Consultation Paper

Review of New Zealand Specification for Reticulated Natural Gas

March 2006

Table of Contents

1 Introduction

Purpose

1.1 The purpose of this consultation paper is to present the Gas Industry Co's assessment of a macro review of the current specification for reticulated natural gas in New Zealand (NZS 5442:1999). That review has not identified any major technical issues that suggest there is a need to reassess the appropriateness of NZS 5442:1999. Subject to responses to this consultation document, the Gas Industry Co does not expect to be making a recommendation to change the Standard. Gas Industry Co is inviting submissions from stakeholders as to whether they agree with the Gas Industry Co assessment or whether there are additional factors that need to be taken into account.

Background

1.2 The Government Policy Statement on Gas Governance (GPS) states, inter alia, that the Government expects the Gas Industry Co to develop and submit to the Minister of Energy for approval:

> *"…protocols and standards applying to wholesale gas trading,* ***including quality standards****, balancing and reconciliation".* (emphasis added)

1.3 Gas Industry Co has been working with the Wholesale Markets Working Group (WMWG)[1] on this issue and it was agreed that the requirement for a recommendation on gas quality standards would best be met by undertaking a review to ascertain whether there were any issues with the current standards and, if so, how best to address these.

Submission Requirements

1.4 The Gas Industry Co invites submissions on this consultation document, preferably including answers to the specific questions in the document, by 5:00 pm on Friday, 21 April 2006. Please note that submissions received after this date may not be able to be considered.

1.5 The Gas Industry Co's preference is to receive submissions in electronic form (Microsoft Word format and pdf) and to receive one hard copy of the electronic version. The electronic version should be emailed with the phrase "Submission on Natural Gas Specification" in the subject header to:

info@gasindustry.co.nz

and one hard copy of the submission should be posted to the address below:

---

[1] Further information on the Wholesale Markets Working Group, including a list of members and their affiliations, can be found on the Gas Industry Co website http://www.gasindustry.co.nz.

Gas Industry Company Limited
Level 9, State Insurance Tower
1 Willis Street
PO Box 10 646
Wellington
New Zealand
Attention: Ian Dempster
Tel: +64 4 494 2467
Fax: +64 4 472 1801

1.6 The Gas Industry Co will acknowledge receipt of all submissions electronically. Please contact Ian Dempster if you do not receive electronic acknowledgement of your submission within two business days.

1.7 Submissions should be provided in the format shown in Appendix A. The Gas Industry Co values openness and transparency and, therefore, submissions will generally be made available to the public on the Gas Industry Co's website. Where submitters intend to provide confidential information as part of their submissions we ask that you discuss that with Gas Industry Co prior to lodging the submission.

2 Regulatory Context

2.1 This section provides information on the relationship between the Gas Act ("Act"), the Government Policy Statement on Gas Governance (GPS"), and the Gas Industry Co.

Gas Act

2.2 Section 43ZO of the Act defines the Minister's role in communicating objectives and outcomes that the Government wishes the Gas Industry Co to pursue. That section states:

> *(1) The Minister may set objectives and outcomes that the Government wants the* [Gas Industry Co] *to pursue in relation to the governance of the gas industry, and against which the* [Gas Industry Co] *must report.*
>
> *(2) The Minister must set those objectives and outcomes by—*
>
> *(a) giving the* [Gas Industry Co] *a statement of government policy containing those objectives and outcomes; or*
>
> *(b) giving the* [Gas Industry Co] *an amendment to, or replacement of, that statement.*
>
> *(3) The Minister must publish in the Gazette, and present to the House of Representatives, each statement (or amendment to, or replacement of, a statement) under subsection (2) as soon as practicable after giving it to the* [Gas Industry Co].
>
> *(4) The* [Gas Industry Co] *must have regard to those objectives and outcomes when making recommendations for gas governance regulations under this Part.*

2.3 There is no specific statement in the Act that relates to gas standards.

GPS Objectives

2.4 The Government's overall policy objective for the gas industry is:

> *"To ensure that gas is delivered to existing and new customer in a safe, efficient, fair, reliable, and environmentally sustainable manner."*

2.5 Consistent with this overall objective, the Government is also seeking the following specific outcomes:

> *(a) The facilitation and promotion of the ongoing supply of gas to meet New Zealand's energy needs, by providing access to essential infrastructure and competitive market arrangements;*
>
> *(b) Energy and other resources are used efficiently;*

(c) Barriers to competition in the gas industry are minimised to the long-term benefit of end-users;

(d) Incentives for investment in gas processing facilities, transmission and distribution, energy efficiency and demand-side management are maintained or enhanced;

(e) The full costs of producing and transporting gas are signalled to consumers;

(f) Delivered gas costs and prices are subject to sustained downward pressure;

(g) The quality of gas services and in particular trade-offs between quality and price, as far as possible, reflect customers' preferences;

(h) Risks relating to security of supply, including transport arrangements, are properly and efficiently managed by all parties;

(i) Consistency with the Government's gas safety regime is maintained; and

(j) The gas sector contributes to achieving the Government's climate change objectives by minimising gas losses and promoting demand-side management and energy efficiency.

2.6 The Government is also looking for industry-led solutions. The GPS, at paragraph 9, states that:

> *"The Government expects the industry body to develop and submit to the Minister of Energy for approval proposed arrangements, including regulations and rules where appropriate, providing for effective industry arrangements in the following areas.*
>
> ***Wholesale Markets and Processing***
>
> - *The development of protocols and standards applying to wholesale gas trading, including quality standards, balancing and reconciliation."*

2.7 The language in the GPS tends to reflect that in the Act. However, the phrasing of this item in the GPS differs from the wording in the equivalent item in the Act (the clause in the Act seeks "*protocols and standards for reconciling and balancing gas*"). Thus the GPS introduced a new requirement in the mention of "*quality standards*".

Consultation Requirements

2.8 Before making a recommendation to the Minister, Gas Industry Co is required to follow the procedure specified in section 43N of the Gas Act 1992, which states:

(1) Before making a recommendation to the Minister for a gas governance regulation [or rule]*, the* [Gas Industry Co] *must–*

(a) seek to identify all reasonably practicable options for achieving the objective of the regulation [or rule]*; and*

(b) assess those options by considering–

(i) the benefits and costs of each option; and

(ii) the extent to which the objective would be promoted or achieved by each option; and

(iii) any other matters that the [Gas Industry Co] *considers relevant; and*

(c) ensure that the objective of the regulation is unlikely to be satisfactorily achieved by any reasonably practicable means other than the making of the regulation [or rule] *(for example, by education, information or voluntary compliance); and*

(d) prepare a statement of the proposal for the purpose of consultation under section 43L(1).

(2) The statement of the proposal referred to in subsection (1)(d) must contain–

(a) a detailed statement of the proposal; and

(b) a statement of the reasons for the proposal; and

(c) an assessment of the reasonably practicable options, including the proposal, identified under subsection (1); and

(d) other information that the [Gas Industry Co] *considers relevant.*

(3) The [Gas Industry Co] *is not required to comply with subsection (1) if it is satisfied that the effect of the recommendation is minor and will not adversely affect the interests of any person in any substantial way.*

2.9 The consultation under section 43L(1) requires Gas Industry Co to:

- Consult with persons that the recommending body thinks are representative of the interests of persons likely to be substantially affected by the proposed regulation;
- Give those persons the opportunity to make submissions; and
- Consider those submissions.

