) or the replacement of the cooling tower. The report also suggested a review of the winter operational practices to reduce the occurrence and size of the visible plume. The report is included as Appendix V.

Methanex reviewed the report and discussed the findings with Council officers at the time. The additional power usage for pursuing the new options and the likely environmental and economic costs/benefits relative to these or the status quo were considered. As a result Methanex will remain with the status quo, but have signalled that they remain open to reconsider these options should appropriate justification arise.

Biennial air emissions report
Condition 6 of consent 4042-3 requires Methanex to provide the Council with a biennial report on its air emissions, including a revision of any technological advances in the reduction or mitigation of emissions, a detailed inventory of emissions (excluding carbon dioxide), outlining any energy efficiency measures, and addressing any other issues relevant to minimisation or mitigation of emissions.

A biennial report covering the period 2012 to 2013 was received in April 2015. This report was received later than it should have been (due in mid 2014). The report is included as Appendix VI.

Methanex reported that they had not identified any new technological advances that could reduce emissions while being commercially viable. The results of perimeter monitoring contained in the report indicated the measured emissions were well within the consent requirements. It was also reported that energy efficiency was continuously improved and that it was related to operating costs which provided additional incentive to minimise energy use around the plant.

The next biennial report is expected in 2016 and will be discussed in the 2015-2016 compliance monitoring report.

2.3.5 Soil

Methanex no longer holds any consent to discharge contaminants to land. Historically Methanex held a consent (ref. 4907-1) to dispose of approximately 2,000 tonnes of river silt/sludge annually. The majority of the disposal area was sold to Shell Todd Oil Services, and a partial transfer of the consent occurred in 2004. In November 2007 the Council received (and subsequently granted) an application for surrender of the consent.

Presently the sludge lagoons collect river silt that has been backwashed from the clarifiers. In time this silt will be spread to land belonging to Methanex as permitted by Rule 29 of the RFWP.

2.3.6 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council for example provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance

with consents, which may damage the environment. The Incident Register (IR) includes events where the Company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In 2014-2015 there was one non-compliant event recorded by Council that was associated with Methanex's Motunui plant.

Discharge of treated wastewater to Land (Incident IN/31970)
On 02 June 2015 Methanex reported that they had identified a wet area in a paddock adjacent (southwest side) to the Motunui plant. At the time they indicated that they thought it was possibly as a result of a burst treated wastewater pipeline from the Methanex Motunui plant. Investigation undertaken by the consent holder found that the discharge was as a result of a leaking wastewater pipeline which extends to the Waitara marine outfall. The wet area was initially noticed during the completion of other work in the area. The leak was not entering any waterways and the wastewater composition was at normal, with potential contaminants at low or non-detectable levels. Methanex undertook work to repair the pipeline. The pipe was repaired and there were no likely adverse environmental effects.

Due to the age of the pipelines and the plants themselves, Methanex have been undertaking significant maintenance and upgrades of this and other infrastructure associated with their operations at Motunui and Waitara Valley.

2.4 Discussion

2.4.1 Discussion of plant performance

Previous high standards of housekeeping were apparent at all inspections undertaken on site at the Motunui plant. The Motunui plant is presently running at full capacity for the site. Maintenance and improvements of the site have been undertaken during the period under review.

Methanex continued to manage activities allowed by the consents it holds for the site well within consent limits over this monitoring period. Methanex has a current contingency plan with respect to the operation of the wastewater consent at the Motunui site. Methanex maintains comprehensive spill contingency equipment on site, and personnel are trained with respect to spill response.

Production related emissions to air from the site continued during the period under review. No consent non-compliances were noted and no complaints were received regarding flaring or the cooling tower plumes.

2.5 Environmental effects of exercise of consents

2.5.1 Environmental effects of exercise of water abstraction permits

The Motunui consent allows for a water take of 1,400 m^3/hr, but typically the water take is much lower, in the range of 500 – 1,100 m^3/hr. This is due to the water reduction initiatives instigated by Methanex and the fact that at certain stages only one of the two reforming units was being run.

2.5.2 Environmental effects of exercise of water discharge permits

Methanex staff continued to provide the Council with monthly monitoring data. The parameters measured were all within consented limits for the water discharge consents held.

Inter-laboratory comparisons between the Council and Methanex laboratories showed good and reasonable agreement of results.

2.5.3 Environmental effects of exercise of air discharge permits

The controls in place to minimise and mitigate the safety risks to operators onsite of air pollution also ensure that there is a low likelihood of adverse environmental effects offsite. Modelling of air emissions when the plant was at full capacity in 2001 has shown emissions levels far below consent limits which are set in line with National Environmental Air Quality Standards.

Neighbourhood effects
No offensive or objectionable odours were noted at the site boundary during any site visit undertaking by Council staff. Furthermore the Council has not received any specific complaints regarding the cooling tower plume through the monitoring period under review.

Ecological effects
No adverse environmental effects were detected during the period under review.

2.6 Evaluation of performance

A tabular summary of Methanex's compliance record under its current active consents for the year under review is set out in Table 10 to Table 15.

Table 10 Summary of performance for Consent 0820-2

Purpose: ***To take water from Waitara River***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. The volume taken shall not exceed 1,400 m^3 /hr.	Daily maximum flow rates provided monthly.	Yes
2. The taking of water is managed to ensure that river flow no less than 4,600 l/s.	Continuous gauging at Bertrand Road.	Yes
3. Installation and maintenance of a water meter for water take data.	Monthly data reports provided.	Yes
4. Water conservation measures – incl. five-yearly testing of pipeline integrity and two-yearly report on water conservation.	Water conservation reports received December 2014. Pipeline testing is due, however Methanex and Council have been in discussion on how best to achieve this.	Water conservation report received Pipeline testing report on hold through discussion with Council
5. Appropriate screening of intake structure to prevent fish entrainment.	Inspection.	Not monitored during this monitoring year
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 11 Summary of performance for Consent 0822-2

Purpose: ***To discharge of stormwater from outfalls into Waihi and Manu Streams***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise effects.	Inspection and liaison with consent holder.	Yes
2. Limitation on stormwater catchment area – specific to application refer to drawing g10637.	Inspection and liaison with consent holder.	Yes
3. Contingency plan to be maintained and followed in event of a spill. Contingency plan to be supplied to the Council.	Contingency plan received and reviewed in December 2014.	Yes
4. Stormwater management plan to be maintained. To be supplied to the Council and approved.	Stormwater management plan received and reviewed.	Yes

Purpose: *To discharge of stormwater from outfalls into Waihi and Manu Streams*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Discharge sample analysis. Sampling to occur from a point prior to entry to Duck Pond. Analysed for pH, SS and total recoverable hydrocarbons.	Sample analysis results received. All within consent limits.	Yes
6. Manu Stream: Discharge cannot cause specified adverse effects beyond mixing zone.	Inspection – observation. Receiving water sample analysis.	Yes
7. Waihi Stream: Discharge cannot cause specified adverse effects beyond mixing zone.	Inspection – observation. Receiving water sample analysis.	Yes
8. The Council is to be notified of any changes that may affect the nature of the discharge.	No notification received.	Yes
9. Review of consent.	Next scheduled in June 2021	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 12 Summary of performance for Consent 0825-3

Purpose: *To discharge of stormwater from Motunui intake facility into Waitara River unnamed tributary*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option to prevent and minimise adverse effects.	Discussion with consent holder.	Yes
2. Activity undertaken in accordance with application documentation.	Liaison with consent holder.	Yes
3. Discharge cannot cause specified increase in turbidity in Waitara River beyond the mixing zone.	Liaison with consent holder.	Yes
4. Lapse of consent.	Consent given affect to.	N/A
5. Review of consent.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 13 Summary of performance for Consent 0827-3

Purpose: ***To discharge of wastewater into Waitara River unnamed tributary***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Maximum daily discharge shall not exceed 1,000m^3/day.	Liaison with consent holder.	Yes
2. Adoption of best practicable option.	Ongoing liaison with consent holder.	Yes
3. Activity undertaken in accordance with application documentation.	Liaison with consent holder.	Yes
4. Discharge cannot cause specified adverse effects on turbidity in Waitara River beyond the mixing zone.	No incidents reported. Liaison with consent holder.	Yes
5. Review of consent.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 14 Summary of performance for Consent 3400-2

Purpose: ***To discharge of effluent and stormwater into Tasman Sea***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Consent holder to adopt best practicable option to prevent or minimise adverse effects.	Inspections, liaison and review of reported data.	Yes
2. Consent holder to maintain a record of the volume of effluent discharged each day.	Monthly reports provided.	Yes
3. Maximum daily discharge 12,096 m^3/day, 140 l/s.	Monthly reports received.	Yes
4. Minimum initial dilution of effluent 100:1.	Outfall designed to specific design. Modelling exercise was undertaken and reported with the five-yearly marine outfall report received in February 2014.	Yes
5. Maximum daily discharge of suspended solids 500 kg.	Review of analytical information provided in self-monitoring data and inter-laboratory comparison.	Yes
6. pH not to exceed range of 6 to 9.	Review of analytical information provided in self-monitoring data and inter-laboratory comparison.	Yes
7. Limits on concentration of COD, hydrocarbons, methanol, copper, nickel, zinc.	Review of analytical information provided in self-monitoring data and inter-laboratory comparison.	Yes
8. Allowable water treatment chemicals	Liaison with consent holder and inspections.	Yes

Purpose: *To discharge of effluent and stormwater into Tasman Sea*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
and volumes.		
9. Maximum daily limit of treatment with Spectrus CT1300 in response to *Legionella*.	Liaison with consent holder and consent holder reports. Variation granted July 2012 for increase in 'Spectrus CT1300' chemical. This condition was not exercised.	N/A
10. Approval from the Council required to discharge 'equivalent' chemical.	Permission for approval to replace/trial Steamate NA0880 with Steamate PAS6074 applied for 1 September 2014 and granted 23 September 2014.	Yes
11. Definition of 'equivalent'.	N/A	N/A
12. Discharge of equivalent chemical requires written request.	Not required.	N/A
13. Conditions 5,6,7 and 8 apply to effluent prior to entry into outfall line.	Monitoring and sampling carried out with regard to this requirement.	N/A
14. Limits in conditions 7 and 8 apply unless the Council has given approval for a short term change.	Not required.	N/A
15. Effects on receiving waters.	Marine ecological surveys (separate programme).	Yes
16. Consent holder to maintain contingency plan.	Contingency plans provided September 2014 and reviewed as satisfactory.	Yes
17. No domestic sewage in discharge.	Liaison with consent holder. Domestic sewage is routed to the WWTP, not directly to the outfall.	Yes
18. Consent holder to notify the Council at least seven days before consent is first exercised.	Notification on file.	Yes
19. Consent holder to certify the structural integrity and dilution performance of outfall at least every five years.	Received a report satisfying this requirement.	Yes
20. Consent holder to supply an annual effluent report by 31 March each year.	Reports received monthly and reviewed as satisfactory.	Yes
21. Lapse of consent.	Consent given affect to.	N/A
22. Review of consent.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 15 Summary of performance for Consent 4042-3

Purpose: ***To discharge emissions into the air – methanol distillation and ancillary facilities***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse effects.	Inspection and liaison with consent holder.	Yes
2. Minimisation of emissions through control of processes.	Inspection and liaison with consent holder.	Yes
3. Consultation and approvals required prior to alterations to plant or processes.	Inspection and liaison found no alterations to plant or processes requiring additional approvals.	Yes
4. Provision of a report on cooling tower plume abatement.	Report received October 2014. Next report expected in 2019.	Yes
5. Biennial written air discharge emission and mitigation reports.	Received April 2015 (report was overdue). Next report expected in 2016.	No – Report overdue
6. Maximum ground-level concentrations of methanol beyond site boundary.	Previous modelling has shown compliance when plant in full operation.	Yes
7. Maximum ground-level concentrations of carbon monoxide beyond boundary.	Previous modelling has shown compliance when plant in full operation.	Yes
8. Maximum ground-level concentrations of nitrogen dioxide beyond boundary.	Previous modelling has shown compliance when plant in full operation.	Yes
9. Maximum ground-level concentrations of other contaminants beyond boundary.	Previous modelling has shown compliance when plant in full operation.	Yes
10. Inventory of emissions to be provided with biennial emission mitigation report.	Received April 2015.	Yes
11. No offensive or objectionable odour at the plant boundary permitted.	Inspection.	Yes
12. Adverse effects on ecosystems not permitted.	Inspection of surrounding environment found no adverse effects.	Yes
13. Optional review provision – notification within 6 months of receiving report (condition 5).	Consent was reviewed as part of the renewal process – 4042-3, granted 12 February 2008.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

N/A = not applicable

In assessing a compliance and environmental performance ranking for Methanex, consideration was also given to the incidents that occurred during the monitoring period. Therefore during the period, Methanex demonstrated good level of environmental performance and compliance with the resource consents for the Motunui installation as defined in Section 1.1.4. This rating would have been an overall high level of environmental performance if solely considering compliance with their consents. The overall administrational performance was high.

2.7 Recommendations from the 2013-2014 Report

In the 2013-2014 Report it was recommended:

1. THAT monitoring of water abstractions from the Methanex Motunui Plant in the 2014-2015 year continue at the same level as in 2013-2014.
2. THAT monitoring of water discharges from the Methanex Motunui Plant in the 2014-2015 year continue at the same level as in 2013-2014.
3. THAT monitoring of air emissions from the Methanex Motunui Plant in the 2014-2015 year continue at the same level as in 2013-2014.
4. THAT the Council considers whether or not the current water meter location is acceptable.
5. THAT Methanex continue with discussions with Council staff on the required testing to establish water intake pipeline integrity at intervals of at least every five years and that this either result in the undertaking of the required testing or a variation of consent conditions.
6. THAT the option of a review of the Methanex Motunui plant resource consents in June 2015, not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

Recommendation 1, 2, 3 and 6 were fully implemented in the monitoring period.

Communication between Methanex and the Council has been on-going in relation to the location and verification of the water meters.

There has been ongoing discussion and investigation between Methanex and the Council staff with regard to the five yearly water intake pipe integrity report. There are some complexities in determining the best method to undertake the required testing without damaging the existing infrastructure.

2.8 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, its obligations to monitor emissions/discharges and effects under the RMA, and report to the regional community. The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

The compliance monitoring programme for 2014-2015 was essentially unchanged from that for 2013-2014, on the grounds that the Methanex Motunui plant has maintained a high level of environmental performance (with the exclusion of incidents) and the existing monitoring programme was adequate to provide sufficient data to assess environmental performance. It is now proposed that for 2015-2016, the programme be maintained at the same level as the programme for 2014-2015.

A recommendation to this effect is attached to this report.

2.9 Recommendations

1. THAT monitoring of water abstractions from the Methanex Motunui Plant in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT monitoring of water discharges from the Methanex Motunui Plant in the 2015-2016 year continue at the same level as in 2014-2015.
3. THAT monitoring of air emissions from the Methanex Motunui Plant in the 2015-2016 year continue at the same level as in 2014-2015.
4. THAT the Council considers whether or not the current water meter location is acceptable.
5. THAT Methanex continue with investigations on the required testing to establish water intake pipeline integrity at intervals of at least every five years and that this either result in the undertaking of the required testing or a variation of consent conditions.

3. Waitara Valley

3.1 Process description

The Waitara Valley plant had been shut down since 2008 and was restarted in October 2013 following significant maintenance and refurbishment work.

The Waitara Valley plant (Photo 3) is a 1,500 tonne/day methanol production facility, which could produce 900,000 tonnes/year of chemical grade methanol. Actual production varies with the availability of natural gas.

Methanex Waitara Valley plant is divided into several discrete areas associated with the on site production of methanol (Figure 3).

The processing area includes the reformer, main compressor, and the distillation units (D1 & D2). The distillation towers are the tallest structures on the site at 51.5 metres, followed by the reformer stack at 38 metres. Product storage area consists of one substantial storage tank and six smaller tanks. A cooling tower and the main servicing facilities are located in the utility area. It is noted that the cooling tower technology in place at the Waitara Valley plant differs from the system used at the Motunui plant and the cooling tower is considerably smaller in size.

Photo 3 Methanex Waitara Valley site

Figure 3 Waitara Valley site layout and water sampling site location

3.1.1 Water discharges

There were various sources of wastewater from processes associated with the methanol manufacturing activities at the site, including water treatment wastes, boiler, cooling tower and other blowdowns, process effluents, domestic effluent and stormwater. The primary sources of water discharges, and the main features of the site are identified in Figure 3. This effluent is produced in a similar manner to that described in this report for the Motunui site (refer to section 2. 1. 1. of this report).

The Waitara marine outfall is the primary method used to dispose of stormwater and wastewater from the site.

Discharges to the Waitara River now occur very infrequently and only after consultation with Council. A small area of the site in the vicinity of the ponds and domestic wastewater treatment area flows overland to a small tributary of the river. A diesel tank in this higher risk area is bunded, and the sump under the diesel tank is sampled and tested prior to discharge.

3.1.2 Emissions to air

The principal emissions from the site were:

a) flue gases from the reformer furnace stack. These comprise typical products from the combustion of natural gas i.e. nitrogen, water vapour, oxygen, carbon dioxide, and traces of nitrogen oxides and carbon monoxide;
b) flue gases from the boiler stacks, which were similar to the above;
c) steam emissions from various vents;
d) water vapour and water droplets from the cooling tower, which could contain entrained water salts and treatment chemicals; and
e) organic vapours (particularly methanol) from the distillation column vents.

3.1.3 Solid wastes

Solid wastes were previously generated at the site. The main source of this was sludge from the ponds. When the ponds were de-sludged, the material was allowed to dry on-site and tested so that the appropriate method of disposal could be determined.

The Waitara Valley plant was restarted the previous year following a long dormant period and therefore little solid wastes have been generated onsite.

3.2 Resource consents

Methanex holds five active resource consents (excluding renewals) for the operation of the Waitara Valley plant. A summary of the requirements imposed by each of the consents is provided in Sections 3.2.1 to 3.2.4 and copies of the resource consents are included in Appendix II.

A summary list of the consents held by Methanex in relation to the Waitara Valley plant is given in Table 17.

The early consents were granted to Petralgas Chemicals NZ Limited. In May 1993, the Company was changed to Methanex Waitara Valley Limited, following the merger of

Fletcher Challenge Methanol and Methanex Corporation Canada. The consents were transferred under the name of Methanex Motunui Limited in 2005.

Table 16 Consents held in relation to the Waitara Valley plant, July 2014 – June 2015

Consent	Purpose	Volume (m^3/day)	Review date	Expiry date
0801-2	Water take from Waitara River for the Waitara Valley petrochemical plant	7,200	Jun 2015	Jun 2021
0802-2	Discharge stormwater from the Waitara Valley plant to the Waitara River	-	Jun 2015	Jun 2021
3399-2	Discharge treated wastewater and stormwater to Tasman Sea	5,000	Jun 2015	Jun 2021
3960-2	Construct rock groyne in Waitara River	-	Jun 2015	Jun 2021
4045-3	Discharge to air from methanol plant	-	Jun 2015	Jun 2021

3.2.1 Water abstraction permits

Methanex holds one resource consent to abstract water for the Waitara Valley petrochemical plant as described below:

Consent 0801-2: Abstraction from the Waitara River
Methanex holds water consent **0801-2** to cover the abstraction at two points upstream of the methanol plant. The original permit was issued by the Council on 23 July 1980 under Section 87(d) of the RMA. It was due to expire in May 2008 and renewed as consent 0801-2 on 29 April 2008. This consent will expire in June 2021.

There are eight special conditions attached to this consent.

Special conditions 1 and 3 set out a maximum rate of abstraction of 300 m^3/hr (approximately 83 l/s) when the flow rate of the Waitara River measured at Bertrand Road is greater than 4,600 l/s. No water is to be taken when the river falls below this level.

Special condition 2 requires that the consent holder must maximise the water take from the Motunui intake structure and minimise that taken from the old Waitara Valley intake.

Special condition 4 requires the installation and maintenance of a water meter and specifies the technical requirement around this. This condition specifies the format and frequency at which the water abstraction records are to be forwarded to the Council.

Special condition 5 requires the consent holder to avoid, remedy and mitigate and adverse effects as a consequence of exercising the consent. This includes five yearly testing and reporting of the pipeline integrity between the plant and take as well as the provision of a two yearly report on water use reduction programmes.
Special condition 6 requires screening of the intake structure to prevent the entrainment of fish.

Special condition 7 and 8 are lapse and review provisions.

3.2.2 Land use permit

3960-2: Rock groyne in Waitara River
Methanex holds land use permit **3960-2** which provides for the construction of a rock groyne in the Waitara River to control against river bed degradation in the vicinity of the water intake structure. This permit was issued by the Council on 23 September 1991 under Section 87(e) of the RMA. It was due to expire on 1 June 2003. The consent was renewed on 14 May 2003 and is due to expire on 1 June 2021. There are three special conditions attached to the consent.

Special condition 1 requires that the consent holder notify the Council prior to undertaking maintenance that may impact on the bed of the river.

Special condition 2 requires that when the structures are no longer required, they be removed and the area reinstated, and that the Council must be notified prior to their removal.

Special condition 3 provides for a review of the consent to be undertaken in June 2015. The consent is due to expire on 1 June 2021.

3.2.3 Water discharge permits

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

Methanex currently holds two consents to discharge water from the Waitara Valley site, as described below.

Consent 0802-2: Discharge of uncontaminated stormwater to the Waitara River
The original discharge permit (consent 0802-1) was granted by the Council on 25 May 1981 under Section 87(e) of the RMA. That consent expired in June 2008. The renewed consent (consent **0802-2**) presently provides for the discharge of stormwater to the Waitara River from the Waitara Valley plant and is due to expire in June 2021.

There are seven special conditions attached to this consent:

Special condition 1 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 2 requires that the consent be exercised in accordance with the documentation supplied in support of the application.

Special condition 3 requires that the consent holder test the levels of contaminants in the stormwater prior to discharge and report these to Council.

Special condition 4 limits the concentration of certain analytes in the discharge and specifies the pH range.

Special condition 5 require certain water quality parameters to be met downstream of the discharge point and mixing zone.

Special conditions 6 and 7 relate to the lapse and review provisions of the consent.

Consent 3399-2: Discharge of plant effluent to Tasman Sea
Methanex holds coastal discharge consent **3399-2** to cover the discharge of treated wastes, including process and water treatment wastes and domestic sewage, and contaminated stormwater from the Waitara Valley plant into the Tasman Sea. The discharge occurs via the Waitara marine outfall which discharges approximately 1,250 metres offshore from the Waitara River mouth. This consent was granted by the Council on 11 October 1989 under Section 87(e) of the RMA with an expiry date in May 2008. The renewed consent (consent 3399-2) presently provided for the discharge of up to 5,000 m^3/day, with a maximum discharge rate of 60 l/s.

There are 20 special conditions attached to this consent:

Special condition 1 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 2 requires the consent holder to keep records of the volume of effluent and provide these to the Council on a monthly basis.

Special condition 3 limits the volume and rate of the discharge.

Special condition 4 requires a minimum initial dilution factor to be met.

Special condition 5 limits the concentration of suspended solids.

Special condition 6 and 7 require certain water quality parameters to be met.

Special condition 8 limits what water treatment chemicals may be used and their relative dosing limits.

Special conditions 9 to 11 and 13 discuss the requirements of Methanex to advise the Council of any proposed changes in water treatment or cleaning chemicals, or equivalent chemicals, in order that limitations may be placed on their discharge, if necessary, for protection of the receiving waters.

Special condition 12 specifies the sampling point for condition 5, 6, 7 and 8.

Special condition 14 outlines what effects the discharge may not give rise to after a mixing zone of 200 metres.

Special condition 15 requires a contingency plan, to maintained and put into operation in the event of spillage, accidental discharge, or pipeline failure. The plan is to be provided to Council initially after the granting of the consent and reviewed by the consent holder thereafter on a two yearly basis.

Special condition 16 specifies that the discharge of domestic sewage (human effluent) will not be permitted following the closure of the Waitara municipal WWTP.

Special conditions 17 and 18 require reports to be received from Methanex. Methanex must certify the structural integrity and dilution performance of the outfall at least

every five years. An annual report on the performance of the effluent disposal system is also required and must detail compliance with conditions of the consent.

Special conditions 19 and 20 relate to the lapse and review provisions of the consent.

Since 2011, Methanex implemented an onsite sewage treatment system, which discharges as treated water to grass on site.

3.2.4 Air discharge permit

Methanex holds one discharge consent for the Waitara Valley site.

Consent 4045-3: Discharges to air from the Waitara Valley methanol plant
Methanex holds air discharge consent **4045-3**, to cover the discharge of emissions from combustion and other activities associated with the production of methanol at the Waitara Valley plant.

The Council issued this permit on 6 December 1995 as a resource consent under Section 87(e) of the RMA. A minor variation to remove requirements relating to carbon dioxide emissions was granted on 6 April 2005. The consent was due to expire on 1 June 2008 but has been renewed as consent 4045-3, granted in April 2008 and is now due to expire in June 2021.

There are 14 special conditions attached to this consent.

Special condition 1 requires that the consent holder adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special condition 2 requires the consent holder to operate all plant and processes to keep emissions to a practical minimum.

Special condition 3 specifies that the consent holder must notify the Council prior to any plant or process change which is likely to substantially change the amount or nature of emissions.

Special condition 4 requires the consent holder to supply a report to the Council, every three years. It must include a review of emission control technology, an emissions inventory, energy efficiency measures and any other relevant issues.

Special conditions 5 through 8 set limits on various gaseous contaminants (methanol, carbon monoxide, and nitrogen oxides) to protect the receiving environment and human health.

Special condition 9 restricts offensive or objectionable odour at or beyond the property boundary.

Special condition 10 specifies that the discharges authorised by the consent should not cause significant adverse effects on local ecosystems.

Special condition 11 is a review condition, including provisions for review of best practicable options in emission control technology.

Special condition 12 requires effects monitoring.

Special condition 13 is a lapse condition.

Special condition 14 allows for provisional review.

3.3 Results

3.3.1 Site inspections

As outlined in section 2.5.1 of this report Council officers carried out four compliance monitoring site inspections on 21 October 2014, 20 February, 09 April and 22 July 2015 as well as two compliance monitoring sampling visits for the purpose of collecting a split sample on 21 October 2014 and 26 May 2015.

21 October 2014 at 1330hrs
An inspection of both the Motunui and Waitara Valley facilities was undertaken by Council staff, accompanied by Gary Rielly and Ben Lawn (Methanex personnel). The Waitara Valley plant was inspected after the Motunui site and the following observations were made:

The site is now fully operational and producing methanol, but a shutdown was planned for the following week, which would also allow for Methanex to complete maintenance on some of the pipework. Methanex were planning to do routine air emission monitoring at both sites next week, but would have to complete the Waitara Valley monitoring when the site is back in operation.

Earthworks were also being undertaken at the site as part of the pipeline integrity testing. No issues were noted.

The fire water pond, check pond and stormwater pond were inspected. No issues were noted, the water was green and slightly turbid. Methanex had previously had some methanol enter the storm pond from a plant malfunction. They had been testing and holding the water, and had introduced bacteria to help with the breakdown of methanol to ensure they were not in breach of their discharge consent if they were to discharge stormwater. This had worked effectively, no evidence of methanol was detected in the ponds during the inspection.

The outfall effluent sampler was inspected and was working, but the fridge temperature was at 7.4 °C. Gary Reilly advised that he would follow up on this with their laboratory staff.

The plant, chemical storage and truck load out areas were inspected and were all in a satisfactory condition, no issues were noted, no spills and no rubbish or debris were observed.

Overall, the site was well managed and tidy.

20 February 2015 at 1415hrs
An inspection of the Methanex facilities at Motunui and Waitara Valley was conducted by Council staff with Ben Lawn (Methanex). The Motunui site was inspected first and the Waitara Valley plant thereafter.

The Waitara Valley plant was restarted in September 2013 and the site was operating at the time of the site visit. No issues were noted around this site.

The cooling towers were inspected with no odour or ambient negative effects noted.

The fire water pond, check pond and stormwater pond were inspected. No issues were noted, the fire water pond was full while the storm pond and check pond were relatively empty.

No flaring was occurring at the time of the site visit.

The outfall effluent sampler was inspected and was working, the fridge temperature was at 7.4 °C. pH readings were recorded at 8.74 at 25.1 °C.

The plant, chemical storage and truck load out areas were inspected and were all in a satisfactory condition, no spills, rubbish or debris were observed. Overall, the site was well managed and tidy.

09 April 2015 at 1100hrs
An inspection of the Methanex facilities at Motunui and Waitara Valley was conducted by Council staff with Ben Lawn (Methanex). The Waitara Valley plant was inspected first. The plant was operating at the time of the site visit.

No issues were noted around this site.

The cooling towers were inspected and no odour or ambient negative effects noted in or around the site. It was overcast and raining at the time of the inspection and therefore no plume or droplet fallout was evident. The rain also meant that it was not possible to identify any obvious spills during the site visit.

The fire water pond, check pond and stormwater pond were inspected and no issues were noted. The fire water pond was in good order with about half a meter freeboard and no wildlife or weed noted in the pond. The storm pond also had about a half a metre free board and a few ducks present. The check pond was relatively full as Methanex were not presently exporting the stormwater as they were waiting on the laboratory to test the water quality. There was no wildlife noted about this pond.

No flaring was occurring at the time of the site visit.

The outfall effluent sampler was inspected and was working with the fridge temperature at 0.9 °C. pH readings were recorded at 7.42 and 7.07.

The plant, chemical storage and truck load out areas were inspected and were all in a satisfactory condition with no spills, rubbish or debris observed. There were no tankers on site at the time of the inspection.

Overall, the site was well managed and tidy.

22 July 2015 at 0900hrs
An inspection was undertaken of the Methanex facilities at Motunui and Waitara Valley was conducted by Council staff with Gary Rielly and Ben Lawn (Methanex). The weather conditions at the time of the site visit were fine, with a cool southerly breeze. The Motunui site was inspected first and the Waitara Valley plant thereafter. The following observations were recorded:

Recent floods had deposited silt around the Waitara Valley water intake structure. Regular maintenance was ongoing to suck out the silt sumps. A potential crack in the upstream reservoir was to be investigated. Overall there were no environmental issues or concerns in relation to this structure.

The fire pond level was normal and the surrounds were tidy. The liner appeared to be in good condition.

The stormwater pond was not discharging, due to a distillation column trip the previous day. Methanex staff were waiting for the methanol level to dissipate before discharging from this pond. The pond level was slightly high.

The check pond pond level was low. The liner appeared to be in good condition and the bund area was tidy.

The composite sample was working. The pH was 7.26 (stagnant sample as the pond was not discharging) and the temperature 0.4 °C.

The tanker load out area appeared well maintained, it was tidy with no spills. Similarly the chemical storage area was found to be tidy and well secured with no spills evident.

There was no visible plume, although the cooling tower was operating. The sump was clear and well maintained. No odour was detected around the plant perimeter.

The present unit for onsite sewerage is to be replaced with a greater capacity unit. It appeared to be operating well with no odour detected.

The pilot flare was operating.

The overflow pipeline to Waitara River was also inspected and no concerns were noted.

Overall, the site was well managed and tidy.

During this inspection, the Council officers visited site where leak from wastewater pipelines occurred under SH3 Road culvert. The section of pipe had been replaced. No environmental effects were evident at the site or considered likely due to the nature of the incident reported (GPS E1706761/N5681383).

Overall site housekeeping had continued to be of a high standard for the monitoring period of July 2014 to June 2015. Methanex staff were cooperative and the site looked to be well managed. There was no evidence noted during the site visits of non-compliance with the Methanex Waitara Valley consents.

3.3.2 Surface water

3.3.2.1 Surface water abstraction monitoring by Methanex

Since 1992, water for operation of the Waitara Valley methanol plant has been supplied from headworks constructed for supply of the Methanex Motunui plant. The headworks are located approximately one kilometre above the Bertrand Road bridge, and supplement the supply from the original Mamaku Road headworks.

Daily volumes of water entering the plant from the Waitara River are recorded and reported to the Council on a monthly basis.

Consent 0801-2 allows Methanex to take up to 300 m^3/ hr from the Waitara River when the river flow at the Bertrand Road gauging station is above 4,600 l/s (16,560 m^3/hour). A hydrograph of river flows at the Bertrand Road gauging station based on data for calculated mean daily flows during the 2013 – 2014 monitoring period is attached to this report as Appendix III. The Waitara River flow did not fall below the consent limit of 4,600 L/s level during the 2014-2015 monitoring period. Reported maximum daily abstraction rates were within allowable limits at all times.

Water use reduction report
The Council received a report from Methanex in December 2014 relating to water use reduction at the Waitara Valley plant during the 2012 and 2013 calendar years. This report is a requirement of condition 5b of Consent 0801-2. It is attached to this compliance monitoring report as Appendix IV.

In their report Methanex recognise both the environmental and economic benefits of reducing their water usage. A number of initiatives were undertaken during the period that was reported on. Although Waitara Valley plant was shut down for the majority of the period, there was significant work done upon the re-commissioning of that plant to ensure efficient operation of the cooling tower and heat exchangers.

Resource Management (Measurement and Reporting of Water Takes) Regulations 2010
Council officers visited Methanex on 30 July 2014 to undertake a verification of the accuracy of the Waitara Valley raw water flow meter. Methanex recently installed new electronics for its existing electromagnetic flowmeter FT-5011. The verification was undertaken using a "clamp-on" ultrasonic flowmeter. The proving was performed by an Irrigation NZ "Blue tick" accredited person and observed by a Council officer.
The prove was unsuccessful, as the verification flow meter did not indicate any flow passing through the pipeline. It is believed that this is because the 30 year-old pipe is likely to have internal corrosion defects or other deposits on the internal surface, which is scattering the ultrasonic signal. Methanex used data from their control system and compared the live readings from other flow meters in the Waitara Valley water treatment plant downstream of FT-5011. They found that FT-5011 reads approx. 3% higher than the other meters, indicating reasonable accuracy. In order to undertake a successful verification, piping modifications will be required to provide a new straight

pipe section suitable for the proving meter. For this to be installed, a full-plant shutdown will be necessary. Methanex's next shutdown is currently scheduled for 2018. Methanex have requested an exemption on this requirement until 20 December 2018, when the next shutdown is scheduled. The matter is still being explored by the Council and Methanex.

3.3.2.2 Effluent monitoring

Wastewater from the Waitara Valley plant is treated and discharged to the Waitara marine outfall. During the period under review, treated plant effluent comprised process and water treatment wastes and stormwater. The discharge is provided for by consent 3399-2.

Effluent monitoring data gathered by Methanex was sent to the Council on a monthly basis. The data is made up of continuous online data, laboratory analysis of a 24-hour composite effluent sample and mass discharge of water treatment chemicals calculated by Methanex using chemical consumption data.

Continuous measurement
Flow and pH are measured by online analysers, and recorded continuously at the Waitara Valley effluent discharge point. The figures reported to the Council are daily averages (m^3/hr), daily maximum (l/s) and daily volume (m^3/day) for flow, and minima, maxima and daily averages for pH. A summary of this data is presented in Table 18 and Table 19.

Special condition 6 of consent 3399-2 states,

"THAT the pH of the effluent shall not exceed the range pH 6 to pH 9 unless it is to be combined with the lime treated wastewater from the Waitara Wastewater Treatment Plant, in which case, it shall not exceed the range of pH 6 to pH 11."

As the Waitara wastewater treatment plant ceased operation in August 2014, the maximum pH values of 6 and 11 are used for assessing consent compliance prior to this and thereafter the pH values of 6 and 9 are used.

On 11 September 2014, Methanex notified the Council that the Waitara Valley plant and surrounding area had experienced a major power failure at 0227 hrs on Friday 05 September 2014. This resulted in both package boilers tripping off and the distillation bottoms water entering the stormpond. Methanex staff responded by immediately stopping the stormpond discharging from the plant site, thereby containing the lost methanol onsite. To mitigate the high level of methanol in the stormpond, they aerated the water by circulating it and dosed it with bacteria with the intention that the bacteria would digest the methanol and bring the levels down. At the time of the first report, Methanex had a level of approximately 60 mg/L (resource consent limit of 15 mg/L prior to discharge via the marine outfall). Methanex were successful in reducing the methanol level to within consent limits before discharging this from their site.

Analysis of composite samples
A proportional sampler is used to create a daily composite sample representative of the daily flow of plant effluent. This is analysed by the Methanex laboratory, to determine

compliance with their discharge consent 3399-2. A summary of this data is presented in Table 17.

