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## Gas Quality Information Protocol

Date issued: August 2014







## **About Gas Industry Co.**

Gas Industry Co is the gas industry body and co-regulator under the Gas Act. Its role is to:

- develop arrangements, including regulations where appropriate, which improve:
  - the operation of gas markets;
  - access to infrastructure; and
  - consumer outcomes;
- develop these arrangements with the principal objective to ensure that gas is delivered to existing and new customers in a safe, efficient, reliable, fair and environmentally sustainable manner; and
- oversee compliance with, and review such arrangements.

Gas Industry Co is required to have regard to the Government's policy objectives for the gas sector, and to report on the achievement of those objectives and on the state of the New Zealand gas industry.

Gas Industry Co's corporate strategy is to 'optimise the contribution of gas to New Zealand'.

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# Executive summary

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Gas quality has three main aspects: gas specification, odourisation and pressure. Gas quality is controlled by parties in the physical supply chain, mainly gas producers and transporters. However, gas wholesalers and retailers also have legal responsibility for the quality of gas they sell, even though they do not themselves own or manage pipelines or facilities connected to pipelines.

## **Legal framework and technical standards that apply to gas quality**

Legal obligations for gas quality are principally set out in the Gas Act, Commerce Act, Consumers Guarantees Act and subsidiary regulation. Specific technical standards for gas specification, odourisation and pressure are prescribed in various New Zealand Standards. These requirements are reflected in the many bilateral contracts between market participants.

Among the legal obligations is a requirement for owner/operators of assets in the physical supply chain, downstream of gas treatment facilities, to implement and maintain safety management systems to identify and manage any hazards that pose a significant risk to people or property.

In addition, the owners of gas transmission systems and gas distribution networks are subject to price-quality regulation which includes requirements for those businesses to publish Asset Management Plans (AMPs). Such plans, together with other information made available under price-quality regulation information disclosure requirements, provide visibility of effective gas quality management and investment.

Gas quality is also governed by technical standards. This protocol provides an overview of both the legal framework and technical standards.

## **Management of gas quality**

All parties in the physical and contractual gas supply chain are interdependent to some extent. For example, gas wholesalers and retailers rely on service providers in the physical supply chain. This protocol describes the actions each party in the gas market will take to manage gas quality and meet its legal obligations.

The performance of parties in the physical supply chain can also affect large numbers of end-users, and gas quality incidents can potentially cause severe economic harm. Information about gas quality can give assurance that gas quality is being effectively managed. The open and effective handling and reporting of gas quality exceptions and incidents, and the availability of information is therefore important to stakeholder confidence. This protocol sets out how possible incidents will be handled and where information about gas quality can be found.

## **Governance of this protocol**

Gas Industry Co is responsible for keeping this protocol up to date.

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# 1

## Introduction

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### 1.1 Purpose

This protocol aims to give gas industry stakeholders an understanding of:

- the legislation relevant to gas quality;
- how gas quality is managed between production station and consumer installations; and
- the availability of information about gas quality.

The protocol originated from the work of gas retailers wishing to ensure that they comply with the Gas (Safety and Measurement) Regulations 2010 (SM Regulations). However, it became clear that it had broader relevance and would require input from all participants in the gas supply chain to show the complete picture of how gas quality is managed. Gas Industry Co agreed to coordinate that input, and will now maintain the protocol and periodically re-issue it in accordance with the governance arrangements set out in Appendix B.

### 1.2 Principles of good industry practice

Maintaining gas quality is central to the safe operation and good reputation of the gas industry. It is an aspect of gas supply where parties in the supply chain rely on each other to perform their legal obligations and to follow good industry practice. For example, each gas retailer<sup>1</sup> relies on the services of participants in the physical gas supply chain – gas producers, gas transporters, and gas measurement system owners – to manage the quality of gas.

In respect of gas quality, the principles of good industry practice are that:

- there will be no secrecy of any gas quality incidents<sup>2</sup> and exceptions<sup>3</sup> that occur;
- where an aspect of gas quality (specification, odourisation, or pressure) is, or is expected to be, outside agreed limits, parties will:
  - promptly notify each other of the situation; and

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<sup>1</sup> A gas retailer is generally also a 'shipper', ie a party who holds a contract for transporting gas. In this document we use the term that is most applicable to the context, but the reader should be aware that normally a gas retailer is also a shipper.

<sup>2</sup> An 'incident' is defined in schedule 16 of Gas Transmission Information Disclosure Determination 2012 (Decision No. NZCC 24) as '...any event, including a near miss, that has the potential to impact on the delivery of gas transmission services or the operations of the GTB.'

<sup>3</sup> An 'exception' is where the product deviates from one or more elements of an agreed specification.



- work together to minimise the risks to people and property.
- service providers will make available to gas wholesalers and retailers all information relating to gas quality that the wholesalers and retailers reasonably need to demonstrate that they are complying with their legal obligations.

### **1.3 Content**

This protocol:

- gives an overview of gas quality arrangements (Chapter 2);
- describes the legal requirements for gas quality (Chapter 3);
- describes the technical standards for gas quality (Chapter 4);
- describes the main obligations on market participants and means of complying with those obligations (Chapter 5);
- describes how gas quality exceptions and incidents are handled (Chapter 6);
- identifies what information is relevant to gas quality, who provides it, and where it can be found (Chapter 7); and
- establishes governance arrangements for the on-going review and update of the protocol (Appendix B).

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# 2

## Overview of gas quality arrangements

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In this paper 'gas quality' describes:

- the composition of gas, including compounds added to gas to make leaks detectable (odorant);
- any contaminants in the gas such as dust or oil; and
- the pressure the gas is delivered at.

Gas composition is primarily determined by the operation of gas treatment facilities, prior to injecting gas into the transmission pipeline. Generally such gas treatment is under the control of gas producers. Other changes to gas composition will result from the addition of odorant at some transmission pipeline receipt and delivery points.

Gas can be contaminated by oil or dust in the transmission system, and contamination by dust in the distribution networks.

End users are supplied with gas at a set pressure, controlled by gas regulators in a Gas Measurement System (GMS). Proper operation of a GMS relies on adequate pressure in the distribution network supplying it.

These arrangements are described more fully below.

### 2.1 Prior to injection into a transmission system

The processing of wellhead products to a gas specification that meets the New Zealand standard (see section 4.1) generally involves oil and condensate removal, water removal, separation of LPGs and, if necessary, the removal of sulphur and carbon dioxide. Sand and other particles are also removed by scrubbers, and heaters warm the gas to prevent hydrate<sup>4</sup> formation. Additional liquid separators and filters may also be installed at gas treatment facilities to further reduce the amount of contaminants passing into the gas transmission system<sup>5</sup>.

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<sup>4</sup> Hydrates are solid or semi-solid compounds of methane and water, resembling ice crystals that can block valves, regulators and instrument sensor lines.

<sup>5</sup> Under normal operating conditions a small quantity of oil is expected to enter the pipeline. Applying the limit suggested in the gas specification, up to 20 litres of oil carry over from compressor stations is acceptable for every petajoule of gas entering the pipeline. At least 150PJ of gas is transported each year, so it is permissible for around 3,000 litres of oil to enter the pipelines each year.

The characteristics of wellhead products can vary considerably between fields. For example the Pohokura field produces a highly volatile light hydrocarbon condensate liquid, while the Kupe field produces a high wax content oil that is 'firm' at low ambient temperatures. The scale and economics of different fields can also vary considerably so that, although they all have the same treatment objectives, the detail, scale, and reliability of gas processing can be quite different.