2.10 The conclusions reached by the consultants on the current gas standard suggest that no action is required. Although a number of stakeholders did raise issues these were largely split between those that gave a view on the parameters defining the standard and those that had issues with respect to gas being supplied that did not meet the standard. For the first group the views were frequently about widening or narrowing the Wobbe index and, as noted later in this document, the standard is designed to strike a compromise between these conflicting needs. With regard to the second group, concerned with lack of compliance with the standard, this issue is discussed

later in this paper and we recommend that this is an issue best addressed between parties to gas supply agreements.

2.11 Overall, the assessment suggests that no action is required on the part of Gas Industry Co and, therefore, we would expect to be recommending no change to the Standard. Even though this does not appear to fit the framework for consultation outlined above, Gas Industry Co places a high value on providing opportunities for stakeholders to have input. Thus, we are inviting stakeholders to make submissions so as to ensure the recommendation that we do make is soundly based.

3 Review of the Standard for Reticulated Natural Gas

NZS 5442:1999

3.1 The current standard was approved by the Standards Council in November 1999. The standard was prepared by the New Zealand Reticulated Natural Gas Specification Committee for the Standards Council. The committee comprised a wide range of stakeholders including producers, pipeline companies, retailers, industry associations, end-users and the (then) Ministry of Commerce.

3.2 The Foreword to the standard states:

> *"The specification provides limits for gas characteristics and components consistent with safe operation of the existing appliance population. By specifying limits for contaminants it seeks to ensure the integrity of the transportation systems and prevent operating problems for most end users."*

3.3 This revision of the standard provided an extension to cover the introduction of gas from sources in addition to gas from petroleum based origins, in particular landfill gas. It also acknowledged that the previous version of the standard had been based largely on the specification in the original contract for supply of Maui gas (reflecting the fact that Maui had become the main source of reticulated has in New Zealand). The current specification was designed to accommodate gas sourced from other oil and gas fields.

3.4 In discussing the derivation of the various limits the standard makes the point that it is necessarily a compromise:

> *"…a balance must be achieved between optimum gas performance, which requires the narrowest possible combustion limits, and cost of supply which, if possible, requires no limits at all…"*

3.5 Please note that it is not possible for Gas Industry Co to provide copies of NZS 5442:1999 as part of this consultation document. Respondents wishing to examine the specification are invited to either source a copy from Standards New Zealand (www.standards.co.nz) or to borrow one from your local library, if available.

The Current Review

3.6 Attached, as Annex A, is the review of natural gas composition issues undertaken by Plant and Platform Consultants Ltd for Gas Industry Co and the WMWG. The terms of reference for that work are included at the end of the Plant and Platform report.

3.7 The review included stakeholder consultation as well as Plant and Platform's own technical evaluation. In their report Plant and Platform concluded that:

- the specification limits defining NZS 5442:1999 do not need to be changed;

- an in-depth review of the current standard would be both costly and time-consuming and unlikely to be of value as little has changed since the last review in 1999; and

- the issues raised by stakeholders were outside of the scope of the standard itself and were matters more appropriately dealt with in the various contractual relationships.

3.8 The WMWG received and reviewed the Plant and Platform report and recommended to the Gas Industry Co that there was no need to seek any changes to the specification for reticulated natural gas in New Zealand. Gas Industry Co agrees, subject to the responses to this consultation, that NZS 5442:1999 is the appropriate standard for the time being.

3.9 Stakeholders are invited to study the report from Plant and Platform and to provide submissions to Gas Industry Co on the following questions (and to raise any other matters they may consider relevant to natural gas specification).

Q.01 What is your view of Plant and Platform's recommendation that the specification limits listed in Table 2 of NZS 5442:1999 do not need to be changed?

Q.02 What is your view of Plant and Platform's recommendation that there is little value to be obtained by undertaking an in-depth, rigorous review of the specification because it would be a costly and time-consuming exercise for stakeholders?

3.10 Plant and Platform identify three areas that, although outside the scope of the specification, they consider are worthy of further investigation, they are:

- Detection and prevention of out of specification gas from entering the gas transmission system;

- Prevention of step changes to the Wobbe Index for gas delivered to gas turbine and gas engine operators; and

- Identification of swings in the Wobbe Index and the forewarning of gas turbine and gas engine operators.

Q.03 What is your view of the recommendation by Plant and Platform that these are matters best left to the stakeholders concerned and that they have the appropriate commercial incentives to handle these matters most efficiently?

Q.04 If there are any matters you are aware of that have a bearing on the specification for reticulated natural gas and have not been considered by Plant and Platform please detail these together with their effect(s) on stakeholders.

Q.05 Are there any changes that you are aware of, either recently or in the near future, that have not been accounted for in either NZS 5442 or on the report from Plant and Platform? If so, please provide detail on these.

Appendix A: Format for Submissions

To assist the Gas Industry Co in the orderly and efficient consideration of stakeholders' responses, a suggested format for submissions has been prepared. This is drawn from the questions posed throughout the body of this consultation document.

Respondents are also free to include other material in their responses.

Recommended Format for Submissions

QUESTION	COMMENT
Q.01 What is your view of Plant and Platform's recommendation that the specification limits listed in Table 2 of NZS 5442:1999 do not need to be changed?	
Q.02 What is your view of Plant and Platform's recommendation that there is little value to be obtained by undertaking an in-depth, rigorous review of the specification because it would be a costly and time-consuming exercise for stakeholders?	
Q.03 What is your view of the recommendation by Plant and Platform that these are matters best left to the stakeholders concerned and that they have the appropriate commercial incentives to handle these matters most efficiently?	

QUESTION	COMMENT
Q.04 If there are any matters you are aware of that have a bearing on the specification for reticulated natural gas and have not been considered by Plant and Platform please detail these together with their effect(s) on stakeholders.	
Q.05 Are there any changes that you are aware of, either recently or in the near future, that have not been accounted for in either NZS 5442 or on the report from Plant and Platform? If so, please provide detail on these.	
OTHER ISSUES/COMMENTS	
ISSUE DESCRIPTION	**COMMENT**

Annex A: Report by Plant and Platform Consultants Limited

REVIEW OF NEW ZEALAND SPECIFICATION FOR RETICULATED NATURAL GAS - ISSUE DISCOVERY

FIRST STAGE TECHNICAL STUDY

Report Prepared for:

GAS INDUSTRY COMPANY
WELLINGTON

REPORT NUMBER: 9163-R- 001
ISSUE DATE: October 2005

PLANT & PLATFORM Consultants Ltd p +64 6 759 2199 f +64 6 759 1139 www.pandp.co.nz
PO Box 660, 141 Devon Street West, New Plymouth, New Zealand manager@pandp.co.nz

EXECUTIVE SUMMARY

Gas Industry Company Wholesale Market Working Group has requested Plant & Platform Consultants Ltd to carry out the first stage of a review the New Zealand natural gas specification, NZS 5442:1999, to ascertain whether it is adequate for producers, transmitters and end users both large and small. Subject to the findings of this review a further in depth review may be undertaken.

The first stage of the review involved consultation with stakeholders to identify issues they had with the specification. The stakeholders submissions are preliminary and given with the understanding that there will be opportunity at the next stage of the review process, should it be required, for them to present supporting evidence and argument.

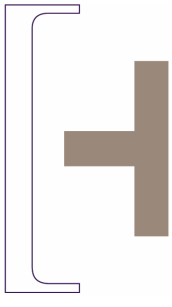
A précis of the issues raised by stakeholders is found in Section 2, along with a brief technical discussion. The full submissions received from the stakeholders are included in Appendices A and B.

Section 3, concludes that NZS 5442:1999 is generally in line with equivalent international specifications.

Section 4 draws conclusions from the stakeholders' submissions and the technical discussion. The principal conclusion being; specification limits listed in Table 2 of NZS 5442:1999 are adequate for gas producers, shippers and consumers.