Table 17 Summary of the Waitara Valley plant's monitoring results of plant effluent during 2014-2015

	Unit	Minimum	Maximum	Consent limit	Number of breaches
Continuous measurement					
Flow (daily average)	m^3/day	0	4,498	5,000	1
pH	-	6.03	9.57	6-11	0
Daily measurement					
Petroleum hydrocarbons	g/m^3	0	1	10	0
Methanol	g/m^3	0	<2	15	0
Suspended solids	kg/day	0	100	500	0
Monthly measurements					
Ammonia	g/m^3	<0.10	9.90	200	0
Copper	g/m^3	<0.05	0.05	0.5	0
Nickel	g/m^3	<0.02	<0.10	1.0	0
Zinc	g/m^3	<0.10	<0.10	2.0	0

The effluent discharge rates are limited by consent 3399-2 to a daily discharge of not more than 5,000 m3 and 60 l/s. From the data provided by the consent holder, a minor exceedance was recorded on two occasions in April 2015. The maximum daily flow rate was recorded as 63 and 62 l/s on 02 April and 21 April 2015 respectively. An explanation of these events was submitted by Methanex in the monthly report. It stated that this occurred due to the effluent pipeline being drained for repair on these dates. When the pumps were restarted with the pipeline empty, there was a short period of high flow for approximately five minutes while the pipeline filled up, before flow rates decreased to normal. Methanex reported that these were unusual circumstances and in normal operation the pumps cannot cause the flow rate to exceed the limit. It is also noted that the daily flow rate was low on these days (at 1,451 m3 and 819 m3.

Chemical dosing rates

Consent 3399-2 (for discharge of process waste from the Waitara Valley site) sets mass discharge limits on the water treatment chemicals used on the site. Methanex calculates water treatment chemical mass discharge rates using chemical consumption data. A summary of this data for the monitoring period is presented in Table 18.

Table 18 Summary of Waitara Valley chemical discharge data (calculated) for July 2013 to June 2014

Water treatment chemicals - consent 3399-2 (calculated)					
	Unit	Minimum	Maximum	Consent limit	Number of breaches
Klaraid PC1192	Kg/day	16	48	150	0
Spectrus BD1500	Kg/day	2	7	50	0

Water treatment chemicals - consent 3399-2 (calculated)					
	Unit	Minimum	Maximum	Consent limit	Number of breaches
Inhibitor AZ8104	Kg/day	5	15	30	0
Steamate NA0880	Kg/day	16	21	25	0
Cortrol OS7780	Kg/day	9	38	300	0
Optisperse HTP 73301	Kg/day	9	12	50	0
Optisperse HTP 73611	Kg/day	8	21	50	0
Optisperse PO5211A	Kg/day	0	0	15	0
Foamtrol AF2290	Kg/day	0	0	2	0
Gengard GN8020	Kg/day	14	34	70	0
Spectrus CT1300	Kg/day	0	5	5	0
Flogard MS6209	Kg/day	1	5	20	0

Compliance with conditions on plant effluent composition were achieved throughout the monitoring period from July 2014 to June 2015.

3.3.3 Inter-laboratory comparisons

The Council carried out inter-laboratory comparisons on two occasions during the monitoring period under review. Split samples were collected from the Waitara Valley site effluent, and analysed by Methanex and the Council. The results of the inter-laboratory comparisons are shown in Table 19. The exercise also serves as a compliance monitoring check.

Table 19 Inter-laboratory comparison on Waitara Valley effluent composite sample results

Waitara Valley process effluent - IND002005 (Consent 3399-2)						
Parameter Unit		Consent limits	21 October 2014		26 May 2015	
			Methanex	TRC	Methanex	TRC
Ammonia as N	mg/l		1.2	1.2	3.3	3.3
Chemical oxygen demand	mg/l	200	27	23	<10	16
Conductivity @ 25 °C	µs/cm	*300**	1220	1210	1750	1749
Copper	mg/l	0.5	<0.05	0.01	<0.05	0.02
Methanol	mg/l	15	<2	<1	<2	<1
Nickel	mg/l	1.0	<0.10	<0.02	<0.1	<0.02
pH		6.0-11.0	8	7.8	7.5	7.4
Total hydrocarbons	mg/l	10	<1	<0.5	<1	<0.5
Total suspended solids	mg/l	daily discharge <500kg	12	12	18	8
Zinc	mg/l	1.0	<0.10	0.054	<0.1	0.057
Turbidity	NTU		6.9	6.2	7.1	3.6

* Guideline limit; not a consent limit

Results from each laboratory for stormwater discharges met the consented water quality criteria on all occasions. Conductivity was elevated in the 2014 and 2015 samples, but with consideration of the other analytical results, this was not considered to be of concern.

Overall there was good agreement between the inter-laboratory analytical sample results for the 2014-2015 monitoring period.

3.3.3.1 Methanex Waitara Valley annual report

Condition 15 of consent 3399 requires Methanex to provide the Council with an annual report on its wastewater disposal system, including the performance of the outfall and compliance with the consent. It was agreed in 2010 that this annual report would consist of monthly reports submitted to the Council on the performance of the wastewater disposal system. Methanex have produced and provided monthly reports throughout the monitoring period and thus comply with this condition.

3.3.3.2 Uncontaminated stormwater

All stormwater from process areas is contained on the Waitara Valley site in the stormwater pond. Consent 0802 allows for the discharge of uncontaminated stormwater to the Waitara River. In April 1994, the Company made a decision to discharge all routine stormwater from the site via the Waitara marine outfall (consent 3399).

To monitor any effects to the Waitara River caused by the stormwater discharge, a total of 37 biological surveys of three sites were carried out between June 1983 and May 1994. No adverse effect on riverbed macroinvertebrate communities or algal populations were found, which could be attributed to the stormwater discharge.

Flood event
On Saturday 20 June 2015, Methanex contacted the Council regarding an emergency weather event as a result of significant rainfall over the previous 48 hours. The Waitara Valley site stormwater containment was exceeded, despite the pumps to the marine outfall operating at maximum. At 2100hrs Saturday 20 June, the valve from the stormpond to the Waitara River was opened under consent 0802-2. The stormwater pond was analysed before the discharge to ensure all parameters were within the levels detailed in special condition 4 of the consent. The results are listed below (turbidity used as an estimation of total suspended solids, verifying that this was low). Methanex undertook this action after various other options were carried out. They reported that drains, laydown areas and bunded areas within the site were approaching critical levels and the stormpond was within 50mm of overflowing, with the local gauge reading being 3.15 m. The discharge of stormwater to the river continued until 1400hrs on Sunday 21 June 2014, when the stormpond was down to 2.0m, and the situation was back under control. The stormpond was analysed again that morning, to show the post discharge levels (as shown below). During the discharge the Waitara River was in very high flood conditions, and hence the discharge would not have given rise to any of the effects noted in condition 5 of the consent. A visual hydrocarbon test was carried out at stages during the discharge to verify that there were no hydrocarbons present.

Waitara Valley stormpond 20 June 2015 1040 hrs

Visual hydrocarbons	Pass
Methanol	<2 mg/L
pH	7.5
Turbidity	25 NTU

Waitara Valley stormpond 22 June 2015 1040 hrs	
Visual hydrocarbons	Pass
Methanol	<2 mg/L
pH	7.3
Turbidity	21 NTU

Methanex staff inspected the Waitara Valley plant infrastructure on the banks of the river. They found that although the intake was several metres under water at the peak of the flood, it had sustained no significant damage, although much debris was deposited. Methanex staff cleared the logs and other debris. They also removed the silt from the pump chambers and spread this to land at the plant lay-down area.

The valve and pipe from the stormpond to the river has sustained some damage, and similarly a lot of debris was left behind.

3.3.4 Air

3.3.4.1 Inspections

During the monitoring period, inspections of the Waitara Valley site were completed by an officer of the Council. Inspections are integrated for air and water related monitoring.

No discernible effects on the receiving environment beyond the plant perimeter were noted during any of the inspections.

3.3.4.2 Consent requirements

Special condition 4 of resource consent 4045-3 requires that, every three years from the date of granting the consent, Methanex provides the Council with a report covering the following:

- Options for reducing or mitigating emissions, focusing on odorous emissions, carbon dioxide and the cooling tower plume.
- An emissions inventory (excluding carbon dioxide).
- Energy efficiency measures implemented at the Waitara Valley site.
- Any other relevant matters.

Methanex supplied a combined report for both Motunui and Waitara Valley in April 2015 covering the 2012 and 2013 calendar years. The findings of the report are summarised in the Motunui section (section 2.3.4.2) of this report. The Waitara Valley plant was restarted during 2013 and therefore reporting of emissions was largely limited to the Motunui site.

3.4 Investigations, interventions, and incidents

In 2013-2014 there was one non-compliant event recorded by Council that was associated with Methanex's Waitara Valley plant.

Discharge of Wastewater to Land (Incident IN/31625)
On 13 February 2015 at 1514hrs the Council received a self notification from Methanex regarding a burst stormwater/wastewater pipeline causing a discharge of treated

stormwater to a roadside drain at the Mamaku Road/Main Road intersection. Methanex undertook work to repair the pipeline and had the water that was in the ditch, sucked out and returned to the plant's wastewater pond. No adverse environmental effects were considered likely or detected. It should be noted that Methanex had been undertaking ongoing work to upgrade certain sections of the pipeline to mitigate potential leaks due to the age and state of repair of the pipeline.

Photo 4 Point of discharge – Roadside culvert

Photo 5 Repaired pipeline

3.5 Discussion

3.5.1.1 Discussion of plant performance

During each inspection by the Council, officers have noted that the facility is well managed, with a high standard of housekeeping apparent. An incident relating to a leaking wastewater pipeline was self-reported by Methanex during the monitoring period. Methanex have recognised that certain sections of their pipelines require significant maintenance as these have deteriorated with age. Methanex responded appropriately to the incident and upgrades/servicing of their pipelines are on-going.

Methanex submitted an updated spill contingency plan for the Waitara Valley site in September 2014.

3.5.1.2 Environmental effects of exercise of water permits

Methanex continued to show good control of the activities permitted by the resource consents associated with the Waitara Valley site and no adverse environmental effects in relation to the water takes or discharges to the marine outfall were observed during the period under review.

3.5.1.3 Environmental effects of exercise of air discharge permit

Neighbourhood effects
Methanex continued to show good control of the activities permitted by the air discharge resource consents associated with the Waitara Valley site. No off-site effects were noted during the period under review.

Ecological effects
No adverse environmental effects were observed during the period under review.

3.5.2 Evaluation of performance

A tabular summary of Methanex's compliance record for the year under review is set out in Table 20 to Table 25.

Table 20 Summary of performance for Consent 0801-2

Purpose: ***To take water from Waitara River***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Limit on total volume of water from the two intakes no more than 300 m^3.	Review of self-monitoring data provided monthly.	Yes
2. Water take should be maximised from the Motunui intake structure.	Liaison with the consent holder.	Yes
3. Water take managed to ensure Waitara River flow at Bertrand Rd > 4,600 L/s. No taking to occur when the river level falls below this.	Ongoing monitoring of river levels and Methanex self-monitoring data.	Yes

Purpose: *To take water from Waitara River*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
4. Installation and maintenance of an appropriate water meter and provision of records to the Council.	Review of abstraction records provided to the Council.	Yes
5. Provision of reports on the testing of pipeline integrity and water use reduction programmes.	Water reduction report submitted December 2014. The Council and Methanex are discussing appropriate methods for testing of pipeline integrity and therefore this requirement is on hold.	Yes
6. Appropriate screening of intake to prevent fish entrainment.	Ongoing consultation.	Yes
7. Lapse condition.	N/A	N/A
8. Review provision.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 21 Summary of performance for Consent 0802-2

Purpose: *To discharge uncontaminated stormwater to the Waitara River*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option.	Inspections and liaison with consent holder.	Yes
2. Activity to be undertaken generally in accordance with the consent application documentation.	Inspections and liaison with consent holder.	Yes
3. Any stormwater to be discharged to the Waitara River to be tested and results provided to the Council for approval before discharge.	Communication with Council at the time of an emergency flood event. Results provided immediately following the event.	Yes
4. Specified chemical constituents not to be exceeded in the discharge.	Parameters met.	Yes
5. Specified prohibited effects on the receiving water.	River was in flood, therefore this was irrelevant.	N/A
6. Lapse condition.	N/A	N/A
7. Review provision.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 22 Summary of performance for Consent 3399-2

Purpose: *To d*ischarge *treated wastes into the Tasman Sea*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Consent holder to adopt best practicable option to prevent or minimise adverse effects.	Inspections (and separate programme).	Yes
2. Consent holder to maintain a record of the volume of effluent discharged each day.	Monthly reports received.	Yes
3. Maximum daily discharge 5,000 m^3/ day, 60 l/s.	Monthly reports received. Two insignificant exceedances were recorded. These resulted due to the repair of a pipe and were as a consequence of water filling this again after it had been drained. Therefore no breach of consent condition occurred.	Yes
4. Minimum initial dilution of effluent 100:1.	Outfall designed to specific design and physical modelling was undertaken. Review of effluent data and volumes discharged was also undertaken.	Yes
5. Maximum daily discharge of suspended solids 500 kg.	Monthly reports.	Yes
6. pH not to exceed range of 6 to 11.	Monthly reports.	Yes
7. Limits on concentration of COD, hydrocarbons, methanol, ammonia, copper, nickel, zinc.	Monthly reports.	Yes
8. Allowable water treatment chemicals and volumes.	Inspection and liaison with consent holder.	Yes
9. Approval from the Council required to discharge 'equivalent' chemical.	Not required during monitoring period.	N/A
10. Definition of 'equivalent'.	N/A	N/A
11. Discharge of equivalent chemical requires written request.	Not required during monitoring period.	N/A
12. Conditions 5, 6, 7 and 8 apply to effluent prior to entry into the outfall line.	Monitoring/sampling undertaken in accordance with this provision.	N/A
13. Limits in conditions 7 and 8 apply unless the Council has given approval for a short term change.	No approval given.	N/A
14. Effects on receiving waters.	Marine ecological surveys (separate programme).	N/A
15. Consent holder to maintain contingency plan.	Contingency plan received in September 2014.	Yes
16. No domestic sewage in discharge after closure of Waitara Municipal WWTP.	Domestic sewage discharged to land.	Yes
17. Consent holder to certify the structural integrity and dilution performance of outfall at least every five years.	Report received February 2014. A commercial diver survey was undertaken to inspect the integrity of the outfall in November 2013. The dilution performance was analysed through a modelling exercise.	Yes

Purpose: *To discharge treated wastes into the Tasman Sea*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
18. Consent holder to supply an annual report by 31 March each year.	Reports received monthly and reviewed as satisfactory.	Yes
19. Lapse of consent.	N/A	N/A
20. Review of consent.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

Table 23 Summary of performance for Consent 3960-2

Purpose: *To construct a rock groyne in the Waitara River*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works.	No maintenance work required.	N/A
2. Removal of structures when no longer required.	Structure still required.	N/A
3. Optional review provision re environmental effects.	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A
Overall assessment of administrative performance in respect of this consent		

Table 24 Summary of performance for Consent 4045-3

Purpose: *To discharge contaminants into the air*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable options likely to minimise adverse effects on the environment	Ongoing inspection and liaison with consent holder.	Yes
2. Minimisation of emissions through control of processes	Ongoing inspection and liaison with consent holder.	Yes
3. Consultations prior to alterations to the plant or processes	Inspection and liaison found no alterations to plant or processes requiring additional approvals.	Yes
4. Triennial written air discharge report	Report received April 2015.	Yes
5. Maximum ground-level concentrations of methanol beyond boundaries	Previous modelling has shown compliance when plant in full operation.	Yes

Purpose: *To discharge contaminants into the air*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. Maximum ground-level concentrations of carbon monoxide beyond boundaries	Previous modelling has shown compliance when plant in full operation.	Yes
7. Maximum ground-level concentrations of nitrogen dioxide beyond boundaries	Previous modelling has shown compliance when plant in full operation.	Yes
8. Maximum ground-level concentrations of other contaminants beyond boundaries	Previous modelling has shown compliance when plant in full operation.	Yes
9. No offensive or objectionable odour at or beyond the site boundaries	Inspection.	Yes
10. Adverse effects on ecosystems not permitted	Inspection of neighbourhood found no adverse effects.	Yes
11. Optional review provision – notification within 6 months of receiving report (condition 4) re environmental effects	No review.	N/A
12. Monitoring to the satisfaction of the Council	Annual review and ongoing liaison.	Yes
13. Lapse condition	N/A	N/A
14. Review provision	Adopted 2013/14 monitoring report recommendation to not review consent. No further provision for review.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

In assessing a compliance and environmental performance ranking for Methanex, consideration was also given to the incidents that occurred during the monitoring period. Therefore during the period, Methanex demonstrated good level of environmental performance and compliance with the resource consents for the Waitara Valley installation. This rating would have been an overall high level of environmental performance if solely considering compliance with their consents. The overall administrational performance was high.

3.5.3 Recommendations from the 2013-2014 Annual Report

In the 2013-2014 Annual Report, it was recommended:

1. THAT monitoring of water abstractions from the Methanex Waitara Valley plant in the 2014-2015 year continue at the same level as in 2013-2014.
2. THAT monitoring of water discharges from the Methanex Waitara Valley plant in the 2014-2015 year continue at the same level as in 2013-2014.
3. THAT monitoring of air emissions from the Methanex Waitara Valley plant in the 2014-2015 year continue at the same level as in 2013-2014.
4. THAT the Council notes the current water meter location as acceptable

5. THAT Methanex continue to investigate the required testing to establish water intake pipe integrity at intervals of at least every five years and that this either results in undertaking of the required testing or a variation of consent conditions.
6. THAT the option of a review of the Methanex Waitara Valley plant resource consents in June 2015, not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

Recommendations 1, 2, 3 and 6 were carried out in full.

Communication between Methanex and the Council has been on-going in relation to the location and verification of the water meters.

There has been ongoing discussion and investigation between Methanex and the Council staff with regard to the five yearly water intake pipe integrity report. There are some complexities in determining the best method to undertake the required testing without damaging the existing infrastructure.

3.5.4 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, its obligations to monitor emissions/discharges and effects under the RMA, and report to the regional community. The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

The compliance monitoring programme for 2014-2015 was essentially unchanged from that for 2013-2014, on the grounds that the Methanex Waitara Valley plant has maintained a high level of environmental performance (where the incidents have been excluded) and the existing monitoring programme was adequate to provide sufficient data to assess environmental performance. It is now proposed that for 2015-2016, the programme be maintained at the same level as the programme for 2014-2015.

Recommendations to this effect are attached to this report.

3.6 Recommendations

1. THAT monitoring of water abstractions from the Methanex Waitara Valley plant in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT monitoring of water discharges from the Methanex Waitara Valley plant in the 2015-2016 year continue at the same level as in 2014-2015.
3. THAT monitoring of air emissions from the Methanex Waitara Valley plant in the 2015-2016 year continue at the same level as in 2014-2015.
4. THAT the Council considers whether or not the current water meter location is acceptable.
5. THAT Methanex continue to investigate the required testing to establish water intake pipe integrity and that this either results in undertaking of the required testing or a variation of consent conditions.

4. Summary of recommendations

1. THAT monitoring of water abstractions from the Methanex Motunui and Waitara Valley plant in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT monitoring of water discharges from the Methanex Motunui and Waitara Valley plant in the 2015-2016 year continue at the same level as in 2014-2015.
3. THAT monitoring of air emissions from the Methanex Motunui and Waitara Valley plant in the 2015-2016 year continue at the same level as in 2014-2015.
4. THAT the Council considers whether or not the current water meter location is acceptable.
5. THAT Methanex continue to investigate the required testing to establish water intake pipe integrity and that this either results in undertaking of the required testing or a variation of consent conditions.

Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Council	The Taranaki Regional Council.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m^3/s).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
F	Fluoride.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
IR	Incident Register – contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
l/s	Litres per second.
m^2	Square metres.
m^3	Cubic metres.

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.
mg/l	Milligrams per litre.
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).
Ni	Nickle.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
NPDC	New Plymouth District Council.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act* 1991 and including all subsequent amendments.
SS	Suspended solids.
Sulphuric Acid	A strong, dense, colourless and oily acid, used commonly for commercial/manufacturing purposes. It has strong dehydrating properties and is also a good oxidising agent.
Temp	Temperature, measured in °C (degrees Celsius).
Turbidity	Turbidity, expressed in NTU.
WWTP	Waste water treatment plant.
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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Appendix I

Resource consents held by Methanex New Zealand Limited for the Motunui plant

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

Water Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	29 April 2008

Conditions of Consent

Consent Granted:	To take water from the Waitara River for use at the Motunui plant at or about 2619820E-6238250N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Motunui Intake Structure, East Bank, Waitara River
Catchment:	Waitara

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

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 volume of water taken shall not exceed 1400 cubic metres per hour.

2. The taking of water authorised by this consent shall be managed to ensure that the flow in the Waitara River at the Bertrand Road gauging station is no less than 4,600 litres per second. No taking shall occur when the flow is less than 4,600 litres per second.

3. The consent holder shall install, and thereafter maintain, a water meter that will record the rate and volume of water taken(date, hourly abstraction rate, and daily total abstraction) to an accuracy of ± 5% and make these records available to the Chief Executive, Taranaki Regional Council in a suitable digital format, no later than 31 July of each year. The water meter shall be capable of being equipped with a digital data logger compatible with the Taranaki Regional Council's hydrologic recording software.

4. Notwithstanding the terms and conditions of this consent the consent holder shall take all reasonable steps to avoid, remedy or mitigate any adverse effect on the environment arising from the exercise of this consent, including, but not limited to, the efficient and conservative use of water. This shall include:

   a. testing of the pipeline from the intake to the plant every five years to establish pipeline integrity; and

   b. a written report to the Chief Executive of Taranaki Regional Council, at intervals not exceeding two years, on the results of water use reduction programmes.

5. The consent holder shall ensure that the intake structure is appropriately screened to avoid the entrainment of fish. The intake structure shall be regularly monitored and maintained to achieve compliance with this condition.

6. This consent shall lapse 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.

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015, for the purpose of: [a] 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; [b] the amount of water authorised to be taken is consistent with the consent holders requirements.

Signed at Stratford on 29 April 2008

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH 4342
Decision Date:	29 November 2012
Commencement Date:	29 November 2012

Conditions of Consent

Consent Granted:	To discharge uncontaminated stormwater from outfalls into an unnamed tributary of the Waihi Stream at or about (NZTM) 1711804E-5683660N and into the the Manu Stream at or about (NZTM)1710848E-5683737N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	State Highway 3, Motunui, Waitara
Legal Description:	Lot 1 DP 324944 Pt Ngatirahiri 2F Pt Lot 1 DP 10081 Ngatirahiri 2C1C 2B2B2 2B2A1 2C1B 2B2A2B Pt 2B1 2B2A2A 2B2B1 2C1A [Discharge source & site]
Catchment:	Waihi

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

General condition

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The stormwater discharged shall be from a catchment area not exceeding 240000 m^2 for the Waihi Stream tributary, and 294000 m^2 for the "Duck Pond", as specified in Methanex drawing number g10637 supplied with application 5748 .

3. The consent holder shall maintain a contingency plan that details measures and procedures to be undertaken to prevent spillage or any discharge of contaminants not authorised by this consent. The contingency plan shall be followed in the event of a spill or unauthorised discharge and shall be certified by the Chief Executive, Taranaki Regional Council as being adequate to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

4. The consent holder shall maintain a stormwater management plan that documents how the site is to be managed to minimise the contaminants that become entrained in the stormwater. This plan shall be followed at all times, shall be certified by the Chief Executive, Taranaki Regional Council, and shall include but not necessarily be limited to:

   a) the loading and unloading of materials;
   b) maintenance of conveyance systems;
   c) general housekeeping; and
   d) management of the interceptor system.

5. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	**Standard**
pH	Within the range 6.0 to 9.5
suspended solids	Concentration not greater than 100 gm^{-3}
total recoverable hydrocarbons	Concentration not greater than 5 gm^{-3}

This condition shall apply to the uncontaminated stormwater prior to entry into the body of water commonly known as the "Duck Pond" and the unnamed tributary of the Waihi Stream at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

6. After allowing for reasonable mixing, within a mixing zone extending to the downstream end of the body of water known as 'The Duck Pond' the discharge shall not give rise to any of the following effects in the receiving waters of the Manu Stream:

   a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   b) any conspicuous change in the colour or visual clarity;
   c) any emission of objectionable odour;
   d) the rendering of fresh water unsuitable for consumption by farm animals;
   e) any significant adverse effects on aquatic life.

7. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge points into the unnamed tributary of the Waihi Stream the discharge shall not give rise to any of the following effects in the receiving waters of the Waihi Stream:

   a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   b) any conspicuous change in the colour or visual clarity;
   c) any emission of objectionable odour;
   d) the rendering of fresh water unsuitable for consumption by farm animals;
   e) any significant adverse effects on aquatic life.

8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.

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

Signed at Stratford on 29 November 2012

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	31 March 2008

Conditions of Consent

Consent Granted:	To discharge stormwater from the Motunui intake facility into an unnamed tributary of the Waitara River at or about 2619942E-6238671N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Motunui intake facility, Tikorangi Road, Waitara
Legal Description:	Pt Lot 2 DP 12099 Blk IX Waitara SD
Catchment:	Waitara

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

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 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.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4594. In the case of any contradiction between the documentation submitted in support of application 4594 and the conditions of this consent, the conditions of this consent shall prevail.

3. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the confluence of unnamed tributary and the Waitara River, the discharge shall not give rise to an increase in turbidity of greater than 50% [as determined using NTU (nephelometric turbidity units)], in the receiving waters.

4. 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.

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

Signed at Stratford on 31 March 2008

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	31 March 2008

Conditions of Consent

Consent Granted:	To discharge wastewater from the Motunui intake facility into an unnamed tributary of the Waitara River at or about 2619942E-6238671N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Motunui Intake Station, Tikorangi Road, Waitara
Legal Description:	Pt Lot 2 DP 12099 Blk IX Waitara SD
Catchment:	Waitara

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

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 maximum daily discharge shall not exceed 1000 cubic metres per day.

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.

3. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4595. In the case of any contradiction between the documentation submitted in support of application 4595 and the conditions of this consent, the conditions of this consent shall prevail.

4. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the confluence of the unnamed tributary with the Waitara River, the discharge shall not give rise to an increase in turbidity of greater than 50% [as determined using NTU (nephelometric turbidity units)], in the receiving waters.

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

Signed at Stratford on 31 March 2008

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Coastal Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH 4342
Decision Date [change]:	18 July 2012
Commencement Date [change]:	18 July 2012 [Granted: 29 April 2008]

Conditions of Consent

Consent Granted:	To discharge treated wastewater and stormwater from the Motunui methanol plant into the Tasman Sea via the Waitara marine outfall at or about (NZTM) 1705615E-5684951N
Expiry Date:	1 June 2021
Review Date(s):	June 2015 and/or within 3 months of receiving notification under special condition 12
Site Location:	At or beyond 1250 metres offshore from Waitara River mouth
Catchment:	Tasman Sea

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

General condition

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The consent holder shall maintain a record of the volume of effluent discharged each day to an accuracy of ±5% and make these records available to the Chief Executive, Taranaki Regional Council in a digital format compatible with Council software, no later than 20th of the following month

3. The maximum daily discharge shall be 12,096 cubic metres per day at a maximum rate of 140 litres per second.

4. The consent holder shall ensure that the minimum initial dilution of the effluent above the outfall diffuser shall be 100:1.

5. The maximum daily discharge of suspended solids shall be 500 kilograms.

6. The consent holder shall ensure that the pH of the effluent shall at all times be within the range of pH 6 to pH 9.

7. On the basis of 24-hour flow proportioned composite samples, constituents of the discharge shall meet the standards shown below.

Constituent	**Standard**
Chemical oxygen demand	concentration no greater than 200 gm^{-3}
Hydrocarbons	concentration no greater than 10gm^{-3}
Methanol	concentration no greater than 15 gm^{-3}
Copper	concentration no greater than 0.5 gm^{-3}
Nickel	concentration no greater than 1.0 gm^{-3}
Zinc	concentration no greater than 1.0 gm^{-3}

8. Subject to condition 10, only the water treatment chemicals listed in Table 1 shall be discharged, and the daily quantity discharged shall not exceed the limits given in Table 1.

Table 1: List of water treatment chemicals

Purpose	Trade name	Maximum Daily discharge (kg)
Corrosion control in high pressure boiler	Optisperse HTP 7330 & 73611	120
Corrosion control in medium pressure boiler	Optisperse PO5211A	20
Oxygen removal from boiler feed water	Cortrol OS7780	400
pH control of steam/condensate to prevent corrosion.	Steamate NA0880	40
Corrosion control of recirculating cooling water.	Continuum AEC3109	300
Control biological activity in cooling water	Spectrus BD1500	200
Corrosion control of recirculating cooling water	Inhibitor AZ8104	300
Control biological activity in cooling water	Spectrus NX1100	50
Control biological activity in cooling water	Spectrus CT1300	20
Corrosion control of recirculating cooling water	Flogard MS6207	40
Reduce foam formation of cooling water	Foamtrol AF2290	40
Coagulant	Klaraid PC 1190P	600
Flocculant	Betzdearborn AE1115	60

9. The maximum daily limit of the water treatment chemical 'Spectrus CT1300' may be increased to 40kg/day in response to increased levels of the bacteria Legionella if detected by the consent holder, to minimise the risk to human health. The Consent holder must notify the Council within 24 hours if this increased dose is utilized.

10. In addition to the water treatment chemicals listed in Table 1, water treatment chemicals determined to be 'equivalents' may be discharged as an alternative to those listed in Table 1, provided approval for the equivalent chemical has been given by the Chief Executive of Taranaki Regional Council in accordance with condition 12.

11. For the purpose of this consent an 'equivalent' is defined as a chemical that, when compared the chemical listed in Table 1, the Chief Executive of Taranaki Regional Council has determined that:

    a) it is of a similar nature and used for a similar purpose;
    b) it has similar breakdown products; and
    c) it has potential environmental effects that are similar.

12. Any discharge of an equivalent chemical in accordance with condition 10, shall only occur after a written request to discharge an equivalent chemical has been approved by Chief Executive Taranaki Regional Council. Any such request shall include:

    a) name of equivalent chemical;
    b) proposed concentration of equivalent in the discharge; and
    c) details of the nature of the chemical including its breakdown products; and
    d) an assessment of the potential effects of the change on the receiving environment.

    Note that the Chief Executive of Taranaki Regional Council may take up to 20 days to consider the request.

13. Special conditions 5, 6, 7 and 8, apply to effluent prior to entry into the outfall line, at a designated sampling point approved by the Chief Executive of Taranaki Regional Council.

14. The limits in special conditions 7 and 8 apply unless the Chief Executive of Taranaki Regional Council has given approval for a short term change for the purpose of routine maintenance including physical and chemical cleaning and catalyst changeouts, as per special condition 12.

15. After allowing for reasonable mixing, being outside of a zone of 200 metres from the centreline of the outfall diffuser, the discharge shall not give rise to any of the following effects in the receiving waters:

    a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    b) any conspicuous change in the colour or visual clarity;
    c) any emission of objectionable odour;
    d) any significant adverse effects on aquatic life, habitats or ecology;
    e) any undesirable biological growths

16. The consent holder shall maintain a comprehensive contingency plan, to be put into operation to prevent unauthorised discharge resulting from spillages, accidental discharges or pipeline failure. The plan shall be provided to the Chief Executive, Taranaki Regional Council no more than 30 days after this consent is first exercised and thereafter reviewed two yearly intervals.

17. No discharge of domestic sewage [human effluent] shall be permitted under the exercise of this consent.

18. The consent holder shall notify the Chief Executive, Taranaki Regional Council at least seven days before this consent is first exercised.

19. The consent holder shall on request by the Chief Executive, Taranaki Regional Council, but at intervals of no less than five years, certify the structural integrity and dilution performance of the outfall.

20. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, an annual report on its waste treatment system discharges. The annual report shall include:

    a) daily volumes;
    b) results of any and all analyses undertaken by or on behalf of the consent holder;
    c) compliance with the consent.

    This report shall be provided by the 31st March each year and covering the previous calendar year period.

21. 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.

22. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 or within 3 months of receipt of notification under special condition 12, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 18 July 2012

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	12 February 2008

Conditions of Consent

Consent Granted:	To discharge contaminants into the air from the Motunui methanol plant and ancillary facilities at or about 2621399E-6245496N
Expiry Date:	1 June 2028
Review Date(s):	June 2013, June 2018, June 2023
Site Location:	Main North Road, Motunui, Waitara
Legal Description:	Lot 1 DP 334095 Pt Ngatirahiri 2F Blk Pt Lot 1 DP 10081 Ngatirahiri 2C1A Blk Ngatirahiri 2C1C Blk Lot 1 DP 16686 Pt Ngatirahiri 2B2B2 Blk Ngatirahiri 2B2A1 Blk Ngatirahiri 2C1B Blk Ngatirahiri 2B2A2B Blk

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

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 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.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4596. In the case of any contradiction between the documentation submitted in support of application 4596 and the conditions of this consent, the conditions of this consent shall prevail.

3. The consent holder shall at all times operate, maintain, supervise, monitor and control all processes so that emissions authorised by this consent are maintained at the minimum practicable level.

4. Prior to undertaking any alterations to the plant, processes or operations which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act.

5. The consent holder shall commission reports that detail the technology that could minimise the adverse effects of the water vapour plume from the cooling tower. These reports shall:

a) be prepared by an appropriately qualified independent person approved by the Chief Executive, Taranaki Regional Council;

b) be provided to the Chief Executive, Taranaki Regional within 12 months of the commencement of this consent [in accordance with Section 116 of the Resource Management Act 1991] and at intervals not exceeding 5 years thereafter;

c) detail the: costs; expected levels of reduction in adverse effects; and practical implications of introducing the technology(s) at the Motunui plant;

d) provide an assessment of what constitutes the "best practicable option" for minimising the adverse effects of the water vapour plume from the cooling tower.

6. Other than as provided for under condition 5, the consent holder shall also provide to the Chief Executive, Taranaki Regional Council, within two years from the date on which this consent is granted and every two years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, especially but not exclusively in respect of potential or actual odorous emissions, how these might be applicable and implemented at the Motunui plant, and the costs and benefits of these advances; and

b) detailing an inventory of emissions [excluding carbon dioxide] from the site of such contaminants as the Chief Executive, Taranaki Regional Council may from time to time specify following consultation with the consent holder; and

c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the Motunui petrochemical plant; and

d) addressing any other issue relevant to the minimization or mitigation of emissions from the site that the Chief Executive, Taranaki Regional Council considers should reasonably be included.

7. The consent holder shall control all emissions of methanol to the atmosphere from the site, so as to ensure that maximum ground level concentrations of methanol do not exceed 9 mg/m^3 measured as a one hour average under ambient conditions, at or beyond the boundary of the site.

8. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the site, so as to ensure that the maximum ground level concentration of carbon monoxide measured under ambient conditions does not exceed 10 mg/m^3 [average exposure over any period of eight hours or longer], or 30 mg/m^3 [one hour average], at or beyond the boundary of the site.

9. The consent holder shall control all emissions of nitrogen dioxide or its precursors to the atmosphere from the site, so as to ensure that the maximum ground level concentration of nitrogen dioxide measured under ambient conditions does not exceed 200 ug/m^3 [one hour average], or 100 ug/m^3 [twenty four hour average], at or beyond the boundary of the site.

10. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than methanol, carbon monoxide, and nitrogen dioxide and its precursors, so as to ensure that the maximum ground level concentration for any particular contaminant at or beyond the boundary of the site is not increased above background levels:

    a) by more than 1/30 th of the relevant Occupational Threshold Value Time Weighted Average, or by more than the Short Term Exposure Limit at any time; or

    b) if no Short Term Exposure Limited is set, by more than three times the Time Weighted Average at any time [Workplace Exposure Standards effective from 2002, Department of Labour].

11. The consent holder shall compile an inventory of emissions discharged to air from the incinerator stacks including the date, time, nature of discharge and any visual impact of emissions offsite. The data gathered shall be supplied as part of report on air emissions stated in special condition 6.

12. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that in the opinion of at least one enforcement officer of the Taranaki Regional Council, is offensive or objectionable.

13. The discharges authorised by this consent shall not give rise to any significant adverse ecological effect on any ecosystems, including but not limited to habitats, plants, animals, microflora and microfauna.

14. Pursuant to section 128(1)(a) of the Resource Management Act, the Taranaki Regional Council, may review any or all of the conditions of this consent by giving notice of review within six months of the provision of a written report under special conditions 5 or 6; for the purpose of reviewing the best practicable option or options available to reduce or remove any adverse effects on the environment [including, but not limited to, minimisation of the cooling tower plume], or to deal with any significant adverse ecological effect on any ecosystems, including but not limited to habitats, plants, animals, microflora, and microfauna.

15. The exercise and effects of this consent shall be monitored to the satisfaction of the Chief Executive, Taranaki Regional Council.

16. 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.