In addition, gas entering most pipelines has odorant added to it to improve its detectability. Exceptions are gas entering the Maui pipeline and Vector's Frankley Road pipeline. Both these pipelines carry only unodorised gas<sup>6</sup>. For gas entering other pipelines, odorant is added at the various locations where gas is injected. This includes interconnection points (other than Frankley Road) where gas leaves the Maui pipeline and enters the Vector pipelines, and production station treatment plants that are directly connected with Vector pipelines.

[Map showing the location of odorisation plants]

## **2.2 Prior to injection into a distribution system**

Once gas has entered the transmission pipeline it may mix with gas from other sources. So the composition of delivered gas can be affected by the extent of co-mingling.

Also, while gas is in the transmission pipeline, contaminants can enter into the gas stream in the form of dust accumulated in the pipeline<sup>7</sup> and oil from compressor stations, adding to any contaminants that may have been introduced from production stations. Dust and oil can be carried by gas as it is transported through the pipeline but filters and separators installed at delivery points are designed to remove most of these contaminants.

The operators of distribution systems rely on odorised gas being delivered into the distribution network. Physically, the odorant will be added by Vector, either at transmission pipeline receipt points or, where a transmission pipeline is required to contain unodorised gas (the Maui pipeline and Vector's Frankley Road pipeline), at the delivery point.

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<sup>6</sup> Both the Maui and Frankley Road pipelines supply petrochemical plants, and the sulphur compounds in odorant can contaminate catalysts where gas is used as a feedstock (rather than as a fuel). These plants prefer to receive unodorised gas, and have their own plant safety regimes.

<sup>7</sup> A 'black powder' dust can form in a pipeline as a result of a chemical reaction between the iron in the steel and the hydrogen sulphide in the gas, forming iron sulphide.

Section 3 of Vector's transmission system AMP contains helpful descriptions of its role as provider of odourisation services:

Under the Gas (Safety and Measurement) Regulations 2010 the legal obligations for gas odourisation are placed with the gas distribution network owners and gas retailers. Vector gas transmission provides gas odourisation services to gas distributors and retailers by odourising the gas in the transmission system. Odorant levels are regularly monitored at selected locations on the gas transmission system and gas distribution network to ensure satisfactory odorant levels are being maintained.

Gas transmitted through the Maui pipeline and the Vector 300line (Frankley Road Interchange with the Maui pipeline to Kapuni Gas Treatment Plant (KGTP)) is unodorised. Gas transmitted through all other pipelines is odorised. Vector odorises gas using electronic pumped odorant injection systems supported by bulk odorant storage tanks at KGTP and the major receipt points from the Maui pipeline, Rotowaro Compressor Station, Pokuru Compressor Station and Pirongia. Origin Energy Limited odorises gas before it enters the Vector assets at Mokoia receipt point. All pumped odourisation systems are monitored by the SCADA system. Some pumped odourisation plants incorporate two or more pumped systems to provide operational n-1 redundancy. Pumped systems operate by measuring gas flow and injecting proportional quantities of odorant into the gas stream to meet prescribed levels.

Minor receipt points along the Maui pipeline are installed with mobile bypass odorant vessels in which odorant is proportionally entrained into the gas stream using an orifice plate pressure differential.

Vector currently imports bulk supplies of gas odorant chemicals and distributes this to the bulk odorant tanks and re-fills rotatable mobile bypass odorant vessels.

Pumped odourisation plants comprise of a number of components including:

- Odorant pump(s)
- Electronic control unit(s)
- Odorant tank.

Mobile bypass odorant plants are self-contained units. The number and age of odourisation plans is listed in Section 3.11 – Number and ages of asset classes. The ages of odourisation plants are based on the age of the odorant tank. Some components may be of different ages due to their individual replacement or renewal.

[Vector Gas Transmission Asset Management Plan, 2013 – 2023, Section 3.4.4]

In respect of transmission systems delivery pressures, these are a function of many factors including inlet pressures, the length and diameter of the pipelines, and the balance between injection and withdrawal quantities.

## 2.3 Prior to delivery to a gas user

Contaminants such as dust can be introduced to gas within a distribution network as a result of pipeline and station maintenance and construction. However, it is very unlikely that liquid contaminants such as oil would be introduced within the distribution network because these networks have no compressors. Similarly, it is very unlikely that black powder dust will form in any significant quantities because the pipelines are mainly polyethylene, and operate at much lower pressures than transmission pipelines.

Distribution Network Owners (NOs) rely on gas delivered into their systems being adequately odourised, but are required to also have arrangements in place for testing the level of odourant concentration in their networks, and dealing with odourant incidents and exceptions (often referred to as 'odourant fade' or 'odourant masking').

NOs also rely on pressure in the transmission pipeline being sufficient to allow gas to be delivered into their networks at stable pressures (generally set somewhere between 4 Bar and 20 Bar). Larger distribution networks tend to have a number of pressure tiers. For example a steel ring main may feed lower pressure polyethylene (PE) networks. In this case the NO will maintain 'district regulator stations' to control the pressure into each tier.

Each end-user will be supplied from a GMS that includes one or more pressure regulators. To provide a stable delivery pressure, the GMS regulators rely on adequate upstream pressure in the distribution network.

Note that while owners/operators of GMS are responsible for the maintenance of the GMS, meter reading is generally the responsibility of the gas retailer. Larger stations generally have telemetry, allowing flows, pressures and temperatures to be monitored remotely.

# 3

## Legal framework for gas quality

The primary pieces of legislation relevant to Gas Quality are:

- the Gas Act 1992 (Gas Act) and associated regulations;
- the Commerce Act 1986 (Commerce Act) and associated Commerce Commission decisions; and
- the Consumer Guarantees Act 1993 (CGA).

Figure 1 provides a road map for the discussion of these acts, subsidiary legislation, contracts and related standards in this chapter.