Section 5 lists the recommendations arising from the study: A summary of these follows:

1. There is little value to be gained by undertaking an in depth, rigorous review of NZS 5442:1999 that would require formal presentation of evidence and argument from the stakeholders. This would be a costly and time consuming exercise and furthermore little has changed since the standard was last reviewed in 1999.
2. The stakeholders raised a number of issues which are outside of the scope of NZS 5442:1999 but are commented upon in Appendix B to the standard. These issues are important and it would be useful to investigate the feasibility and costs associated with:
    - ❖ Detection and prevention of non-specification gas entering the gas transmission system;
    - ❖ Prevention of step changes to the Wobbe Index as various gas suppliers start and cease supply. This is critical for gas delivered to gas turbine and gas engine operators;
    - ❖ Identification and forewarning of swings in Wobbe Index for gas delivered to the gas turbine and gas engine operators.



CONTENTS

APPENDICES

Rev	Date	Description	Prepared By	Checked By	P&P Approved	Client Approved
0	04-09-05	Draft for comment	CPR	OFM	WJH	RL
1	14.10.05	Updated to include Gas Industry Co comments and reissued for comment	CPR	OFM	WJH	RL
2	4-11-05	Draft revision to include Gas Industry Co comments	CRP	OFM	WJH	RL
3	24-11-05	Revision to include Gas Industry Co comments	CRP	OFM	WJH	RL
4	14-12-05	Revision to include Gas Industry Co comments	CRP	OFM	WJH	ID

1.0 INTRODUCTION

1.1 Introduction

Gas Industry Company Limited's (Gas Industry Co) Wholesale Market Working Group has requested Plant & Platform Consultants Ltd (P&P) review the New Zealand (NZ) natural gas specification NZS 5442:1999 to ascertain whether it is adequate for producers, transmitters and end users both large and small.

NZS 5442 was formulated when Maui gas made up a significant proportion of the natural gas supply. Gas Industry Co is required by the Government's Policy Statement on Gas Governance to provide for "the development of protocols and standards applying to wholesale gas trading, including quality standards, balancing and reconciliation". This report aims to identify any issues that exist with the current quality standard and recommend ways of addressing them. A review of the specification is also timely as the Maui gas supply declines and there is a growing diversity of gas suppliers.

The scope of the first-stage review was to identify issues associated with the specification, but not to resolve them. If sufficient or significant issues were identified in the first-stage review, a further in-depth review of the gas specification may be required.

1.2 Stakeholders Surveyed

Discussions were held with the following stakeholders to identify any relevant issues with the natural gas specification NZS 5442.

(i) Gas Producers

- Shell Todd Oil Services Ltd(STOS);
- Swift Energy New Zealand Ltd (SENZ);
- Todd Energy Taranaki Ltd;
- Greymouth Petroleum Ltd, and

(ii) Gas Transmission Companies / Shippers

- NGC New Zealand Ltd;
- Powerco Ltd;
- Contact Energy Ltd, and
- E-Gas Group.

(iii) Gas Distribution Companies / Retailers

- Powerco Ltd;
- Contact Energy Ltd, and
- E-Gas.

(iv) Large and Small Consumers

- Genesis Energy Ltd;
- Ballance AgriNutrients Ltd;
- Taranaki Combined Cycle Power Plant (Contact), and
- E-Gas Group.

(iv) Others

- Energy and Safety Service (ESS) of the Ministry of Economic Development, and
- Gas Association New Zealand.

The stakeholders contacted were asked to identify issues with the gas specification but not to produce detailed analysis, justifications, or reports in support the issues.

1.3 NZS 5442:1999

The specification limits for NZS 5442:1999 are shown in Table 1.

Table 1 NZS 5442:1999 Specification Limits

Characteristics and Components	**Limit**	
Wobbe Index	Minimum	46 MJ/m³
	Maximum	52 MJ/m³
Relative density	Maximum	0.8
Oxygen -medium and low pressure	Maximum	1.0 mol%
-other cases	Maximum	0.1 mol%
Hydrogen	Maximum	0.1 mol%
Hydrogen sulphide	Maximum	5 mg/m³
Total sulphur (as S)	Maximum	50 mg/m³
Water	Maximum	100 mg/m³
Total halogens (as Cl)	Maximum	25 mg/m³
Hydrogen dew point temperature	Maximum	2℃ at 5 MPa
Temperature	Minimum	2℃
	Maximum	40℃

Note:
1. Standard conditions, 15℃ and 101.325 kPa, apply to all gas properties listed in the table except hydrocarbon dewpoint temperature.
2. The limit for total sulphur content includes odorant added.

3. The Wobbe Index and relative density limits imply a calorific value range of 35.2 MJ/m³ to 46.5 MJ/m³.

1.3.2 Commentary on Specification

The following comments are largely extracted from Appendix A of NZS 5442:1999.

(i) Background

NZS 5442:1999 was written to cover methane based gases, in recognition that Maui was soon to cease being the dominant gas supply. More detailed limits on composition would have to be introduced if LPG/air and synthetic natural gas reticulation was contemplated. In order to retain the greatest flexibility of supply no attempt was made to detail the composition of the gas beyond those compounds normally regarded as gas contaminants and which have a harmful effect on the properties of the gas.

The specification limits are generally consistent with overseas practice, and of more particular concern, with those from whom New Zealand obtains gas appliances

(ii) Wobbe Index

Wobbe Index is the number expressed in MJ/m³ produced when the calorific value of the gas is divided by the square root of the relative density of that same gas.

Wobbe Index is a measure of the energy input rate to a burner at a constant pressure and also relates to the capacity of the gas to entrain primary air at the burner nozzle. A change in Wobbe Index will result in a proportional change in the energy output of all gas appliances and equipment supplied, and in the energy carrying capacity of gas pipelines. Refer to NZS 5442:1999, Section A3.1 for further comments.

If the Wobbe Index is too low, flame abnormality, such as lift may occur, refer Figure A1 in NZS 5442:1999. A high Wobbe Index may give rise to unacceptable levels of carbon monoxide. Conventional gas appliances have the ability to handle gas with a Wobbe Index in the range specified in NZS 5442:1999. This is not the case for large commercial and industrial appliances. which are individually adjusted to the available gas for optimum performance and require regular checking and adjustment.

(iii) Inert Gases

The common inert gases nitrogen (N_2) and carbon dioxide (CO_2) have a high relative density with respect to that of methane. Gas containing a high proportion of inert gas tends to have high relative density.

Inert gases are undesirable because they reduce the stabilisation quality of the flame and this directly influences a reduction in the thermal capacity of the flame.

(iv) Oxygen

Oxygen (O_2) limits are imposed to minimise corrosion of steel pipelines.

(v) Hydrogen

A maximum hydrogen limit is imposed because high hydrogen content causes burner light back. Hydrogen is not normally present in natural gas.

(vi) Hydrogen Sulphide

The limitation on the hydrogen sulphide content is necessary because of its offensive odour. Also in the presence of water, hydrogen sulphide may cause corrosion in high tensile steels at high pressure.

(vii) Total Sulphur

Maximum sulphur content is required because there is widespread use of flueless heating in New Zealand and because of an increasing awareness of air quality.

(viii) Water Content

NZS 5442:1999 states that the main concern for water content is the risk of hydrate formation in CNG equipment. Also there is the risk of hydrate formation at pressure reduction stations in the gas distribution network. Natural gas hydrates are compounds formed by methane, ethane, propane and butane molecules being trapped within a lattice formed by water molecules. Hydrates when formed can block valves and lines. The formation of hydrates is promoted by the presence of water, high pressure and low temperature.