17. 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 2013 and/or June 2018 and/or June 2023, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 12 February 2008

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Appendix II

Resource consents held by Methanex New Zealand Limited for the Waitara Valley plant

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

Water Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	29 April 2008

Conditions of Consent

Consent Granted:	To take water from two sites on the Waitara River for use at the Waitara Valley methanol plant at or about 2618429E-6240375N and 2619820E-6238250N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Waitara Valley Intake Structure, Mamaku Road, Waitara and Motunui Intake structure, East Bank, Waitara River
Catchment:	Waitara

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

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 total volume of water taken from the two intake sites shall not exceed 300 cubic metres per hour.

2. The consent holder shall maximise the water take from the Waitara River at the Motunui intake structure and minimise abstraction at the Waitara Valley intake structure.

3. The taking of water authorised by this consent shall be managed to ensure that the flow in the Waitara River at Bertrand Road gauging station is no less than 4600 litres per second. No taking shall occur when the flow is less than 4600 litres per second.

4. The consent holder shall install, and thereafter maintain, a water meter that will record the rate and volume of water taken(date, hourly abstraction rate, and daily total abstraction) to an accuracy of ± 5% and make these records available to the Chief Executive, Taranaki Regional Council in a suitable digital format, no later than 31 July of each year. The water meter shall be capable of being equipped with a digital data logger compatible with the Taranaki Regional Council's hydrologic recording software.

5. Notwithstanding the terms and conditions of this consent the consent holder shall take all reasonable steps to avoid, remedy or mitigate any adverse effect on the environment arising from the exercise of this consent, including, but not limited to, the efficient and conservative use of water. This shall include:

a. testing of the pipeline from the intake to the plant every five years to establish pipeline integrity; and
b. a written report to the Chief Executive of Taranaki Regional Council, at intervals not exceeding two years, on the results of water use reduction programmes.

6. The consent holder shall ensure that the intake structure is appropriately screened to avoid the entrainment of fish. The intake shall be regularly monitored and maintained to achieve compliance with this condition.

7. This consent shall lapse 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.

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015, for the purpose of : [a] 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; [b] the amount of water authorised to be taken is consistent with the consent holders reasonable requirements.

Signed at Stratford on 29 April 2008

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	31 March 2008

Conditions of Consent

Consent Granted:	To discharge stormwater from the Waitara Valley Methanol Plant into the Waitara River at or about 2618495E-6241539N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Waitara Valley Methanol Plant, Mamaku Road, Waitara
Legal Description:	Lot 1 DP 13541 Blk V Waitara SD
Catchment:	Waitara

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

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 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.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4599. In the case of any contradiction between the documentation submitted in support of application 4599 and the conditions of this consent, the conditions of this consent shall prevail.

3. The consent holder shall test the levels of contaminants in the stormwater prior to discharge into the Waitara River and advise the Chief Executive of Taranaki Regional Council of the results. The stormwater shall not be discharged until the Chief Executive of Taranaki Regional Council has advised the consent holder that the discharge will comply with the standards specified in condition 5.

4. The following constituents of the discharge shall not be exceeded in the discharge:

Constituent	**Standard**
pH (range)	6.0-9.0
suspended solids	100 gm^{-3}
hydrocarbons	15 gm^{-3}
methanol	15 gm^{-3}

5. After allowing for a 50 metre mixing zone extending downstream of the discharge point the discharge shall not give rise to any of the following effects in the receiving waters of the Waitara River:

   a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   b) any conspicuous change in the colour or visual clarity;
   c) any emission of objectionable odour;
   d) the rendering of fresh water unsuitable for consumption by farm animals;
   e) any significant adverse effects on aquatic life.

6. 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.

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

Signed at Stratford on 31 March 2008

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Coastal Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	29 April 2008

Conditions of Consent

Consent Granted:	To discharge treated wastewater and stormwater from the Waitara Valley methanol plant into the Tasman Sea via the Waitara marine outfall at or about 2615711E-6246696N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	at or beyond 1250 metre offshore from Waitara River mouth
Catchment:	Tasman Sea

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

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 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.

2. The consent holder shall maintain a record of the volume of effluent discharged each day to an accuracy of ±5% and make these records available to the Chief Executive, Taranaki Regional Council in a digital format compatible with Council software, no later than 20th of the following month.

3. The maximum daily discharge shall be 5000 cubic metres per day at a maximum rate of 60 litres per second.

4. The consent holder shall ensure that the minimum initial dilution of the effluent above the outfall diffuser shall be 100:1.

5. The maximum daily discharge of suspended solids shall be 500 kilograms.

6. The consent holder shall ensure that the pH of the effluent shall not exceed the range of pH 6 to pH 9 unless it is to be combined with the lime treated wastewater from the Waitara Wastewater Treatment Plant, in which case, it shall not exceed the range pH 6 to pH 11.

7. On the basis of 24-hour flow proportioned composite samples, constituents of the discharge shall meet the standards shown below:

Constituent	**Standard**
Chemical oxygen demand	concentration no greater than 200 gm^{-3}
Hydrocarbons	concentration no greater than 10 gm^{-3}
Methanol	concentration no greater than 15 gm^{-3}
Ammonia	concentration no greater than 200 gm^{-3}
Copper	concentration no greater than 0.5 gm^{-3}
Nickel	concentration no greater than 1.0 gm^{-3}
Zinc	concentration no greater than 2.0 gm^{-3}

8. Subject to condition 9, only the water treatment chemicals listed in Table 1 shall be discharged, and the daily quantity discharged shall not exceed the limits given Table 1 below.

Table 1: List of water treatment chemicals

Purpose	**Trade name**	**Maximum Daily discharge (kg)**
Corrosion control in high pressure boiler	Optisperse HTP 7330 & 73611	50
Corrosion control in medium pressure boiler	Optisperse PO5211A	15
Oxygen removal from boiler feed water	Cortrol OS7780	300
pH control of steam/condensate to prevent corrosion.	Steamate NA0880	25
Corrosion control of re-circulating cooling water.	Continuum AEC3109	100
Control biological activity in cooling water	Spectrus BD1500	50
Corrosion control of re-circulating cooling water	Inhibitor AZ8104	30
Reduce foam formation of cooling water	Foamtrol AF2290	2
Coagulant	Klaraid PC 1192	150

9. In addition to the water treatment chemical listed in Table 1 [condition 8], water treatment chemicals considered to be 'equivalents' may be discharged as an alternative to those listed in Table 1, provided approval for the equivalent chemical has been given by the Chief Executive of Taranaki Regional Council in accordance with condition 11.

10. For the purpose of this consent an 'equivalent' is defined as a chemical that, when compared the chemical listed in Table 1, the Chief Executive of Taranaki Regional Council has determined that:

a) it is of a similar nature and used for a similar purpose;
b) it has similar breakdown products; and
c) it has potential environmental effects that are similar.

11. Any discharge of an equivalent chemical in accordance with condition 9, shall only occur after a written request to discharge an equivalent chemical has been approved by Chief Executive Taranaki Regional Council. Any such request shall include:

a) name of equivalent chemical;
a) proposed concentration of equivalent in the discharge; and
b) details of the nature of the chemical including its breakdown products; and
c) an assessment of the potential effects of the change on the receiving environment.

Note that the Chief Executive of Taranaki Regional Council may take up to 20 days to consider the request.

12. Special conditions 5, 6, 7 and 8 apply to effluent prior to entry into the outfall line, at a designated sampling point approved by the Chief Executive of Taranaki Regional Council.

13. The limits in special conditions 7 and 8 apply unless the Chief Executive of Taranaki Regional Council has given approval for a short term change for the purpose of routine maintenance including physical and chemical cleaning and catalyst changeouts, as per condition 11.

14. After allowing for reasonable mixing, being outside of a zone of 200 metres from the centreline of the outfall diffuser, the discharge shall not give rise to any of the following effects in the receiving waters:

a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
b) any conspicuous change in the colour or visual clarity;
c) any emission of objectionable odour;
d) any significant adverse effects on aquatic life, habitats or ecology;
e) any undesirable biological growths.

15. The consent holder shall maintain a comprehensive contingency plan, to be put into operation to prevent unauthorised discharge resulting from spillages, accidental discharges or pipeline failure. The plan shall be provided to the Chief Executive, Taranaki Regional Council no more than thirty [30] days after this consent is first exercised and thereafter reviewed at two yearly intervals.

16. There shall be no domestic sewage [human effluent] in the discharge authorised by this consent following the closure of the Waitara municipal wastewater treatment plant.

17. At the request of the Chief Executive, Taranaki Regional Council, but at intervals of no less than five years, the consent holder shall certify the structural integrity and dilution performance of the outfall.

18. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, an annual report on its waste treatment system discharges. The annual report shall include:

    a) daily volumes;
    b) results of any and all analyses undertaken by or on behalf of the consent holder; and
    c) compliance with the consent.

    This report shall be provided by the 31st March each year and covering the previous calendar year period.

19. 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.

20. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 or within 3 months of receipt of notification under condition 11, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 29 April 2008

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Coastal Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH 4342
Decision Date (Change):	29 July 2013
Commencement Date (Change):	29 July 2013 (Granted: 29 April 2008)

Conditions of Consent

Consent Granted:	To discharge treated wastewater and stormwater from the Waitara Valley Methanol Plant into the Tasman Sea via the Waitara marine outfall
Expiry Date:	1 June 2021
Review Date(s):	June 2015 and/or within 3 months of notification under special condition 11
Site Location:	At or beyond 1250 metre offshore from Waitara Rivermouth
Grid Reference (NZTM)	1705615E-5684951N
Catchment:	Tasman Sea

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

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 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.

2. The consent holder shall maintain a record of the volume of effluent discharged each day to an accuracy of ±5% and make these records available to the Chief Executive, Taranaki Regional Council in a digital format compatible with Council software, no later than 20th of the following month.

3. The maximum daily discharge shall be 5000 cubic metres per day at a maximum rate of 60 litres per second.

4. The consent holder shall ensure that the minimum initial dilution of the effluent above the outfall diffuser shall be 100:1.

5. The maximum daily discharge of suspended solids shall be 500 kilograms.

6. The consent holder shall ensure that the pH of the effluent shall not exceed the range of pH6 to pH 9 unless it is to be combine with the line treated wastewater from the Waitara Wastewater Treatment Plant, in which case, it shall not exceed the range pH 6 to pH 11.

7. On the basis of 24-hour flow proportioned composite samples, constituents of the discharge shall meet the standards shown below:

Constituent	Standard
Chemical oxygen demand	concentration no greater than 200 gm^{-3}
Hydrocarbons	concentration no greater than 10 gm^{-3}
Methanol	concentration no greater than 15 gm^{-3}
Ammonia	concentration no greater than 200 gm^{-3}
Copper	concentration no greater than 0.5 gm^{-3}
Nickel	concentration no greater than 1.0 gm^{-3}
Zinc	concentration no greater than 2.0 gm^{-3}

8. Subject to condition 9, only the water treatment chemicals listed in Table 1 shall be discharged, and the daily quantity discharged shall not exceed the limits given Table 1 below.

Table 1: List of water treatment chemicals

Purpose	Trade name	Maximum Daily discharge (kg)
Corrosion control in high pressure boiler	Optisperse HTP 73301 & 73611	50
Corrosion control in medium pressure boiler	Optisperse PO5211A	15
Oxygen removal from boiler feed water	Cortrol OS7780	300
pH control of steam/condensate to prevent corrosion.	Steamate NA0880	25
Corrosion control of re-circulating cooling water.	Gengard GN8020 Flogard MS6209	70 20
Biocidal dispersant	Spectrus BD1500	50
Corrosion control of re-circulating cooling water	Inhibitor AZ8104	30
Reduce foam formation of cooling water	Foamtrol AF2290	2
Coagulant	Klaraid PC 1192	150
Secondary biocide	Spectrus CT1300	5

9. In addition to the water treatment chemical listed in Table 1 (condition 8), water treatment chemicals considered to be 'equivalents' may be discharged as an alternative to those listed in Table 1, provided approval for the equivalent chemical has been given by the Chief Executive of Taranaki Regional Council in accordance with condition 11.

10. For the purpose of this consent an 'equivalent' is defined as a chemical that, when compared the chemical listed in Table 1, the Chief Executive of Taranaki Regional Council has determined that:

    a) it is of a similar nature and used for a similar purpose;
    b) it has similar breakdown products; and
    c) it has potential environmental effects that are similar.

11. Any discharge of an equivalent chemical in accordance with condition 9, shall only occur after a written request to discharge an equivalent chemical has been approved by Chief Executive Taranaki Regional Council. Any such request shall include:

    a) name of equivalent chemical;
    a) proposed concentration of equivalent in the discharge; and
    b) details of the nature of the chemical including its breakdown products; and
    c) an assessment of the potential effects of the change on the receiving environment.

    Note that the Chief Executive of Taranaki Regional Council may take up to 20 days to consider the request.

12. Special conditions 5, 6, 7 and 8 apply to effluent prior to entry into the outfall line, at a designated sampling point approved by the Chief Executive of Taranaki Regional Council.

13. The limits in special conditions 7 and 8 apply unless the Chief Executive of Taranaki Regional Council has given approval for a short term change for the purpose of routine maintenance including physical and chemical cleaning and catalyst changeouts, as per condition 11.

14. After allowing for reasonable mixing, being outside of a zone of 200 metres from the centreline of the outfall diffuser, the discharge shall not give rise to any of the following effects in the receiving waters:

    a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    b) any conspicuous change in the colour or visual clarity;
    c) any emission of objectionable odour;
    d) any significant adverse effects on aquatic life, habitats or ecology;
    e) any undesirable biological growths.

15. The consent holder shall maintain a comprehensive contingency plan, to be put into operation to prevent unauthorised discharge resulting from spillages, accidental discharges or pipeline failure. The plan shall be provided to the Chief Executive, Taranaki Regional Council no more than thirty (30) days after this consent is first exercised and thereafter reviewed at two yearly intervals.

16. There shall be no domestic sewage (human effluent) in the discharge authorised by this consent following the closure of the Waitara municipal wastewater treatment plant.

17. At the request of the Chief Executive, Taranaki Regional Council, but at intervals of no less than five years, the consent holder shall certify the structural integrity and dilution performance of the outfall.

18. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, an annual report on its waste treatment system discharges. The annual report shall include:

    a) daily volumes;
    b) results of any and all analyses undertaken by or on behalf of the consent holder; and
    c) compliance with the consent.

    This report shall be provided by the 31st March each year and covering the previous calendar year period.

19. 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.

20. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 or within 3 months of receipt of notification under condition 11, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 29 July 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Land Use Consent

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	14 May 2003

Conditions of Consent

Consent Granted:	To construct and maintain a rock groyne in the Waitara River to control against further river bed degradation at or about GR: Q19:185-405
Expiry Date:	1 June 2021
Review Date(s):	June 2009, June 2015
Site Location:	Pump Station, Mamaku Road, Waitara
Legal Description:	River Reserve Blk V Waitara SD
Catchment:	Waitara

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

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. That the consent holder shall notify the Consents Section of the Taranaki Regional Council at least 24 hours prior to any maintenance works which would involve disturbance of, or deposition to the riverbed, or discharges to water.

2. That the structures authorised by this consent shall be removed and the area reinstated, if and when the structures are no longer required. The consent holder shall notify the Consents Section of the Taranaki Regional Council at least 48 hours prior to structure removal and reinstatement.

3. 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 2009 and/or June 2015, 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.

Transferred at Stratford on 26 April 2005

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Methanex Motunui Limited Private Bag 2011 NEW PLYMOUTH
Consent Granted Date:	29 April 2008

Conditions of Consent

Consent Granted:	To discharge contaminants into the air from the Waitara Valley methanol plant at or about 2618266E-6241201N
Expiry Date:	1 June 2021
Review Date(s):	June 2015
Site Location:	Waitara Valley Methanol Plant, Mamaku Road, Waitara
Legal Description:	Lot 1 DP 13541 Blk V Waitara SD

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

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 consent holder shall at all times adopt the best practicable option [including but not limited to, minimising carbon dioxide emissions] to prevent or minimise any actual or likely adverse effect on the environment arising from emissions from the site. `Best practicable option' [as defined in section 2 of the Resource Management Act 1991] shall be determined by the Taranaki Regional Council, taking into account the information supplied by the consent holder under condition 4 of this consent, and following review as set out under condition 11 of this consent.

2. The consent holder shall at all times operate, maintain, supervise, monitor and control all processes so that emissions authorised by this consent are maintained at the minimum practicable level.

3. Prior to undertaking any alterations to the plant, processes or operations which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act.

4. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, within three years from the date on which this consent is granted and every three years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, especially but not exclusively in respect of potential or actual odorous emissions and the cooling tower plume, how these might be applicable and/or implemented at the Waitara Valley methanol plant, and the costs and benefits of these advances; and

b) detailing an inventory of emissions [excluding carbon dioxide] from the methanol distillation tower of such contaminants as the Chief Executive, Taranaki Regional Council may from time to time specify following consultation with the consent holder; and

c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the Waitara Valley methanol plant; and

d) addressing any other issue relevant to the minimisation or mitigation of emissions from the site that the Chief Executive, Taranaki Regional Council, considers should be included.

5. The consent holder shall control all emissions of methanol to the atmosphere from the site, so as to ensure that maximum ground level concentrations of methanol do not exceed 9 mg/m^3 measured as a one hour average under ambient conditions, at or beyond the boundary of the site.

6. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the site, so as to ensure that the maximum ground level concentration of carbon monoxide measured under ambient conditions does not exceed 10 mg/m^3 [average exposure over any period of eight hours or longer], or 30 mg/m^3 [one hour average], at or beyond the boundary of the site.

7. The consent holder shall control all emissions of nitrogen dioxide or its precursors to the atmosphere from the site, so as to ensure that the maximum ground level concentration of nitrogen dioxide measured under ambient conditions does not exceed 200 ug/m^3 [one hour average], or 100 ug/m^3 [twenty four hour average], at or beyond the boundary of the site.

8. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than methanol, carbon dioxide, carbon monoxide, and nitrogen dioxide and its precursors, so as to ensure that the maximum ground level concentration for any particular contaminant at or beyond the boundary of the site is not increased above background levels:

   a) by more than 1/30 th of the relevant Occupational Threshold Value Time Weighted Average, or by more than the Short Term Exposure Limit at any time; or

   b) if no Short Term Exposure Limited is set, by more than three times the Time Weighted Average at any time [Workplace Exposure Standards effective from 2002, Department of Labour].

9. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that in the opinion of at least one enforcement officer of the Taranaki Regional Council, is offensive or objectionable.

10. The discharges authorised by this consent shall not give rise to any significant adverse ecological effect on any ecosystems, including but not limited to habitats, plants, animals, microflora and microfauna.

11. Pursuant to section 128(1)(a) of the Resource Management Act, the Taranaki Regional Council, may review any or all of the conditions of this consent by giving notice of review within six months of the provision of a written report under special condition 4; for the purpose of reviewing the best practicable option or options available to reduce or remove any adverse effects on the environment, or to deal with any significant adverse ecological effect on any ecosystems, including but not limited to habitats, plants, animals, microflora, and microfauna.

12. The exercise and effects of this consent shall be monitored to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

13. 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.

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

Signed at Stratford on 29 April 2008

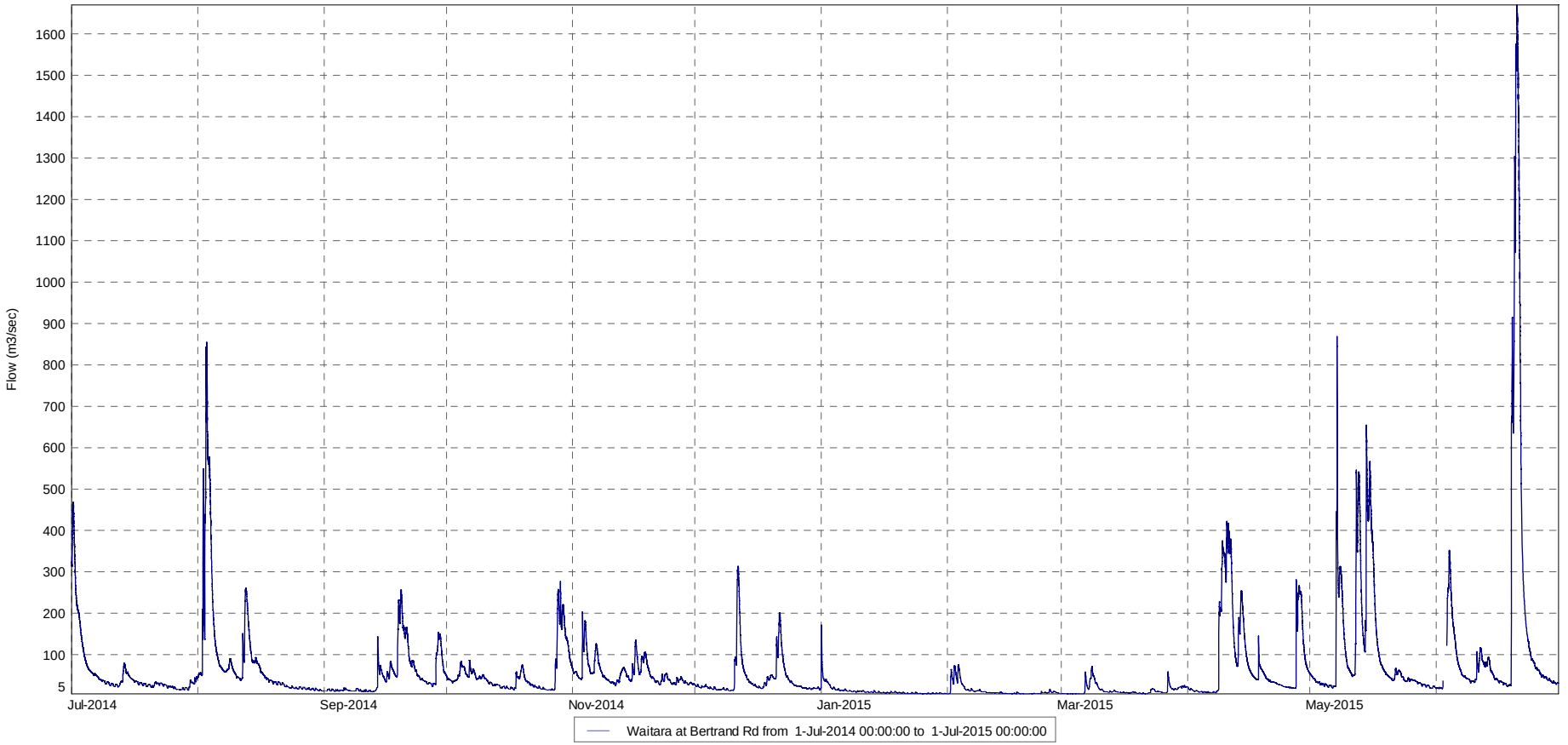
For and on behalf of
Taranaki Regional Council

_____

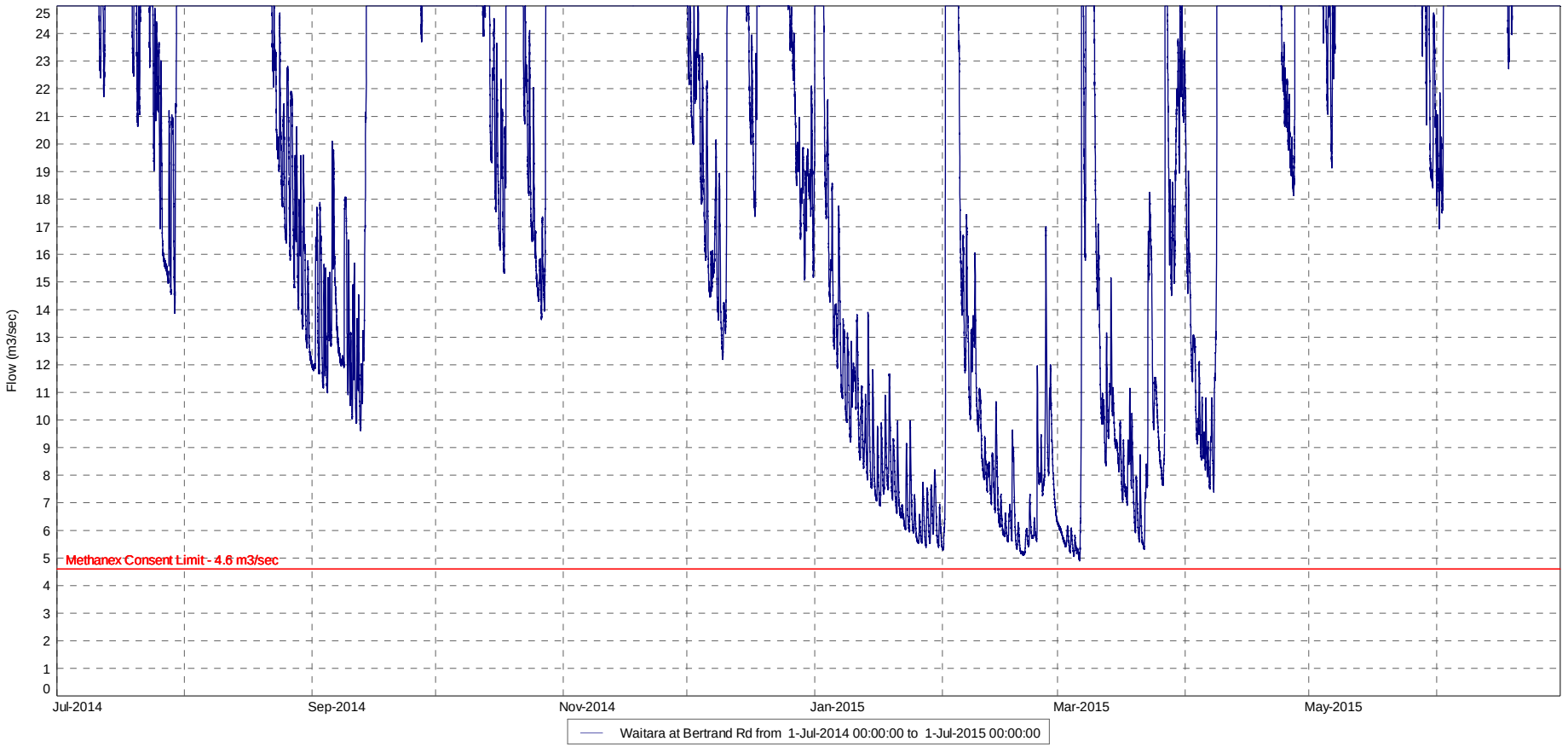
Director-Resource Management

Appendix III

Hydrograph for the Waitara River at Bertrand Road for the monitoring period July 2014 to June 2015



The flow of the Waitara River at Bertrand Road is presented in this hydrograph for the period 01 July 2014 to 30 June 2015. The consent limit is shown (in red) in the following hydrograph which shows recorded flow between 0 and 25 m^3/sec .


Flow (m3/sec)
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Methanex Consent Limit - 4.6 m3/sec
Jul-2014
Sep-2014
Nov-2014
Jan-2015
Mar-2015
May-2015
Waitara at Bertrand Rd from 1-Jul-2014 00:00:00 to 1-Jul-2015 00:00:00

Appendix IV

Biennial water use reduction report for Methanex NZ Ltd. Motunui and Waitara Valley plants (2012/2013)

Methanex New Zealand Limited
409 Main North Road, SH3
Motunui
Private Bag 2011
New Plymouth 4342
New Zealand

Telephone: +64 6 754 9700
Facsimile: +64 6 754 9701

www.methanex.com

METHANEX®

A Responsible Care® Company

December 1, 2014

Taranaki Regional Council
Private Bag 713
Stratford

Attention: Helen Meintjes

BIENNIAL WATER USE REDUCTION REPORT FOR METHANEX NZ LTD.
MOTUNUI & WAITARA VALLEY PLANTS
2012/2013 REPORTING PERIOD

1. Introduction

Methanex New Zealand Ltd is to provide this biennial report to the Taranaki Regional Council to meet conditions in the consents granted for taking water from the Waitara River for use at the Motunui and Waitara Valley plants.

The consents are:

Motunui Plant: 0820-2

Waitara Valley Plant: 0801-2

2. Summary of Plant Operation and Water Use

Motunui Plant:

The Motunui plant produced methanol during all of the 2012/2013 reporting period. At the beginning of the period only one reforming unit ('Motunui 2') was in production, with the second unit ('Methanol 1') being brought on line in early July 2012. The Motunui consent allows for a water take of 1400 cubic meters per hour. Typically the water take with one unit in production was in the range of 500 - 600 cubic meters per hour, and with both units operating this increased to typically 1000 – 1100 cubic meters per hour.

With the re-commissioning of Motunui 1, a decision was made to replace the unit's boiler feed-water dearator with a design using the best available technology, which would have benefits in water and energy efficiency and noise reduction. The new dearator vents approximately 5 tonnes/hr less steam, making a significant water make-up saving. The replacement was very

successful, and consequently the dearator in the Methanol 2 dearator was also replaced with the same design in 2013, with the same benefits in water savings.

Continuous focus was also placed on the efficient use of water; both through recycling within the process and through ensuring minimum amounts were using in operations such as back-flushing ion exchange units.

Waitara Valley Plant:
The Waitara Valley consent allows for a water take of 300 cubic meters per hour; however Methanol production from this site was shut-down during this reporting period, through until October 2013, when it was restarted after several months of re-commissioning work. Up until this time only a very small amount of water was used for making up the fire-water pond and cooling tower basin due to evaporation losses. Once production re-started, water take typically averaged 250 cubic meters per hour.

During the re-commissioning work the cooling tower was completely refitted, the cooling water system flushed, and heat exchangers checked and rebuilt wherever required. Through all of these initiatives the heat exchange efficiency was ensured to be at optimal levels, with an associated benefit in water consumption requirements.

3. Conclusion

For the reporting period the water takes for both plants remained well within permitted levels of water extraction from the Waitara River. The use of minimal amounts of water is of importance to Methanex, both from the Responsible Care commitment to ensure the efficient use of resources and from the cost benefits involved. During this reporting period Methanex demonstrated a responsible approach to the use of water, both through the major maintenance carried out in the replacement of the two dearator units at Motunui and the continuous focus on the efficient use of water at both plants.

Report Prepared by:

Gary Rielly
Sustainability and Quality Leader

Appendix V

Motunui cooling tower plume abatement feasability study for Methanex NZ Ltd. Five yearly report (2014)

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METHANEX®

A Responsible Care® Company

September 25, 2014

Taranaki Regional Council
Private Bag 713
Stratford

Attention: David Olson

MOTUNUI COOLING TOWER PLUME ABATEMENT FEASABILITY STUDY FOR METHANEX NZ LTD.
5 – YEARLY REPORT (2014)

Dear David,

Enclosed is a report that has been commissioned by Methanex New Zealand Ltd to satisfy clause 5 of consent 4042-3 – Consent to Discharge Contaminants into the Air from the Motunui Methanol Plant. The requirement of Clause 5 is to have an independent person report on the details of technology that could reduce the adverse effects of the water vapour plume from the cooling tower. Worley Parsons has been commissioned to carry out this report and their recommendation is that the installation of a new 'helper' cooling tower along-side the existing tower would be the best practicable option for a retrofit to reduce the effects of the plume.

Methanex has considered this recommendation, along with the other option they have assessed of installing a completely new tower. A summary of our findings follows:

Option 1 (recommended by Worley Parsons):
Installation of a 'helper' tower with 6 cells along-side existing tower

- Target: To reduce the plume frequency down to 30% (current plume frequency is 80%).
  Note: This is not to achieve totally plume-less condition, i.e. a plume frequency of 0%.
- Budgetary installation cost: 5 million
- Additional loss of revenue for period the plant is shut down for the replacement.
- Incremental energy costs for the 6 new cells would be approximately 9,198,000 kWh per year. This additional power

usage corresponds to 1150 NZ households' annual electricity consumption.

Option 2:
Installation of a new cooling tower

- Target: To reduce the plume frequency down to 15% (current plume frequency is 80%).
  Note: This is not to achieve totally plume-less condition, i.e. a plume frequency of 0%.
- Budgetary cost: 20 to 25 million
- Additional loss of revenue for period the plant is shut down for the replacement.
- Incremental energy costs for running the new tower: vendors suggest the power usage will increase by 50 to 100%.

  Current cooling tower:
  Power usage for each fan: 175 kW
  18 fans: 3150 kW
  Power usage per year: 27,594,000 kWh

  Additional power usage for the new tower would be between 13,797,000 to 27,594,000 kWh per year. This additional power usage corresponds to 1725 to 3449 NZ households' annual electricity consumption.

As a result of this assessment Methanex has decided not to progress either option at this point in time. This is primarily due to the consideration of the large amount of power required, with the environmental aspects of the associated generation and transmission, along with costs taken into account, to reduce what is essentially a visual effect. Methanex has received no complaints regarding the plume since it re-started production at the site in 2008. If this were to change, or if the TRC considers that the consumption of energy is worthwhile to reduce the adverse effects of the existing tower, Methanex is willing to consider this further, otherwise another report will be commissioned in another five years' time.

Report Prepared by:

Gary Rielly
Sustainability and Quality Leader

WorleyParsons
resources & energy

METHANEX
A Responsible Care® Company

METHANEX NEW ZEALAND LIMITED

Motunui Cooling Tower Plume Reduction
Plume Abatement Feasibility Study

502092-RPT-P0001
July 2014

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Rev	Description	Originator	Reviewer	WorleyParsons Approver	Date	Client Approval	Date
A	Issued for Review/Comment	V Rimmer	O Kilian	O Kilian	06/2014	N/A	
0	Approved for Use	A Nobbs	O Kilian	O Kilian	06/2014	N/A	
1	Re-approved for Use	A Nobbs	O Kilian	O Kilian	4/7/2014	N/A	

EXECUTIVE SUMMARY

Methanex NZ Ltd currently owns and operates a HAMON designed counter-flow cooling tower at their Motunui Site, North of Waitara. The Taranaki Regional Council [TRC] monitored the Motunui Cooling Towers operation in the spring of 1994, and in particular the size and visual impacts of the cooling tower plume formed by this tower during operation. They concluded that at the 1994 cooling tower operating rates (800MW) the visual impacts of the cooling tower plume "can be properly considered as no more than minor".

The Motunui Second Train Restart Project was completed in 2012. This project restarted Methanol Train 01 and since then the cooling tower has operated at approximately 80% of the peak cooling duty recorded in earlier 1994 plant operation. As the current operation is close to the original design load, it is anticipated that the size and shape of the plume will be similar to the 1994 findings, albeit that this may be conservative as the current operation is only 80% of original design.

The fogging frequency curve representing the current operation of the Motunui cooling tower was superimposed on meteorological data from September 2011 to May 2014 and the pluming frequency was calculated to be 80%. The current design point, which lies on the fogging frequency curve, was found to be 15°C, at 57% Relative Humidity.

Three vendors were engaged to provide budget proposals for either a retrofit of the existing tower or a new cooling tower with plume abatement technology. Only two companies (Marley Flow Control and Hamon) responded with satisfactory proposals.

Marley Flow Control estimated a retrofit option of $5 million for a benefit in plume abatement of approximately 10%. As a reduction in pluming frequency of 10% would not be noticeable it would be difficult to justify the cost of $2-5 million.

The Marley Flow Control recommendation of new helper cooling towers added alongside the existing cooling towers is considered the best practicable option for a retrofit. At a cost of $3-5 million the improvement in plume abatement would be noticeable.

New cooling towers are the only option for achieving a target design plume frequency of 15%. Marley Flow Control and Hamon provided budgetary costs for new towers of $20 million and $25 million respectively plus there is an additional loss of revenue for the period the plant is down for the replacement. Alternatively the new tower can be installed "online" at an additional cost of approximately 25% of the above capital outlay.

For winter operation, the occurrence days of visible pluming, and size of the visible plume can be partly reduced without any capital expenditure. On colder days the current practise is to switch off fans to maintain the same cooling water temperature, and save electricity usage. Maintaining all fans on would increase the air/water ratio in the tower, and thereby reduce the saturation level of the air leaving the tower. This would directly impact on the quantity of water condensing as the plume meets the cold air, and therefore reduce the size and frequency of the plumes.

The current pluming is within acceptable limits, based on the requirements of the 1994/5 study [Ref. 4]. If abatement becomes a requirement, then it is the opinion of WorleyParsons that the best practicable option for minimising the adverse effects of visible vapour plume would be to install new helper cells alongside the existing cooling towers. A review of current winter operational practices could also reduce the frequency of plume occurrence.

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APPENDICES

2. INTRODUCTION

The Motunui Methanex Site was constructed in 1983. The Bechtel / Davy McKee designed plant included three main process units; two Methanol production trains and a Methanol to Gasoline Plant (MTG). The plant has undergone significant changes since its original construction, including shutdown of the MTG unit and commencement of two distillation columns (D3 & D4) in 1997, demolition of the MTG unit in 2004, an extended shutdown (due to gas supply issues) from 2004 to 2008 followed by a restart of Methanol Train 02 in 2008, and then a restart of the second Methanol train (Train 01) in 2012.