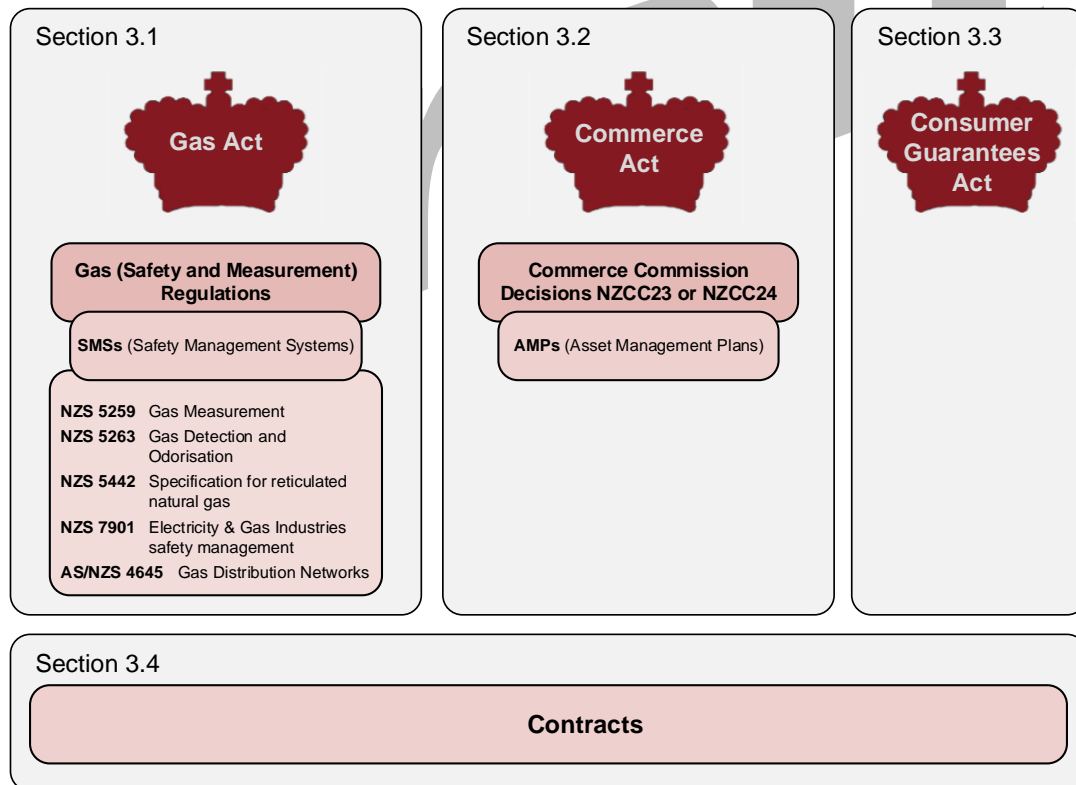


Figure 1 – Road map for discussion on documents most relevant to gas quality

### 3.1 Gas Act 1992

Gas quality is governed by regulations and standards under the Gas Act. Of particular relevance is Section 46A of the Gas Act which requires that every person that owns or operates a gas supply system<sup>8</sup> must implement and maintain a safety management system (SMS) that allows for all practicable steps to prevent the gas supply system from presenting a significant risk of:

- serious harm to any member of the public; or
- significant damage to property owned by a person other than the person that owns or operates the gas supply system.

The more detailed requirements for an SMS, are set out in the SM Regulations, issued under sections 54 of the Gas Act, which also set requirements and responsibilities for gas specification, odourisation and pressure.

#### SM Regulations

##### Safety management systems (SM Regulations 30-40)<sup>9</sup>

SM Regulation 30 provides that every transmission system owner and operator (TSO), distribution network owner and operator (NO), gas measurement system owner and operator (GMSO), and owner of equipment forming part of a system for conveying more than 10 terajoules of gas a year must implement and maintain an audited SMS. Regulations 30 to 40 set out requirements of an SMS and related matters. Essentially an SMS deals with:

- the identification of hazards associated with the gas supply system;
- the assessment of the scope and magnitude of each hazard;
- the steps that must be taken to eliminate, isolate, or minimise hazards;
- the investigation of accidents; and
- an audit programme.

Regulations 35 requires that an SMS is audited at least once every 5 years by an accredited auditor to confirm:

1. the SMS complies with NZS 7901, or Regulations 33 and 34;
2. the SMS operator is implementing and

#### **NZS 7901:2008**

#### ***Electricity and gas industries - Safety management systems for public safety***

*This standard has been developed by the New Zealand Electricity and Gas supply industries in response to changes in legislation that requires all power generation, transmission and distribution companies to implement and maintain a SMS for public safety. In the case of gas the legislative requirement is detailed in the SM Regulations.*

<sup>8</sup> Section 46A of the Gas Act defines a "gas supply system" as "...distribution systems, gas installations, fittings, and gas appliances that form part of a system for conveying gas to consumers."

<sup>9</sup> The SM regulations offer alternative provision depending on whether a distribution system is covered by an audited safety management system (Regulations 30-40) or not (Regulations 24-28). However owners of all open access distribution systems are covered by audited safety management systems, so only Regulations 30-40 are considered here.

maintaining the SMS as written; and

3. the effect of the SMS is that all practicable steps are taken to prevent the gas supply system from presenting a significant risk of serious harm to any member of the public or significant damage to property owned by a person other than the SMS operator.

The SMS operator must make a statutory declaration to the Secretary of Energy, at least once every 5 years, that it has an audit certificate that is still in force.

#### **Gas specification (SM Regulation 41)**

Regulation 41 requires that all reticulated natural gas must comply with the NZ Standard 5442: 2008 (gas specification), and that gas supplied to end users is suitable and safe for use.

Responsibility for ensuring the gas complies with the gas specification lies with the retailer or wholesaler supplying gas to the end user's point of supply (Regulation 41(4)). Failure to meet this obligation is a 'grade A offence' (Regulation 41(5)), which would expose the company responsible to a fine not exceeding \$50,000 (Regulation 41(6)).

#### **NZS 5442:2008 Specification for reticulated natural gas**

*This standard sets out the requirements for providing a gas suitable for transportation and end use, and proposes reasonable test frequencies*

*Further details are provided in Chapter 4: Technical Standards for Gas*

#### **Odourisation (SM Regulations 16-19)**

Regulation 16 requires that gas entering, leaving and within a distribution system is odourised and complies with Part 2 of NZS 5263. This is to give the gas a distinctive and unpleasant odour so that leaks are readily detectable. The regulation does not apply to gas in a transmission system, or supplied to large customers connected to the transmission system with alternative means of detection.

Regulation 17 makes every NO responsible for gas entering and within the distribution system being odourised. The gas retailer is responsible for gas being odourised at an end user's point of supply. In the case of odourised gas supplied directly from a Vector pipeline to an end user, it is generally the wholesaler<sup>10</sup> who is responsible.

#### **NZS 5263:2003 Gas detection and odourisation**

*This standard aims to ensure that persons are warned of the presence of escaping gas well before gas concentrations in the atmosphere reach levels capable of causing a hazard. It specifies minimum odorant concentrations in gas requirements for olfactory tests.*

*Further details are provided in Chapter 4: Technical Standards for Gas Quality*

Regulation 18 requires that the odorant selected should not damage the integrity of the distribution system, installations, fittings or appliances.

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<sup>10</sup> Section 2(1) of the Gas Act provides that a gas wholesaler is Vector, and anyone who supplies gas for resupply.



Regulation 19 requires every NO to have documentation demonstrating that:

- gas in the system is odourised;
- quality assurance and emergency procedures are in place; and
- testing is done by a competent person.

Also, gas retailers and wholesalers must have documentation to demonstrate that their obligations under regulation 16 and 18 are met (ie that the gas they supplied was odourised with a suitable odorant).

### **Pressure (SM Regulations 42)**

Regulation 42 provides that every gas wholesaler and retailer is responsible for ensuring that that gas it supplies at a consumer's point of supply is at a pressure that ensures its safe use.

AS/NZS 4645 contains provisions relating to:

- pressure control (s4.7), including determination of the Maximum Allowable Operating Pressure (MAOP), and design of overpressure protection systems;
- pressure testing (s5.5); and
- emergency response (s9.2.1).

NZS 5259, is principally focused on measurement accuracy, including provisions relating to:

- pressure measurement devices (s1.2.2.4, s1.2.2.6, s2.2.6, s2.5.3.6 & Appendix A);
- pressure measurement (s2.2.3); and
- inspections (s2.5.3.3).