(ix) Total Halogens

A maximum halogen limit is required because halogens can be harmful to gas equipment and in the case of unflued appliances to health.

(x) Hydrocarbon Dewpoint

The hydrocarbon dewpoint limits the level of heavy hydrocarbons (C_3 upwards) in the gas. The dewpoint is a concern because at high pressure and low temperature, condensation of heavy hydrocarbons may occur. A gas with a high dew point will have a high content of C_3 upwards components.

When natural gas expands through a pressure reducing valve, it gets colder. This is known as Joule-Thompson cooling. Therefore before gas pressure is reduced it is heated to compensate for this cooling.

(xi) Temperature

The maximum temperature of gas entering gas transmission pipelines is limited to protect the pipelines. The coatings on many of the pipelines are adversely affected by high temperature. Also corrosion and stress corrosion cracking are promoted by higher temperatures.

A minimum temperature of gas entering gas transmission lines is specified to keep the gas temperature above its dewpoint and hence prevents liquid condensing out of the gas in the pipeline or consumer lines. Stress analysis for the pipelines is based on the minimum temperature.

(xii) Combustion Characteristics

The primary objective of the gas specification is to ensure that the gas has suitable combustion characteristics. Wobbe Index has a stronger correlation with good combustion characteristics than does the composition of the gas. The higher hydrocarbons, ethane, propane and butane, have better combustion qualities than methane but must have their content limited to allow transmission through high pressure pipelines. If the content of these components is too high it

will raise the dew point and promote fallout of these components throughout the transmission system.

CO_2 and nitrogen both reduce the stabilisation quality of the flame.

Together with Wobbe Index, a maximum relative density specification will sufficiently describe the combustion characteristics of natural gas.

1.4 Comparison with International Standards

NZS 5442: 1999 was compared with some natural gas specifications currently in use in Australia and California, see Section 3. An extensive comparison with international specifications for reticulated gas is not required at this stage of the review process.

2.0 DISCUSSION

A summary of the issues raised by the stakeholders is presented in Section 2.1. A commentary by P&P on the issues raised is presented in Section 2.2

2.1 List of Issues Identified

The following issues were identified by the companies contacted.

(i) Lower the Wobbe Index.

(ii) Raise the Wobbe Index.

(iii) Lower the dew point for water and hydrocarbon.

(iv) No inert gas limit is required.

(v) Inert gas limit is required.

(vi) Odorised gas in the high pressure transmission system is unsuitable.

(vii) Rate of change in Wobbe is a problem.

(viii) Joint NZ/Australian gas specification is desirable.

(ix) Non-compliance with current specification.

Extracts of the key points made by the various stakeholders are set out below. The full text of the submissions is shown in Appendix A.

Note P&P have not determined the validity of the statements made by stakeholders, but have merely assembled the submissions received.

2.1.1 Lower Wobbe Index (Stakeholder: Gas Producer)

The decline of the Maui gas field will mean that a greater proportion of the gas market will be supplied with gas from Kupe, Pohokura and Kapuni; all fields with a high carbon dioxide content.

Removal of CO_2 by the producer is an energy and capital intensive process, and the costs of this removal will be passed-on to consumers, resulting in higher prices for the consumers for gas and derived products (including electricity).

The energy used removing CO_2 will actually increase total CO_2 emissions. In short - relaxing the Wobbe Index will improve the overall processing energy efficiency.

2.1.2 Raise Wobbe Index (Stakeholder: Gas Producer)

A higher Wobbe Index specification would avoid the necessity to add inert gas to lower the Wobbe Index of some gases produced in Taranaki. This would:

(a) Encourage production and sale of associated gas from smaller fields.

(b) Reduce waste (eg. Burning gas to make inerts and/or generating N_2).

(c) Better fit with the NZ market where there are no ethane sales opportunities (if ethane can be sold it can be extracted to lower the Wobbe Index).

2.1.3 Lower Dew Point for Water and Hydrocarbon (Stakeholder: Gas Distributor)

There have been some serious incidents of liquid drop-out at pressure reducing stations. On one occasion liquid drop-out almost caused a gas-out in the Wellington region due the pressure regulator being blocked with drop-out liquids.

2.1.4 No Inert Gas Limit Required (Stakeholder: Gas Producer)

There is no specified limit for the inerts content of the gas, because it is indirectly limited via other specifications (relative density and Wobbe Index).

A gas producer submitted that they would not like to see inert gas content limits imposed because limiting inert gas content by limiting the maximum relative density allows more flexibility in regard to composition.

2.1.5 Inert Gas Limit Required (Stakeholder: Large Consumer)

The introduction of one or more new limits, e.g. for inerts (N_2 + CO_2), might be required if the current or any new gas specification did not offer sufficient safeguards with respect to the design and operation of very expensive gas turbines.

If NZS 5442:1999 was changed to allow a wider Wobbe Index range, there would be more scope for increasing the proportion of inert gas. Hence a direct limit on inert gas content would be required.

2.1.6 Odorised Gas is Unsuitable as Feedstock(Stakeholder: Large Consumer)

Companies who draw “process” gas from the high pressure transmission system, such as Ballance AgriNutrients Ltd and Methanex NZ Ltd cannot tolerate odorants in the gas. Damage to catalysts has multi-million dollar consequences.

2.1.7 Change in Wobbe Index is a Problem (Stakeholder: Large Consumer)

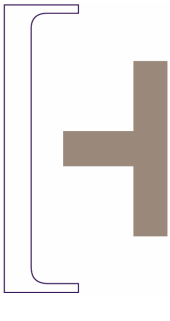
Gas turbines are sensitive to changes in Wobbe Index. Problems range from unstable operation to concerns with emission limits and efficiency. Unstable operation drastically reduces the life of the turbine.

A narrower Wobbe Index range would be preferable.

2.1.8 Joint NZ/Australian Standard is Desirable (Stakeholder: Other, ESS)

Recently joint standard processes between NZ and Australia has gained momentum and given that the types of gas appliances used in the two countries are similar, a pragmatic and efficient approach could be to do a joint natural gas specification with Australia.

The gas specifications are already closely aligned with Australia.



2.1.9 Non-compliance with Current Specification (Stakeholder: Gas Distributor)

The main non-compliance issue is regarding liquids fallout, see Section 2.1.3. One explanation of liquid drop-out problems could be that producers are supplying gas closer to the specification limits than has been the case in the past and / or for some periods outside of the specification limits. Hence there is a case for lowering the dew points for water and hydrocarbon.

2.2 Commentary on Specification Issues

The most important specification criterion is Wobbe Index as this sets the combustion characteristics. A Wobbe Index range combined with a high relative density limit is sufficient to ensure that gas has satisfactory combustion characteristics. All the other specification limits are set to facilitate the transmission of gas or limit harmful affects.

2.2.1 Wobbe Index

Wobbe Index was the main issue for gas producers and operators of gas turbine plant and gas engines.

The issue for the gas producers is the cost of treating a gas to bring the Wobbe Index into the required range. There are gases being produced in Taranaki which, after being dew pointed, yield Wobbe Indices at the extremes of the NZS 5442:1999 Wobbe Index range. Gases which have high CO_2 content require expensive treatment to remove CO_2 and so lift the Wobbe Index into range, while other gases, low in CO_2 content and high in ethane content, require dilution with nitrogen and/or CO_2 to lower the Wobbe Index into range. The provision of inert gas for dilution is wasteful and expensive.