The Cooling Water system was designed by HAMON to satisfy the Cooling Water demand of the three major units listed above. The change in operation of the Cooling Water System, including the Cooling Water Tower between 1995 and 2014 is detailed in section 4.

2.1 Taranaki Regional Council Report 1994/95

The concern regarding the effects of the Motunui Cooling Tower visible plume was raised in 1994 during the hearing process for the initial application for resource consent (4042). Specific concerns were the effect of the cooling tower plume, when visible, on the amenity values of neighbouring properties and also reduction in grass growth due to artificial shading caused by the plume.

The Taranaki Regional Council (TRC) carried out a survey in spring 1994 in an attempt to quantify the nature of the plume formed by the Motunui cooling tower. This survey would act as a basis for considering the extent to which the plume impacts on the amenity values in the local area.

The major results of this study are summarised below (from TRC report 1995 clause 59):

- The occurrence of artificial shadowing on neighbouring properties was an infrequent event during clear skies (TRC – 1994).
- North to North East winds are required for artificial shadowing to occur inland on neighbouring properties (to the South). These winds occurred 61% of the total monitoring period. Historical data indicates that such winds should normally be expected 16% of the time (prevailing wind is South West to North West winds), and most frequently in spring. The report took this in to account, and indicated that the results were 'worst case'.
- The plume appeared to enhance pre-existing cloud cover 25% of the time (TRC – 1994).

The report concluded that "the quantitative data represented a 'worst case scenario' for the visual impacts arising from the cooling tower plume in respect to an observer from the South of the Motunui Plant". The report also concluded that "the effects can properly be considered as no more than minor". The report did not attempt to quantify or estimate the effect on amenity values of neighbouring properties.

2.2 Other Reviews

Methanex also carried out a review in 2009 to consider the alternative technologies that were available to mitigate the visual impact of the cooling tower plume. The review indicated "that plume abatement technology should only be considered practicable or cost effective if it is installed in combination with a new cooling tower at the end of the existing towers design life".

Prior to the restart of the Motunui plant and the Cooling Tower in 2008, one submission was received by the council on the air discharge consent application which raised the cooling tower plume as an issue. It was noted by the Council that local concern, although minimal (one submission from approximately 10 neighbouring properties) shall be recognised. Methanex have also regarded the local concern, and as a Responsible Care company, seek to reduce external effects on the neighbourhood.

2.3 Current Status

The Motunui Methanex plant has had further changes in operation since 2009 (detailed in section 4). The current predicted cooling duty of the plant is now approximately 80% of the peak cooling duty recorded in earlier plant operation, such as in 1994. This is an increase since the last report in 2009, however it is still less than the original design, which means it will be emitting less water vapour (produced by the evaporative cooling process), potentially with the same air flow (if fan pitch is per design with all units in operation), resulting in slightly less days of visible pluming, and a slight reduction in the size of the plume observed. This will be expanded on in subsequent sections.

2.4 Scope

The requirements of this report are set out by the Taranaki Regional Council (TRC).

The consent holder shall commission reports that detail the technology that could minimise the adverse effects of the water vapour plume from the cooling tower. These reports shall:

a) Be prepared by an appropriately qualified independent person approved by the Chief Executive, Taranaki Regional Council.*

b) Detail the costs, expected levels of reduction in adverse effects, and practical implications of introducing the technologies at the Motunui plant.

c) Provide an assessment of what constitutes the "best practicable options" for minimising the adverse effects of the water vapour plume from the cooling tower.

* TRC were contacted and they don't have an official list of qualified companies, their requirement is for a "suitably qualified person or company" to do the work. WorleyParsons is a leading provider of professional services to the resources & energy sectors and complex process industries and through our globally connected network of specialists is suitably qualified to undertake this report.

3. PLUME CHARACTERISATION

This section outlines the thermodynamic principals that lie behind plume formation. This will allow comparisons and predictions to be made between the size of the Cooling Tower plume as witnessed during 1994 TRC study (and 1995 PI Data), and the expected size of the plume and frequency of occurrence (fogging frequency) for the current (2014) operating rates.

This section will also go into greater detail on the results generated from the survey conducted by the Taranaki Regional Council in spring 1994. This survey quantified the nature of the plume in a "worst case scenario". As such, this report sets a benchmark to compare the visual impacts predicted at the current (2014) operating rates.

3.1 Plume Formation

A plume from a cooling tower is formed when heated moist air (generally saturated) exits the cooling tower, mixes with ambient air and is cooled below its dew point. At its dew point, the moisture in air condenses out into water droplets, and this is essentially observed as a cloud or plume. The tendency for plumes to form is far greater in cold humid conditions, than it is in warm, dry conditions. This is because the warm saturated air discharged from a cooling tower is more readily cooled to below its dew point in cold conditions.

This concept is illustrated in Figure 1. The curve illustrated from 1 - 2 is operation of a cooling tower during winter month's (cooler ambient conditions). Inside the tower, the heating and humidification of the air is shown by moving from point 1 to 2 (note point 2 as at the saturation point of air). When the air exits the tower, it is cooled and dehumidified back to ambient conditions along the line from point 2 to 1. As illustrated, this line enters the super saturation area of the graph, and hence a visible plume will be seen as water condenses out of air.

The curve illustrated from 3 – 4 is operation of a cooling tower during summer months (warmer ambient conditions). Inside the tower, the heating and humidification of the air is shown by moving from point 3 to 4 (note point 4 is at the saturation point of air). When the air exits the tower, it is cooled and dehumidified back to ambient conditions along the line from point 4 to 3. As illustrated, this line does not enter the super saturation area of the graph (air remains super-heated), and hence there will be no visible plume.

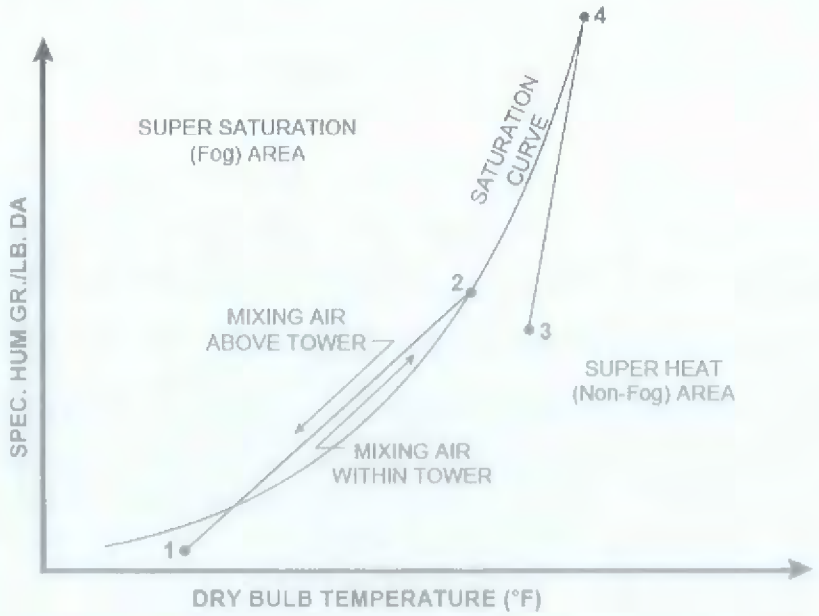


Figure 1: Psychometric chart for conventional Cooling Tower operation in winter months (1-2) and summer months (3-4) (*Reference 2: Cooling Tower Institute, Technical Paper TP93-01*).

3.2 Fogging Frequency

An approach to establishing the fogging frequency is by a graphical method (reference 3) that is based on a curve of ambient temperatures plotted on a psychrometric chart, for which a given piece of equipment will produce fan to ambient mixlines that are exactly tangent to the saturation curve, or have zero theoretical visible plume. The curve is typically generated for operation of the equipment at various ambient temperatures and full design heat load, unless a profile of tower heat load versus wet bulb temperature is available. Figure 2 shows the method of generating this theoretical curve of ambients at which visible plume formation begins. This curve, known as a fogging frequency curve, is a tool to determine fogging frequency at a given site for a particular cooling tower.

The fogging frequency curve divides the psychrometric chart into fog producing and non-fog producing conditions. The visible plume intensity increases as the ambient conditions represented on the psychrometric chart move to the left of the theoretical line, since the corresponding effluent-ambient mix lines move further into the supersaturated region. Site weather characteristics utilized with the fogging frequency curve allow determination of the fogging frequency, expressed as a number of hours per year or percentage of total hours for which visible fog may occur.

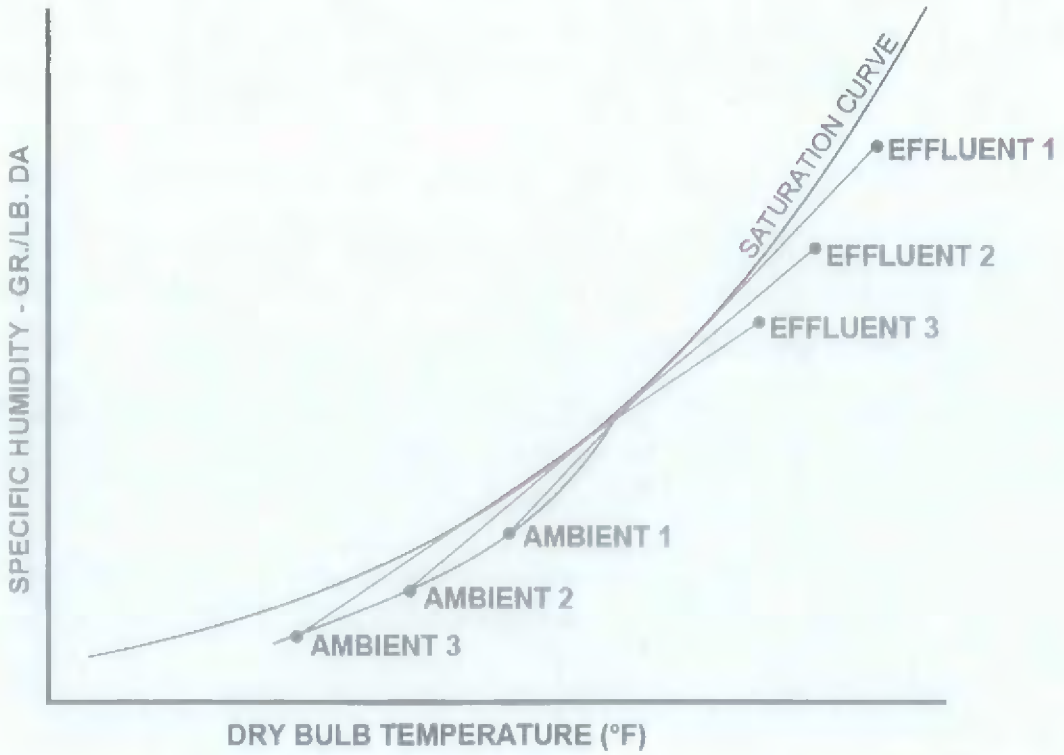


Figure 2: The generation of the Fogging Frequency curve using inlet and corresponding outlet conditions (Reference 2: Cooling Tower Institute, Technical Paper TP93-01).

A fogging frequency curve has been created for current operation in Section 4.

For a conventional 'wet' cooling tower (with no plume abatement) the fogging curve will typically look like the lower right curve in Figure 3. This plot illustrates that most atmospheric conditions will result in the formation of a visible plume for a conventional wet cooling tower. The addition of plume abatement will act to push this 'fogging curve' to the left; hence a plume will not be formed for a greater range of ambient conditions. Figure 3 shows that with greater amounts of investment in plume abatement equipment the visible pluming can be eliminated over a greater range of expected ambient conditions.

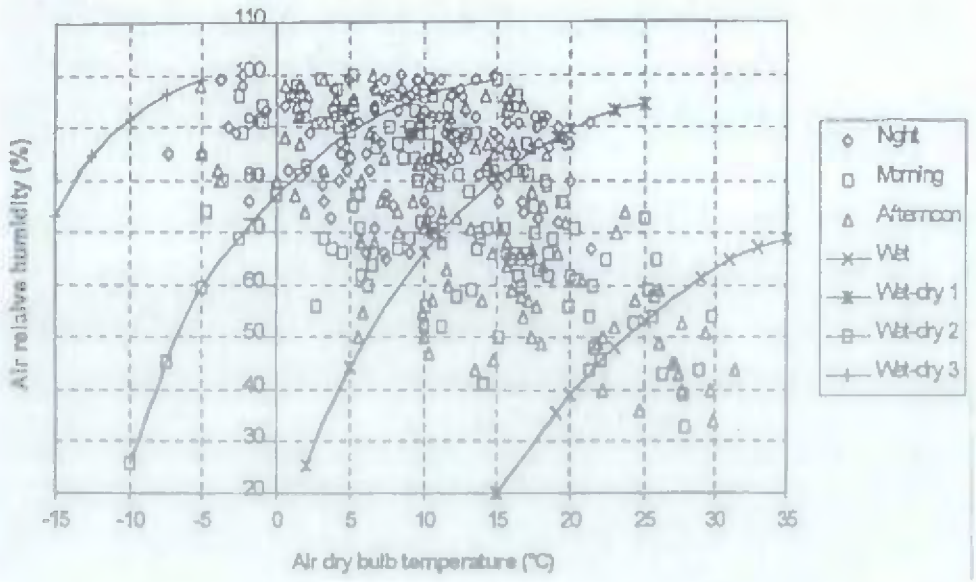


Figure 3: Ambient atmospheric conditions overlaid with fogging curves for a cooling tower with no plume abatement (lower right) and cooling towers with steadily more plume abatement investment (*Reference 3: Cooling Tower Institute Bulletin ATC-150*).

3.3 Plume Effects

3.3.1 TRC Survey

The TRC conducted a survey in the spring of 1994 in an attempt to quantify the nature of the plume emitted from the Motunui Cooling Tower. The TRC issued a report in 1995 which outlined the findings of this survey, as well as their conclusions on the visual impact of the cooling tower plume.

The major visual impacts identified were loss in amenity values of neighboring properties and reduced pasture growth caused by:

- Artificial shadowing of farm land caused by a large cooling tower plume on mostly clear days (less than 10% cloud cover).
- Cloud enhancement – defined as those times when the cloud cover in the vicinity of the end of the plume appeared to be denser or more widespread than elsewhere in the local atmosphere.

Note that the plume from the tower is not considered to have any adverse ecological / environmental effects as the dissolved salts and solids and chemicals are not entrained in the air during the evaporation step of the cooling process.

The report defined the following plume characteristics:

- The plume was found to remain less than 200m in height for 61.4% of observations.
- The plume was found to remain less than 200m long for 40.5% of observations.
- On predominately clear day's (less than 50% of cloud obscured) the plume only exceeded 600m in height 6.2% of the time, and it exceeded 970m in length 4.1% of the time.

The report stated the following conclusions for the visual impacts of the cooling tower plume:

- The cooling tower plume was found to enhance the cloud cover in the vicinity of the plant approximately 25% of the time monitored.
- The report noted artificial shadowing events occurred to the south of the plant 5.1% of the total period of clear skies (less than 10% of cloud obscured).
- Overall the report concluded that the effects of the Motunui Cooling Tower plume "could be properly considered as no more than minor".

Further to the above conclusions the report also noted that north to north easterly winds are required for artificial shadowing to occur to the south of the plant. Such winds made up 61% of the wind direction readings during the Council survey. Meteorological data for New Plymouth suggests that the wind blows form the North and easterly sectors 16% of the year. The report therefore documented a 'worst case' scenario.

Assuming the amount of clear sky days during the survey period is representative of the average annual clear sky days, then artificial shadowing would only be expected to occur 1.3% of the clear sky day's per year.

Now based on the assumption that 50% of the time there are clear skies in Taranaki (approximately correct based on annual sunshine hours of 2150 hours per year), the total hours per year where artificial shadowing is an issue to the south of the Motunui plant is 53 hours per year.

Both the TRC report conclusion and predicted fogging frequency estimation based on the vendor simulated performance will be used to benchmark the plumes visual impacts at the current (2014) operating rates in section 4 of this report.

4. COOLING TOWER OPERATION – EFFECTS ON PLUME FORMATION

This section will compare the operating conditions, cooling water flow rates and heat load requirements of the Motunui Cooling Tower for the following periods:

- Pre 1995-2004 – The Motunui plant was run at full or close to full cooling water rates as two Methanol trains, two distillation units and the MTG plant were in service. It was during this period that the TRC last monitored the cooling tower plume (1994).
- 2008-June 2012 – The Motunui plant was operated at reduced rates, as only one Methanol train (02) and two distillation units (at low rates) were in service.
- July 2012-2014 – The Motunui plant is currently operated at full rates but without the MTG. This corresponds to approximately 80% of the design cooling load.

The visual impacts of the cooling tower plume whilst operating the Motunui plant on reduced rates will also be analyzed in this section.

4.1 Methanex Motunui Operations 1995 – 2004

During the time period of 1995 – 1997 the Methanex Motunui plant was run with two Methanol trains, two distillation units and the MTG plant in operation. In 1997 the MTG plant ceased operation, but both Methanol trains and distillation units remained in operation until a gas shortage resulted in the Motunui plant reducing rates then ceasing operation in 2004. The MTG plant was also demolished in 2004.

During the time period of 1995-2004 the Cooling Tower was operated under the following conditions:

- Cooling Water Supply Temperature 25°C
- Cooling Water Return Temperature 45°C
- Cooling Water Flow rate 34,000m³/h
- Total Cooling Duty 791MW
- Estimated Water Loss to Evaporation 1,178m³/h
- Total Water Make Up 1325m³/h

During this period 17 out of the 18 cells of the Cooling Tower, and 17 induced draft fans were in operation (one cell spare for maintenance). The total heat load was estimated as 630MW post 1997 when the MTG plant ceased operation and the two Methanol trains were operated at full capacity.

4.2 Methanex Motunui Operations 2008 – Jun 2012

Methanex Motunui ceased all operations in 2004 for close to four years (2004-2008). During this time period the Methanex Waitara Valley plant produced Methanol and the Motunui facilities remained inactive.

The Motunui Restart Project was completed late in 2008. This project restarted Methanol Train 02 at the Motunui Plant, and as a consequence the Waitara Valley Plant was 'laid-up'. Since the Motunui Plants restart, the cooling tower has operated under the following conditions (2008-2009):

- Cooling Water Supply Temperature 26°C
- Cooling Water Return Temperature 38°C
- Cooling Water Flow rate 22,000m³/h

- Total Cooling Duty (estimate) 307MW
- Estimated Water Loss to Evaporation 475m³/h
- Total Water Make Up *359m³/h (average from period and depending on cooling water flow rate)

During this period of operation cooling water was distributed to all 18 cells. Of these cells, ten have induced draft fans available, but on average only seven fans are operated (during summer worst case). The rest of the cells (11) were cooled by natural draft (ambient air flow caused by density and pressure differences and also the effect of induced draft from adjacent cell fans). This reduced the overall air flow through the tower. The air flow was around 60% of the flow with all 18 fans in operation, but without direct measurement the exact air rate was unknown.

4.3 Methanex Motunui Operations July 2012 - present

The Motunui Second Train Restart Project was completed in 2012. This project restarted Methanol Train 01 at the Motunui Plant. Since the Motunui Plant Train 01 restart, the cooling tower has operated under the following conditions (2012-present):

- Cooling Water Supply Temperature 25°C
- Cooling Water Return Temperature 41.3°C
- Cooling Water Flow rate 33,000 m³/h
- Total Cooling Duty (estimate) 622 MW
- Estimated Water Loss to Evaporation 720 m³/h
- Total Water Make Up 831m³/h

During this period of operation cooling water was distributed to all 18 cells. Typically, operation is with all 18 fans on.

4.4 Current Plume Size

The visual effects of the cooling tower plume at peak operating rates (1994) have been described in detail in section 2 of this report. As the current operation is close to the original design load, it is anticipated that the size and shape of the plume will be similar to the 1994 findings, albeit that this may be conservative as the current operation is only 80% of original design.

4.5 Current Fogging Frequency

The fogging frequency curve representing the current operation of the Motunui cooling tower is shown below. The curve has been superimposed on Motunui meteorological data from September 2011 to May 2014. This curve was produced using the graphical method described in Section 3.2 Fogging Frequency (reference 3). If an ambient condition lies above the fogging frequency curve, a visible plume occurs. Conversely, if the ambient condition lies below the curve, no visible pluming occurs. Based on the site meteorological data from September 2011 to May 2014, the pluming frequency was calculated to be 80%. This means that during this period pluming occurred approximately 80% of the time. The current design point, which lies on the fogging frequency curve, was found to be 15°C, at 57% Relative Humidity.

The fogging frequency curve had an error margin of 10% associated with the manual graphing of the curve using the psychrometric chart.

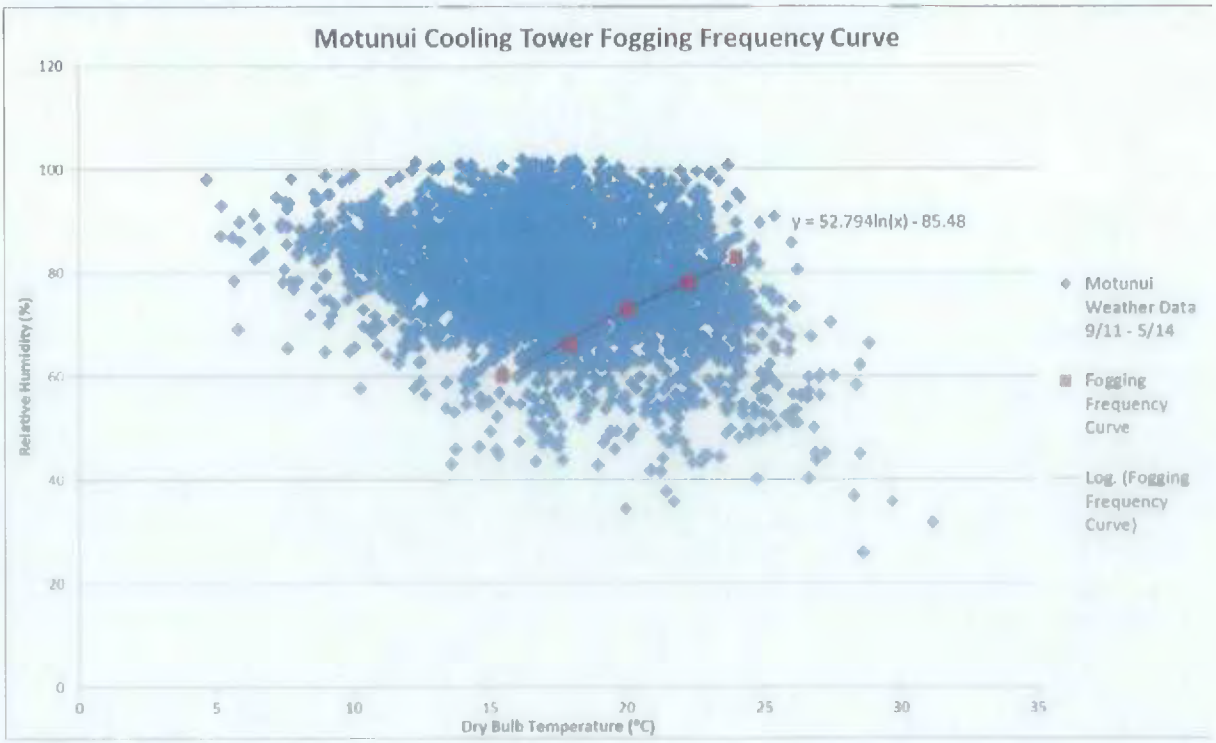


Figure 4: Motunui Cooling Tower Fogging Frequency Curve superimposed on Motunui meteorological data. Visible pluming occurs approximately 80% of the time, this being illustrated by 80% of the points lying above the fogging frequency curve.

5. PLUME ABATEMENT OPTIONS

Plume abatement technology is required to achieve significant plume abatement in areas that have cold/moist conditions. Lower levels of plume abatement can be achieved without any plume abatement technology, as discussed in section 7.

This section will introduce the theory behind a 'wet / dry' cooling tower. This type of cooling tower utilises a dry heat exchange section for plume abatement, and is the recommended option for a 'retrofit' of the existing tower, and also for the options involving a new cooling tower with plume abatement.

5.1 Plume Abatement Technology

The main concept behind plume abatement in a wet / dry cooling tower is to add sensible heat to an ambient air stream and then mix this stream with the saturated exiting air stream inside the tower (known as the plenum, the area above the fill section and below the fan deck). Mixing the two air streams promotes dehumidification of the saturated air stream, and thus the combined air stream leaves the tower super-heated, and outside of the visible plume formation area. This is best illustrated by Figure 5 below.

The steps are summarised as follows:

- Step 1 – 2: Ambient air enters the wet section (base) of the cooling tower and is directly contacted with water. This air is heated and saturated (humidified).
- Step 1 – 3: Ambient air enters the dry section of the cooling tower, and is heated by indirect contact with water (by a heat exchanger tube bundle or coil). The air is superheated, as sensible heat is added to the air.
- Step 2 – 4, and Step 3 – 4: The superheated air stream from the dry section is mixed with the saturated air from the wet section. The effect is to lower the overall air saturation level of the air exiting the tower.
- Step 4 – 1: The exit air mixes with the cooler ambient air, but the saturation level of the exiting air is such that the mixing process does not cool the air to below its dew point. Hence no condensation occurs and a visible plume is not witnessed.

Note that Figure 5 shows a cross-flow cooling tower configuration with a 'dry' heat exchange section. This plume abatement technology is equally applicable to a counter-flow tower, as operated at the Motunui plant.

Typically a plume point is selected when designing a new cooling tower. The plume point is typically selected such that a visible plume is not witnessed for approximately 85% of the local ambient conditions. The typical plume design point for a plant in the Taranaki region would be 6°C at a relative humidity of 85%.

A fogging frequency curve is generated by the Cooling Tower design firm. This curve will generally guarantee the range of ambient conditions where a plume will not be witnessed for the designed cooling tower. A typical fogging frequency curve is detailed in Figure 6. Note that Figure 2 in section 2.1 also depicts the same concept.

There are many other plume abatement alternatives, but most are based on the same concept as above. The main variation is the position and operation of the 'dry' exchanger. This exchanger can be commonly placed on the inside of the wet section, and it can also be operated with cooled water, which is used to condense the water from the warm humid air inside the tower.

It is possible to install a complete 'dry' cooling system that utilises an entire bank of air cooled exchangers. Obviously this requires a considerable capital outlay.

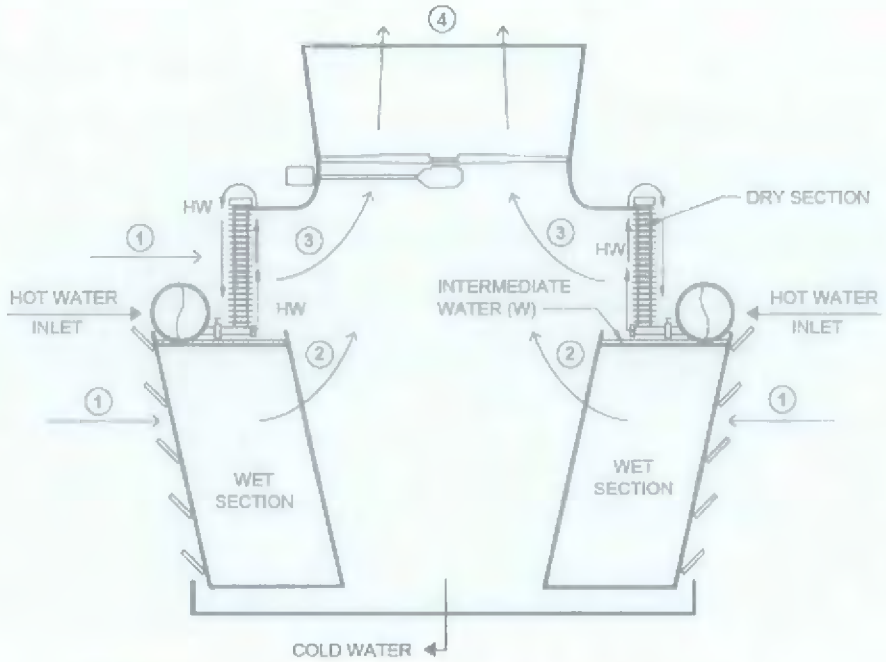


Fig. 5a. Psychrometric chart for parallel air path, series water path (PPWD).

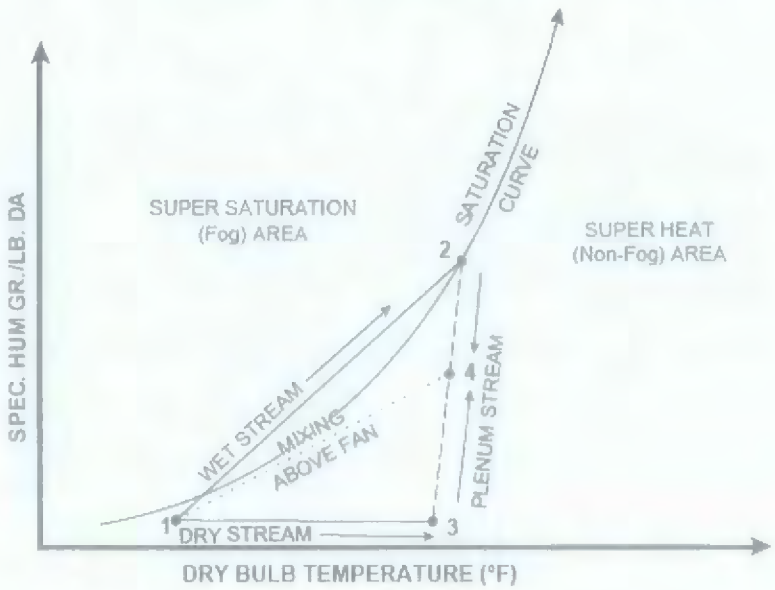


Figure 5: A common wet / dry cooling tower is illustrated above. The psychometric chart illustrates the different states of air throughout the cooling and mixing process (*Reference 2: Cooling Tower Institute, Technical Paper TP93-01*).

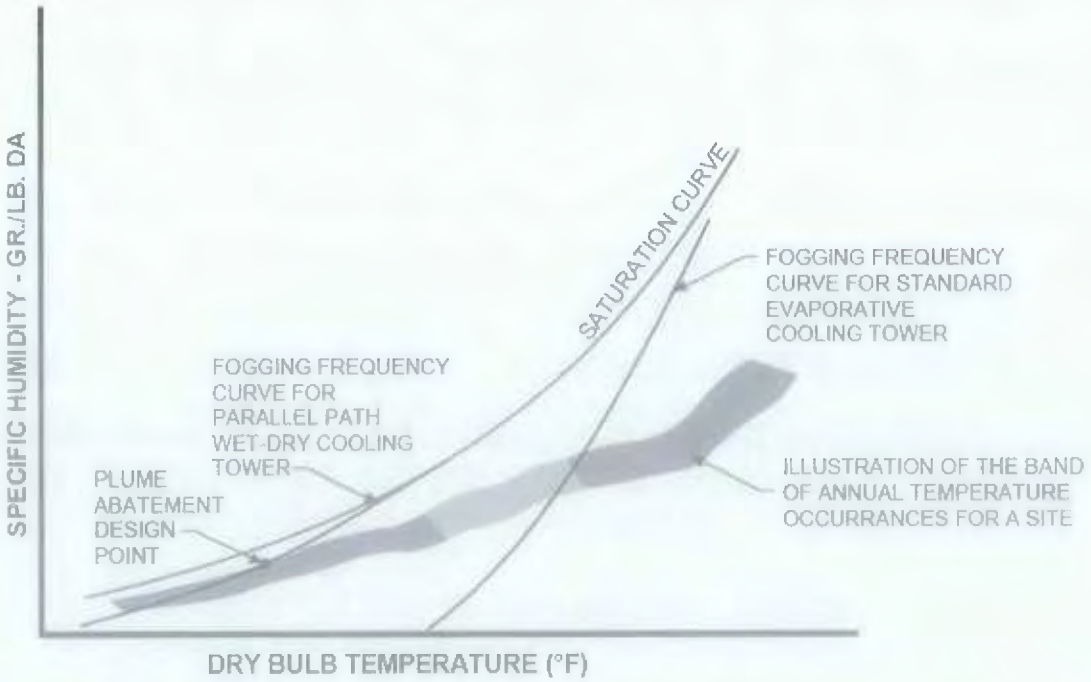


Figure 6: Graphical depiction of plume abatement design point selection (*Reference 2: Cooling Tower Institute, Technical Paper TP93-01*).

A new "PVC fill" technology is also available, but this has only been successfully trailed on a cross-flow cooling tower. The "PVC fill" technology works by diverting water flow to every other passage. The alternate passage without water act as 'dry' sections hence superheated ambient air and warm humid air can mix within the tower.

Typically the overall thermal performance of a plume abated 'wet / dry' tower is inferior when compared to a conventional tower. This is because the 'dry' sections are inefficient compared to 'wet' sections as only sensible heat can be transferred from the water to the air.

6. PLUME DESIGN SPECIFICATION

The key item to specify correctly when considering retrofitting to reduce visible pluming, or installing new cooling towers with some visible plume reduction capability, is the plume design point. Although the plume design point in reality corresponds to a dry bulb air temperature at a set relative humidity, it is better for the operator to focus on how much visible pluming they can tolerate, that is what frequency is tolerable? This can then be worked back by the contractor to a plume design point that the vendors can work to. This approach is more likely to lead to a tower retrofit or new tower performing as expected, without costing an excessive amount for little perceived benefit.

In the case of a retrofit it is crucial for the operator to understand how this investment to reduce visible pluming will impact the thermal performance of the cooling tower. Once the operator is able to ascertain to what level they can permit this thermal performance to be eroded, they can then determine how much visible plume reduction can be achieved before serious tower modifications (for example heightened structure, new fans) are required. It is often the case with an existing tower designed for wet cooling duty, that the level of visible plume reduction achievable would not be significant enough for interested parties to even notice the impact of the investment (potentially in the order of $NZ5 million).

As a general rule, installation of a cooling tower with serious plume abatement technology could be expected to be approximately double the cost of a tower without this technology installed.

For the option of retrofitting the existing tower, vendors were asked to assess what level of visible plume abatement can be achieved.

For the option of a new replacement cooling tower, the plume design will be specified such that visible pluming does not occur more than approximately 85% of the time (based on historical meteorological data). In most cases it is not justified to design for abatement of the visible plume more than 85% of the time.

7. PLUME ABATEMENT

Three vendors, specified by Methanex, were engaged to provide budget proposals for either a retrofit of the existing tower or a new cooling tower with plume abatement technology. One was later removed from the process for technical and professional concerns.

The vendors engaged were Marley Flow Control and Hamon. Both vendors responded with proposals as detailed in Appendices 1 and 2.

This section summarises their responses and recommendations, including costs and practical implications for installing each option at the Methanex Motunui site.

7.1 Marley Flow Control

Refer to Appendix 1 for Marley information.

7.1.1 Work Undertaken

Marley Flow Control NZ engaged their Australian plume abatement expert to understand and recommend the best options for cooling tower visible plume reduction. They took a high level approach considering the overall economics of the retrofit versus level of visible plume reduction.

In addition to this, they also built a simulation of the existing tower in order to quantify its current pluming point and carried out site inspection to confirm the state of the fill, and check for fouling issues to qualify the water fouling potential.

7.1.2 Results

A matrix was developed collaboratively to show investment options to reduce visible pluming, versus the impact on thermal performance and level of visible plume reduction. Refer Table 1 below.

Option	Plume Abatement Schemes	Thermal Performance	Visible Plume	Relative Cost	Order of Cost
A	Leave tower as it is No new cells	25.7°C	14°C/70% Occurrence of 60%	Zero	Nil
B	Install plume abatement on existing tower (no upsizing) No new cells	Slight worsening	No noticeable improvement (although some reduction in plume hours, e.g. 10%)	Medium	$5 million
C	Add helper tower 3 cells No plume abatement features on either existing or new tower	Improves CWT by 1.3 degrees	13°C/75% Reduced annual hours but still anoccurrence of 44%	Low	$3 million
D	Add helper tower 6 cells No plume abatement features on either existing or new tower	Improves CWT by 2.2 degrees	12°C/77% Further reduced annual hours but still anoccurrence of 30%	Medium	$5 million
E	Install significant plume abatement on existing tower (e.g. 10°C/80%) Requires major structural changes and upsizing to mechanicals No new cells installed	Maintained at expense of fan kW (approx. doubled)	Very noticeable improvement Hours of visible plume reduced to a small fraction of current tower	High	$15 million

Option	Plume Abatement Schemes	Thermal Performance	Visible Plume	Relative Cost	Order of Cost
F	Install significant plume abatement on existing tower (e.g. 10°C/80%) Requires major structural changes Add cells with plume abatement	Improved according to design specification	Very noticeable improvement Hours of visible plume reduced to a small fraction of current tower	High	$15 million
G	Install new tower with significant plume abatement (e.g. 10°C/80%)	Improved according to design specification	Very noticeable improvement Hours of visible plume reduced to approx. 15% time compared to currently approx. 80% of time	High	$20 million

Table 1: Plume Abatement Investment Options

Options C & D reduce visible plume by spreading the heat load over more cells, and thereby increasing the dry air to water ratio in each cell. Running these 3 or 6 helper tower cells will increase the cooling tower electricity consumption by 6.5% or 13% respectively per year. (The concept calculations are based on 3 additional identical cells.) These options therefore lead to additional operating costs.