#### **AS/NZS 4645:2008 Gas Distribution Networks**

*This standard requires that risk assessment will be undertaken in accordance with AS/NZS ISO 31000 and controls established to reduce any risk above the acceptable risk level.*

*Further details are provided in Chapter 4: Technical Standards for Gas Quality*

#### **NZS 5259:2004 Gas Measurement**

*This standard provides performance-based requirements for gas measurement that are useful, measurable and repeatable.*

*Further details are provided in Chapter 4: Technical Standards for Gas Quality*

## **3.2 The Commerce Act 1986**

In 2008 a new Part 4 of the Commerce Act was introduced. The purpose of Part 4 is to promote the long-term benefit of consumers in markets where there is little or no competition and little or no likelihood of a substantial increase in competition. In particular, it provides for the regulation of the price and quality of goods or services in such markets, including the market for gas pipeline services, both transmission and distribution.

Part 4 requires the Commerce Commission to set default price-quality paths and information disclosure requirements for regulated businesses, including the disclosure of Asset Management Plans (AMPs). One of the objectives of price-quality regulation is to ensure that the regulated firms have incentives to improve efficiency and provide services at a quality that reflects consumer demands.

### **Price-quality regulation**

From 1 July 2013, price-quality regulation was introduced for the transmission systems of MDL and Vector, and the distribution systems of GasNet, Powerco, and Vector.

Currently gas quality does not feature as one of the quality standards required by price-quality regulation<sup>11</sup>, but it is possible that future quality standards could include gas quality. The Commerce Commission's paper *Initial Default Price Quality Path for Gas Pipeline Businesses – Issues Paper, 12 April 2010*, noted that metrics related to reliability, system integrity, quality of gas, and customer service could all be useful. In particular, it noted that issues of gas quality may be relevant to the setting of the price-quality regulation. However, the initial price-quality determination only has one quality measure: emergency response times.

### **Information disclosure**

Commerce Commission Decision NZCC 23 sets out the information disclosure requirements for gas distribution businesses, and Decision NZCC 24 sets out the information disclosure requirements for gas transmission businesses. Both decisions are dated 1 October 2012. The required disclosures are the minimum packages of information the Commerce Commission considers that an interested person will need to determine whether the purpose of Part 4 is being met. Of particular relevance to gas quality is a requirement for these businesses to disclose AMPs.

### **Asset Management Plans**

AMPs set out the TSO's or NO's view of the on-going investment, maintenance and operational requirements of its system. Although an AMP is forward looking, it contains statistics on risk factors such as the history of reported gas escapes, interruptions, 3rd party damage incidents etc. in accordance with the mandatory disclosure requirements of NZCC 23 and NZCC 24.<sup>12</sup>

## **3.3 Consumer Guarantees Act 1993**

The CGA potentially adds to the obligations on industry participants already arising from the Gas Act and Commerce Act described in sections 3.1 and 3.2.

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<sup>11</sup> The Commerce Commission considers reliability the most important measure of the level of service that suppliers provide to consumers. However, in the absence of data to establish robust reliability targets, its current quality standards relate only to emergency response times: 180 minutes or less to respond to an emergency; and 60 minutes or less to respond to 80% of emergencies.

<sup>12</sup> Disclosures required under NZCC 23 and NZCC 24 relate to the promotion of the long-term benefit of consumers, and currently they do not require disclosure of all information relating to the risks identified by SMSs. For example, there is currently no requirement on TSOs or NOs to disclose the number of incidents of non-specification gas entering a pipeline, although this should be an important concern to consumers.

Under the CGA, consumer<sup>13</sup> rights are expressed as a series of 'guarantees' that a seller automatically makes when a consumer buys goods or services. Amendments to the CGA in 2003 provide for the supply of gas to be included as a good and a contract for the supply of gas to be included as a service. As a result, the sale of gas to consumers must comply with the guarantees. For example, sale of gas to consumers must comply with the 'acceptable quality' guarantee in the CGA.

A further revision to the CGA in 2013 introduced section 7A, clarifying what the guarantee of acceptable quality is in relation to the supply of gas and electricity, and section 7B, describing the relationship of section 7A with rest of CGA.

Basically, there is a guarantee that the supply of gas by a gas retailer is of an acceptable quality, ie as safe as a reasonable consumer would expect it to be and can be used consistently for the things that a reasonable consumer would expect to use it for. Section 7A(3) notes that a reasonable consumer would expect that:

- the supply may be affected by emergencies, or other events or circumstances, outside the control of the retailer or any other person involved in the supply;
- it may be interrupted for safety, maintenance, or other technical reasons;
- the quality of gas may fluctuate, but fluctuations are acceptable only within tolerances permitted by the SM Regulations; and
- the reliability and quality of the supply may vary with location and price.

Where any defects of reliability or quality have been specifically drawn to the consumer's attention before he or she agreed to the supply, then the goods will not fail to comply with the guarantee as to acceptable quality by reason only of those defects. If gas doesn't comply, consumers could have a right of redress against the supplier (that is, the retailer) and against the manufacturer (that is, the producer).

Whether consumers have a right to redress for poor quality gas under the CGA will be determined case by case. Acceptable quality is a context-specific guarantee. It is unlikely consumers have a right to redress in all circumstances where they are affected by gas supply issues. However, supply contracts cannot remove the protection provided to consumers under the CGA.

Note that if a court grants a right to redress, it will only apply to the consumer—it would not, for example, give a right of redress to a retailer or NO against a producer.

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<sup>13</sup> 'Consumer' under the CGA means a person who (a) acquires from a supplier goods or services of a kind ordinarily acquired for personal, domestic, or household use or consumption; and (b) does not acquire the goods and services, or hold himself or herself out as acquiring the goods or services, for the purpose of (i) resupplying them in trade; or (ii) consuming them in the course of process of production or manufacture; or (iii) in the case of goods, repairing or treating in trade other goods or fixtures on land. The CGA does not apply to business transactions.

### 3.4 Contracts with provisions relating to gas quality

Contracts do not displace the legislative requirements or any associated criminal liability. However, they can allocate responsibilities for the work/costs of meeting those requirements, and may allocate civil liability.

Contracts related to buying, selling and transporting gas invariably have provisions relating to gas quality. In general, the legislative requirement is for a party selling gas to be responsible for the specification of the product it sells. However, where that party is not in direct control of the gas specification, it will contract with service providers to ensure that the specification is met. Quality provisions in such service contracts may also address a range of related matters such as:

- equipment specification;
- equipment and product testing;
- rights to witness tests;
- notification of test results;
- product monitoring;
- notification of non-specification product;
- liability for non-specification product; and so on.

The major contracts are illustrated in Figure 2 and described below.