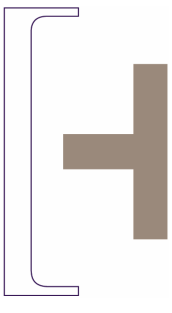
Hence a wider range for Wobbe Index, say 45 to 53, would reduce costs for gas producers. The effects on users of widening the Wobbe Index range are discussed latter in this section.

A specification which allows a higher CO_2 content in gas reduces costs for some gas producers, but it increases costs for the transmission companies. CO_2 also reduces the stabilisation quality of flames and reduces the efficiency of heat transfer from the flame. See Section A4.4 in NZS 5442:1999.

The operators of gas turbine plant and engines were the most concerned with NZS 5442:1999 and any contemplated changes. The economical performance of gas engines and gas turbines depends on the gas fuel having a narrow range of properties; in particular, Wobbe Index. The issue for the operators of gas turbine plant and engines is not so much about the actual value of the Wobbe Index but about it being consistent and varying very slowly over time within a limited range.

Gas turbines can be set up to continuously operate with gas falling within the NZS 5442:1999 Wobbe Index range, but swings in Wobbe Index within the current range seriously decrease the life of turbines, decrease their efficiency and make compliance with atmospheric emissions impossible.

Small swings in Wobbe Index can be reluctantly accommodated as long as the Wobbe Index varies slowly over time and the users are forewarned.



For efficient operation and low atmospheric emissions the gas turbine operators would like a narrower Wobbe Index range. The operators are also interested in the limits that NZS 5442 set on inert gas and total sulphur content.

The issues for gas engine users are similar to those pertaining to gas turbines. Swings in Wobbe Index between the extremes of the specification mean that the engines cannot run at maximum efficiency all the time and maintenance costs are higher.

The issues for furnace / boiler operators are similar to those pertaining to gas turbines. Furnaces / boilers are less damaged by swings in Wobbe Index but suffer the same changes in efficiency and atmospheric emissions.

The Wobbe Index in a gas line can swing from one extreme to the other. For example if there are two major producers flowing gas into a pipeline, one with Wobbe Index 46 and the other 52, and one producer shuts down as the other comes on stream, the Wobbe Index swings through the entire range for Wobbe Index. More commonly if both are producing and one producer shuts down the Wobbe Index will swing from the mid-point to one extreme. Gas flow in pipelines is surprisingly plug flow in nature meaning that a step change in Wobbe Index will transmit along a pipeline with little smoothing of the Wobbe Index profile.

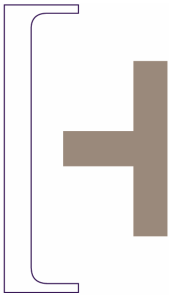
This phenomenon can occur now in the southern pipeline where there are two major producers who produce gas near each extreme of the Wobbe Index range. A similar effect can be seen, although to a lesser extent, in the northern region where Maui and KPS gases are blended. Fortunately there are no gas turbine operators using gas from the southern pipeline.

The Taranaki Combined Cycle (TCC) plant at Stratford blends Maui and TAWN (from SENZ) gas supplies. Given a warning of loss of supply of one or the other of the gas supplies, TCC can smoothly ramp down the proportion of either gas until only one gas is being used.

Managing Wobbe Index and its rate of change is the main challenge for the transmission companies. The gas producers supply NGC with gas flow rate, compositional data from gas chromatographs (GC), Wobbe Index (derived) and relative density (derived). The quantities being transmitted to various branches in the transmission system are measured. Hence the timing of Wobbe Index changes could be estimated at various points in the gas distribution system. Alternatively by installing GC facilities at logistical points in the gas distribution system, say upstream of gas turbine operators, prior notice of Wobbe Index changes could be available for gas turbine operators.

Prevention of step changes in Wobbe Index at reasonable cost is much more difficult. Measures that could be used but which are probably too expensive include:

- A Taranaki ring main in which all gases are mixed, and
- Each gas producer having available, say, 30 minutes temporary supply of gas in high pressure storage from which, either a tapered supply of gas is delivered to ramp the supply to zero, or the supply is maintained because the outage will be of short duration.



2.2.2 Relative Density

Relative density combines with Wobbe Index to set the combustion characteristic and limits the inert gas content. There is no issue with the relative density specification limit.

2.2.3 Hydrocarbon Dewpoint Specification

There is little scope for relaxing this specification while gas is transmitted in high pressure pipelines. A higher dewpoint would increase the likelihood of liquid, mainly butane and propane, condensing out of the gas in the pipeline. On the other hand, there is little evidence of any benefit to be gained to support a tightening of the limit.

There have been few problems with liquids condensing out of the gas in the transmission system and the few that have occurred have been due to the failure of pressure reduction pre-heaters at the delivery points. The heaters used in the gas transmission systems are robust and conservatively designed.

A reduction in the hydrocarbon dewpoint specification would entail more expensive treatment to ensure the gas is within specification limits. Many small fields use Joule-Thompson cooling to obtain the hydrocarbon dewpoint but this method would not work if the dewpoint limit was lowered. In the case of some small fields this additional treatment may mean the development of the field became uneconomic.

2.2.4 Water Content

As detailed above there is little scope for relaxing this specification while gas is transmitted in high pressure pipelines. Higher water content would increase the likelihood of hydrate formation, thereby blocking pressure reducing valves and pipelines. Also higher water content would increase the likelihood of water condensing in the pipelines initiating corrosion and stress corrosion cracking. On the other hand, there is little evidence of any benefit gained to support a tightening of the limit.

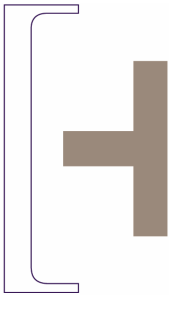
2.2.5 Other Specification Limits

The other specification limits are for O_2, hydrogen, hydrogen sulphide, total sulphur and temperature. There is little scope for relaxing any of these limits and no issues associated with the limits were raised by the stakeholders.

2.2.6 Feedstock Gas

Gas for feedstock is drawn from the Maui gas system, which is unodorised. Currently Maui gas flows north towards Auckland and south to the Kapuni Gas Treatment Plant (KGTP). At Kapuni, Maui gas and gas from KGTP are blended for use by Ballance AgriNutrients Ltd.

In the foreseeable future it is unlikely that the gas in the transmission lines will match the requirements for “process“ gas for Ballance AgriNutrients Ltd because

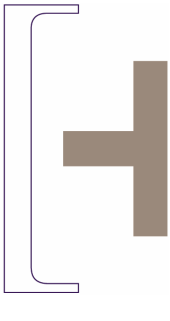


more of the gas being produced has a carbon to hydrogen ratio higher than the stochiometric ratio required for urea production. Ballance AgriNutrients Ltd can continue to use the gas but its efficiency will be decreased. NZS 5442:1999 states that it is not intended to cover methane based gas for feedstock.

Maui gas flowing north is odorised where it flows to branch lines, e.g. Pirongia. Gas from KGTP and Rimu Production Station flows to the gas line south to Wellington and is odorised at source, i.e. KGTP and Rimu Production Station.

2.2.7 Lead-in Time for Specification Changes

A change to NZS 5442:1999, especially to the Wobbe Index, water content or hydrocarbon dewpoint, would require several years for gas producers to implement. The implementation would be expensive and for some gas fields the investment may not be worthwhile. A change must be well heralded as it will affect investment decisions.



3.0 COMPARISON WITH INTERNATIONAL SPECIFICATIONS

The requirements of NZS5442:1999 have been compared with the following international specifications:

- Australia: Alinta, EGP Natural Gas Specification;
- Northern California: PG&E Rule 21, and
- Southern California: SOCALGAS Rule 30.