This is similar in concept to operating with all fans on in the winter and maximising the cooling duty. This approach is not used at Methanex at present as during colder weather fans are turned off. This is to maintain the cooling water temperature at a target outlet temperature and reduce electricity consumption. However, an alternative could be to bypass a portion of the cooling water as a means of outlet temperature control whilst running the tower at maximum cooling duty and hence reduced plume.

The type of cooling tower for the helper cells (options C and D) would be traditional counterflow. The type of cooling tower for option G would be a PPWD (parallel air path series water path exchanger).

Site Inspection

The site inspection highlighted that the current fill is in good condition and does not require replacement. The two key criteria for recommending replacement are:

- If the water fouling potential does not match the design fouling potential of the fill;
- Fill is brittle – indicative by whether the fill crumbles on touch.

Neither of these criteria were satisfied, meaning there is no real justification for replacement of the existing fill. Given this, no proposal was submitted for replacement of the fill (per option 1).

Fogging Frequency

The fogging frequency curve for Option B with a design point of 10°C and 80% humidity was plotted on the Motunui Weather data. A hand drawn approximation of the fogging frequency curve (refer to Appendix 1) was very similar to the Hammon fogging frequency curve. The fogging frequency was determined to be approximately 21%.

7.1.3 Further Work Required

More detailed engineering into the costs and benefits of Options C and D in Table 1 is recommended. These options represent better value for Methanex than a straight "Plume Abatement" retrofit (option B). These options are much easier to install, than a retrofit or straight out replacement option, and require less downtime. They also provide additional cooling tower flexibility.

7.2 Hamon

Refer to Appendix 2 for Hamon budget quotation.

7.2.1 Work Undertaken

Hamon provided budgetary quotes for 2 options:

Option A – A replacement cooling tower without plume abatement and the same cell sizes and number as the existing tower.

Option B – A plume abatement type of cooling tower with the same cell sizes and number as the existing tower but an increased cell height to accommodate the dry section.

Hamon did not offer a refurbishment or retrofit of plume abatement systems to the existing cooling tower because they would first require to establish the condition and performance of all items.

7.2.2 Results

	Option A without Plume Abatement	Option B with Plume Abatement
Total Lump Sum Budget Price – Excl GST ($NZ)*	$13,300,000	$24,800,000

*assumes 1NZ$ = 0.9 AUS$, price is budgetary and is +/-30%. Includes Engineering, Material, Manufacture, Delivery, Installation, Supervision, Commissioning and Electric Motors

Table 2: Hamon costs for new cooling towers

Fogging Frequency

The fogging frequency curve for Option B (refer to Appendix 2) with a design point of 10°C and 80% humidity was plotted on the Motunui Weather data. The fogging frequency was determined to be approximately 21%.

Fan Power Consumption – Hamon highlighted the potential power savings for their cooling tower. For options A and B the power consumption is 1763kW and 1445kW respectively (versus the existing estimated power consumption of 175.1kW per Hudson Blade fan (ref 2) which totals to 3152kW).

Power

The quoted power usage for the Hammon wet/dry cooling towers is lower than the existing wet cooling tower. The exit cooling water temperature, and the exit air saturation percent are directly influenced by the cooling tower fill area and the air flow rate. Further investigation into the power saving claims of Hammon is required since an increase in plume abatement is normally associated with an increase in power consumption, which is in contradiction to their recommendation. Marley was asked to comment on the power change for a generic wet tower changing to a wet/dry tower. Marley uses as a rule of thumb that the power will increase by 50-100%. The exact magnitude of the power increase is a trade-off between the capital cost vs operating costs and hence the site power cost is a key factor.

It should be noted that the operating costs of each option is different, and should be evaluated during the next engineering phase to appreciate differences in payback, if there is any, for each option.

Cooling Tower Fill

Hamon have highlighted in their quote:

"We have included our Hamon 'COOLFILM/SNCS)' Film Fill which is an efficient fill suitable for a continuous operation with a Total Suspended Solids (TSS) concentration of 50ppm (annual average). The film can accommodate peaks of 100ppm for 10% of the time."

Installation of New Cooling Tower

Hamon can minimise shutdown time by replacing cells one at a time.

"We have also assumed that the new Cooling Tower will be installed in an "Offline" State. However, to minimise the overall Plant Outage duration, we could consider the 'On-line' installation whereby the existing cooling tower cells are replaced isolated and replaced individually one at a time whilst the other cells are in operation."

The cost to install a new tower in an "On-line" state would be approximately 25% more than the cost of installing the same tower "Offline".

7.2.3 Further Work Required

Not enough process data was supplied by Hamon to technically review the proposal. The overall cost of the cooling tower with plume abatement is in the same range as the Marley budgetary quote ($25 million compared to Marley $20 million).

Confirmation of the current Motunui power usage and site cost per kWh is required to evaluate any potential savings in power identified by Hamon.

8. CONCLUSIONS & RECOMMENDATIONS

8.1 Retrofit of Existing Cooling Towers

Marley estimated a retrofit option of $5 million for a benefit in plume abatement of approximately 10%. As a reduction in pluming frequency of 10% would not be noticeable it would be difficult to justify the cost of $5 million.

For a retrofit option to have noticeable improvement on pluming frequency, the fans have to be upgraded to twice their current size. This retrofit option was looked at in detail in 2009 by Hamon and Marley (reference 1) and the costs were estimated at approximately $15 million and $19 million respectively. It was concluded then that "it is neither cost effective nor practical to retrofit the existing cooling tower with plume abatement technology". This report agrees with the previous 2009 recommendation and suggests that the money would be better spent towards a new cooling tower.

The Marley recommendation of new helper cooling towers added alongside the existing cooling towers is considered the best practicable option for a retrofit. At a cost of $3-5 million the improvement in plume abatement would be more noticeable. This option also has the benefit of increased cooling duty to the cooling water which may provide additional justification.

8.2 New Cooling Towers

New cooling towers are the only option for achieving a target design plume abatement frequency of 85%. The costs of new towers would be approximately $20-25 million based on "offline" construction costs. As the retrofit will need to be done "online" (i.e. cell by cell), the construction costs will be approximately 25% more, that is approximately $31 million, due to the longer construction phase. If replacement of any cooling water lines or headers is required, a short plant outage would be required which is an additional cost via loss of revenue. It is assumed that pump replacement could also be done "online". This would need to be confirmed during later design phases.

8.3 Winter Operation

The occurrence days of visible pluming, and size of the visible plume can be partly reduced without any capital expenditure (to be confirmed based on fans, minimum CW temp etc.). Visible pluming occurs less frequently in summer due to the hotter, drier weather, and more frequently in winter due to the colder and wetter weather. On colder days the current practise is to switch off fans to maintain the same cooling water temperature, and save electricity usage. Maintaining all fans on would increase the air/water ratio in the tower, and thereby reduce the saturation level of the air leaving the tower. This would directly impact on the quantity of water condensing as the plume meets the cold air, and therefore reduce the size and frequency of the plumes.

8.4 Overall

The current pluming is less than it was during the period in which the regional council carried out their survey [Ref. 4], hence should be acceptable. If abatement becomes a requirement, then it is the opinion of WorleyParsons that the best practicable option for minimising the adverse effects of visible vapour plume would be to install new helper cells alongside the existing cooling towers. A review of current winter operational practices could also reduce the frequency of plume occurrence.

From: Lawrence Thomas [mailto:Lawrence@marleyflow.com.au]
Sent: Wednesday, 25 June 2014 3:34 PM
To: Aleena Nobbs
Subject: Fogging curves

Aleena,

Looking the actual fan power 175kW at motor shaft (say 166 at fan shaft), you get about 20% more air through the tower than previously with 100kW (96 at fan shaft). I've then looked at my psychometric chart and plotted the outlet air condition with a factor of 1.2 less enthalpy rise.

Coincidentally this is very close to the addition of 3 cells, which effectively increases the airflow by about the same margin.

So then, let's move,

15C/60% line to 14/70

14/70% line to 13/75

13/75% line to 12/77

Effectively you need to relabel 2 lines, delete one line and draw one line...

Let me know if you have any questions

Lawrence

From: Lawrence Thomas
Sent: Friday, 16 May 2014 2:56 PM
To: 'Aleena.Nobbs@worleyparsons.co.nz'
Cc: Heyden Johnston
Subject: RE: Methanex Cooling Towers

Hi Aleena,

Thank you for talking to me this afternoon.

As I mentioned there are several important aspects and pieces of information to look at in order to recommend the best practical way forward. Firstly I want to reiterate the useful information you were able to give me, just to check my understanding is correct...

- Fill requires replacement as it's in bad condition. We don't yet know exactly what that means (scaled, clogged, collapsing etc). The current fill is PVC film fill, model type unknown as yet. If you can find out what fill model type it is please let me know.
- Plume abatement is a new requirement and you are looking at modifying the tower to achieve 14C/70%RH. You have analysed weather data, temp and humidity, and the 14C dry bulb at 70%RH has been selected to meet the needs. See attachment of CTI plume point selection for your reference.
- Wood structure is largely in good condition.
- Drift eliminators were originally asbestos cement but have since been replaced with PVC type. These do not need replacement with new.
- Current duty is more or less as the original states, namely approx. 33,000 m3/h with 16K delta T.

What I would suggest in this first round is to determine the feasibility of either lightening the heat load on the existing tower in combination with a small new tower. If that is not reasonable as determined from the required wet vs dry proportions we will then look at upgrading the tower to plume abatement and adding the necessary additional tower to achieve the total requirement. In order to this I would request from you the following items...

- Approx chlorides ppm level in the circulating water
- Approx category of fouling potential in the circulating water...ie a fill type category from the attached Water Conditions Limits. I've attached the salt water sheet even though you mentioned the tower is not seawater makeup; it's the silicon bronze hardware that makes me think the original tower was designed for saltwater possibly.

I've attached some further reference information on plume abatement, this reference shows the finned tube type since that was state of the art at the time. Also a brochure of condensing type of plume abatement developed by SPX in recent years. The condensing type has the advantage in a retrofit of light, distributed weight as opposed to heavy concentrated weight of the finned tubes. Anyway we can discuss further many issues once we've had a closer look at the thermal and plume performance requirements.

Lastly there is a photo of the Stratford combustion turbine power station tower which is a plume abated, timber counterflow tower.

Kind regards,

Lawrence Thomas

MIMechE MIEAust CPEng

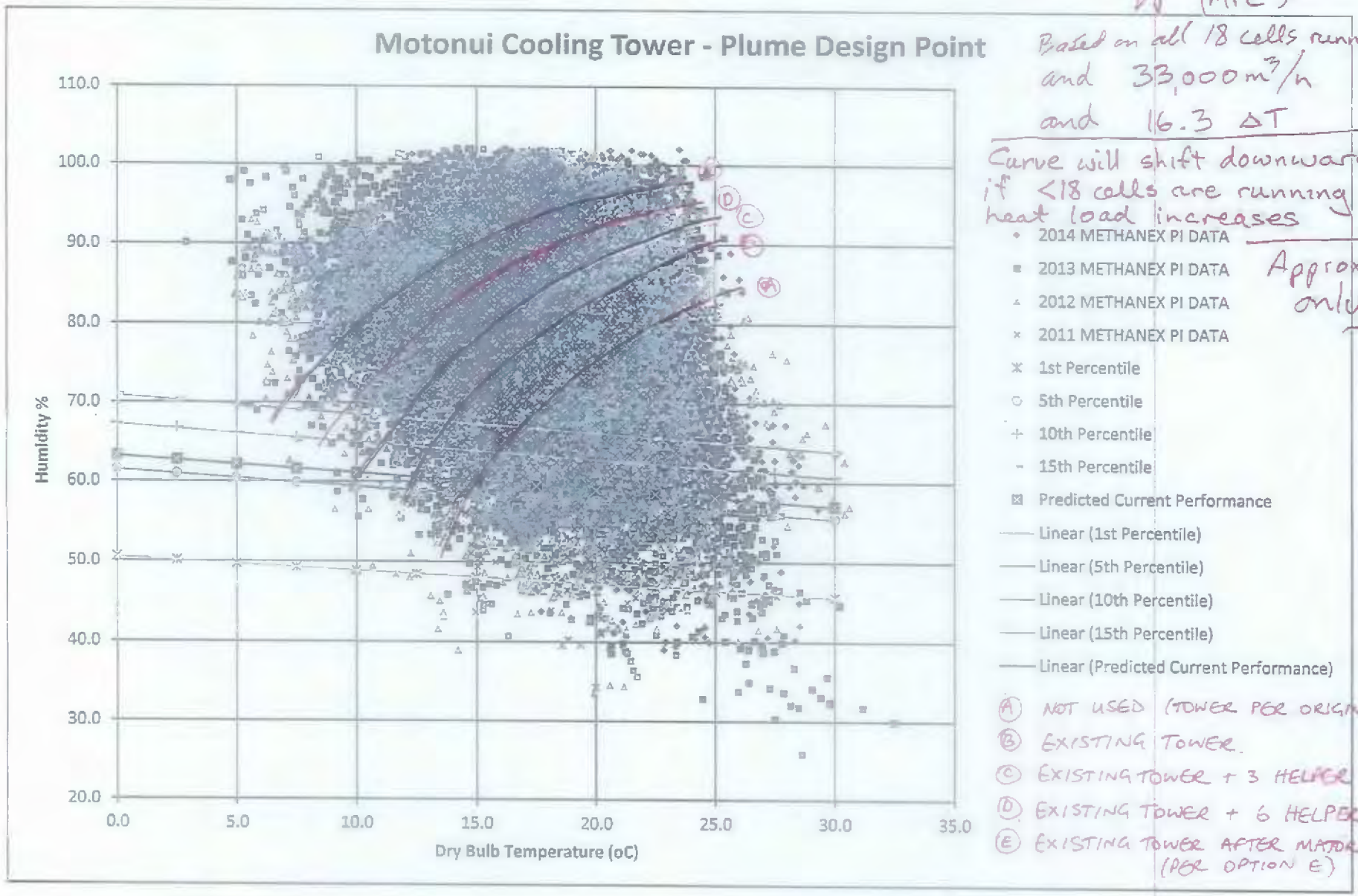
Engineering Manager

Marley Flow Control Pty Ltd

lawrence@marleyflow.com.au

10 June '14

(MFC)



Based on all 18 cells running and 33,000 m^3/h and 16.3 ΔT

Curve will shift downward if <18 cells are running or heat load increases

Approximate only

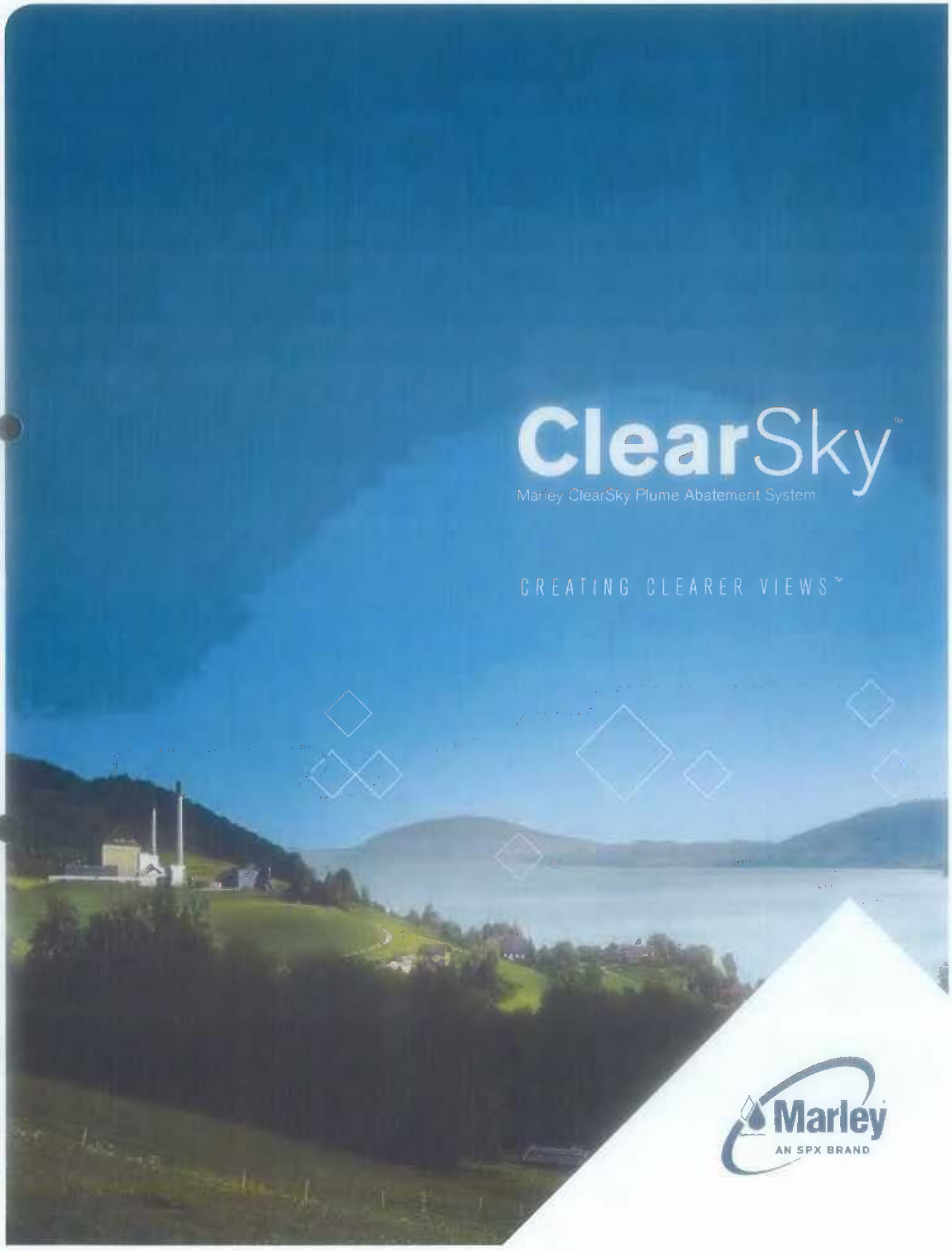
(A) NOT USED (TOWER PER ORIGINAL DSHT)

(B) EXISTING TOWER.

(C) EXISTING TOWER + 3 HELPER CELLS

(D) EXISTING TOWER + 6 HELPER CELLS

(E) EXISTING TOWER AFTER MAJOR REVAMP (PER OPTION E)

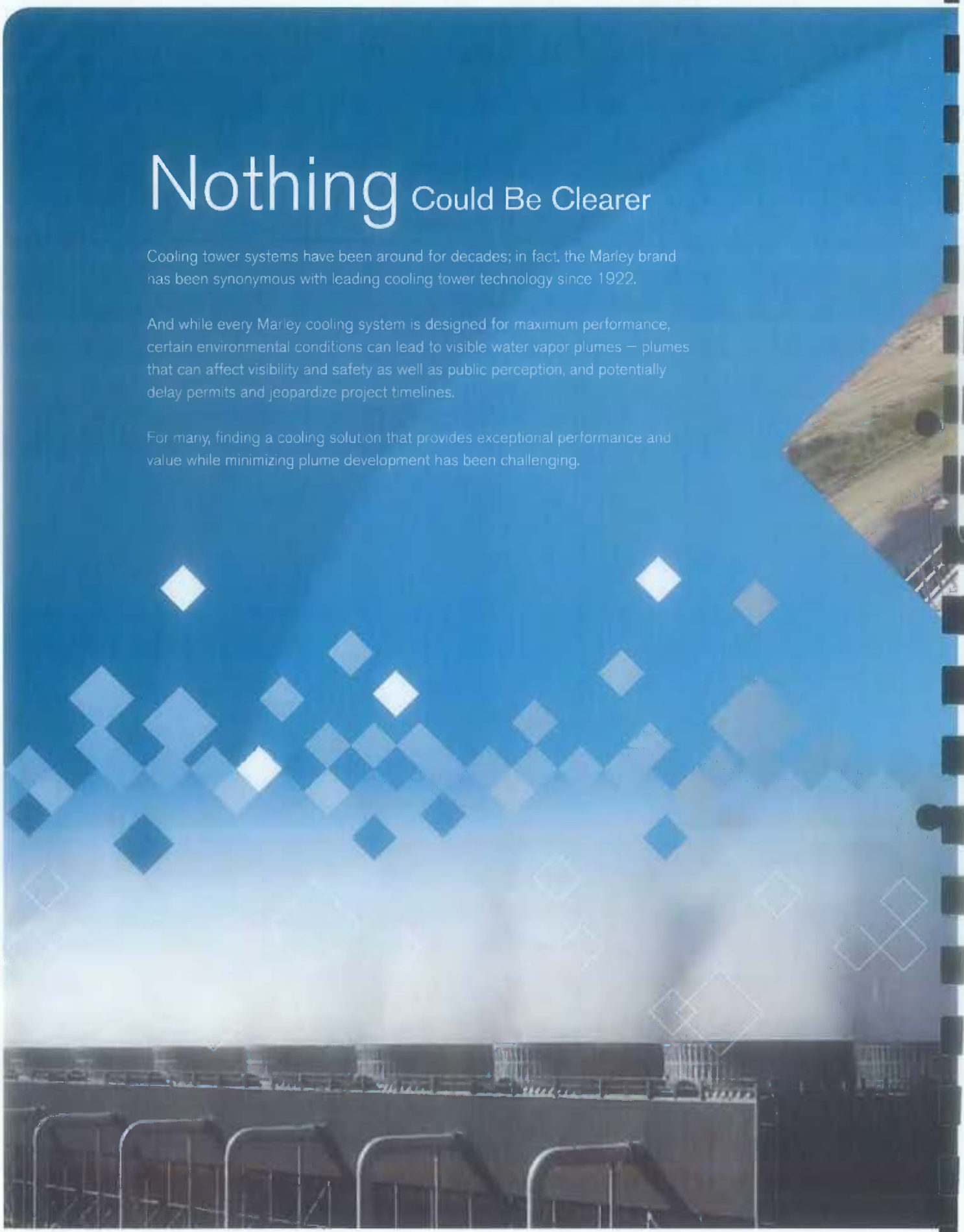

ClearSky™
Marley ClearSky Plume Abatement System
CREATING CLEARER VIEWS™
Marley
AN SPX BRAND

Nothing Could Be Clearer

Cooling tower systems have been around for decades; in fact, the Marley brand has been synonymous with leading cooling tower technology since 1922.

And while every Marley cooling system is designed for maximum performance, certain environmental conditions can lead to visible water vapor plumes – plumes that can affect visibility and safety as well as public perception, and potentially delay permits and jeopardize project timelines.

For many, finding a cooling solution that provides exceptional performance and value while minimizing plume development has been challenging.



A Break in the Clouds

ClearSky Plume Abatement System

Why is plume abatement important?

Aesthetics / Neighbor Relations – Even though the cooling tower plume is made up of water vapor, a community may perceive it as unwanted or smoke-related. This may affect the use of nearby land or decrease property values.

Safety – Community concerns regarding visibility can be removed by significantly reducing visible plume.

Retrofit – The ClearSky Plume Abatement System can be added to existing cooling towers in many cases, making plume abatement even more economical.

Permitting – Permitting can be a long and costly process. Eliminating the visible plume may enhance a smooth permitting process.

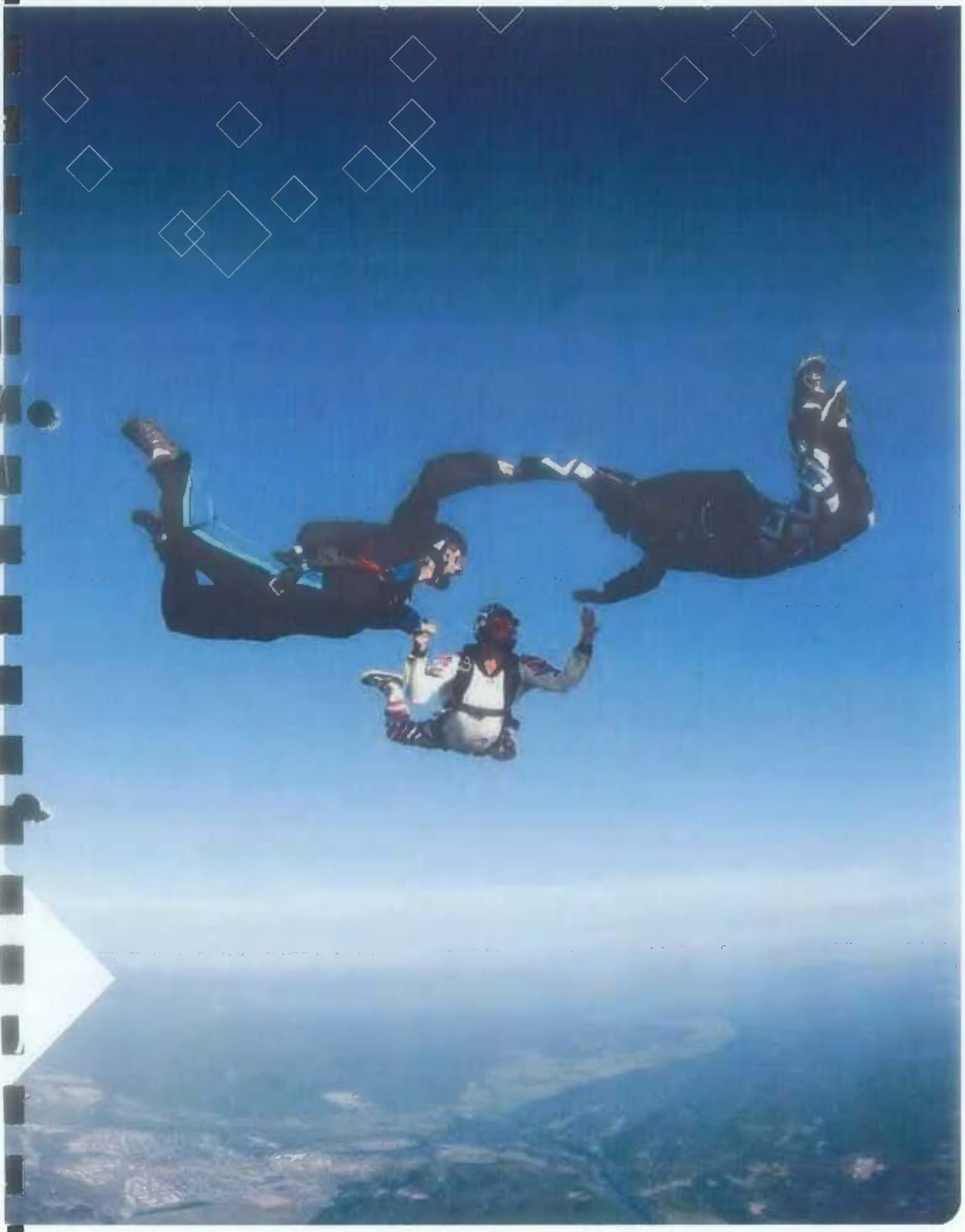
Water Conservation – Water is increasingly becoming a scarce and valuable commodity. Removing water from the vapor plume can help decrease water-related costs and help the environment.

Marley created the industry's first plume abatement tower.

Performance with Leading Edge Technologies

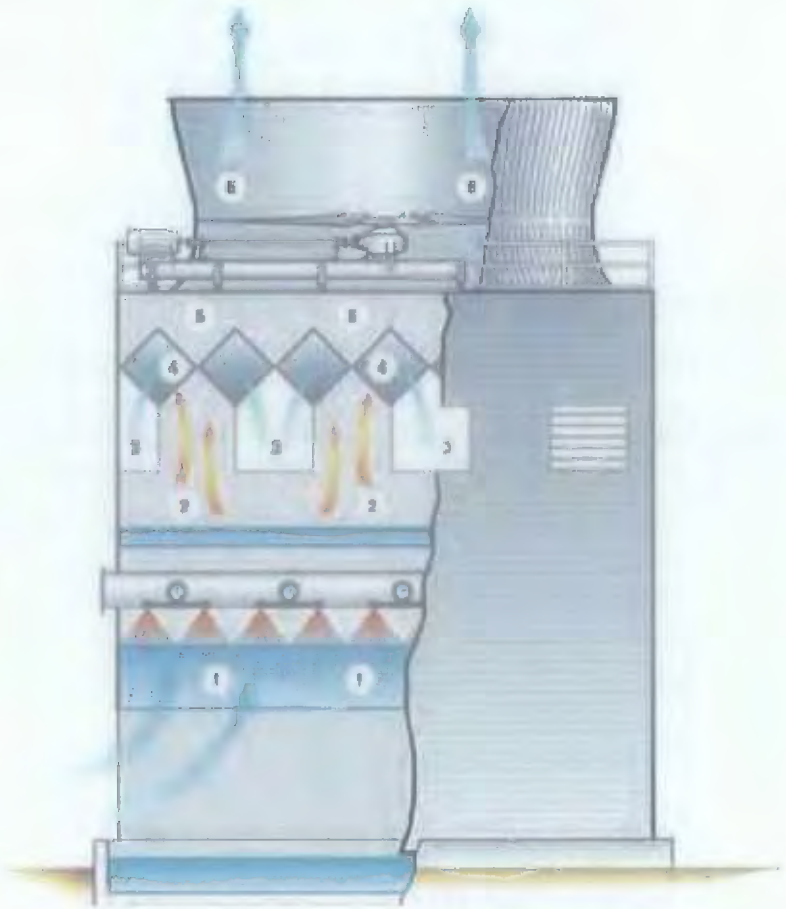
Marley ClearSky Plume Abatement System is a ground-breaking approach to the reduction of cooling plumes. Employing leading-edge technology, not only does ClearSky provide the proven performance you need – including design flexibility – but it can also lower installation and operating costs. In fact, ClearSky has simply the best value proposition in plume abatement – it can even be installed into existing cooling tower applications, negating the need for complete system replacement.

For applications that require high-performance cooling systems but can't afford the generation of visible plumes, ClearSky offers customers an effective solution without compromise.



Forget What You've Seen Before

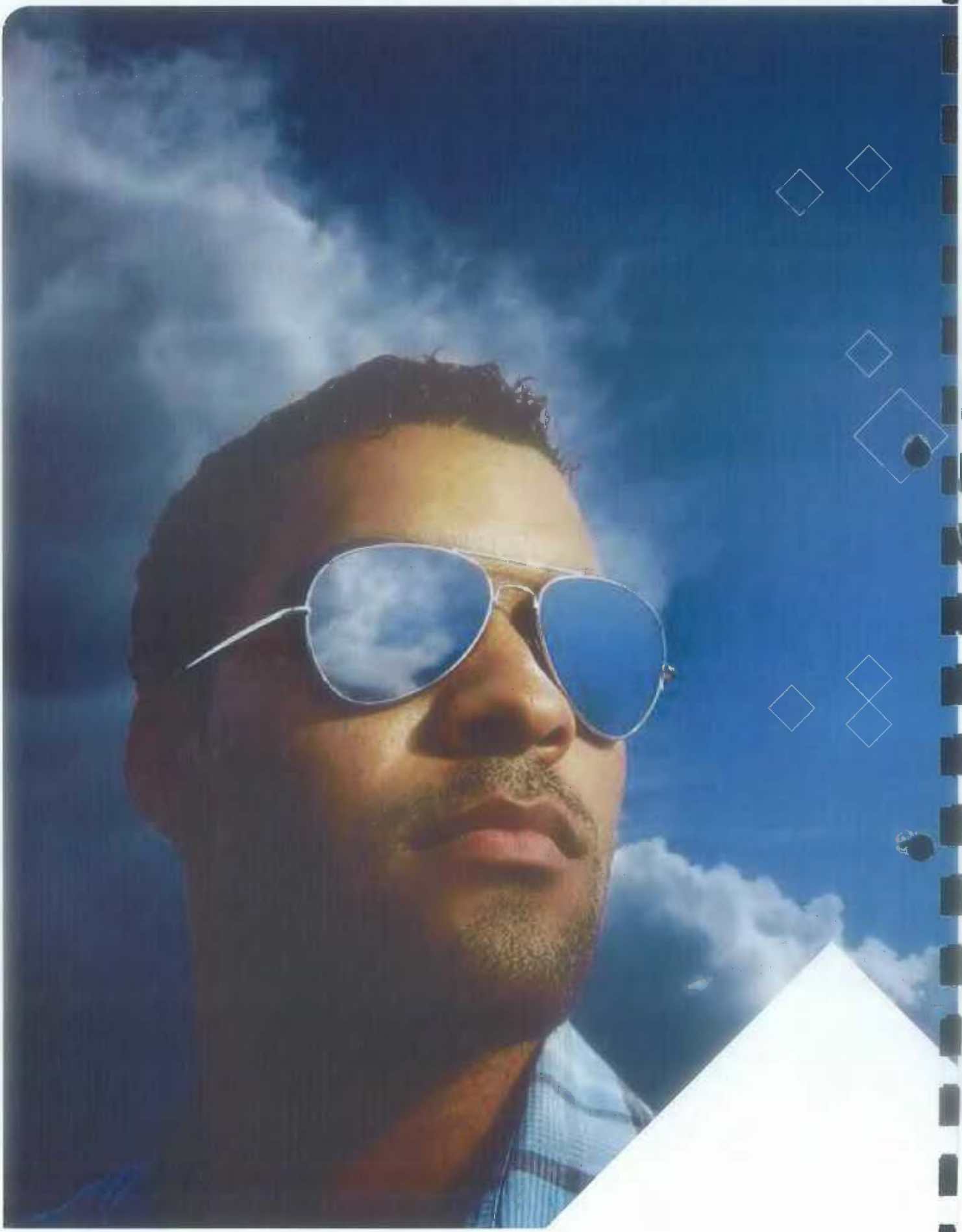
The power behind the ClearSky system lies in its elegance and simplicity. Building on the highly successful and effective Marley coil plume solution system, ClearSky provides the latest, evolutionary solution with its unique patented design that is as effective as it is unconventional.



ClearSky Cooling Process

1. Ambient air passes through the warm, wet section
2. Warm, saturated air travels in between alternate pairs of plates
3. Ambient air passes into ducts
4. Ambient air travels in between alternate pairs of plates
5. Cooler, saturated air from the wet section side and warmer dryer air from ambient side mix together
6. Air leaving

Clear the air with your neighbors. Clear away your plume.



Now You See It Now You Don't

It's not enough to simply say something works – you need proof. That's why the ClearSky story begins with Marley, a leading name in cooling towers for more than 85 years. Marley has more than 80 plume abatement installations worldwide, and the story continues based on technology funded in part by the U.S. Department of Energy as well as hundreds of thousands of hours of real-world operation.

Empowered by that legacy and expertise, the ClearSky Plume Abatement System provides effective, economical operation.

COST SAVINGS	SAVINGS POTENTIAL
Lower Investment Costs	◆◆◆
Lower Maintenance Costs	◆◆
Lower Operation Costs	◆

OTHER BENEFITS	
Improved Permitting	◆◆◆
Improved Safety	◆◆
Design Flexibility	◆◆

A large cooling tower fan cell, with ClearSky, can save over 1,000,000 gallons of water annually.

Multiple Needs, Singular Solution

The ClearSky system offers several unique benefits to EPCs, End Users and Regulators. That's because ClearSky was developed based on a variety of criteria, reflecting diverse needs, applications, and conditions, including the following:

- Safety and visibility concerns
- Regulation compliance
- Sunlight impairment
- Aesthetics
- Community and neighbor relations
- Water Conservation

As a result, ClearSky offers solutions for multiple audiences, in turn providing them with the key features and benefits they need to meet their own specific challenges.

Engineering, Procurement, Construction

For EPCs, ClearSky provides a clear choice over conventional systems when selecting plume abatement, including greater back-to-back design flexibility as well as more economical investment, operating, and maintenance costs versus conventional systems.