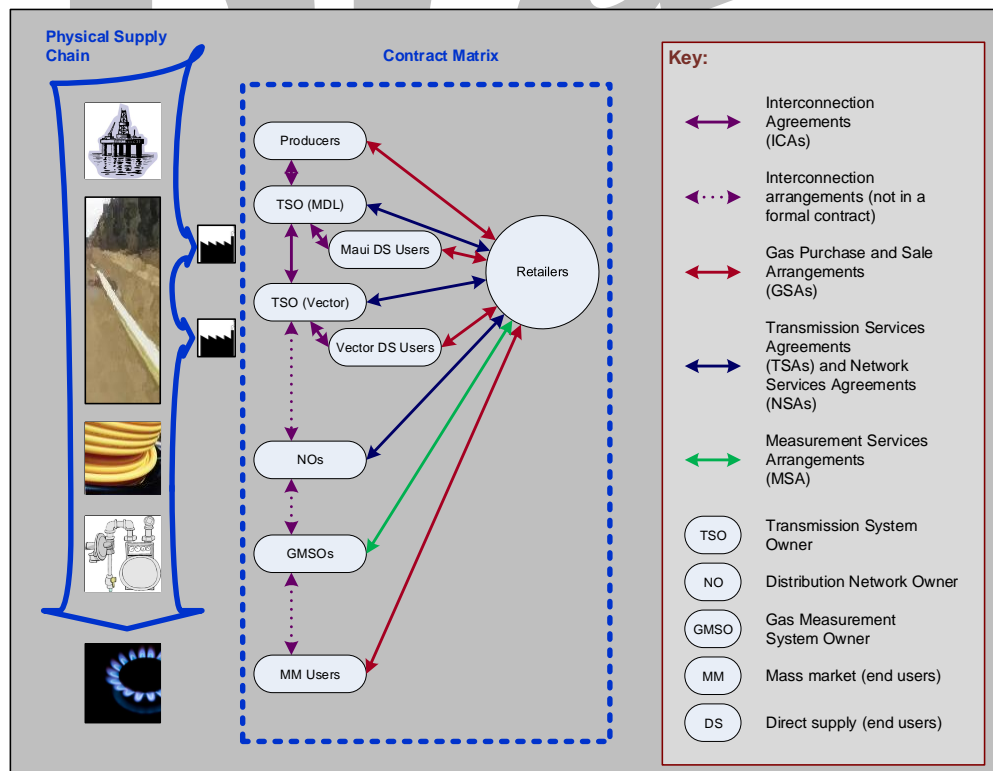


Figure 2 – contracts with significant gas quality provisions

## Interconnection agreements (ICAs)

ICAs are contracts between the owners of interconnecting assets, such as gas treatment facilities, and transmission pipelines. ICAs are not always formally recorded in written contracts<sup>14</sup>. All transmission receipt points have associated ICAs, but some transmission delivery points do not.

Under both the MDL and Vector ICAs, it is the injecting party who is responsible for monitoring and ensuring gas quality.<sup>15</sup>

Both MDL's and Vector's ICAs stipulate minimum frequencies for monitoring gas components. They also allow that less frequent testing may be carried out if:

- the facility is designed and operated to prevent a component exceeding the gas specification limit; or
- if the Producer is reasonably able to demonstrate that components (such as hydrogen sulphide, total sulphur, oxygen and halogens) are not expected to be present, providing that the test frequencies still comply with the gas specification.

## Maui pipeline ICAs

The multi-lateral terms of interconnection with the Maui pipeline are included in the MPOC.

The MPOC requires each direct injecting party to ensure injected gas complies with, and is monitored in accordance with, the gas specification. The injecting party is also required to ensure the same obligations apply to any indirect injecting party<sup>16</sup>.

Injecting parties are required to notify MDL of any non-specification gas, and MDL is in turn required to notify other affected parties. Section 17 of the MPOC requires direct injecting parties to monitor gas quality as shown in Table 6.

If an injecting party injects non-specification gas or fails to meet the monitoring requirements, that party is exposed to potential liability claims. Injecting parties indemnify MDL for any losses incurred as a result of non-specification gas injections. MDL indemnifies other pipeline users for losses they incur as a result of non-specification gas being injected.

Parties are not liable if they performed their contractual obligations to a Reasonable and Prudent Operator (RPO) standard. Liability is capped and limited to direct losses and any damages made or money paid to a third party.

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<sup>14</sup> For example there are generally no documented ICAs between TSOs and NOs at gas gates supplying distribution networks, or between the NOs and the GMSOs, or between GMSOs and end-users.

<sup>15</sup> Although both TSOs monitor aspects of gas quality in order to determine the energy content of the gas.

<sup>16</sup> Section 17.1 of the MPOC defines a 'Direct Injecting Party' as a party who injects gas into the Maui Pipeline directly from a gas production or processing facility. An Indirect Injecting Party is a party who injects gas into a transmission pipeline which then flows into the Maui Pipeline.

## **Vector pipeline ICAs**

Section 12 of the Vector Transmission Code (VTC) stipulates that ICAs must require injecting parties to:

- comply with the gas specification;
- demonstrate that facilities, systems, and procedures comply with obligations to inject only specification gas; and
- notify Vector of any injection of non-specification gas (Vector in turn must notify other affected parties).

Vector is not obliged to monitor gas quality.

### Vector Receipt Point ICAs

Under a receipt point ICA, injecting parties must:

- comply with the gas specification;
- demonstrate that facilities, systems, and procedures comply with obligations to inject only specification gas;
- terminate the flow of non-specification gas if it is detected; and
- use reasonable endeavours to avoid step changes to gas composition.

If Vector suspects that gas being supplied is non-specification, the interconnected party must promptly investigate. If the gas is non-compliant, Vector must terminate flow.

The receipt point ICA specifies the frequency with which a party must monitor gas quality. The frequency of monitoring is the same as that required by the MPOC. The ICA also requires continuous monitoring of temperature.

Vector is not obliged to monitor gas quality at receipt points but may request gas monitoring data from the interconnecting party.

### Vector Delivery Point ICAs

Under its Delivery Point ICA, Vector is not required to monitor gas quality and is not liable to the interconnected party for any non-specification gas delivered (although in certain circumstances it may have liability for dust or oil contamination).

Written ICAs with interconnected distribution networks are not normally in place, but customary arrangements exist (ie largely unwritten understandings about the rights and obligations of the parties).

### **Transmission Services Agreements (TSAs)**

The multilateral provisions of TSAs are set out in the MPOC and VTC, which apply to users of the open access gas transmission pipelines. Broadly, Section 17 of the MPOC provides that:

- Injecting parties will ensure all gas complies with the gas specification and monitor all such gas to demonstrate compliance; and
- Injecting parties that detect or suspect that non-specification gas is flowing, or is likely to flow, will notify MDL as soon as reasonably practical, and MDL will notify all other parties accordingly.

Section 12 of the VTC provides that:

- Vector Transmission is not required to monitor the quality of gas entering the pipeline;
- Vector will ensure any Interconnection Agreement (ICA) requires that all gas injected into the pipeline complies with the gas specification;
- Vector may require any party to demonstrate that it has adequate facilities, systems and procedures to ensure it is able to comply with its obligation to inject gas to specification;
- at a shipper's request, Vector may ask a party who injects gas to demonstrate it has adequate facilities, systems and processes in place;
- if non-specification gas enters the pipeline Vector is unlikely to be able to prevent it from reaching a Delivery Point; and
- as soon as Vector or a shipper suspects that non-specification gas is flowing, it must notify the other party.

In addition, in respect of odorisation, Section 13 of the VTC provides that:

- Vector may begin or cease to odorise gas entering a pipeline if all shippers using the pipeline request a change;
- where gas in a pipeline is odorised, Vector will inject enough odorant that in normal circumstances will ensure that the gas delivered from downstream distribution networks complies with NZS 5263;
- Vector will check odorant levels in its transmission pipelines from time to time and notify shippers of any problems; and

- Vector will not be liable for the loss of odorant.

Retailers are generally the counterparties to transport agreements, as illustrated in Figure 2. However, there is no reason why end users (either 'direct supply' end users, directly connected to the transmission pipelines, or 'mass market' end users, connected to a distribution network) cannot contract for the unbundled elements of their own supply arrangements.