The key differences between NZS5442:1999 and these specifications are summarised as follows:

(i) Wobbe Index

NZS 5442:1999 Wobbe Index range is typical for reticulated natural gas.

(ii) Relative Density

The above International standards did not specify relative density. It is however an appropriate method of limiting the proportion of inert gas present, because inert gases such as CO_2 or N_2 have relatively high molecular weights.

(iii) Oxygen

NZS 5442:1999 is in general agreement with the international specifications.

(iv) Hydrogen Sulphide

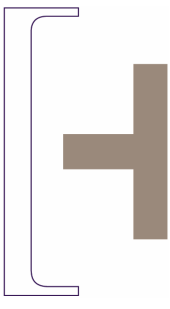
NZS 5442:1999 is in general agreement with the international specifications.

(v) Total Sulphur

NZS 5442:1999 total sulphur limit is higher than the international specifications and up to twice as high in some cases even allowing for the inclusion of mercaptan odorant in the sulphur quantity.

(vi) Water

It is difficult to compare water content specifications without knowing the operating conditions of the transmission system. However NZS 5442:1999 appears to be on the high side.



(viii) Halogens

The international specifications studied did not specify a halogen limit. A halogen limit is only required when the gas is artificially produced such as landfill gas.

(ix) Hydrocarbon Dew Point

It is difficult to compare hydrocarbon dew point specifications without knowing the operating conditions of the transmission system. When the transmission pressure is high, there is potentially greater Joule-Thompson cooling possible at pressure reduction stations. For every pressure drop of 10 barg in natural gas, the Joule-Thompson cooling effect is near 5°C. Gas has a dew point for water and hydrocarbons. When gas is cooled to a dew point, liquid, either water or hydrocarbons start to condense, in the same way as humid air rising into the atmosphere is cooled to its dew point and forms clouds.

A high hydrocarbon dew point means that the gas does not need to be cooled so far to cause liquid to condense out of the gas, hence there is less margin for error at pressure reduction stations. The NZS 5442:1999 hydrocarbon dew point limit appears a little high, when the transmission pressure is near 86 barg. However there have been few problems with liquids condensing in the transmission system and those that have occurred have been the result of heater failure. The heaters used in the gas transmission systems are robust and conservatively designed.

(x) Temperature

NZS 5442:1999 is in general agreement with the international specifications. The temperature limits are appropriate for the coatings used on the exterior of the pipelines in New Zealand.

(xi) Inerts

NZS 5442:1999 does not specify a limit for inert gas content as it is indirectly achieved with the relative density limit and Wobbe Index range. This issue was canvassed in the 1999 review. Commentary on the review is found in Appendix A, Section A.4 of the standard.

Too few international specifications were studied to get a general guideline for inert gas content limitations, but where specified they were in the range 3 to 4% maximum inert content.

4.0 CONCLUSIONS

4.1 Stakeholder Submissions

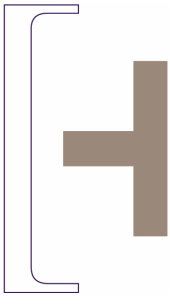
The significant issues raised by the stakeholders were:

- A wider Wobbe Index range would reduce the cost of producing gas to meet the specification.
- A narrower range of Wobbe Index would be preferred by the gas turbine and gas engine operators.
- The rate of change of Wobbe Index is a serious issue for the gas turbine and gas engine operators. They would like to be forewarned of changes to the Wobbe Index.
- While there has been one serious instance of liquid condensing in a transmission line, the gas transmission companies and small consumers, generally have little issue with NZS 5442:1999. A change to the specification would be an issue.
- The management of gas quality entering the gas transmission pipelines from the many suppliers is an issue for the gas transmission companies.
- Changes to NZS 5442:1999 must be well heralded as any significant change could affect investment decisions.

4.2 Commentary

The issues raised by the stakeholders were examined and the following conclusions were drawn:

- The Wobbe Index in conjunction with a relative density limit is the critical specification for determining the combustion characteristics of the gas.
- The current range for the Wobbe Index is in line with overseas reticulated natural gas specifications.
- A wider range for Wobbe Index would increase the risk of large swings in Wobbe Index as suppliers start or cease supplying gas at extreme ends of the Wobbe Index range. Even now, in the worst case, step changes in the Wobbe Index of gas arriving at the consumer from 46 to 52 or vice versa could occur.
- A narrower range for Wobbe Index would significantly increase the cost of production.
- Swings in the value of Wobbe Index should be managed and gas turbine and gas engine operators forewarned. This is especially critical to the economical operation of gas turbines.



5.0 RECOMMENDATIONS

The intent of this first stage review was to identify in broad terms significant issues pertaining to the NZS 5442:1999 specification and the submissions sought from the stakeholders were obtained on this basis.

Subject to this understanding our considered recommendations are:

- The specification limits listed in Table 2 of NZS 5442:1999 do not need to be changed.
- Apart from the issues listed below there is little value to be gained by undertaking an in depth, rigorous review that would costly and a time consuming exercise requiring formal presentation of evidence and argument from the stakeholders
- A number of issues raised by the stakeholders are noted in Appendix B of NZS 5442:1999. These issues are outside of the scope of the standard but it would be useful to investigate the feasibility and costs associated with:
    - ❖ Detection and prevention of out of specification gas from entering the gas transmission system;
    - ❖ Prevention of step changes to the Wobbe Index for gas delivered to gas turbine and gas engine operators;
    - ❖ Identification of swings in the Wobbe Index and the forewarning of gas turbine and gas engine operators.

  The information could then be considered by stakeholders with regard to the costs and benefits and, therefore, the appropriate commercial decisions taken. These arrangements would, however, fall outside of the NZ Standards process and are a matter for the affected stakeholders to address in the first instance.

APPENDICES

Appendix A – Stakeholders Submissions

Appendix B – Terms of Reference

.

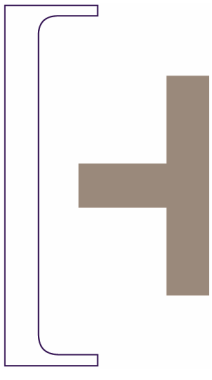
APPENDIX A – STAKEHOLDER SUBMISSIONS

Stakeholder Submissions

1. Shell Todd Oil Services Ltd (STOS)
   Submitter: Andrew Inwood, Senior Process Engineer
2. Swift Energy New Zealand Ltd
   Submitter Chris Bush, Vice-President Facilities
3. Ballance AgriNutrients Ltd
   Len Houwers, General Manager
4. Energy Safety Service - Ministry Of Consumer Affairs
   Submitter Mehdi Yassaie, Principal Technical Adviser
5. Powerco Ltd
   Submitter Dan Hynson, Brian McLaughlan
6. Genesis Energy Ltd
   Submitters David Whitfield, Robert Schinkel, Keith Hopkins
7. Contact Energy
   Submitter Barrie Almond,
8. Todd Energy Taranaki Ltd
   Submitter Winfred Boeren
9. E-Gas Group
   Submitter Syd Hunt
10. Greymouth Petroleum Ltd
    Submitter John Sturgess
11. Gas Association of New Zealand Inc
    Submitter Stephen Parker

Note:

Submissions are reported verbatim. Only minor editing has taken place and no comments have been inserted.



1 Shell Todd Oil Services Ltd (STOS)

There are only two issues that STOS would like to comment on with regards to NZS5442:1999.

Inerts Content:

There is currently no specification on maximum inerts quantity in natural gas, and STOS support this - we would not like to see any limits imposed. The inerts content is indirectly limited via other specifications (relative density and Wobbe Index) and we feel that these are sufficient.