- **Lower Installation Cost** – Less piping means less investment than conventional systems
- **Greater Design Flexibility** – Back-to-back design allows for easy installation, including retrofits
- **Reduced Maintenance Costs** – Unique patented design and materials means less need for maintenance
- **Reduced Auxiliary Power Usage** – Driven by reduced pump head, ClearSky towers can effectively reduce auxiliary power usage when compared to coil type hybrid towers

End Users/Operators

When plume abatement is necessary, ClearSky allows cooling tower operators to reduce plume production, minimizing operating costs without compromising cooling performance versus more expensive dry solutions.

- **Reduced Maintenance** – No coil replacement or fin cleaning, plus reduced operator monitoring and training
- **Improved Permitting** – Smoother process with reduced likelihood of interruptions due to public comment
- **Lower Cost Versus Dry** – The high-performance operation you need with fewer costs
- **Reduced Auxiliary Power Usage** – Driven by reduced pump head, ClearSky towers can effectively reduce auxiliary power usage when compared to coil type hybrid towers

Regulators

By minimizing visibility and safety issues, ClearSky provides cooling tower operators with an effective and reasonable solution for compliance with plume regulations.

- **Environmental Agency Regulations** – Utilizes less energy, and has lower carbon footprint, than dry systems
- **Local Municipal Codes** – Improved safety for surrounding transportation and improved neighbor relations
- **Improved Permitting** – Smoother process with reduced likelihood of interruptions due to public comment

From: ANDONIAN Raffi [mailto:raffi.andonian@hamon.com]
Sent: Wednesday, 11 June 2014 2:34 PM
To: Vaughan Rimmer
Cc: Aleena Nobbs; LEURQUIN Albert
Subject: RE: METHANEX

Hi Vaughan,

Please also note that the motors for Options 'A' and 'B' are now 110kW and 90kW respectively.

Best regards,

Raffi ANDONIAN

GENERAL MANAGER

HAMON AUSTRALIA PTY LTD

From: ANDONIAN Raffi
Sent: Wednesday, 11 June 2014 12:18 PM
To: 'Vaughan Rimmer'
Cc: Aleena Nobbs; LEURQUIN Albert
Subject: RE: METHANEX

Hi Vaughan,

Regarding our email correspondence of yesterday, please refer to below:

1. We have also changed a few design features so that they have common features. These are:
    a. For Option 'B', we have increased the fan stack height to 5m and we have incorporated a diffuser section to aid in pressure recovery and hence lower power. We have also changed the drift eliminators to our 25mm variety which is the same as that for Option 'B'
    b. For Option 'A', we have changed the air inlet louvres to the same design as that for Option 'B' which is the 45mm DE type. This has a much lower power consumption that the previous design.
    c. I have attached the revised GAs for both the cooling towers.

2. Power consumptions:
    a. My email of yesterday was partly incorrect. In fact, the main reason for the differences in power consumption is because the tower for Option 'A' is lower in fan deck (and hence the air inlet) than the Option 'B'. The reason for being that we tried to maintain the same pump head for Option 'A' as the existing cooling tower. For Option 'B' you have to increase the pump anyway to accommodate the dry section heat exchangers we did not have to maintain the same pump head as the existing. The air inlet velocity for Option 'A' is consequently much higher and the power consumption differences are predominantly due to this fact.
    b. The revised fan power consumptions for Options 'A' and 'B' are therefore 1,763 kW and 1,445 kW respectively.

3. No Plume Curve:-regarding your request for details on the psychrometric chart, we have generated a curve which shows the conditions for which there will be no plume and plume. Please note that the top curve is when the shutters on the dry section are fully open and the lower curve is when the shutters are fully closed.

Best regards,

Raffi ANDONIAN

GENERAL MANAGER

HAMON AUSTRALIA PTY LTD

From: Vaughan Rimmer [mailto:Vaughan.Rimmer@worleyparsons.co.nz]
Sent: Tuesday, 10 June 2014 2:38 PM
To: ANDONIAN Raffi
Cc: Aleena Nobbs; LEURQUIN Albert
Subject: RE: METHANEX

Hi Raffi,

Thank you for your explanation and that makes sense. In regards to illustrating the new cooling tower on a psychrometric chart, is this possible if you supplied us the heat exchanger duty, the cooling water flow and air flows for both the dry and wet sections? (To illustrate what I mean I've attached a paper and the example is shown in figure 5b on page 18)

Kind regards

Vaughan Rimmer

Principal Process Engineer, WorleyParsons New Zealand

Tel: +64 9 820 4723 | Mob: +64 22 088 3841 | Fax: +64 9 820 4774

485D Rosebank Road | Auckland | 1026 | WorleyParsons New Zealand Ltd | NZBN 893258

www.worleyparsons.com

From: ANDONIAN Raffi [mailto:raffi.andonian@hamon.com]
Sent: Tuesday, 10 June 2014 4:28 PM
To: Vaughan Rimmer
Cc: Aleena Nobbs; LEURQUIN Albert
Subject: RE: METHANEX

Hi Vaughan,

Please don't hesitate to ask any questions. It is a perfectly reasonable to ask why the power consumption is lower for the plume abatement condition.

The reason for the lower fan power for the plume abatement is due to the fact that the air flow in the 'wet' zone fill area is reduced substantially and more air is drawn through the 'dry' section finned tube heat exchanger. The amount of air flow increases slightly but, overall, this has the effect of reducing the pressure drop in the 'wet' section and hence the cooling tower (the pressure drop through the 'dry' section is the same). Lower pressure drops in the system hence lead to lower power consumption.

The above is a basic explanation but is the essence of the physics behind it.

Best regards,

Raffi ANDONIAN

GENERAL MANAGER

HAMON AUSTRALIA PTY LTD

From: Vaughan Rimmer [mailto:Vaughan.Rimmer@worleyparsons.co.nz]
Sent: Monday, 9 June 2014 2:45 PM
To: ANDONIAN Raffi
Cc: Aleena Nobbs; LEURQUIN Albert
Subject: RE: METHANEX

Dear Raffi,

Thank you for your budget quotation for the cooling tower options. I have taken over from Aleena while she is away on holiday. I have a few questions if you could please assist with (these may be obvious questions and if so if you could please provide the obvious answers as I'm trying to get up to speed).

Why is the fan power lower for option B? I thought with plume abatement that additional dry air will add to the total air flow and increase the power required by the fan?

We would like to illustrate option B on a psychrometric chart. Is this possible for you to do? Or else if you could supply the heat exchanger duty, the cooling water flow and air flows for both the dry and wet sections?

Kind regards

Vaughan Rimmer

Principal Process Engineer, WorleyParsons New Zealand

Tel: +64 9 820 4723 | Mob: +64 22 088 3841 | Fax: +64 9 820 4774

485D Rosebank Road | Auckland | 1026 | WorleyParsons New Zealand Ltd | NZBN 893258

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From: ANDONIAN Raffi [mailto:raffi.andonian@hamon.com]
Sent: Friday, 6 June 2014 9:29 PM
To: Aleena Nobbs; LEURQUIN Albert
Cc: Vaughan Rimmer
Subject: RE: METHANEX

Hi Aleena,

Further to your correspondence with Albert Leurquin, please find attached our Budget Quotation for a Cooling Tower with and without Plume Abatement for the Methanex Motunui Plant.

If you have any questions, please do not hesitate to contact us for assistance.

Best regards,

Raffi ANDONIAN

GENERAL MANAGER

HAMON AUSTRALIA PTY LTD

Level 2, 80 Chandos Street

NAREMBURN NSW 2065

SYDNEY, AUSTRALIA

Ph: +61-(0)2-9467 0600

Fx: +61-(0)2-9901 4127

From: Aleena Nobbs [mailto:Aleena.Nobbs@worleyparsons.co.nz]
Sent: Saturday, 31 May 2014 1:12 PM
To: LEURQUIN Albert
Cc: ANDONIAN Raffi; Vaughan Rimmer
Subject: RE: METHANEX
Importance: High

Hi again Albert

FYI we have re-evaluated what may be an appropriate level of plume abatement to use for the new tower design. The new plume design point we have is 10°C at 80%. (I have been corrected on my methodology for calculating this point.)

The cost information we want really is at high level. A list of options the client could consider to reduce visible pluming against approximate cost (say order of cost) would really be appreciated by our client. This may not even require much input from your technical people.

Are you able to please provide some input by COB (your time) 9th June? This is the latest we can accept your input.

(And as mentioned previously, please send it to Vaughan Rimmer.)

Thanks

Aleena Nobbs

Tel: +64 6 759 6328

From: Aleena Nobbs
Sent: Friday, 16 May 2014 2:45 PM
To: 'LEURQUIN Albert'
Cc: ANDONIAN Raffi
Subject: RE: METHANEX

Albert

Thanks for the comparison design point. It actually gives me more confidence in the point we have selected so I will stick with it.

As mentioned we are undertaking a feasibility study for Methanex looking at both replacement and retrofit options for their existing cooling towers. Part of this study is to look at plume abatement options, with consideration of retrofitting the tower both with and without plume abatement technology.

I have attached datasheets for both the replacement and retrofit options, and the existing tower GA.

The options being as follows:

1 - retrofit no plume abatement,

2 - retrofit with plume abatement;

3 - replacement tower

Please forward this information to Laurence, who left a message.

Can you please submit a proposal for each option? For each proposal please fill in the vendor details, provide details of the proposed technologies including a schematic, and a Type I cost estimate for supply and installation of the relevant hardware, stating any assumptions made.

I would appreciate a response within a week, if possible, as I am on leave early June.

Should you require any further information, please advise.

Thanks

Aleena Nobbs

Tel: +64 6 759 6328

From: LEURQUIN Albert [mailto:albert.leurquin@hamon.com]
Sent: Friday, 16 May 2014 12:36 PM
To: Aleena Nobbs
Cc: ANDONIAN Raffi
Subject: METHANEX

Aleena,

For the Huntly, the design was made a no-plume condition of 12.9 deg C dry-bulb and humidity 85%.

Regards

Albert Leurquin

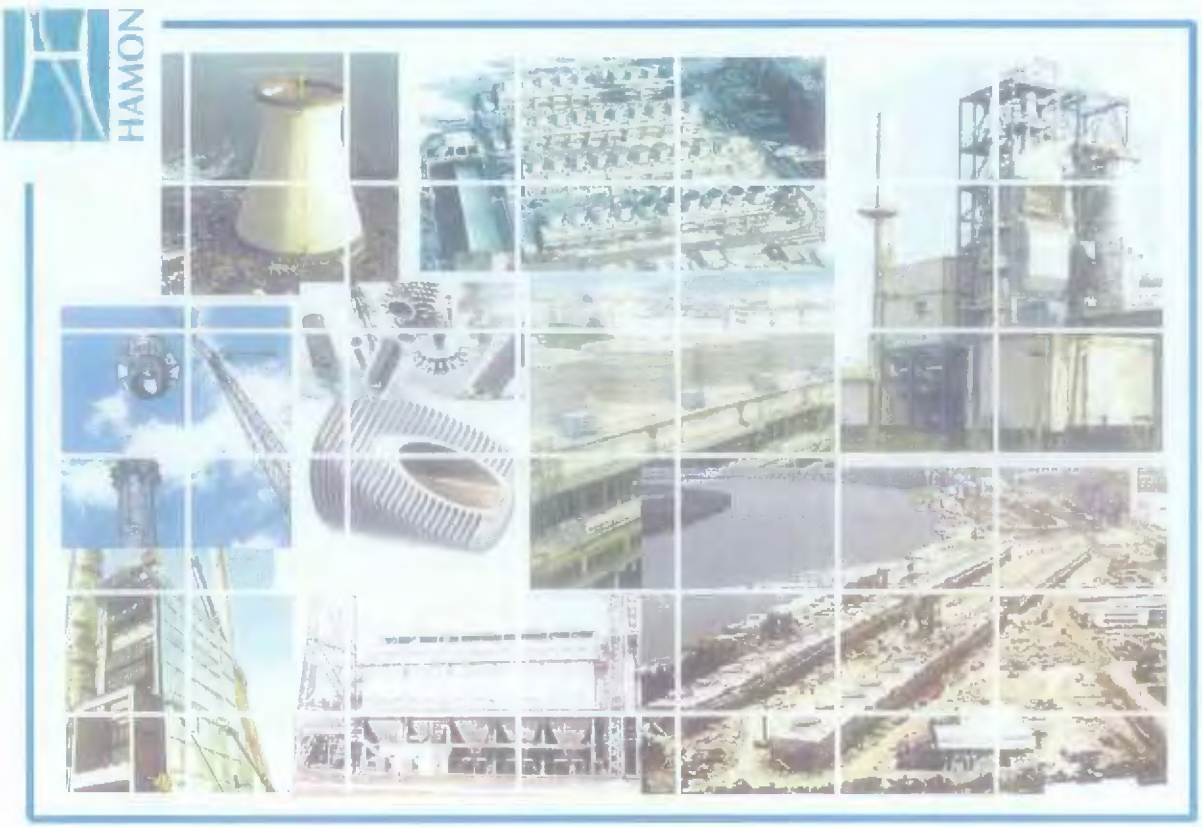
Hamon Australia PTY LTD

HAMON AUSTRALIA

BUDGET QUOTATION

DESIGN, SUPPLY, DELIVERY & INSTALLATION
of
COOLING TOWER &
PLUME ABATEMENT (HYBRID WET-DRY) ALTERNATIVE COOLING TOWER
for
WORLEY PARSONS
METHANEX
MOTUNUI, NEW ZEALAND

WorleyParsons Project No: 502092
Hamon Ref No: Q1321 Rev 0



Date: 6th June 2014

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HAMON AUSTRALIA

1. COVER LETTER

6th June 2014

WORLEY PARSONS NEW ZEALAND

Attention: Aleena NOBBS

Dear Aleena,

Re: METHANEX, MOTUNUI, NEW ZEALAND
COOLING TOWER REPLACEMET

We thank you for giving Hamon Australia the opportunity to participate on the METHANEX MOTUNUI project and we herewith attach our Budget Quotation for a replacement Cooling Tower and also an Alternative Plume Abatement Type of Cooling Tower for your consideration.

We hope that our Quotation herein meets your expectations and we look forward to further participation on this Project with you.

Please consider the following important points in evaluating our Quotation:

1. ***Cooling Tower Options*** – As per your request, we have offered two (2) Options only in this Quotation. The first, Option 'A', is a replacement Cooling Tower without Plume Abatement and it has the same cell sizes and number as the existing. The second, Option 'B', is a Plume Abatement type of Cooling Tower and it has the same cell number, width and Length but the cell height is higher to accommodate the 'dry section' finned tube bundles.

   We have not offered refurbishemt or the retro-fitting of Plume Abatement systems on the existing CT. This is because we do not know the condition of the existing CT structure, fill, drif eliminators, fans, gearboxes and motors. We would need to establish the condition and performance of all of these items to determine the best retro-fitting option.

   Both the CTs in this Quotation have FRP structural sections and do not include any timber or plywood materials.

   Please refer to the Technical Section of this Quotation for more details.

2. ***Design Conditions*** – The Cooling Towers (CT) in this Budget Quotation have been selected for the water flows, hot water, cold water and wet bulb temperature shown in WorleyParsons New Zealand (WPNZ) Cooling Tower Data Sheets 502092-DSH-P0001 & P0002. Please note, however, that the plume abatement condition for the Plume Abatement Cooling Tower is at 10°C ambient dry bulb and relative humidity of 80%.

3. ***Pumping Head-*** Please note that the pumping head for the Plume Abatement Cooling Tower is much higher than the one without the Plume Abatement.

4. ***Fan Power Consumption*** – Please note that fan power consumptions of both of the Cooling Tower Options in this Quotation are considerabley less than the WPNZ Data Sheets. Please refer to the Technical Section of this Quotation. Our Coolng Tower with and without Plume Abatement have total power consumption of 1,557 kW and 1,974 kW respectivel. The WPNZ data sheet has 175.1 kW for the Non-Plume Abatement CT. In other words, our CTs have a power saving of 1,595kW and 1,172kW respectively over the WPNZ data sheet.

   If the WPNZ Data Sheet 502092-DSH-P0001 represents the existing Cooling Tower, then our Cooling Towers would offer a considerable power consumption and hence cost reduction.

5. ***Cooling Tower Fill–*** We have included our Hamon 'COOLFILM/SNCS)' Film Fill which is an efficient fill suitable for a continuous operation with a Total Suspended Solids (TSS) concentration of 50ppm (annual average). The film can accommodate peaks of 100ppm for 10% of the time. For details, please refer to the description in the Technical Section of this Tender

6. ***Cooling Tower Materials*** - We have chosen to use Fibreglass Reinforced Polyester Resin (FRP) pultruded structural sections (with UV protection) for the Cooling Tower columns, diagonal braces and horizontal members. All structural anchors and wetted fasteners will be Silicon Bronze. Please refer to the Technical Section of this Budget Quotation for more details.

7. ***Demolition of Existing Cooling Tower and Installation of New Cooling Tower*** – Our Budget Quotation includes installation at Site but does not include the demolition of the existing Cooling Tower. Also, we have assumed that the Cooling Tower Concrete Basin will be empty, clean and dry upon our arrival at Site.

   We have also assumed that the new Cooling Tower will be installed in an "Offline" State. However, to minimise the overall Plant Outage duration, we could consider the 'On-line' installation whereby the existing cooling tower cells are replaced isolated and replaced individually one at at time whilst the other cells are in operation. We can discuss this option further with you if you prefer.

8. ***Experience & Reference List in Australia-*** Hamon is one of the few large multinational Cooling Tower companies and has been in Cooling Towers business for over a 100 years. Hamon Australia has been in operation in Australia since 1981 and our attached reference list shows we have built and refurbished cooling towers in diverse industries all over Australia.

   We have an excellent goodwill and reputation with our Clients for our congratulatory safety record, reliability of product and professionalism in the execution of Contracts.

   Hamon Australia offers an advantage over our competitors in Australia in that it is a wholly owned subsidiary of the internationally renowned company Hamon & Cie with 100 years of experience and expertise in the field of cooling towers. The relationship with our parent company ensures that Hamon has direct control of a Contract starting from design through the installation and commissioning of the cooling towers. This direct control throughout the installation of the cooling towers has been found to be the best method to ensure that the Hamon standards are maintained and customers are satisfied to the highest levels that Hamon requires.

9. ***Quality System*** - We have carried out numerous projects for the power industry throughout Australia and our quality system etc has been implemented in accordance with AS/NZS/ISO 9001:2000 to suit cooling tower projects.

We trust the above and enclosed will meet with your approval and would also welcome the opportunity to discuss our Quotation in detail with you at a time and date convenient to you. Assuring you of our interest at all times.

Yours faithfully
HAMON AUSTRALIA PTY LTD

Albert LEURQUIN
Managing Director

Raffi ANDONIAN
General Manager

2. COMMERCIAL SECTION

2.1. *PRICES, TERMS OF PAYMENT & QUALIFICATIONS*

a) Schedule of Prices

For the design, supply, manufacture, delivery and installation of one (1) 'counterflow' Cooling Tower to be constructed above concrete basins which are designed and constructed by others to dimensional and loading data provided by Hamon Australia all as stated in our Scope of Supply described herein:

	Option 'A' Cooling Tower WITHOUT Plume Abatement	Option 'B' Cooling Tower WITH Plume Abatement
Engineering	Included	Included
Materials	Included	Included
Manufacture	Included	Included
Delivery, DDU Site	Included	Included
Installation (including on-site labour)	Included	Included
Supervision of Installation & Commissioning	Included	Included
Commissioning	Included	Included
Training	Excluded	Excluded
Thermal Performance Testing	Excluded	Excluded
Electric Motors	Included	Included
Recommended Spares (refer to below)	Excluded	Excluded
Total Lump Sum Budget Price - Excl. GST (AUD)	**$ 12,000,000 Please see Item (b) below**	**$ 22,300,000 Please see Item (b) below**

b) Price Basis

The prices in this Quotation are of budgetary (+/- 30%) nature and subject to confirmation. The price is exclusive of GST.

c) Validity of Quotation

Our Quotation will be valid for a period of 30 calendar days from the date herein

d) Terms of Payment

Payment Terms shall be Nett 30 days following the end of the month of receipt of the correct payment claim / invoice by telegraphic transfer (TT) into a nominated Hamon Australia bank account.

Payment shall be in accordance with the following schedule:

- 5% of Contract Value on placement of order.
- 10% of Contact Value on Hamon's placement of orders for fans, motors, gearboxes, shafts, dry section tube bundles (Option 'B' only), FRP structure and fan deck, drift eliminators, fan stacks, distribution piping, film FILL and hardware.
- 60% of Contract Value on delivery of components to site or readiness to deliver to site.
- Monthly progress claims for site installation work to sub-total of 25% of Contract Value on completion of installation.

Cash Retention on payments shall not apply to the Contract.

e) Spare Parts

The following spare parts are recommended for the cooling towers:

	PRICES (AUD)
	Cooling Tower
2 off Spare Fan Blades	7,000.00 each
1 set of Gearbox Bearings & Seals	4,000.00
20 off Sprayer Nozzles and support rings	50.00 each

The above prices are excluding GST and are conditional on the order for the spares being placed within 30 days of placing the cooling tower order. Otherwise the above spares prices are subject to escalation due to extra production, shipment and handling charges.

f) Optional Items

No optional items are offered in this Quotation

g) Site Rates and Allowances

We have based our Cooling Tower Site installation labour rates and allowances in accordance with Hamon Australia's labour rates and allowances.

Should the labour rates and allowances for the METHANEX MOTUNUI Site differ from that used in our Quotation then Hamon Australia reserves the right to adjust the Contract Price in accordance with the increased costs if there should be any.

h) Cooling Tower Thermal Performance Testing

We have not allowed for a thermal performance test in our price.

i) Delivery, Program and Completion, Commissioning & Training

The delivery period of the materials to site from the date of a technically and commercially clear Order, or instruction to proceed is as follows:

- 40 weeks for the cooling tower parts.
- 26 weeks for the installation of the cooling tower.

Please refer to our Covering Letter in Section 1 of this Quotation in regards to the duration of the instatllation period. If the Cooling Tower can be replaced on an 'On-Line' basis, then the Plant Outage period can be significantly reduced. We could disucss this option further with yourselves if you wish .

All delivery dates are given in good faith and every attempt will be made to adhere to them. Should there be delays, however, due to circumstances beyond our direct control, then we cannot be held responsible, nor can we accept any penalties or liquidated damages for late delivery.

Delivery of equipment to site is based on being allowed to order the mechanical equipment immediately without submission for approval of drawings.

j) Currency Fluctuation (Not Used).

k) Interruption of Work

Should the client, for reasons of their own, wish to interrupt the work on the cooling tower, then we would need to be reimbursed for time lost as follows -

Tradesman	TBA
Trade Assistants	TBA
Crane	TBA
Other Equipment & Tools	Hamon Cost + 15%
Materials	Hamon Cost + 15%

These rates are not applicable for additional work and work on a Schedule of Rates (SOR) basis.

l) Consequential Damages

We will not be liable for any damages, consequential or otherwise and force majeure must apply to the Contract.

Consequential Loss means indirect, remote or unforeseeable loss or damage including but not limited to:

- In the case of breach of Contract:
  - (i) Loss of production, profit or savings
  - (ii) Loss of denial of opportunity
  - (iii) Loss of access to markets
  - (iv) Loss of business reputation, future reputation or publicity
  - (v) Damage to credit rating
  - (vi) Loss of use of data
  - (vii) Or any similar occasioned by that breach, whether or not in the reasonable contemplation of parties at the time of execution of the Contract as being a probable result of the relevant breach; and

- From any tort (including negligence): those items specified above and additionally – in the case of pure economic loss, loss which does not flow directly from the commission of the tort.

Notwithstanding any other provision of the Contract and except to the extent that liability cannot be limited or excluded the liability of Hamon whether arising under or in connection with the Contract or the performance or non performance thereof or anything incidental thereto and whether by way of indemnity by

statute, in tort (for negligence of otherwise), or on any other basis in law or equity is hereby limited and excluded as follows:

- Hamon shall have no liability whatsoever for loss of use, data, production, profit, revenue, business, contract or anticipated saving, or for any delay, financial costs or increase in operating costs or any economic loss or for any special, indirect or consequential loss or damage.

- For all other matters the total aggregate liability of Hamon shall not exceed in the aggregate a sum equal to one time the Contract Price irrespective of whether such claims for damages be based on Contract, tort or otherwise at law except where the matter is the subject of an insurance claim when the aggregate liability to the proceeds recovered from Insurances required under the Contract

m) Materials and Equipment Guarantee

Materials are guaranteed to meet the requirements of the specifications set forth herein. Hamon Australia will repair or replace without charge (ex our Bayswater factory) any materials which within the stated guarantee period from date of delivery are proved defective in materials or workmanship, provided however, that the purchaser shall give Hamon Australia written notice of such defect and that such defects are exclusive of corrosion, erosion and normal wear and provided the equipment has been operated in accordance with generally approved practice.

The Guarantee period for the Contract will be 12 Calendar months from the date of Practical Completion. Practical Completion being defined as completion of installation of the cooling tower

The ph value of the circulating water in this tower should be held between 6.0 and 9.0 by either bleed-off or chemical dosing.

Since Hamon Australia has no control over the type of circulating water of the type of water treatment, no responsibility is assumed for fouling, scaling and erosion and/or corrosion failure of any materials.

n) Taxes

We have not allowed for any government, state, council or other institutional taxes, levies, charges or any other monies, nor have we allowed for sales tax or GST, Customs/Import Duties. Should there be any applicable, then this will be for your account.

o) Additional Work

We have not allowed for any other work other than as described in this Quotation (as stated in our section Scope of Supply).

Any additional work requested would be quoted for as a separate item rather than on a schedule of rates basis.

p) Access to Site

Our Tender price is based on clear and unobstructed access to the cooling tower site at all times from the Site Establishment to Demobilisation. Hamon will need one level prefabricating area at Site.

We will also need a lay down area adjacent to the cooling tower of approximately 2.0 times the cooling tower plan area to allow for unloading, sorting and stacking of materials prior to prefabrication or installation.

Hamon reserves the right for reimbursement of costs arising from obstructed or insufficient area and access.

q) Continuous Development

In line with our policy of continual product improvement and development, we reserve the right to change specification and dimensions at our discretion and would advise you accordingly.

r) Sub-contractors

Please refer to our Subcontractor's List.

s) Site Work Methodology

The site work methodology is as described in the Technical section of this Quotation. Harnesses and an appropriate number of planks will be used for the Cooling Tower installation. Complete self-supporting internal scaffolds are not practical and are not included in our Quotation.

t) Other Contract Terms & Conditions

All other Terms and Conditions are subject to discussion and acceptance by Hamon Australia.

2.2. *SCOPE OF SUPPLY*

To be supplied by Hamon Australia:

i) Design, engineering, general arrangement drawings showing all overall dimensions, loading data and details, and thermal performance curves sufficient for the operation and maintenance of the cooling towers. Drawings will be supplied either as prints, transparencies or in electronic form in pdf format only. All drawings will be produced in accordance with AS standards. Other documents shall be in either Microsoft Word or Excel format. Contract programmes and schedules shall be in Microsoft Project format.

ii) All Site labour and supervision for the installation of the Cooling Towers.

iii) Site Inductions & Training – we have allowed a total of 2 hours per man for all inductions & training. Any additional inductions or training will be at extra cost to UGL in every respect to the cooling tower project.

iv) Full time working site supervisor who will be in control of all our site activities and will liaise with UGL in every respect to the cooling tower project.

v) Commissioning which can generally be carried out immediately upon completion of erection and would only take approximately 1-2 days. If commissioning cannot be completed upon completion of erection and an additional visit is required, then the additional cost would be cost of airfare plus accommodation plus $1,350.00 per day.

vi) Accommodation for all of our Site Crew and Supervisors.

vii) Transportation of our Site personnel from the Site accommodation to the Cooling Tower Site.

viii) Cooling tower FRP (fire retardant) structure and casing above basin level also interior FRP (fire retardant) columns.

ix) Two stair towers at each end of the Cooling Tower constructed from Polyester resin FRP, fire retardant to ASTM E84 rating <25.

x) Fans – Howden (or Equivalent, Hamon's Choice)- for each of the cooling tower cells.

xi) Gearboxes specially designed for cooling towers.

xii) AC electric motors for the cooling tower fans (not suitable for variable speed drive).

xiii) Dry section heat exchanger finned tube bundles, air mixers, vacuum system, and internal piping.

xiv) Supply of all equipment detailed in our Scope of Supply.

xv) Supply and delivery DDP (Incoterms 2010) to Site of all equipment detailed in our Scope of Supply.

xvi) All cooling tower internals - fill, water distribution and drift eliminators

xvii) All cooling tower mechanicals – oil & lubrication system, mild steel galvanized & epoxy painted bed frames, FRP fan stacks and vibration switches.

xviii) Operating and maintenance manuals (Hamon Australia normal standard).

xix) Anchor brackets which serve a dual purpose as an anchor and support for a diagonal bracing member. The anchor bolts will be set in the concrete basin floor with epoxy resin.

xx) All material supplied and work carried out will be in accordance with all relevant Standards and Codes as applicable.

xxi) Gearboxes will be painted to manufacturer's standard paint specification.

xxii) Motors will be painted to manufacturer's standard paint specification.

xxiii) Fan hubs painted to manufacturer's standard paint specification unless specified otherwise herein.

xxiv) Oil indicator/filler arrangement and draining of oil for gearbox can be carried out external to the fan cylinder.

xxv) We will supply 'Murphy' vibration switches. The switches would be attached to a M.S. bracket, which in turn would be bolted onto the mechanical support frame near the motor.

xxvi) We will be supplying extruded rigid P.V.C. bladed drift eliminators rather than the lightly constructed cellular type supplied by others.

xxvii) Terminal points-

a) Top of concrete floor in basin.
b) Hot water header pipe flange for each cell located externally as shown on the general arrangement drawing included herein.
c) Electric motors terminals box for power cabling.
d) Vacuum pump electric motor terminal points.
e) Vibration switch terminals

2.3. *EXCLUSIONS*

Our Quotation does not include the following items:

i) Design, supply and installation of all civil and concrete works of the concrete basins. THIS INCLUDES ANY REPAIRS OR MODIFICATIONS WHICH MAY BE REQUIRED ON THE EXISTING CONCRETE BASIN OR ANY ITEMS CONNECTED TO THE BASIN SUCH AS DRAINS, PIPES, SCREENS ETC.

ii) DEMOLITION AND REMOVAL OF THE EXISTING EIGHTEEN (18) CELL COOLING TOWER.

iii) Site facilities including crib huts, lunchroom, toilets/washrooms and office for our crew as well as the supervisor and Side Manager. We have assumed that we can use the Client's facilities. We have also assumed that these facilities will be in the immediate vicinity of the Cooling Tower. Should this not be the case, then our price is subject to review and increase.

iv) Removal and disposal of all rubbish from the Site activities.

v) Cranage

vi) Our quotation is based on the use of electricity for our power tools etc. free of charge and have assumed free electrical power points at cooling tower site.

vii) Supply and erection of all pipework and pumps to and from the Cooling Towers except those listed in our Scope of Supply.

viii) Design, supply and installation of penstock valves, sluice gate valves, trash screens, pipes and spigots or any other items in the basin for the cooling tower.

ix) Design, supply and installation of the external 'Riser' pipes to the Cooling Tower Cells, Cast Iron butterfly isolation valves and rubber bellows from Terminal Point of Cooling Tower.

x) External hot water return manifold located adjacent to the cooling tower and connection of Riser pipes (not in Hamon Scope) to this manifold.

xi) Electric power cabling to motors, electrical wiring to the vibration switches, lightning protection systems lighting systems earthing systems and any other electrical, instrumentation or control items whatsoever.

xii) Electric power supply at Site.

xiii) Make up water, blow down, etc. to the towers.

xiv) A laydown area of sufficient space.

xv) Test running of mechanical equipment such as motors, gearboxes and fans in the workshop is not included in the Scope of Work. These tests are not practical for this application.

xvi) All pumps such as the for cooling water recirculation pumps, piping external to the tower, contactors, wiring, electrics, controls, water treatment, water flow measurement device/s and/or thermometer pockets or any other non-standard materials or items not specifically specified by us.

xvii) Proprietary drawings and calculations are confidential and cannot be supplied. All other information will be submitted. (Please also note comments for drawing supply under our section "Scope of Supply")

xviii) Drawings for pipework, electrical or instrumentation other than the drawing for the pipework of the cooling tower itself.

xix) Make up water system, blow down or chemical dosing and have assumed this will be carried out by your local water treatment company.

xx) As we will not be supplying the concrete basin or any external pipework to the tower, we have not allowed for any outlet flanges or other fittings applicable to the cold water concrete basin.

xxi) Cooling Tower control system.

xxii) Additional painting and any painting other than that provided under the Scope of Supply.

xxiii) As this project is not comprised of complex series of events, we will not supply complicated programming charts etc.

xxiv) We have not allowed for trash racks.

xxv) Gearbox anti run-back device.

xxvi) Variable speed drives.

xxvii) Thermal performance tests.

xxviii) Noise tests

xxix) Vibration Tests

xxx) Drift loss tests.

xxxi) Fire Fighting System.

xxxii) Waterflow measurement device/s or thermometer pockets.

xxxiii) Fan stack screens.

xxxiv) Any special site inductions for the personnel of the fire protection contractor

xxxv) Design, supply and installation of side stream filtration system

xxxvi) Any other items not specifically mentioned in this Quotation.

2.4. *GUARANTEES*

a) Thermal Performance - Performance Test

Thermal performance of the tower is guaranteed by ourselves. Should thermal performance not be achieved Hamon Australia will be responsible for rectification work to the tower to achieve guaranteed performance. Testing to methods and procedures of the C.T.I is acceptable to us. Testing to be carried out with fill pack and water in clean condition.

We reserve the right to utilise the full motor HP if required at no penalty to ourselves.

b) Drift Loss

We guarantee drift loss of less than 0.002% of waterflow. Testing of drift loss is not included in our Scope of Work.

2.5. *SUBCONTRACTORS, SUPPLIERS& COUNTRIES OF MANUFACTURE*

SUBCONTRACT WORK	SUBCONTRACTOR SUPPLIER NAME	COUNTRY OF MANUFACTURE
COOLING TOWER STRUCTURAL FRP PULTRUDED SECTIONS	Strongwell	USA
COOLING TOWER FILL	Hamon China	China
SPRAYERS & NOZZLES	Hamon Europe	France
FRP CLADDING	Ampelite	Australia
STRUCTURAL HARDWARE, BEDFRAMES & CAGE LADDERS	Various Miscellaneous Suppliers Consolidated In Hamon Factory	Australia
GEARBOXES	Sumitomo	Japan
ELECTRIC MOTORS	CMG TECO	China
FANS	Howden Cofimco	China China/Italy
FRP HEADER PIPES	Hamon India ICFU	India Indonesia
UPVC PIPES & FITTINGS	Hamon India McCRACKENS	India Australia
DRIFT ELIMINATORS	Hamon Korea Hamon China	South Korea China
FANSTACKS	Hamon India PT ICFU	India Indonesia
DRY SECTION FINNED TUBE BUNDLES	Hamon	France, UAE or South Korea
DRY SECTION AIR MIXERS	Ampelite Kemrock Industries Polser	Australia India Turkey
DRY SECTION VACUUM SYSTEM	Hamon	Australia / New Zealand

2.6. *COMPANY PROFILE*

a) Hamon Australia Pty. Ltd is a fully owned subsidiary of Hamon Brussels, Belgium. The Company is one of a less than handful of major cooling tower manufacturers in the World and the leading cooling tower manufacturer in Europe. Other fully owned established subsidiaries are in the USA, England, France, Germany, Italy, Spain, Korea and South Africa.

Since its inception in 1980 in Australia, HA has been awarded the majority of large cooling towers in both the utility and industrial sectors. The attached list of references testifies to it and proves the confidence shown in HA by all major utilities and industry giants.

All these projects were carried out on a turnkey basis:- design, supply, installation.

We trust this short presentation will reassure you in so far as our capabilities are concerned.

b) For personal references on Hamon Australia's stature and performance as a leading cooling tower manufacturer please feel free to contact the following persons:

- Graham Christensen, Portfolio Services, CS Energy, Tel: +61-7-3222 9515
- Tom Luebker, Qenos Pty Ltd, +61-(0)3-9360 2854
- Peter PJ Roberts, Project Manager, Capital Development-Technology & Environment, Bluescope Steel, Pt Kembla, NSW, Tel: 61-(0)2-4275 7522Tom Luebker, Qenos Pty Ltd, (03) 9360 2854
- John Dalley, Senior Mechanical Engineer, Tarong Power Station, QLD, Tel: (07) 4160-9357
- Edwin Kordt, Plant Engineer Muja Power Station, Western Australia Tel: (08) 9781 6494

2.8. *COMPANY POLICY*

POLICY STATEMENT

Hamon Australia Pty. Ltd specialises in the design, installation, refurbishment and commissioning of cooling towers associated with power generation, refineries and industrial processes, etc. It is the objective of Hamon Australia Pty. Ltd to provide services, which conform to the contractual requirements of the client.