### **Network service agreements**

Three NOs offer open access to their distribution networks: Vector, Powerco, and GasNet. NSAs generally provide that only specification gas is transported through the network. Powerco and GasNet NSAs provide for non-specification gas to be transported if all retailers agree and the requesting retailer indemnifies the NO against claims from others.

The NO may shut off injection points where the gas supplied is non-specification. The exception is if an agreement has been reached for the transport of non-specification gas and the gas is safe to use.

Liability is limited to direct losses or damage to physical property where the loss has been caused by a breach of the agreement, and excludes events beyond the NO's reasonable control.

### **Gas sale agreements (GSAs)**

Gas sale agreements (GSAs) deal with the purchase or sale of gas. Although an end user may buy its own gas directly from a producer, generally it is a retailer who contracts to buy gas from a producer and on-sell it to end users. The producer therefore will generally have a GSA with the retailer, and the retailer will generally hold a GSA with each of its end users. The latter GSA is usually referred to as a 'consumer contract'.

GSAs deal with such matters as where the gas is bought or sold, and in what quantities. These matters are similar to those that ICAs deal with but, while they do and can overlap to an extent, ICAs are concerned with aggregate physical flows at a location, whereas GSAs are concerned with individual retailer contract entitlements. For example, a producer who contracts to sell gas to several retailers at a single point will have GSAs with each retailer (and each GSA may have different terms and conditions); but this producer will have only one ICA at that location.

### **Wholesale GSAs**

Wholesale GSAs apply where a gas retailer purchases gas from a producer (or, occasionally, a wholesaler). These contracts are not disclosed, but can be expected to specify the point of sale as a transmission receipt point (where gas from either a gas treatment plant or an upstream transmission pipeline is injected into a transmission system).



### **Consumer contracts (retail GSAs)**

Consumer contracts apply where a gas retailer sells gas to an end user. The standard residential and commercial retail GSAs are available from each retailer.

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# 4

## Technical standards for gas quality

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This chapter broadly describes the technical standards for gas quality set out in the various standards and contracts. The requirements arise mainly from the New Zealand standards:

- NZS 5442 Specification for reticulated natural gas, that prescribes ranges and limits for the various components of gas, and testing requirements;
- NZS 5263 Gas Detection and Odorisation, that identifies when and where odorization is required as the means of detection, the minimum odorant concentrations, and where other means of detection can be used;
- NZS 5258 Gas Distribution Networks, that contains a number of provisions related to the control, testing and monitoring of pressure; and
- NZS 5259 Gas Measurement, that sets requirements for the on-going calibration and inspection of gas chromatographs and associated equipment that form part of a GMS.

A number of other standards relate to the specification of particular pieces of equipment. For example odorant vessels are managed under Vector's Pressure Equipment Management Plan to meet Pressure Equipment, Cranes and Passenger Ropeways (PECPR) Regulations and inspected in accordance with AS/NZS 3778: 2006 Pressure Equipment In-Service Inspection. Odorant plants are also certified under the requirements of the Hazardous Substances and New Organisms Act 1996 (HSNO). These more specific standards are not considered here.

### 4.1 Gas specification

The gas specification, NZS 5442, distinguishes between 'characteristics and components' of the gas and 'contaminants', as described below.

#### Characteristics and components

Table 1 of the gas specification (reproduced below) sets out the limits on gas 'characteristics and components'.

**Table 1 - Gas specification characteristic and component limits**

Characteristics and components	Limit	
Wobbe Index	Minimum	46.0 MJ/scm
	Maximum	52.0 MJ/scm
Relative density	Maximum	0.80
Oxygen - for gas to be transported through medium and low pressure systems only - In all other cases	Maximum	1.0 mol %
	Maximum	0.1 mol %
Hydrogen	Maximum	0.1 mol %
Hydrogen sulphide	Maximum	5 mg/scm
Total sulphur (after odorant addition) <sup>17</sup>	Maximum	50 mg/scm
Water	Maximum	100 mg/scm
Total halogens	Maximum	25 mg/scm
Hydrocarbon dewpoint temperature	Maximum	2 °C at 5 MPa
Temperature	Minimum	2 °C
	Maximum	40 °C

In regard to testing, Section 5 of the gas specification requires that the methods used must allow for the value of a characteristic or component to be determined with 95% confidence. The frequency of testing is to be such '...that any potential deviations beyond the limits are likely to be detected when they occur'.

Also, Section 5.4 of the gas specification allows that the test frequency for a particular component can be lowered if that component is demonstrated to be absent or at very low levels relative to the limits. Current test frequencies for gas entering the Maui and Vector pipelines, as specified in contracts, are provided in Appendix B.

### Contaminants

Section 4.2.1 of the gas specification requires that gas 'shall not contain materials... to an extent which might cause damage to, or interference with the proper operation of lines, meters, regulators...'. The gas specification also suggests compressor coalescing filters should limit the amount of oil in gas downstream of the compressor station to 20ml/TJ, but does not specify the method or frequency of monitoring for contaminants (either oil or dust).

In addition, the transmission receipt and delivery point ICAs require filtration adequate to prevent solid or liquid contaminants from affecting metering equipment.

## 4.2 Odourisation

Part 1 of NZS 5263 deals with performance standards when gas is expected to be detected by odour. For example, the required documentation – such as monitoring

<sup>17</sup> The amount of sulphur added at normal odorant injection rates is of the order of 6 mg/scm.

and testing records, information exchange between parties in the supply chain – is listed, and a code compliance checklist is provided.

Part 2 of NZS 5263, which Regulation 16 of the SM Regulations requires odorised gas to comply, deals with odorant selection, odorant concentration, testing, supplementary odourisation, situations where odourisation is not required, emergency and contingency planning, quality assurance, and guidance/education<sup>18</sup>.

The minimum odorant concentration in natural gas is 3 mg/m<sup>3</sup>, and the rate of dosage is to be monitored sufficiently frequently to give confidence that this is achieved. (s2.3.1)

Odorant levels and concentrations are to be tested. Odorant levels are measured by a trained individual smelling different concentrations of gas in air, using an odorometer. Odorant concentrations are measured using mercaptan detector tubes or other odorant sensors. (s2.4.2) The results of these tests are to be compared over time as a check on the adequacy of testing procedures, abnormal olfactory responses, and odorant masking. (s2.4.4)

Actions are suggested in the event that odorant fade or odorant masking is evident. These include such suggestions as increasing the rate of odorant dosage and informing customers of the risk. (s2.4.7 & s2.4.8)

Odorant levels and concentrations are to be tested close to the point of injection, at gate stations at least monthly, and at points on the network where concentrations are likely to be low, at least three monthly. (s2.4.3.1)

Emergency and contingency plans for under-odorisation, over-odorisation and odour masking are to be documented, and quality assurance procedures put in place.

Educational material on how to detect and respond to gas escapes, and policies and procedures for training are to be available.

## **4.3 Pressure**

### **Network pressure**

AS/NZS 4645 aims for systems to be in place so that personnel, the public and the environment are not exposed to unacceptable risks. This is supported by a Formal Safety Assessment (FSA) and a Safety and Operational Plan (SAOP). The FSA will identify hazards, determine the threats, assess the risk and level of control necessary to meet an acceptable risk level. The controls required to mitigate the risks identified in the FSA are documented in the SAOP.

In relation to pressure AS/NZS 4645 requires action to be taken to "...proactively identify and address any supply and pressure problems likely to jeopardise the future

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<sup>18</sup>

safety and performance of the distribution network. Gas flow and/or network pressure shall be routinely monitored to achieve this objective.” (s3.4).