Wobbe Index Specifications

STOS believe that there may be some scope to reduce the minimum limit on Wobbe index below the current of 46.0 MJ/m^3, as well as some benefits from doing this.

The decline of the Maui gas field will mean that a greater proportion of the gas market will be supplied with gas from Kupe, Pohokura and Kapuni; all fields with a high Carbon Dioxide content.

Removal of carbon dioxide by the producer is an energy and capital intensive process, and the costs of this removal will be passed-on to consumers, resulting in higher prices for the consumers for gas and derived products (including electricity).

Secondly, from an environmental perspective, a lower limit on the Wobbe index will have a slight environmental benefit. The carbon dioxide potential of the reserves in these fields is neutral - carbon dioxide can either be removed as part of processing, or carried with the gas and released by the consumers. However, the removal of the CO_2 from the gas stream is energy intensive, so the energy used by this process will actually increase total CO_2 emissions. In short - relaxing the Wobbe index will improve the overall processing energy efficiency.

With New Zealand soon to be a net importer of LPG, relaxing the Wobbe specification would provide an incentive to extract LPG from gas streams. Removal of LPG reduces the Wobbe index, so some producers may find that the LPG must be kept in the gas stream to maintain the gas within the Wobbe specification.

2 Swift Energy New Zealand Ltd

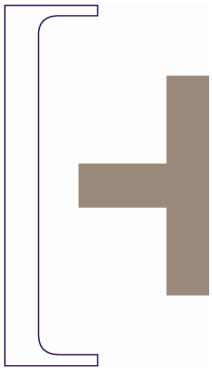
Our main interest is in getting the Wobbe spec increased to 53 maximum (see actual numbers from earlier this year). At this level, Rimu / Kauri gas can go into the pipeline without the need for an expensive IGG operation.

This change is recommended to :

a) Encourage production and sale of associated gas from smaller fields

b) Reduce waste (eg. Burning gas to make inerts! and/or generating N2)

c) Better fit to the NZ market where there are no ethane extraction opportunities



Which ever range we adopt, the biggest issue is the change from one extreme to the other. There is little ability to control this as one field can fill an entire pipeline system and (when it trips or shuts down) the reticulated gas is able to change across the spectrum of the Wobbe range as other gas is substituted into the system at that point.

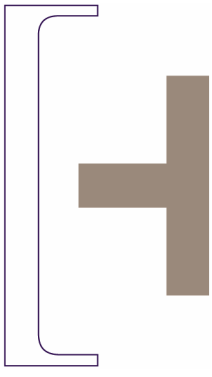
It is interesting to note that the US is heading to a Wobbe spec because of the impact of LNG on their future gas specs. A quick search on Goggle will bring up a lot of submissions / articles. There is one of interest from Shell.

3 Ballance AgriNutrients Ltd

Ballance uses methane based gas for two purposes. One as a chemical feedstock for conversion into Urea, a synthetic nitrogen fertiliser used primarily in agriculture, but also as a feedstock for the production of Urea Formaldehyde resins. The other is as a fuel for both heating processes and as an internal combustion fuel to drive compressors in the manufacture of Urea, as well as a gas turbine to generate electricity. The required of gas specification is different for each application.

I would note that NZS 5442.1999 is not a specification designed for methane based gas for use as chemical feedstock. In fact the specification specifically excludes this application from the standard, instead putting the onus of the specification back on contractual parties to agree on. The Gas Act 1992, which constituted the GAS INDUSTRY CO, also excludes under its application the use of methane based gas for chemical feedstock processes. The reality of a common grid system based around this standard is that we were fortunate that the Maui gas had a composition and consistency that matched our process gas needs. This quality and consistency is not a guarantee in an era where there may be multiple gas sources into a common grid system.

Our process gas specification has a preference for a certain Hydrogen to Carbon ratio that matches the stochiometry of Urea production. A surplus of either Hydrogen or Carbon causes inefficiency and reduced capacity in our process. Maui gas has tended to be higher in hydrogen content relative to our ideal ratio, but we have managed to control this via the blending of a high CO_2 gas stream from Kapuni. More recently as NGC have pushed the limits of the maximum Wobbe Index number we've experienced a surplus of Carbon in our gas stream. We have no ability to rebalance this and consequently the Plant suffers from process inefficiency and reduced capacity. The broader impact is increasing Urea imports into NZ (a balance of payments issue) and wasting a scarce national resource by having to heat a large amount of CO_2 that is then vented to atmosphere. The corresponding parameter in NZS 5442 would be Wobbe Index and given a choice we would like to see the top end of the range lowered from 52 MJ/ M3 to no more than 47 MJ/M3. Lowering the bottom range may also suit some gas fields. Nevertheless we understand that there is a range required for the stable combustion within existing gas burning appliances that may limit the feasibility of this submission, although I note there is a substantial safety margin built into this.



Our process gas is also sensitive to catalyst poisons such as sulphur compounds. We would not want the High Pressure Transmission system to have odorant added to it, even though NZS 5442 allows it, as this would kill our catalyst with multi-million dollar consequences. This would be true also for organisations like Methanex, and possibly the Hydrogen Peroxide Plant at Morrinsville (DuPont?). Again, we try and deal with this issue through terms in our GSA but generally parties are reluctant to agree to an inclusion on a guarantee that no odorant will be added as it is not something they generally control in common grid system if they are not the pipeline operator as well as the wholesale gas supplier, i.e. NGC.

Finally our process is sensitive to rapid changes in gas composition, manifested through CV, as this makes the process control unstable. This risks our asset through potential thermal cycles generated by Plant trips, and Plant instability raises safety risk to people and environment. We currently specify within our GSAs that a CV change of more than 0.5 MJ/ M3 within an hour has to be notified in advance so that we can anticipate it. NZS 5442 does not deal with this, nor does it intend to, as again it points to including this in a contractual arrangements between consenting parties via a GSA.

Fuel gas specifications are generally more robust, and well met by the existing gas spec. However our Gas compressors are generally tuned to a certain gas composition, and don't respond well to rapidly fluctuating CV (composition), with potential for predetonation causing damage to large machines. A similar concern arises for our GT, which also prefers a stable composition.

In summary NZS 5442 is inadequate to meet our concerns and in fact most of our gas is effectively excluded from this spec. The reality also is that the ability of parties to meet our needs is prevented by a common grid pipeline that operates on NZS 5442. We just have to take what we can get. Hope this is useful but I guess I have some doubts as to whether the WMWG will care too much about what we want, particularly if it calls for a tightening of the current spec. Not only is there too much vested interest in the status quo, or loosening it, but also conveniently they can point to all sorts of reference documents including the GAS INDUSTRY CO's own Terms of Reference to exclude our concerns as being outside scope.

4 Energy Safety Service – Ministry of Consumer Affairs

Firstly, the key to gas specification is that the gas supplied must be compatible with the appliances that intend to utilise the gas. Given the international market for gas appliances, the borderline for test gases must be defined with the design of the appliances imported (that constitute the majority of appliances in NZ).

Secondly the review will have to consider the quality in relation to transportation, measurement systems handling of gas.

Both of the above aspects are covered in the gas specification Standard.

Although a study, a few years ago, of the comparison between gas specification in NZ and Australia revealed no major differences, the study was not completed

and it covered only the present gas specifications and did not look into any changes to specs.

Recently joint Standard processes between NZ and Australia has gained momentum and given that the types of gas appliances used in the two countries are similar, a pragmatic and efficient approach could be to do a joint natural gas specification with Australia. Broadening the envelope for test gases to be able to allow a wider range of gas specification would naturally require a study of many types of appliances that would be exposed to the new spec. gases.

Such work would be very costly and would be far more comprehensive if done jointly with Australia rather than only in NZ.