In order to fulfil this objective Hamon Australia Pty. Ltd has implemented a Quality System in accordance with AS/NZS/ISO 9001

This Quality System has been developed to demonstrate to our clients our capabilities and commitment to meeting the highest standards for quality.

The responsibility for quality and quality assurance activities is not vested only in the Q.A representative but shall be the responsibility of each and every person in the Company within their prescribed duties.

3. TECHNICAL SECTION

3.1. *DESIGN DATA AND TOWER DIMENSIONS – OPTION 'A' (NO PLUME ABATEMENT COOLING TOWER)*

Design	Cooling Tower
Waterflow per Cooling Tower	33,000 m³/hr
Hot water Temperature	41.3 °C.
Cold water Temperature	25.0 °C.
Wet bulb Temperature at Air Inlet	20.3 °C.
Dry bulb Temperature	26.0 °C.
Drift loss	< 0.0009%
Evaporation loss (%)	2.39%
Tower Dimensions & Other	
Number of cells	18
Type of tower	Hamon Counterflow, "In-Line with Ends Closed"
Size of each cell	12.6 x 16.2 m
Basin size (approx)	Refer to GA
Centre line hot water inlet above basin curb	6.40m
Pump Head (reference from basin curb)	7.10 m
Number of and size of HW inlets per cell	1 x 600mmNB, ANSI Class 150
Fan Deck from basin kerb level	9.30m
Total height above basin kerb level (including fan stack)	13.54m
Motor shaft installed power per cell	132 kW
Motor power (motor shaft)	109.7 kW
Total power absorbed (motor shaft) for Cooling Tower	1,975.1 kW
Fan	
Manufacturer	Howden or Cofimco
Number	1 per cell
Type	Axial flow,
Size	8.534m diam.
Number of blades	6
Fan speed approx.	132 RPM
Fan Blade Tip Speed	59.1 m/s

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Fan Stacks	
Height, overall	4.24 m
Construction	Ribbed panels with flanged ends
Number of panels	T.B.A.
Panel connections	Bolted
Support	Fan stack panels bolted to structural timber beams with 304SS bolts and clamp plates
Gearbox	
Manufacturer	Sumitomo or Hansen (Hamon's choice)
Number	1 per cell
Type	Spiral bevel
Size	T.B.A
Ratio (approx)	11.2 (Approx)
Service factor on power and as guaranteed by gearbox manufacturer	Minimum 2.0 on installed power.
Transmission Shaft	
Manufacturer	Addax
Number	1 per cell
Type	Carbon Fibre with (flexible coupling)
Size	T.B.A.
Material of couplings	S/Steel 316
Motors	
Manufacturer	CMG, TECO or WEG (Hamon's Choice)
Number	1 per cell
Installed power (each)	132 kW
Phase / Freq./ Volts	3/50Hz/415V
Poles	4
IP Rating	56
Variable Speed Capability	No
Fill	
Type	Hamon 'COOLFIM/SNCS' Film Type
Material	PVC
Fire Rating	Self-extinguishing

Drift Eliminators	
Spacers	25mm, Polypropylene
Waves	PVC, 1.2 –1.5mm (Assembled in panels 500mm wide & 1830mm long)
Water Distribution	
Header	1 x 700mmNB, ANSI Class 150
Material	Glass fibre reinforced resin
Lateral Distribution Pipes	PVC pressure pipes Class 9 or polyethylene
Support	316SS Hangers
Noise Data	
Sound pressure level	78.5.0 dBA at 1m

3.2. *DESIGN DATA AND TOWER DIMENSIONS – OPTION 'B' (PLUME ABATEMENT COOLING TOWER)*

	PLUME ABATEMENT (HYBRID WET-DRY) COOLING TOWER WITH 'COOLFILM/SNCS' FILL PACK
Design	
Configuration of Cells	In-Line & Closed Ends
Load Condition	Design
Waterflow	33,000 m³/hr
Hot water Temperature (Coolant Inlet Temperature)	41.3 °C
Cold water Temperature (Coolant Outlet Temperature)	25.0°C
Wet bulb Temperature at Air Inlet -Design	20.3°C
Dry bulb Temperature at Air Inlet - Design	26.0°C
Drift loss	< 0.009%
Evaporation loss (%) – at Wet Bulb 20.3°C & Dry Bulb 26.0°C	2.28%
Evaporation loss (%) – at Dry Bulb 10.0°C & RH 80%	1.86%
No Plume Conditions	
Dry bulb Temperature	10.0°C
Relative Humidity (RH)	80%
Total Fan Power (at Motor shaft)	1,556.8 kW
Drift Losses	<0.0009%
Evaporation Losses	1.86%
Tower Dimensions & Other	
Number of cells	18
Type of tower	Hamon Counterflow,
Size of each cell – length at air inlet side (m) x width (m)	12.6m x 16.2m
Basin size (approx)	Existing
Centre line hot water inlet above basin curb	7.03 m
Pump Head (reference from basin curb)	11.25 m
Number of and size of HW inlets per cell	1 x 700 mm NB, ANSI Class 150
Fan Deck height above basin kerb level (approx)	14.3 m
Total height above basin kerb level (including fan stack)	16.8 m
Air Inlet Louvres Included (Yes/No)	Yes
Motor shaft installed power per cell	110 kW
Motor power (motor shaft)	86.5kW per motor
Total power absorbed (motor shaft)	1,556.8kW

Dry Heat Exchanger Section	
Tube orientation	Horizontal
Fin type	L, Aluminium
No of fins	11 FPI
Fin diameter	57.2 mm
Tuber material	304SS
Tube thickness	1.0mm
Tube pitch	63.50 mm
No of bundles per cell	2
Bundle net width	2.73m
Bundle net length	11.30m
No of rows	4
No of water passes	1
No of tubes per bundle	170
Air mixers	FRP
Shutters	Roller Type
Connection piping	HDGS
Fan	
Manufacturer	Howden
Number	1 per cell
Type	Axial flow,
Size	8.534 m diam.
Number of blades	6
Fan speed approx.	132 RPM
Fan Stacks	
Height, overall	2.5 m
Construction	Ribbed panels with flanged ends
Number of panels	16 per fan stack
Panel connections	Bolted
Support	Fan stack panels bolted to structural FRP beams with 316SS bolst and clamp plates
Gearbox	
Manufacturer	Sumitomo, Hansen or equal (Hamon's choice)
Number	1 per cell
Type	Spiral bevel
Size	T.B.A
Ratio (approx)	11.2 (Approx)
Service factor on power and as guaranteed by gearbox manufacturer	Minimum 2.0

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Transmission Shaft	
Manufacturer	Addax
Number	1 per cell
Type	Carbon Fibre with (flexible coupling)
Size	LRX850.625SS
Material of couplings	SS 316
Motors	
Manufacturer	CMG, TECO or WEG (Hamon's Choice)
Number	1 per cell
Phase / Freq./ Volts	3/50/400
Poles	4
IP Rating	55
Installed power (each)	110 kW
Variable Speed Capability	No
Fill (See attached drawings)	
Type	Hamon 'COOLFIM/SNCS' Film Type
Material	PVC
Fire Rating	Self Extinguishing
Drift Eliminators	
Spacers	25 mm, Polypropylene
Waves	PVC, 1.2 –1.5 mm (Assembled in panels 500 mm wide & 1830 mm long)
Water Distribution	
Header	1 x 700 mm NB, ANSI Class 150
Material	Glass fibre reinforced Resin
Lateral Distribution Pipes	PVC pressure pipes Class 9
Noise Data	
Sound pressure level	78.0 dBA at 1.0m

3.3. *MATERIALS OF CONSTRUCTION*

COMPONENT	MATERIAL
Dry Heat Exchanger Section (for OPTION 'B' COOLING TOWER ONLY)	
Tube material	SS304
Fin material	Aluminium
Water boxes	FRP
Tube bundle frames	HDGS
Air mixers	FRP
Shutters	N/A
Connection piping	HDGS
Structure	
Columns, Diagonal Braces & Splices	Isophthalic polyester resin FRP, fire retardant rating < 25 to ASTM E84, colour is light grey
Diagonal Brace Anchor Brackets	Silicon Bronze or Aluminium Bronze
Connection Plates	Isophthalic polyester resin FRP, fire retardant rating < 25 to ASTM E84, colour is light grey or 316SS Stainless Steel.
Nuts, Bolts & Washers	Silicon Bronze or Aluminium Bronze
Holding Down Bolts for Diagonal Brace Anchor Brackets	Supplied by Hamon Australia. Silicon Bronze or Aluminium Bronze
Holding Down Bolts for Columns	Not applicable
Casing	
Sheeting	'Supersix' SR76 Profile, 3050gsm Fire Retardant Polyester FRP,Opaque Grey gel coat finish
Fasteners	SS316 self-tapping screws
Casing corner moulds & supports	Polyester FRP, fire retardant, & 316SS self-tapping screws
Seals between casing corner moulds and corrugated sheeting	Closed Polyethylene Foam
Fandeck	
Panels	Isophthalic polyester resin FRP, fire retardant rating < 25 to ASTM E84, colour is light grey.

Panel's walking surface	'Anti-slip' – coarse grit impregnated in resin during fabrication.
Fasteners for fan deck	SS316 screws
Sealing at fan deck joints – plywood deck	Overlapping joints & silicone sealant
Inlet Louvres	
Louvres	'Supersix' SR76 Profile, 3050gsm Fire Retardant Polyester FRP,Opaque Grey gel coat finish
Supports	Isophthalic polyester resin FRP, fire retardant rating < 25 to ASTM E84, colour is light grey
Fasteners	SS316 self-tapping screws
Cell Partition Walls	
Material	Fire Retardant Polyester FRP corrugated sheets, 2400gsm
Method of support	Silicon Bronze or Aluminium Bronze
Windscreens in Cells	
Construction	Corrugated panels extending from underside of fill to top of water level in basin. Windscreen in located on longitudinal frame(s) on centre of each cell
Material	Fire Retardant Polyester FRP corrugated sheets, 2400gsm
Method of support	Silicon Bronze or Aluminium Bronze
Water Distribution	
Header pipes in cells	FRP Polyester Resin, fire retardant
Header pipe flanges & bolts	Located outside of cooling tower-FRP with hot dip galvanized mild steel backing flange with galvanized bolts (Bolts & Nuts Not Included in our Scope of Supply)
'Riser' pipe from External Header Pipes to Our Terminal Point Flanges on Cooling Tower Cells	Not in Our Scope of Supply

Distribution Pipes in Cells	UPVC, glued connections
Distribution pipe connection to header pipe in Cells	Distribution pipes joined by Neoprene Rubber Ring Joint (RRJ) to embedded UPVC stub in header pipe
Sprayers	Polypropylene, integral threaded joint into Sprayer Holder
Sprayer holders	PVC
Sprayer Holder Fasteners	Monel
Nozzles	Polypropylene, inserted in Sprayer
Header Supports	Silicon Bronze or Aluminium Bronze
Distribution Supports	Monel
Fill	
Hamon "CleanFlow Plus" Film Fill	PVC
Supports	Cooling Tower Structural Sections
Drift Eliminators	
Drift Eliminator Waves	PVC
Spacers	Polypropylene
Drift Eliminator supports	Panels of 'waves' and spacers rest on cooling tower FRP structure
Fan Stacks	
Fan stack panels	Fire retardant Polyester resin FRP
Bolts, nuts & washers for flange connections	304SS
Fans	
Fan blades	Polyester FRP with stainless steel leading edge protection.
Fan hub	carbon steel protected as per Category C5M of ISO12944
Blade clamps/supports	Aluminium saddles
U-bolts for blade clamps	316SS
Hub shaft coupling	Protected as per Category C5M of ISO12944 which is for very high (marine) corrosion environment.

Gearboxes	
Casing	Cast iron – ASTM40A-48
Shafts	Chromium Molybdenum Steel – SCM445H
Coating	Refer to Latter Sections
Holding down bolts	316SS
Electric Motors	
Casing	Cast Iron TEFC Construction
Protection	Minimum IP56
Painting	Standard Manufacturer's paint specifications.
Mechanical Bedframe	
Rolled Section	Hot dipped galvanized mild steel with as described in latter Secions of this Quotation
Holding down bolts	316SS

3.5. *TECHNICAL DESCRIPTION*

3.5.1. General – OPTION 'B' (PLUME ABATEMENT COOLING TOWER)

This unit is of the counter flow plume abatement (hybrid wet-dry) type, mechanical induced draft. The cells are arranged in line and 'back-to-back'.

Air is drawn vertically from the wet air inlet in the lower part of the tower, travels across the fill against the stream of water and is discharged in the atmosphere at high velocity.

Air is also drawn through the dry heat exchanger section (bundles), which is located above the wet air inlet and in the central part. The 'dry' air will then mix with the 'wet' air and is then discharged in the atmosphere, allowing the no plume operation of the cooling tower.

The thermal, structure design and selection of materials and components have been made in accordance with the specifications. Only first class materials will be used in construction and only mechanical components of proven reliability have been chosen.

The final optimised design is a combination of modern computer based methods coupled with an extensive service history of items used.

This wet-dry system has been selected to achieve a plume free operation as stated in your design reference conditions.

The tower is composed of a common basin with individual cells, adjacent to each other, and a common access to the maintenance points of the tower.

Each cell is equipped with its own hot water riser pipes (not in Hamon supply), partition walls, windscreen and mechanical equipment.

The wet section of each cell includes the water distribution system with spray nozzles, the P.V.C. fill, the drift eliminators, the hot water risers, and the required rubber joints.

The dry section of each cell includes the finned tube bundles, the air mixers, the water circuit, the risers and valves, the vacuum pumps and circuits.

3.5.2. Basins

We have assumed that the existing Cooling Tower Concrete Basin is in good condition and can be used. We have not allowed for any repairs or modifications to the Concrete Basin

Both of the Cooing Tower in this Quotation are the same size and configuration as the existing Cooling Tower and hence will be able to be installed inside the existing Concrete Basin without any modifications to the Basin.

3.5.3. FRP COOLING TOWER STRUCTURE

The cooling tower structural frames will comprise pultruded fibreglass reinforced polymer (FRP) structural sections bolted together with 'C' channel FRP profile sections. Please refer to photographs below.

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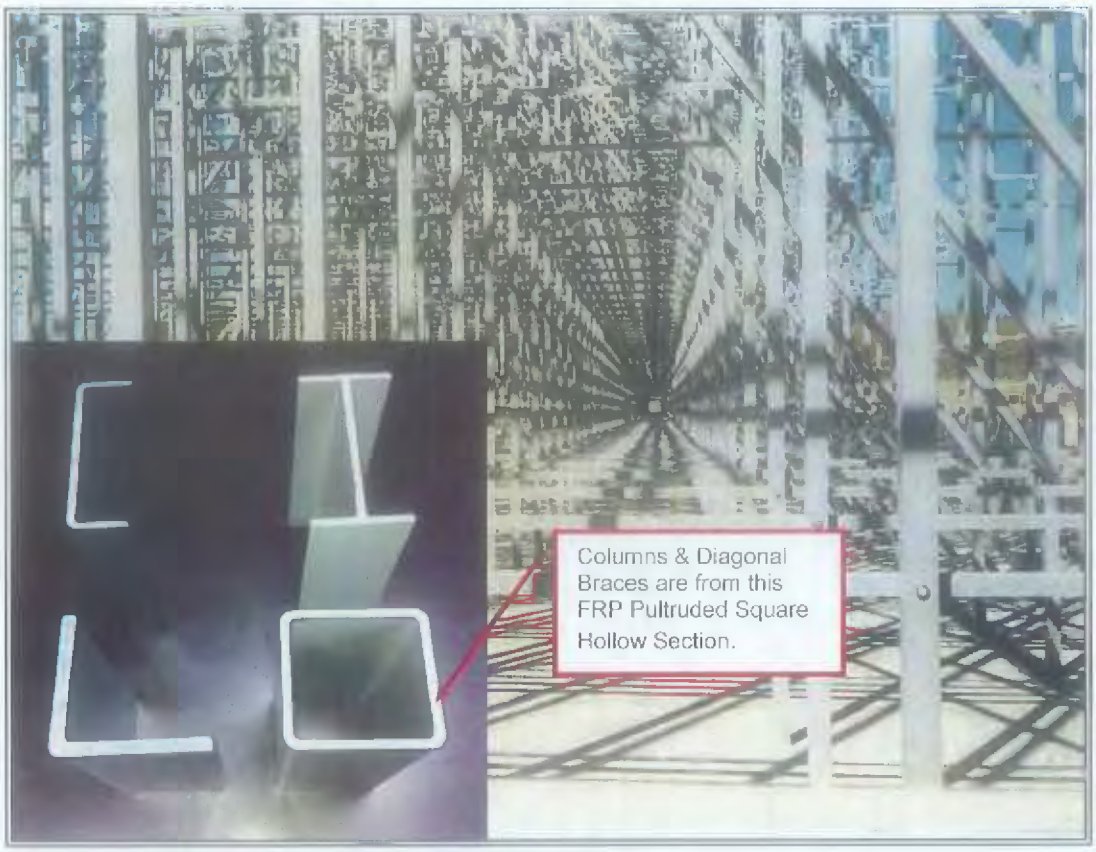

All FRP materials are fire retardant to ASTM E84 with fire retardant rating <25.

The FRP members are designed following major international codes and standards.

All FRP members will be cut at final length and all required holes would be drilled. The members will be marked-up in order to make easy the assembly on site. All bolted connections are 304 Stainless Steel bolts, nuts and washers.

We have taken into account in our design the wind loading requirements for both structure and fan stack.

The diagonal FRP members are anchored to the concrete basin floor by 'anchor brackets' fabricated from 316 Stainless Steel. Please refer to photograph below on the anchors.

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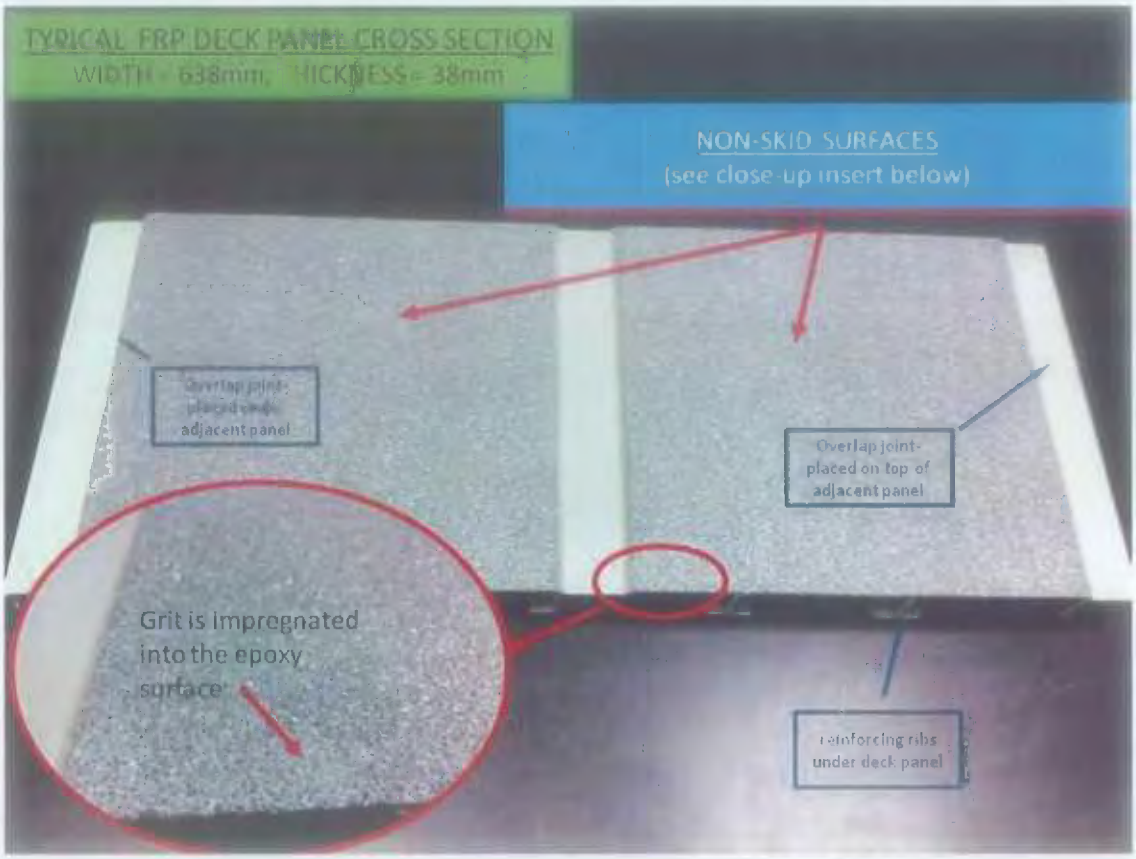
3.5.4. Fan Deck



The cooling tower fan deck will be constructed from Fibreglass Reinforced Polymer (FRP) which includes UV protection and also fire retardant additives to comply with ASTM E84 flame spread <25.
The top (walking) surface of the panels will be a "grit-impregnated" non-skid surface. The grit is firmly imbedded in the epoxy and it provides a much better non-skid surface than any paint system applied on plywood fan decks. Additionally, the surface will not be susceptible to peeling off like paint may do after exposure to the elements, given the fact that moisture is present underneath the fan deck. FRP will prevent moisture penetration in the deck layer whereas plywood will absorb moisture. The FRP deck panels proposed will therefore provide a much longer life with a non-skid surface. Photographs on some cooling towers in the finished form and under construction are shown on the following page.

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3.5.5. Cooling Tower Sheeting/Cladding

The exterior of the tower will be sheathed with fire retardant FRP cladding with Opaque Gull grey gel coat finish, and density of 3050 gsm, 'supersix' profile fixed to the structure by means of 'Tek' Stainless Steel screws.

3.5.6. Air Inlet Louvres & Internal Windscreens

FRP louvres will be installed at both of the air inlet openings on the cooling tower. The material will be similar to the FRP cladding of the cell walls.

To prevent wind blowing through from one air inlet and out the other thus carrying water with it, an internal FRP corrugated profile (as per the external cladding) screen is fixed on the FRP frames below the fill level.

3.5.7. Water Distribution

OPTION 'A' COOLING TOWER (NO PLUME ABATEMENT)

The hot water from the condensors reaches the tower via vertical riser pipes (not in Hamon Scope of Supply) connected to an interior header pipe – water distribution system.

The headers are not designed to carry the loads of the riser piping and this piping should also be restrained from transmitting forces onto the header pipe.

We recommend that a flanged rubber expansion joint or similar is used at the junction of the riser pipe and header to absorb vertical and lateral movements. The expansion joints have not been allowed for in Hamon Australia's supply.

We suggest that an isolating valve is installed on the vertical riser to the header. This will allow maintenance and isolation of the cell as required.

Attached to the header pipes (internal to the cells) is a series of PVC side pipes. Attached to the underside of each pipe are the plastic sprayers. Each downward sprayer has a large orifice, is easily removable and is virtually self-cleaning.

The sprayers ensure perfect distribution of the water over the entire pack plan area as well as breaking up of the water into droplet form.

The distribution pipes are supported on the structural sections by 316SS 'band-it' strapping system.

The water distribution system is designed to handle 120% overflow.

A big advantage of our distribution system is our simple sprayer arrangement, which allows for a very quick and cheap means of increasing waterflow throughout the tower at any time in the future.

The water distribution system drains by downspraying nozzles.

OPTION 'B' COOLING TOWER (WITH PLUME ABATEMENT)

On one side of each cell, the hot water will be directed to one header connected to the hot water distribution (wet section) and to the finned tube bundles (dry section). Interconnecting pipes connect the finned tubes heat exchangers on both side of the cooling tower.

The water from the finned tubes flows back to the header inside the cell.

Each riser (not in Hamon scope of supply) will be independently in order to ensure no load on the interface flange.

Butterfly isolation valves (not in Hamon scope) will be installed on each riser and used to shut off the water flow for maintenance. (Only ON-OFF position)

Just above the main valve, the riser will be equipped with a drain pipe to empty completely the installation when stopped, to avoid freezing.

All the valves are manual type.

Where it is required, rubber joints should be included (not in Hamon scope of supply – supplied by others) in the pipelines or riser pipes to allow expansion and remove the stress.

Attached to the header pipe is a series of PVC side pipes. Attached to the underside of each pipe are the plastic sprayers. Each downward sprayer has a large orifice, is easily removable and is virtually self-cleaning.

The sprayers ensure an even distribution of the water over the entire pack plan area as well as breaking up of the water into droplet form.

The water distribution system is designed to handle 120% overflow.

A big advantage of our distribution system is our simple sprayer arrangement, which allows for a very quick and cheap means of increasing waterflow throughout the tower at any time in the future.

The water distribution system drains by down spraying nozzles.

3.5.8. Cooling Tower Fill - "COOLFILM/SNCS" Film Fill

The evaporative exchange surface (the pack or fill) is of the film flow type. The patented design allows for an optimal heat transfer per unit of volume of fill with the corrugations on the vertical axis to help reduce the possibility of clogging, and to allow condenser cleaning balls to pass through. **The flutes in Hamon SNCS (Coolfilm™) are vertical and aerodynamically shaped and the pitch between sheets is 20 mm**. The fill height and its elevation are designed for an optimised heat transfer and air distribution in the cooling tower

The pack consists of thermoformed corrugated PVC sheets bonded into modules covering the whole surface of the tower. Water is distributed evenly over the surface of the sheets in a thin film. The plastic material is capable of withstanding temperature up to 60 °C without damage or permanent distortion.

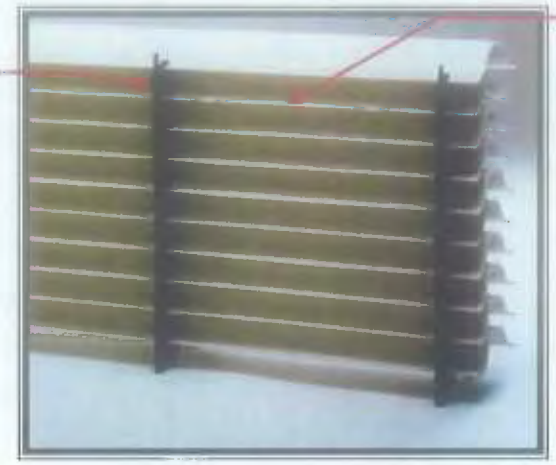
Cooling water can be used with up to 50 ppm total suspended solids (TSS) on an continuous operation (annual average). Peaks can be accommodated with TSS peak of 100 ppm for a duration of 1 to 2 days maximum for a duration of 10% average over a year. The 10% is the aggregate over the year. Note, however , that CoolFilm film cannot endure 100ppm peak continuously during 10% of the year (i.e. 1.2 month). The 1 to 2 days represents the maximum time allowed to the client to react and activate the chemical treatment to return to a normal water quality (back to 100 ppm or less)

The fill is supported from below by tower structural members and covers the entire interior plan area of the tower.
This packing is the result of long and extensive research. Development tests were run in Hamon's own facilities in order to maximise heat transfer, keeping as low as possible air pressure drops.

3.5.9. Drift Eliminators

25mm Spacer, one in middle and two at ends.

Each spacer includes two hooks shown on top. These clip into the back of the previous spacer in the pack.



Drift Eliminator Waves.

Usual Number per pack is 10.

There are different lengths of 'waves' for specific locations in the Cooling tower

Directly above the water distribution system is a layer of easily removable drift eliminators that are supported on structural timber sections. The water distribution pipes are also supported by these sections but are underneath. Please refer to photograph below

The drift eliminators are made into panels comprising UPVC waves kept at the required spacing means of polypropylene spacers. The waves are UV stabilized. The panels are strong enough to walk on but can be planked over to provide a working platform for other maintenance should this be required.

The rigidity of our panels made from 1.5mm thick UPVC blades and reinforced at the edges by a tear-drop section and has been recognized as being without peer in the industry. HA eliminator panels may be blast cleaned by high pressure water without damage should cleaning be necessary.

HA drift eliminators have been installed extensively by the major industrial, chemical and electricity generators in Australia.

3.5.10. Mechanicals

The mechanicals comprise:-

a) Fan Stack

Fibreglass reinforced polyester fan stacks have been allowed for.

The entry into the fan stack is bell-mouthed from the top of the fan deck.

The stacks are manufactured using ultra violet stabilized resins.

An access panel is provided in the fan stack.

All fan stack panel connecting flange bolts are SS304 including the holding down bolts.

b) Fans

Axial fans with fibreglass reinforced polyester blades. The fan blades are adjustable at standstill within the power limits of the motor.

Fan hub is statically balanced.

The fan blades are moment balanced to a master standard.

The fan hub and coupling flange are epoxy painted and mount directly onto the output shaft of the gearbox.

The fan hub bolts and fan blade bolts are HDGS.

c) Gearboxes

Spiral bevel helical speed reducers specifically engineered for cooling tower applications are provided.

Gearboxes are specially epoxy painted for cooling tower environment. Please refer to Section 3.4 for painting details.

The gearboxes feature a labyrinth seal on the output shaft central grease system and heavy duty bearings. The gearboxes will be bolted to the bed frame with 316SS bolts.

d) Transmission Shaft

A dynamically balanced fully floating transmission shaft couples the motor to the gearbox.

The shaft is designed and selected especially for cooling tower application ie rating, balancing and first critical speed. Balancing certificates will be supplied.

The spacer shafts supplied will be carbon fibre with the manufacturers standard stainless steel couplings.

e) Motors

Footmounted, these will be bolted to the bedframe with 316SS bolts, nuts and washers.

f) Oil & Lubrication

External oil and lubrication piping system is provided for the gearbox. This allows maintenance checks, top-ups and oil changes from the outside the fan stack and without the need to shut-down the unit and without having to enter the cell to reach the gearbox.

g) Bed frames

The bed frame for support of the motor and gearbox will be mild steel and epoxy painted in accordance with Section 3.4 of this Quotation. It will be bolted to the structure with 316SS bolts.

3.5.11. Dry Section

Dry heat exchanger (horizontal)

In order to heat up and dry the wet air coming out of the wet section, fin tube bundles are installed in the external walls of the cooling tower structure. The bundles will have vertical water boxes with the fin tubes running horizontally.

Water is continuously running in those bundles.

Tubes are with aluminium fins.

The aluminium fins have been selected for their good heat transfer efficiency and performance. This material has been proven to be weather resistant and is adequate to most environment conditions

Tubes are mechanically expanded in the steel plate of the water box. For easy maintenance, water boxes may be opened.

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Vacuum system

Two 100 % vacuum pumps will be provided. The pumps must be installed in an indoor area.

The pump is operated to insure a proper water flow circulation inside the bundles: the so called "holding" vacuum pumps will run continuously.

One pump will be in operation and the other one will be on stand-by. City water supply is required for the vacuum pumps.

Air mixers

In order to allow for proper mixing of wet and dry air, cooling towers are provided with air mixers. They are in FRP and provide good mixing between dry and warm air from the dry section and over-saturated air from the wet section.

Shutters

The cooling tower in this Tender does not include shutters for the tube bundles.

3.5.12. Access

1) To the roof deck

Access to the top of the cooling towers is via an FRP (fire retardant) stairway as shown on the general arrangement drawing. The materials will be the same as that of the cooling tower structure.

A caged escape ladder is provided as shown on the general arrangement drawing.

2) Around roof deck

Handrailing is provided around the roof deck. This handrailing will comply with safety requirements.

3) To Cells

Access is provided by a trapdoor in the fandeck. An FRP (fire retardant) ladder is provided to a landing approx 2 metres below the fan deck. Refer to photograph below.

4) Access to drift eliminators and water distribution

During shutdowns, the area on top of the drift eliminators can be accessed by personnel (although the drift eliminators can carry normal personnel, we recommend that a plank is used to distribute the load on the drift eliminators and prevent damage) on planks arranged on the FRP (fire retardant) beams which are above this level and just under the gearbox support beams (also the fan deck beams). This is an easy exercise using standard Aluminium plank sections. FRP sections as shown can be built around the gearbox.

5) Maintenance Platform / Access Walkway for Gearbox and Fan

The walkways will be manufactured from ISOPHTALIC polyester resin, Fire Retardant complying with ASTM E84, flame spread less than 25. This is a standard requirement when for all structural FRP cooling tower. All hardware used will be SS316

The FRP will be coloured in Yellow. The pigment will be in the resin and guarantee longevity. No maintenance will be required on the FRP.

Refer to pictures 1, 2 and 3 for illustration and in section 4.0 for a typical drawing.

Picture1 – viewing from the fanstack access hatch

Some deviations in regards to the compliance with Australian Standard have to be considered. The elevation of the handrails will be defined by the fan location in the fanstack. A Clearance of at least 500 mm must be between the handrails and the fan blades. Also, if the fan blades are in vertical position, the fan must be free for rotation with no interference with the handrail. This might imposes that the handrail high be lower than recommended by the code.

Picture 2 – viewing from inside the fanstack, from gearbox

Picture 3 – viewing from below the access walkway
Plenum above drift eliminators

3.5.13. Commissioning

This can be carried out in 1 -2 days.

The service of a Hamon Supervisor can be provided at a daily basis for the commissioning of the cooling tower.

3.5.14. Maintenance and reliability of components

The components used in the fabrication of the fans, film packing, drift eliminators, distribution pipes and sprayers are either fibre reinforced polyester or plastic for a long trouble-free life.

This combination has been used in Hamon Cooling Towers for over 20 years Worldwide. The components are reliable, inert to chemical attack from biocides used in water treatment, will withstand very high service temperatures and require a minimum of maintenance. Many components are now second or third generation, with proven performance records.

3.5.15. Equipment Warranties

Mechanical components such as motors, fans and gearboxes as per our suppliers' warranties.

3.6. *SURFACE TREATMENT*

3.6.1. Gearboxes

The surface preparation and coating of the gearboxes will be as per below or similar:

1. First coat of high build, modified aluminium epoxy paint, DFT 40 – 80 microns
2. Second coat of polymide epoxy resin, DFT 120 – 240 microns.

All of the coats shall be applied in accordance with paint manufacturer's recommendations

3.6.2. Mechanical (Gearbox / Motor) Bedframes

The corrosion protection system for the Mechanical Bedframes shall be the following:

1. Surface preparation – abrasive blast cleaning to AS 1627 Cl. 2.5.
2. Hot dip galvanising in accordance with AS/NZS 4680 "Hot-dip galvanised (zinc) coatings on fabricated ferrous articles.
3. Light blast / whip blast cleaning of galvanised surface.
4. Primer coat of Epoxy zinc phosphate primer.
5. Second coat of Intercure 200 or Interguard 251 (or equivalent) to a DFT of 100 micron
6. Top Coat of Polyurethane Interthane 990 (or equivalent) to a DFT of 75 micron

All of the coats shall be applied in accordance with paint manufacturer's recommendations

3.6.3. Access Ways – Fan Deck Handrails

Handrails and other components are FRP structural sections as in the cooling tower and will not be painted.

3.7. *COOLING TOWER TESTING REQUIREMENTS*

The Client must ensure that the following are provided:

a) Temperature probe tapping points into the hot and cold water lines as per Fig. 1.

b) If the cold water tapping point is located after the pump, then provision for pressure readings before and after the pump will be required.

c) A device for measuring water flow to the tower should be located in the supply line to the tower in the longest straight section possible. It should be positioned with the minimum number of upstream and downstream straight lengths as stipulated in BS1042 - Fluid Flow in Closed Conduits. Where we are to use our pitot tube for flow analysis, the tapping points as per Fig. 2 must be positioned in a section where the pipe is running full, and where the static pressure is a minimum of 2.5m W.G.

It should also be noted that a pitot tube analysis is only suitable for pipeline diameters of 200mm or greater. Where pipelines are smaller than 200mm we recommend that an orifice plate be fitted with suitable tapping points.

d) Where water flow rate measuring points or temperature measuring taps are positioned more than 1500mm above grade, then scaffolding is to be provided and erected by Verve Energy.

e) If the fan motor speed is controlled by a Variable Frequency Drive, then provision will need to be made to bypass this controller during the test. The reason for this is that the Variable Frequency Drive may effect our power measurements.

f) A meter installed in the water make-up line to the tower(s) should be provided for the measurement of the make-up water quantity during the test.

g) A single-phase 240V power outlet should be in the vicinity of the cooling tower(s)

If it is difficult or impossible to meet with the above requirements, please contact Hamon Australia so alternatives may be discussed.