Section 6.3 deals with network pressure management. In particular, it requires controls to maintain minimum operating pressures (s6.3.2) and over pressure systems to ensure that the maximum allowable operating pressure (MAOP) is not exceeded (s6.3.3).

Upper pressure limits are generally determined by the maximum allowable operating pressure of pipe and fittings in the delivery system, and minimum pressures by the requirements of gas appliances.

GMS inlet pressures will be specified in NSAs, and delivery pressures will be specified in Gas Measurement Services Agreements (GMSAs).

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# 5

## Obligations and means of compliance

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The previous chapters set out the legal and technical requirements governing gas quality. This chapter identifies the specific<sup>19</sup>, key gas quality obligations<sup>20</sup> on each market participant and provides examples of the actions that will be taken to comply with those obligations.

Note that gas wholesalers and retailers (W/R) are not in the physical supply chain but under SM Regulation 41 are responsible for ensuring that gas supplied at a consumer's point of supply for use in gas installations and gas appliances must be of a specification that is suitable and safe for those uses. In addition to the specific means of compliance set out in the table below, W/Rs need to be confident that:

- the SMSs of TSOs and NOs properly acknowledge the risk of non-specification gas, have appropriate arrangements to reduce the risk, and procedures for dealing with any non-specification gas incidents that may occur;
- the AMPs of TSOs and NOs deal with the maintenance and replacement of equipment associated with gas quality (gas chromatographs, filters, separators etc);
- non-specification gas events will be promptly reported and dealt with.

Generally retailers achieve this by having service provider agreements in place that recognise this requirement, and give W/Rs access to supporting information<sup>21</sup>.

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<sup>19</sup> In addition to the specific obligations identified in this chapter, a number of non-specific obligations may also apply. For example, contracts applying to participants in the supply chain require them to act as a Reasonable and Prudent Operator.

<sup>20</sup> Only the key obligations relating to gas quality are identified in this chapter. There will be other statutory and contractual obligations that are not addressed here.

<sup>21</sup> For example, retailers may wish to verify that TSOs and NOs have audit certificates in force for their SMSs (as required under SM Regulation 37). TSOs and NOs could facilitate this by posting the statutory declarations to the Secretary of Energy (made under SM Regulation 37) on their websites.

## 5.1 Gas specification

The following table identifies the primary obligations on each stakeholder in respect of gas specification, and actions related to those obligations.

**Table 2 – gas specification obligations and actions**

Obligation	Primary obligations in respect of gas specification (and where the obligation arises from)
Means of Compliance	An example of how the obligation will be met
<b>Gas Producers/Treatment Station Owner/Operator (GP)</b>	
Obligation	Each GP must only inject gas that meets the gas specification into the transmission system. (ICA between injecting party and transmission pipeline owner)
Means of Compliance	Each GP will maintain on-line chromatographs and/or other monitoring equipment and monitor gas quality as required. Where it detects or suspects that non-specification gas is flowing, or is likely to flow, it will notify the TSO as soon as reasonably practical <sup>22</sup> . Notifications of excursions will be made via phone, email or alternative immediate form of communication; and a written record of any communications will be kept.
Obligation	Each GP must test gas injected into the transmission system at specified frequencies. (ICA between injecting party and transmission pipeline owner)
Means of Compliance	Each GP will test at the frequencies specified and keep test results as evidence that testing has occurred. Where the GP does not test at the prescribed frequency, it will notify the TSO as soon as reasonably practical of any failure/interruption of testing equipment, describing the problem and how the GP proposes to remedy it.
<b>Transmission System Owner/Operator (TSO)</b>	
Obligation	Each TSO must ensure all practicable steps are taken to prevent the supply system presenting a significant risk of harm or damage, by implementing an SMS. (SM Regulation 30)

<sup>22</sup> Occasional 'excursions' from the gas specification are expected. These excursions may be 'transients', lasting only minutes, and therefore unlikely to have any significant effect on the quality of delivered gas. However, any such incident represents a breach of the strict requirement under every ICA which requires that only gas meeting the gas specification may be injected into the transmission pipelines, so they must all be notified. In some overseas regimes, protocols exist to specify thresholds for escalating actions depending on the severity of an incident, but there is no such protocol currently in operation in New Zealand.

Means of Compliance	Each TSO will develop, maintain and implement an SMS that, for example, allows for continuous monitoring of gas specification at key locations throughout its system, and maintaining equipment (filters and separators) and systems to ensure that the liquid and dust contamination of gas delivered from the system is within specification.
Obligation	Each TSO must notify shippers if the TSO believes that non-specification gas may flow through a Receipt Point or a Delivery Point. (s17.6 of MPOC and s12.4 of VTC)
Means of Compliance	Unless otherwise agreed (for example through an industry agreement specifying thresholds for escalating actions depending on the severity of an incident), each TSO will notify shippers of <u>all</u> non-specification gas incidents. Such notification will include sufficient detail for shippers to assess the likely effects on end users.
<b>Distribution Network Owner/Operator (NO)</b>	
Obligation	Each NO must ensure all practicable steps are taken to prevent the supply system presenting a significant risk of harm or damage, by implementing an SMS. (SM Regulation 30)
Means of Compliance	Each NO will develop, maintain and implement an SMS that, for example, allows for maintaining equipment (filters) and systems to ensure that dust contamination of gas delivered from the system is within specification.
Obligation	Each NO must notify gas retailers if the NO believes that non-specification gas may flow through a Receipt Point or a Delivery Point. (Network Services Agreements)
Means of Compliance	Unless otherwise agreed (for example through an industry agreement specifying thresholds for escalating actions depending on the severity of an incident), each NO will notify shippers of all non-specification gas incidents. Such notification should include sufficient detail for gas retailers to assess the likely effects on end users.
<b>Gas Measurement System Operator/Operator (GMSO)</b>	
Obligation	None.
<b>Wholesalers/Retailers (W/R)</b>	
Obligation	Each W/R Must ensure that gas it supplies at a consumer's point of supply is of a specification that is suitable and safe for use. (SM Regulation 41)



Means of Compliance	<p>Each W/R will hold service provider agreements with parties in the physical supply chain requiring that specification gas is delivered and that any non-specification incidents or exceptions are promptly notified.</p> <p>Each W/R will also maintain emergency procedures that provide for notifying categories of end user of quality excursions via the most appropriate communication channels, and keeping written records of such communications.</p>
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## 5.2 Odourisation

Table 3 identifies the primary obligations on each stakeholder in respect of gas odourisation, and actions related to those obligations.