5 Powerco Ltd

Principal concern is with lack of compliance with the existing specification. There have been some serious incidents in the southern line where liquids have been produced at pressure reduction stations. The liquids and gooey material have shut down pressure regulation valves almost causing gas-outs in the Wellington region.

Another affect of liquid fall out that has been observed, is the reduction in odorant level in the gas. It appears that the liquids falling out take with them a large part of the odorant.

Powerco are not willing to contemplate changes to the gas specification before compliance with the current specification is enforced.

6 Genesis Energy Ltd

The Genesis Energy e3p combined cycle power plant presently under construction (based on a 270 MW Mitsubishi M701F3 gas turbine) and the recently completed simple cycle power plant (50MW GE LM6000 gas turbine) both will operate over the entire stable load range using natural gas supplied within the specified limits defined in NZS 5442: 1999. Any contemplated change to the limits stated in this specification could be of considerable concern to the operation of the plant and very stringent emission limits. To determine the sensitivity to incremental changes to gas composition I would need to contact the gas turbine manufacturers, however before I do this I would like to know as this review progresses what changes may possibly be contemplated.

I appreciate you are wanting to identify what may be considered to be more specific issues, however all I could very tentatively nominate at this time would be the limits on Sulphur, Inerts and Wobbe index.

You will see it's quite generic at this stage - basically expressing our concern over any proposed changes and if necessary being able to make a submission on them.

We may wish to suggest the introduction of one or more new limits, e.g. for inerts ($N2 + CO_2$), if we felt the current or any new Spec. did not offer us sufficient safeguards with respect to the design and operation of very expensive plant.

Will the consultant be paying us a visit?

7 Contact Energy Ltd

Without becoming too specific, the issue with gas spec is that the new large gas turbines do not like variations in gas quality. Their optimum operating range is usually fairly narrow so I would not like to see the NZ gas spec any wider….if anything, I would like to see it narrower.

Steam turbine stations like New Plymouth can operate over a much wider spec range so that isn't a concern.

8 Todd Energy Taranaki Ltd

Much of the gas being discovered contains appreciable proportions of carbon dioxide. The removal of carbon dioxide is expensive and could make the development of small gas field uneconomical. For this reason there should be some flexibility with respect to Wobbe Index and inert gas content.

9 E-Gas Group

There are no issues with the current specification

10 Greymouth Petroleum Ltd

Clearly it is good from a gas producer point of view to have as wide a gas specification as possible, enough to make sure that burners work well, but no more.
Also as a gas producer my main concern with NZS 5442:1999 would be that it could be changed, as clearly we have to make investments to get gas to this specification and want to make sure that it is not wasted. Any uncertainty in the rules just adds to the delay in investments and development. The NGC transmission system rules have to be rigidly fixed firm, for say 20 year periods

11 GANZ

Further to our discussions, thank you for contacting the Gas Association of New Zealand Inc on this matter. The following comments I trust you will find useful. The most important point in all of this is to recognise that there is a formal process via the Standards Committee that allows for such reviews.

The Gas Association of NZ (GANZ) represents three groups in the NZ gas industry:-

- Gas transporters – operators of natural gas transmission, distribution and measurement systems;
- Gas retailers - suppliers of reticulated natural gas to residential, commercial and industrial consumer;

- Gas equipment suppliers – importers and manufacturers of gas appliances for both the natural gas and LPG market.

The Standard (NZS 5442) was developed for the reticulated sector of the industry. It does not apply to gas supplied as a feedstock or where a specific contract is agreed between all involved parties.

The Standard provides certainty for the design of the 600 to 700,000 appliances in use by the 250,000 consumers in the natural gas reticulated market. It also applies to the automotive use of natural gas (CNG) but this market has almost disappeared.

The three main purposes of setting a Specification for the reticulated sector are to ensure:-

- that the gas is safe and suitable for use in gas burning appliances;
- that the products of combustion are not toxic or hazardous to health other than the normal combustion products;
- the integrity of the transportation systems is maintained by setting limits for contaminants.

The main aim is to achieve good combustion but gas appliance control equipment comprises metals and materials that are sensitive to some trace elements in methane based gases. The current appliance population includes a significant number of flueless appliances and the toxicity and hazards to health of the products of combustion are an important safety aspect also.

Natural gas transported through distribution systems and supplied to consumers is required to be readily detectable by odorisation. Allowance is made in the Specification for odorants, containing sulphur, to be added. It is recognised that sulphur levels can cause problems for plants using gas as a feedstock, hence the non-application in this sector.

The Specification is based on setting limits to provide a balance between performance and cost of supply. Appliance performance is optimised if narrow combustion limits are set. The cost of supply is lowest if limits are made as wide as possible. In the 1999 version of the Standard the limits are set as wide as is possible for the current appliance population while still maintaining safe combustion.

One aspect that was considered at the last review (in 1999), but not adopted by the committee, was the setting of any controls on the rate of change of components or characteristics. As we move to a supply situation where gas will come from a variety of gas sources there may be an increased likelihood that rates of change could increase. However the pressure for controls from gas turbine and industrial equipment suppliers needs to be carefully compared to cost increases caused by loss of flexibility.

NZS 5442 was first issued as a NZ Standard in 1990 and there were some minor amendments issued in 1993. The Specification which was originally close to the Maui Gas specification was reviewed in some detail in 1999 particularly to recognise the reducing dominance of Maui and partly to accommodate the impact of landfill gases.

Standards are periodically reviewed to ensure currency. Opinions were canvassed last year on the need for any amendment to NZS 5442 and there were no matters of concern raised. If there now is a need to consider any changes these must be managed through the Standards NZ process. As the document is cited in legislation any changes agreed will require ministerial approval.

The committee that developed the 1999 version had wide representation. It comprised producers, wholesalers, transmission and distribution operators, gas retailers, gas appliance suppliers, utilisation engineers, major industrial users, turbine users and Ministry of Commerce (ESS). A similar group should consider any amendments which would be managed by the New Zealand Gas Industry Standards Advisory Group, via Standards New Zealand.

For completeness, and so my members appreciate the comments we have conveyed, this will be copied to them.

Should you, or the GIC, have further questions please do not hesitate to contact me.

Yours sincerely

Stephen Parker

GAS ASSOCIATION OF NEW ZEALAND

APPENDIX B – TERMS OF REFERENCE

Gas Industry Co Wholesale Market Working Group

Terms of Reference

Review of Natural Gas Composition Issues

Objective

- To review whether there are natural gas composition issues and the adequacy of the natural gas specification NZS 5442:1999.

Scope

The scope of the review includes:

- Identifying natural gas composition/quality issues arising from the growing diversity of new supplies.
- Assessing the adequacy of the current gas specification NZS 5442:1999.

The issues to be considered include, but are not limited to:

- Odorisation requirements (including how the odorisation requirement relates to other standards, the Gas Act and other regulations);
- The scope of the specification;
- The characteristics and components of natural gas specified; and
- The means of demonstrating compliance and the adequacy of the current regime in this regard.

Deliverables

A report and recommendations to the Gas Industry Company on significant natural gas composition issues, including the adequacy of the natural gas specification NZS 5442:1999.

Review Stages and Timeline

Draft report to be transmitted to Gas Industry Council in time for distribution prior to Gas Industry Co meeting to be held 18th October 2005.

Stakeholder Consultation

A technical sub-committee of the Group is to work with consultant.

A wider group of stakeholders should be consulted

If a review of the gas specification is proposed a cost-benefit analysis and programme of submissions and consultation will need to be worked out to allow existing producers/consumers an opportunity to advise what impact this may have.