HAMON AUSTRALIA

COOLING TOWER BUDGET QUOTATION

Client:	WORLEY PARSONS, NEW ZEALAND	Hamon Ref:	Q1321 Rev 0
Site:	METHANEX, MOTUNUI, NEW ZEALAND	Client Ref:	Project No 502092
		Date:	6th June 2014

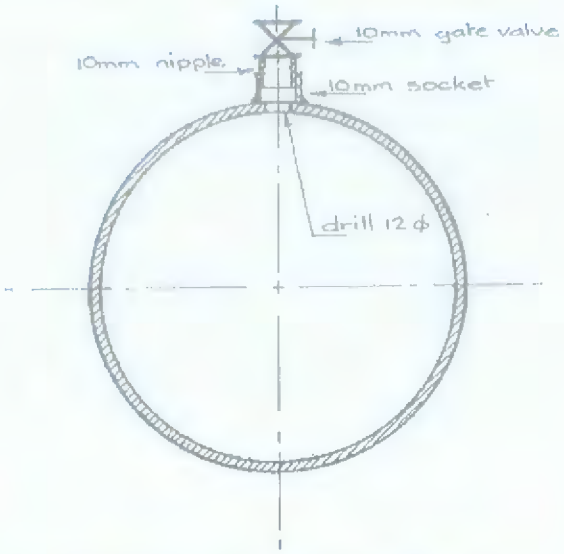


FIG 1 - TEMPERATURE PROBE TAP DETAILS

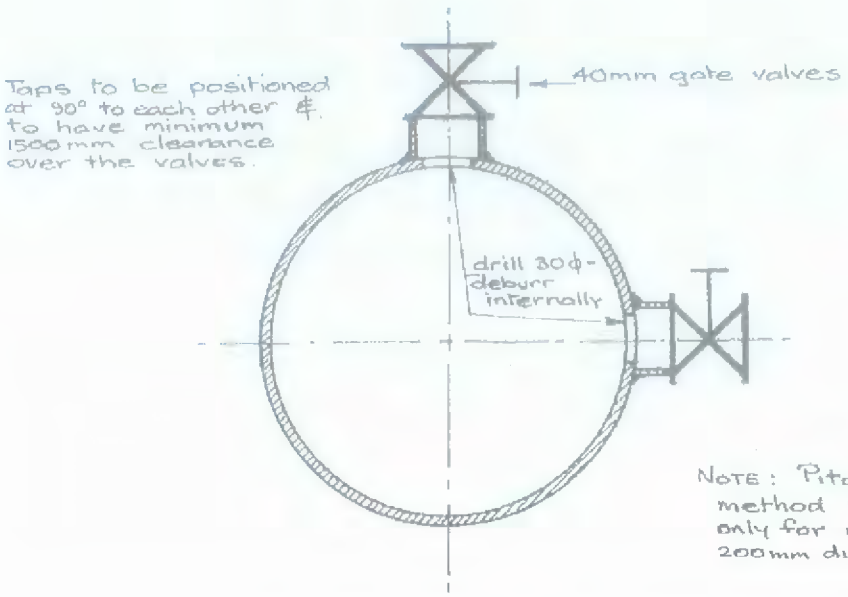
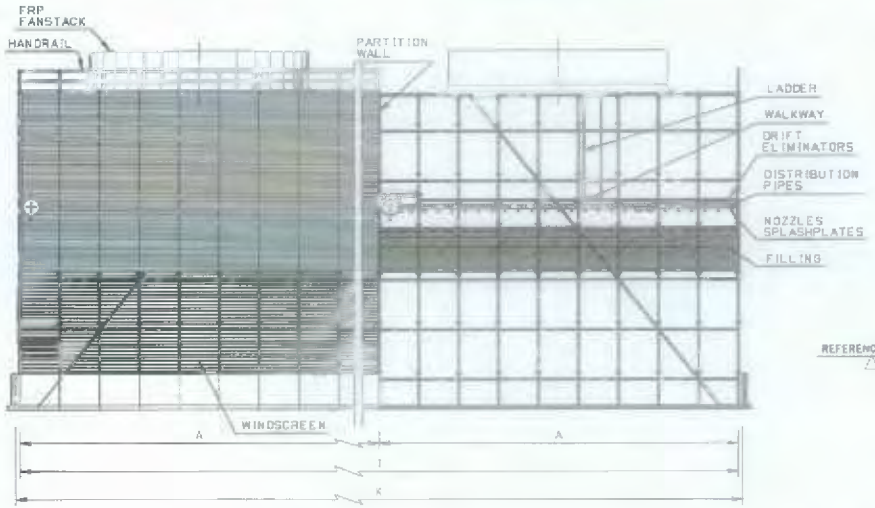


FIG 2 - PITOT TAP DETAILS FOR PIPES TO 1500 mm OD

4. DRAWINGS

4.1 OPTION 'A' COOLING TOWER

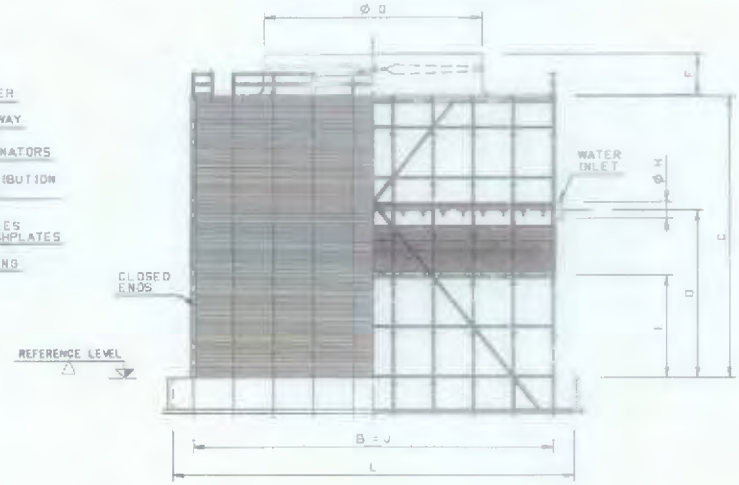
FRONT VIEW



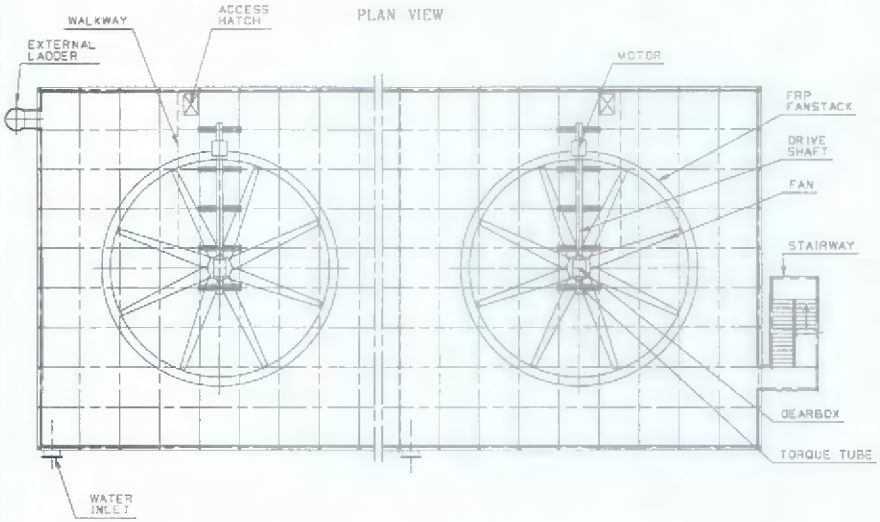
LONGITUDINAL SECTION

SIDE VIEW

TRANSVERSE SECTION



PLAN VIEW



DIMENSIONS FOR 1 CELL.

A CELL LENGTH	B CELL WIDTH	C FAN DECK HEIGHT	D WATER DISTRIBUTION AXIS	E AIR INLET HEIGHT	F FANSTACK HEIGHT	G FAN DIA	H WATER INLET NOMINAL DIA
12.60	16.20	9.30	6.40	3.46	5.00	8.53	600

TOWER DIMENSIONS.

NUMBER OF CELLS	I NOMINAL TOWER LENGTH	J NOMINAL TOWER WIDTH	K BASIN INTERNAL LENGTH	L BASIN INTERNAL WIDTH
18	227.25	16.20	227.95	18.60

VALUES IN m/ft EXCEPT H IN mm/in

INDUCED DRAFT COOLING TOWER
GENERAL ARRANGEMENT

HAMON AUSTRALIA

Level 4, 80 Chandos Street, NAREMBURN

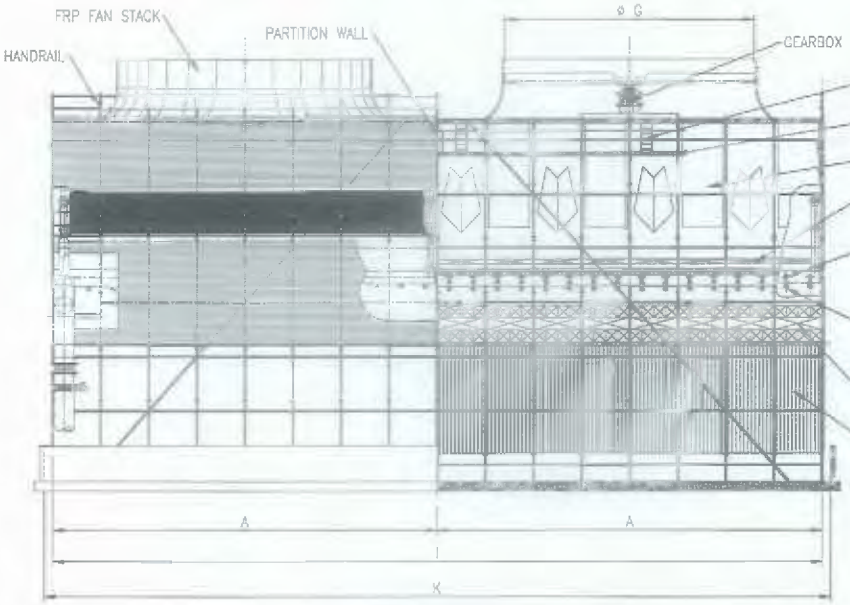
SYDNEY NSW 2065, AUSTRALIA

SCALE : NO SCALE

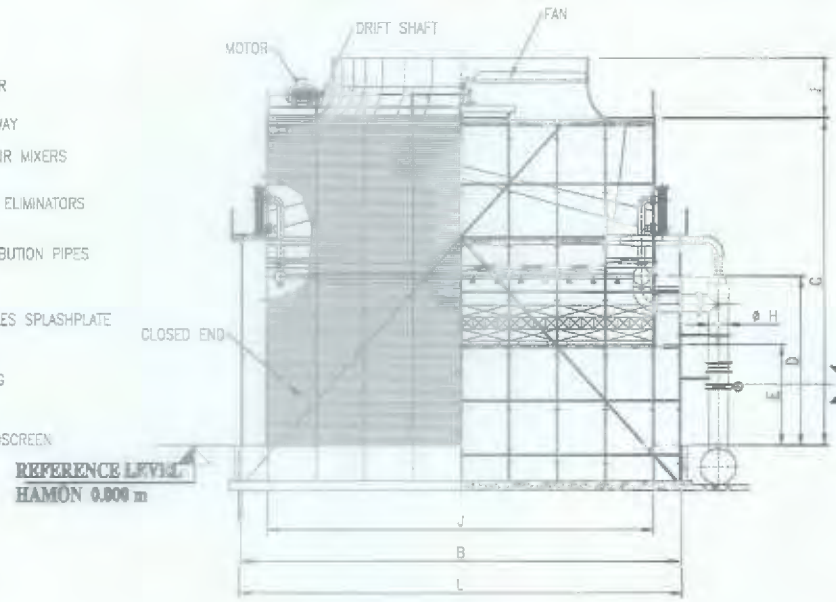
CENTER	PROJECT No	DOC	DOC No	REV	NB PAGES	No PAGE	PAGE SIZE
	Q132Isnes1	DWG		0	1	1	A4

4.2 OPTION 'B' COOLING TOWER

FRONT VIEW

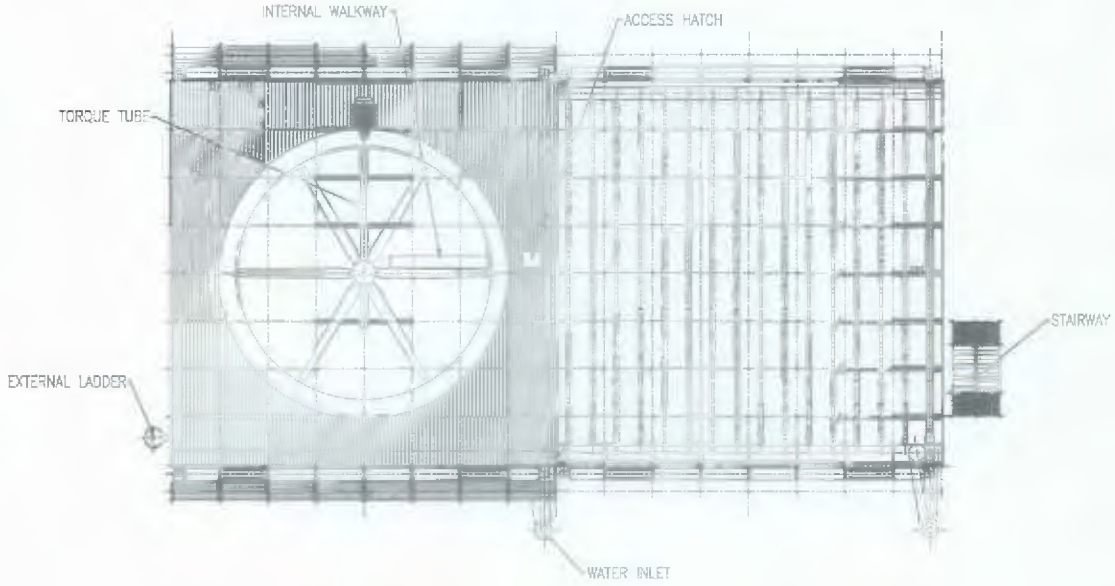


LONGITUDINAL SECTION



REFERENCE LEVEL
HAMON 0.000 m

PLAN VIEW



DIMENSION FOR 1 CELL

A CELL LENGTH	B CELL WIDTH	C FAN DECK HEIGHT	D WATER DISTRIBUTION AXIS	E AIR INLET HEIGHT	F FAN STACK HEIGHT	G FAN DIA	H WATER INLET NOM. DIA
12.60	16.20	14.30	7.03	4.20	2.50	8.534	700.

TOWER DIMENSIONS

VALUES IN m/ft. EXCEPT H IN mm/in.

NUM. OF CELLS	I NOMINAL TOWER LENGTH	J NOMINAL TOWER WIDTH	K BASIN INTERNAL LENGTH	L BASIN INTERNAL WIDTH
18	227.25	16.20	227.05	18.60

TYPICAL DRAWING

REV	DATE	DESIGN	CHECK	APPR. 1	APPR. 2	APPR. 3	STATUS	REMARKS
A	01-04-10	BE	BE			FM		FIRST ISSUE

PREL = PRELIMINARY | CD = CERTIFIED DRAWING | CFC = CERTIFIED FOR CONSTRUCTION | ASB = AS BUILT

Methanex - Motunui

GENERAL ARRANGEMENT
CELLS IN LINE – FRP STRUCTURE
HORIZONTAL BUNDLES

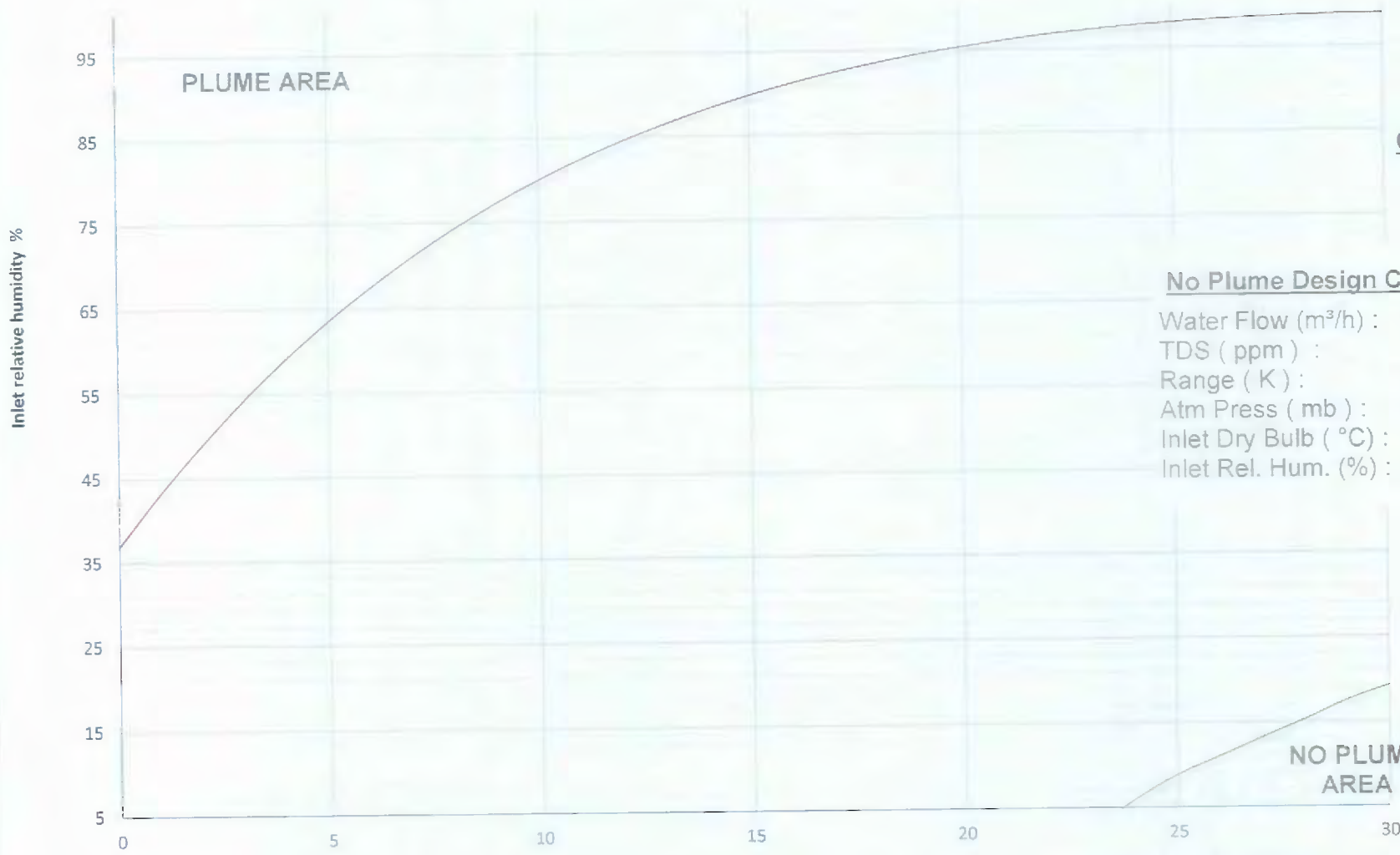
HAMON THERMAL EUROPE
HTTP : /WWW.HAMON.COM

GENERAL SCALE: –
SIZE: A2
DRAWING N°:
CAN NOMINAL SIZE:
UNIT: R CLT
JOB N°:

FILE NAME AND PATH:

MECHANICAL DRAFT WET-DRY COOLING TOWER

Plume/no plume area as a function of dry bulb and relative humidity



Operating Mode :

—— WetDry

—— Wet

No Plume Design Condition :

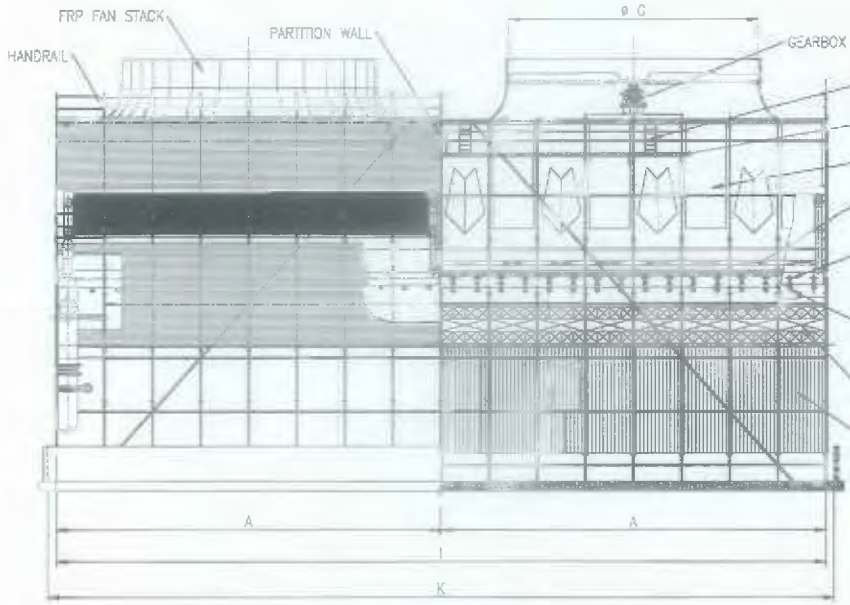
Water Flow (m³/h) :	33000
TDS (ppm) :	0
Range (K) :	16.3
Atm Press (mb) :	1009.7
Inlet Dry Bulb (°C) :	10
Inlet Rel. Hum. (%) :	80

For information only

Water Flow = 33000 m³/h (100%)
Range = 16.3 K

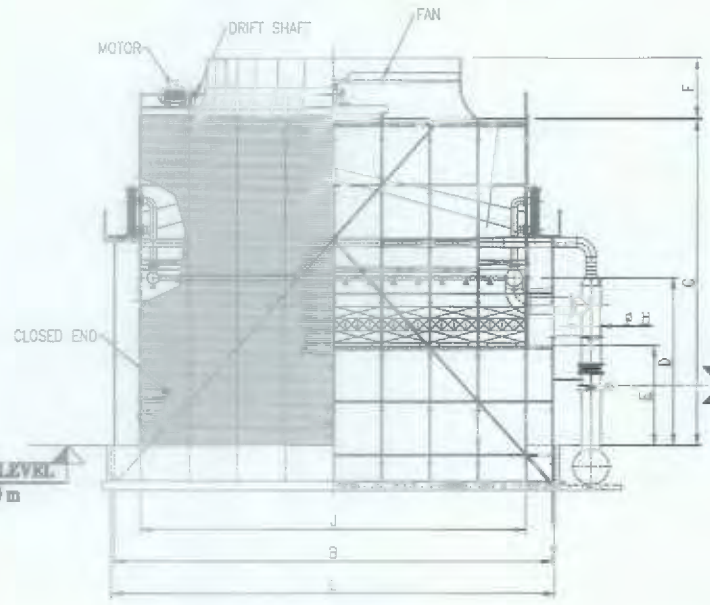
HAMON THERMAL EUROPE S.A.
Date : 10/06/2014
Project Name : Methanex - Rev 1
Project Number : 0
Curve ID : 1

FRONT VIEW



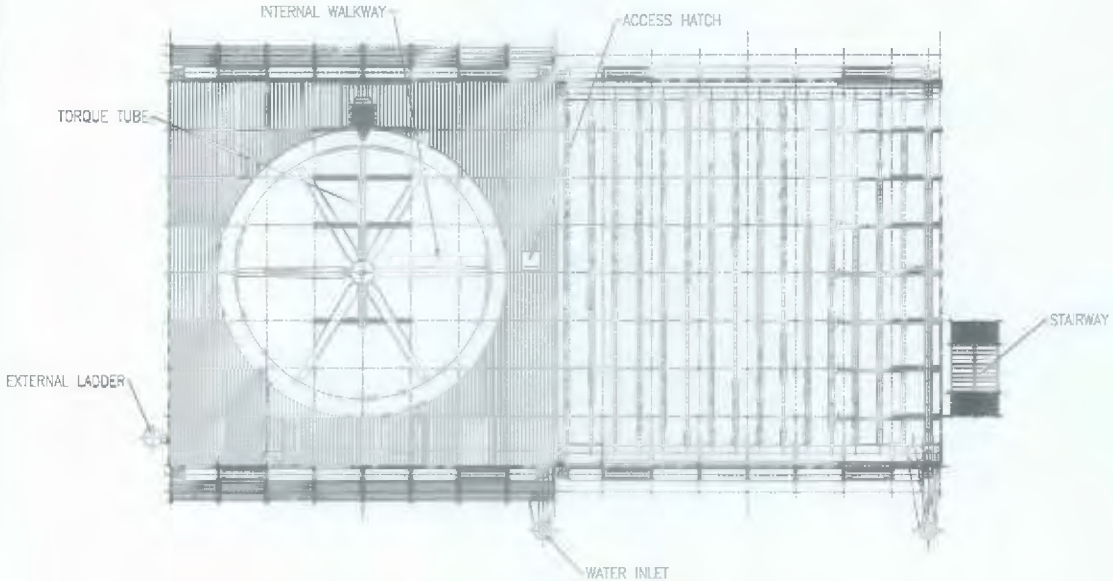
LONGITUDINAL SECTION

SIDE VIEW



TRANSVERSE SECTION

PLAN VIEW



DIMENSION FOR 1 CELL

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TOWER DIMENSIONS

VALUES IN m/ft. EXCEPT H IN mm/in.

NUM. OF CELLS	I NOMINAL TOWER LENGTH	J NOMINAL TOWER WIDTH	K BASIN INTERNAL LENGTH	L BASIN INTERNAL WIDTH
18	227.25	16.20	227.95	18.60

TYPICAL DRAWING

A	01-04-10	MH	MV		FN	-	CD	FIRST ISSUE
DATE		EE	EE	STRUCT.	TECHN.	FM	STATUS	REMARKS
		DRAWN	CHECK	APPR.	APPR.	APPR.		

PREL = PRELIMINARY | CD = CERTIFIED DRAWING | CFC = CERTIFIED FOR CONSTRUCTION | ASB = AS BUILT

Methanex - Motunui

GENERAL ARRANGEMENT
CELLS IN LINE – FRP STRUCTURE
HORIZONTAL BUNDLES

SCALE: -

SIZE: A2

DOSSIER FILE:

PLAN No. SHS No.: -

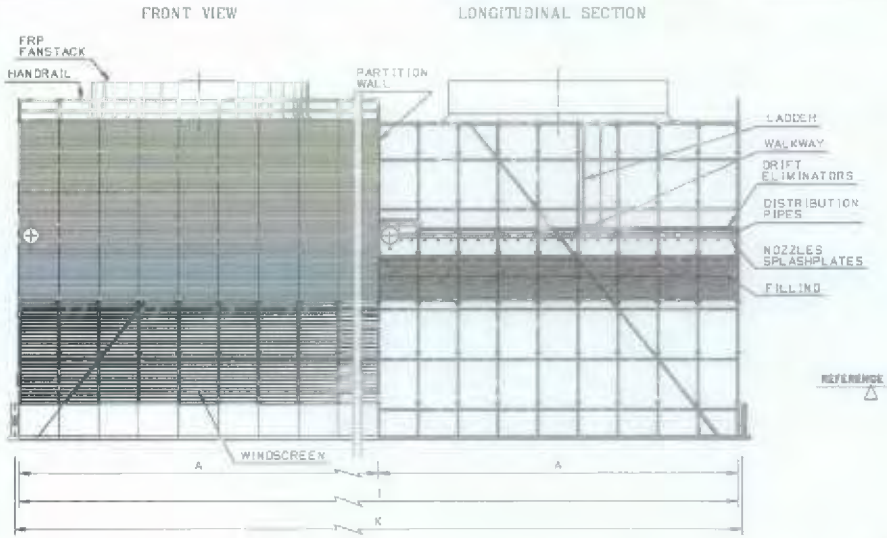
QTY: 3 CLT

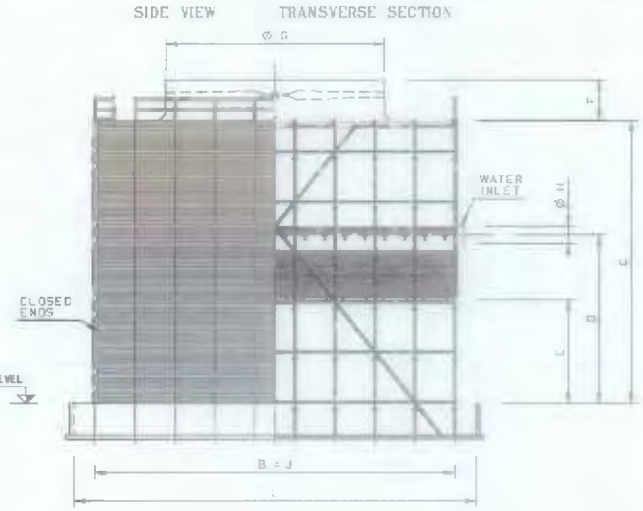
SHS #: -

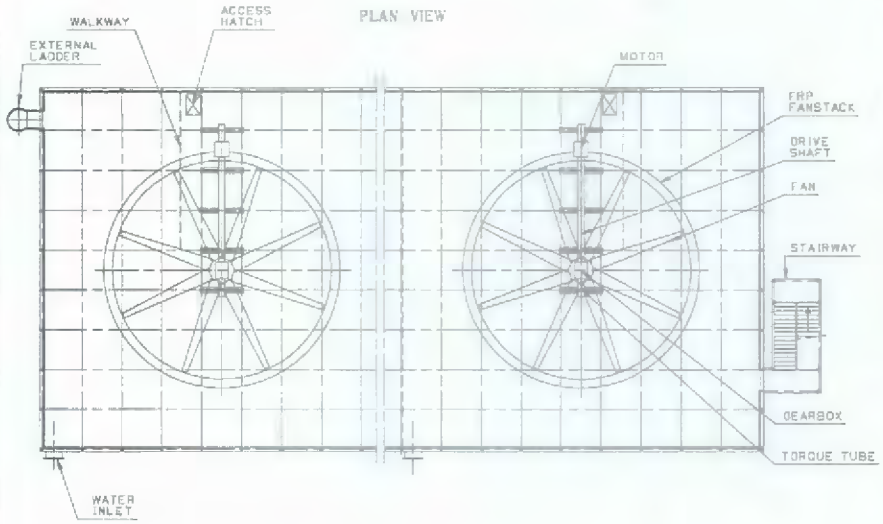
HAMON THERMAL EUROPE

HTTP : /WWW.HAMON.COM

FILE NAME AND PATH: .







DIMENSIONS FOR 1 CELL

A CELL LENGTH	B CELL WIDTH	C FAN DECK HEIGHT	D WATER DISTRIBUTION AXIS	E AIR INLET HEIGHT	F FANSTACK HEIGHT	G FAN DIA	H WATER INLET NOMINAL DIA
12.60	16.20	9.00	6.10	3.16	5.00	8.53	600

TOWER DIMENSIONS

NUMBER OF CELLS	I NOMINAL TOWER LENGTH	J NOMINAL TOWER WIDTH	K BASIN INTERNAL LENGTH	L BASIN INTERNAL WIDTH
18	227.25	16.20	227.95	18.60

VALUES IN m/ft EXCEPT H IN mm/in

INDUCED DRAFT COOLING TOWER
GENERAL ARRANGEMENT

HAMON AUSTRALIA
Level 4, 80 Chandos Street, NAREMBURN
SYDNEY NSW 2065, AUSTRALIA

SCALE
NO SCALE

CENTER	PROJECT No	DOC	DOC. No	REV	NB PAGES	No PAGE	PAGE SIZE
	Q1321	DWG		1	1	1	A4

Appendix VI

Air emmissions report for Methanex NZ Ltd. Motunui and Waitara Valley plants 2012/2013

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Motunui
Private Bag 2011
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New Zealand

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Facsimile: +64 6 754 9701

www.methanex.com

METHANEX®
A Responsible Care® Company

10-Apr-15
File No: R40 0243

Taranaki Regional Council
Private Bag 713
Stratford

Attention: Helen Meintjes and Rae West

AIR EMISSIONS REPORT FOR METHANEX NZ LTD. MOTUNUI & WAITARA VALLEY PLANTS

2012/2013 REPORTING PERIOD

Introduction

Methanex New Zealand Limited is required to supply the Taranaki Regional Council with a report every two years for its Motunui plant and every three years for its Waitara Valley plant addressing requirements detailed in the air discharge consents for the sites.

The consents are:

Motunui Plant: 4042-3

Waitara Valley Plant: 4045-3

Methanex is supplying this combined report for both the Motunui and Waitara Valley plants.

The Motunui plant produced methanol during all of 2012. In July the second crude methanol unit (Methanol 1) was restarted, bringing the site to full production levels, using the associated two distillation columns used to distill the crude methanol (known as Distillation 3 and 4 units).

The Waitara Valley plant was in a 'laid up state' before work began on restarting it in 2013, with the methanol production starting in September of that year, using

the crude methanol unit and the two distillation columns (known as Distillation 1 and 2 units).

Air Emissions Report

[A] Review of Technological Advances to Reduce or Mitigate Emissions

No new technologies for reducing emissions from the plants were identified that are commercially viable during this reporting period. No complaint was received from the public, and neither was any objectionable odour noticeable under ambient conditions within the boundaries of the plants during this period.

It is worthy of note that with the return to full production and the associated positive predicted future for Methanex's assets, the company is now beginning to re-assess options for reducing or mitigating emissions to identify if they are now economically viable. These investigations include potential vapour recovery fitted to the methanol storage tanks and recovery of emissions from the distillation column vents. Methanex will continue to inform the TRC as decisions are made regarding these potential projects.

[B] Inventory of Emissions (excluding carbon dioxide)

No request from the TRC was received for an inventory of any particular contaminates. With the re-commissioning of plants that have been idle for some time, Methanex is currently in the process of analysing and calculating emissions from tanks, reformer stacks and distillation vents and this information will be included in the next report for the 2014 -15 reporting period.

The Motunui plant incinerator has been permanently decommissioned; hence there were no emissions to report from this.

[C] Ambient Atmospheric Monitoring

Perimeter monitoring for methanol, carbon monoxide and nitrogen dioxide was carried out in 2012 at the Motunui site and the following table records these results:

2012 Motunui site

Location	North		East		South		West	
Monitoring period	11/12/2012 11:46 – 12:50		11/12/2012 12:55 – 13:58		11/12/2012 14:06 – 15:06		11/12/2012 10:37 – 11:40	
Wind Direction	NE		N		SW		N to NE	
Wind Speed (m/s)	0.0-2.2		2.3-3.8		0.0-2.0		1.0-1.5	
Temperature (°C)	19.3		18.8		21.6		16.0	
Relative Humidity (%)	75.9		69.2		58.5		82.2	
Barometric Pressure (hPa)	1018.9		1018.2		1017.0		1019.2	
Conditions	Mostly cloudy – no precipitation		Partly cloudy – no precipitation		Partly cloudy – no precipitation		Overcast – no precipitation	
Unit	ppm	mg/m^3	ppm	mg/m3	ppm	mg/m3	ppm	mg/m3
CO *	<LDL	<LDL	<LDL	<LDL	<LDL	<LDL	<LDL	<LDL
Unit	ppb	$\mu g/m^3$	ppb	$\mu g/m^3$	ppb	$\mu g/m^3$	ppb	$\mu g/m^3$
NO_2 **	0.4	0.8	2.1	4.3	0.3	0.6	0.2	0.4
Unit	ppm	mg/m^3	ppm	mg/m^3	ppm	mg/m^3	ppm	mg/m^3
Methanol ***	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

*The lower detection limit (LDL) for CO is 0.05ppm or 0.2% of concentration reading, whichever is greater. mg/m^3 is corrected to 0 °C, 101.3 kPa

** $\mu g/m^3$ is corrected to 0 °C, 101.3 kPa

*** The limit of quantification of RAE VOC gas monitor used for logging the Methanol concentration is 0.04 ppm (0.06 mg/m^3). The average concentration from the four locations monitored is <0.04 ppm or <0.06 mg/m^3.

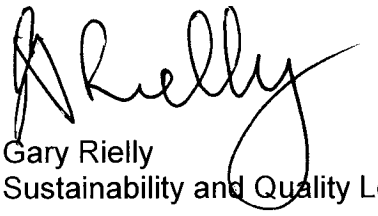
With the return to full production, Methanex carried out another round of ambient monitoring at both the Motunui and Waitara Valley sites in 2014 and this information will be included in the next report for the 2014-15 reporting period.

[D] Energy Efficiency

Because the cost of energy makes up a large portion of the operating costs associated with the production of methanol, Methanex has a significant incentive to continuously improve energy efficiency by 'trimming' the way in which it operates the plants. This includes using steam efficiently and minimising the number of cooling tower fans in use.

With the re-commissioning of both crude methanol units at the Motunui site, it was recognised that the original dearators were at end of life, and so new ones were installed. These were major projects, and efficiency was an important factor in the selection of the design of these units, with the results being a significant reduction in steam usage.

Report Prepared by:



Gary Rielly
Sustainability and Quality Leader