**Table 3 – odourisation obligations and actions**

Obligation	Primary obligations in respect of gas odourisation (and where the obligation arises from)
Means of Compliance	An example of how the obligation will be met
<b>Gas Producers/Treatment Station Owner/Operator (GP)</b>	
Obligation	None, unless ICA with the TSO requires that odourised gas is injected into the transmission pipeline.
Means of Compliance	-
<b>Transmission System Owner/Operator (TSO)</b>	
Obligation	<p>The SM Regulations odourisation requirements do not apply to gas in the transmission system. (SM Regulation 16)</p> <p>However, Where Vector agrees with its shippers to odourise gas in its pipelines, it will inject sufficient odourant that will normally ensure it complies with the gas specification when delivered through a typical distribution network. (s13.2 of VTC)</p> <p>Vector also commits to conduct spot checks from time to time to test whether it is delivering gas that meets the detectability requirements of NZS 5263:2003. If it is not, it will advise each affected shipper as soon as is reasonably practicable. (Section 13.3 of the VTC)</p>
Means of Compliance	<p>Vector will conduct spot checks from time to time (but not at all delivery points), to test whether the gas in the distribution network meets the detectability requirements set out in NZS 5263. If not, Vector will advise affected shippers as soon as reasonably practicable and take all reasonable steps to remedy the situation. (s13.3 of VTC)</p>

Obligation	Each TSO must ensure all practicable steps are taken to prevent the supply system presenting a significant risk of harm or damage, by implementing an SMS. (SM Regulation 30)
Means of Compliance	<p>Since Vector performs odourisation services, its SMS (and/or AMP) will need to address odourisation by, for example, including:</p> <ul style="list-style-type: none"> <li>• a contingency plan for responding to emergencies (under/over odourised gas, odour masking, etc);</li> <li>• a description of odorant injection plant, its location, its maintenance regime, its operation, and service performance;</li> <li>• information on the specification of odorant used; and</li> <li>• a description of odorant equipment testing and reporting arrangements.</li> </ul>
<b>Distribution Network Owner/Operator (NO)</b>	
Obligation	Each NO must ensure all gas in the distribution system complies with Part 2 of NZS 5263 (SM Regulation 16-18)
Means of Compliance	Each NO will conduct spot checks from time to time to test whether the gas in the distribution network meets the detectability requirements set out in NZS 5263. If not, the NO will advise affected gas retailers as soon as reasonably practicable and take all reasonable steps to remedy the situation. (good industry practice)
Obligation	Each NO must have documentation that demonstrates compliance, including a quality assurance procedure that tests and monitors whether the gas is odourised at all times to the required level, and contingency plans. (SM Regulation 19)
Means of Compliance	Each NO will develop and regularly review competency and testing procedures and keep test results. If requested by a gas retailer, the NO will make odourisation documentation available.
Obligation	Each NO must ensure all practicable steps are taken to prevent the supply system presenting a significant risk of harm or damage, by implementing an SMS. (SM Regulation 30)
Means of Compliance	<p>Each NO's SMS (and/or AMP) will address odourisation by, for example, including</p> <ul style="list-style-type: none"> <li>• a contingency plan for responding to emergencies (under/over odourised gas, odour masking, etc); and,</li> <li>• unless the NO relies entirely on Vector Transmission and has no capability of its own to add odorant: <ul style="list-style-type: none"> <li>○ a description of odorant injection plant, its location, its maintenance regime, its operation, and service performance</li> <li>○ information on the specification of odorant used; and</li> <li>○ a description of odorant equipment testing and reporting arrangements</li> </ul> </li> </ul>
<b>Gas Measurement System Operator/Operator (GMSO)</b>	
Obligation	None.

<b>Wholesalers/Retailers (W/R)</b>	
Obligation	Each W/R must ensure all gas at a point of supply complies with Part 2 of NZS 5263 (SM Regulation 17)
Means of Compliance	Each W/R will hold service provider agreements with parties in the physical supply chain requiring that odourised gas is delivered and that any odourisation incidents or exceptions are promptly notified. Also, each W/R will maintain emergency procedures that provide for notifying categories of end user of odourisation incidents via the most appropriate communication channels, and keeping written records of such communications.
Obligation	Each W/R must have documentation that demonstrates compliance, including a quality assurance procedure that tests and monitors whether the gas is odourised at all times to the required level, and contingency plans (SM Regulation 19)
Means of Compliance	Each W/R will develop and regularly review its testing procedures and systems. Also, each W/R will make odourisation documentation (including test results and incident reports) available to its customers on request. (good industry practice)

### 5.3 Pressure

Table 4 identifies the primary obligations on each stakeholder in respect of gas pressure, and actions related to those obligations. However, for mass market end users supplied from distribution networks pressure incidents are only likely to arise from problems occurring on the distribution network or GMS they are supplied from.

**Table 4 – gas pressure obligations and actions**

Obligation	Primary obligations in respect of gas pressure (and where the obligation arises from)
Means of Compliance	An example of how the obligation will be met
<b>Gas Producers/Treatment Station Owner/Operator (GP)</b>	
Obligation	Each GP must only inject gas up to an agreed limit, usually the rated pressure of the transmission pipeline (ICA between injecting party and transmission pipeline owner)
Means of Compliance	Each GP will design and operate suitable pressure control equipment and, where it detects or suspects an over-pressure incident, it must notify the TSO as soon as reasonably practical.
<b>Transmission System Owner/Operator (TSO)</b>	

Obligation	Each TSO will manage pipeline pressures within declared limits and below the MAOP. (s2.5 of MPOC, AS/NZS 2885, and good industry practice)
Means of Compliance	Each TSO will design and operate suitable pressure control equipment and where it believes gas cannot be delivered at safe operational pressures as a result, for example, of damage to the pipeline or supply/demand imbalance, it will declare a pipeline emergency
<b>Distribution Network Owner/Operator (NO)</b>	
Obligation	Each NO must ensure all practicable steps are taken to prevent the supply system presenting a significant risk of harm or damage, by implementing an SMS. (SM Regulation 30)
Means of Compliance	Each NO will develop, maintain and implement an SMS that, for example, allows for maintaining equipment (pressure regulators and relief valves) and systems to ensure that gas is delivered from the system at safe pressures.
Obligation	Each NO will manage network pressure to ensure minimum supply requirements are maintained and the MAOP of the system is not exceeded. (AS/NZS 4645 s6.3.1, and good industry practice)
Means of Compliance	Each NO will design and operate suitable pressure control equipment and will notify affected parties of any pressure excursions or emergencies. Where multiple ICPs are at risk, each NO will declare a network emergency where it believes gas cannot be delivered at safe operational pressures as a result, for example, of damage to the network or supply/demand imbalance.
<b>Gas Measurement System Operator/Operator (GMSO)</b>	
Obligation	Each GMSO must manage metering and delivery pressures within set limits (AS/NZS 4645 s6.3, NZS 5259 , and good industry practice)
Means of Compliance	Each GMSO will design and operate suitable pressure control equipment and will advise affected retailers where it believes gas cannot be delivered at agreed metering pressures as a result, for example, of low inlet pressures or GMS malfunction
<b>Wholesalers/Retailers (W/R)</b>	
Obligation	Each W/R must ensure that gas it supplies at a consumer's point of supply is at a pressure that ensures the safe supply, passage, and use of the gas, where the gas is used for its intended purpose in a properly functioning gas installation (SM Regulation 42)

Means of Compliance	Each W/R will hold service provider agreements with TSOs and/or NOs and/or GMSOs, with delivery pressure related provisions. Also, each W/R will promptly advise their customers of any breach of SM Regulations 42, giving full details.
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# 6

## Exceptions and Incidents

This chapter explains how exceptions and incidents are dealt with. Transparency of exceptions and incidents is essential for:

- Safety – allowing other parties in the supply chain to take actions to mitigate possible consequences of an event; and
- Confidence – enabling stakeholders to assess how effectively gas quality is being managed, and to develop improvements where required.

### 6.1 Gas specification

#### Communication during gas specification incident

The order of communication during a non-specification incident originating, for example, when non-specification gas is injected into the transmission system is illustrated below.

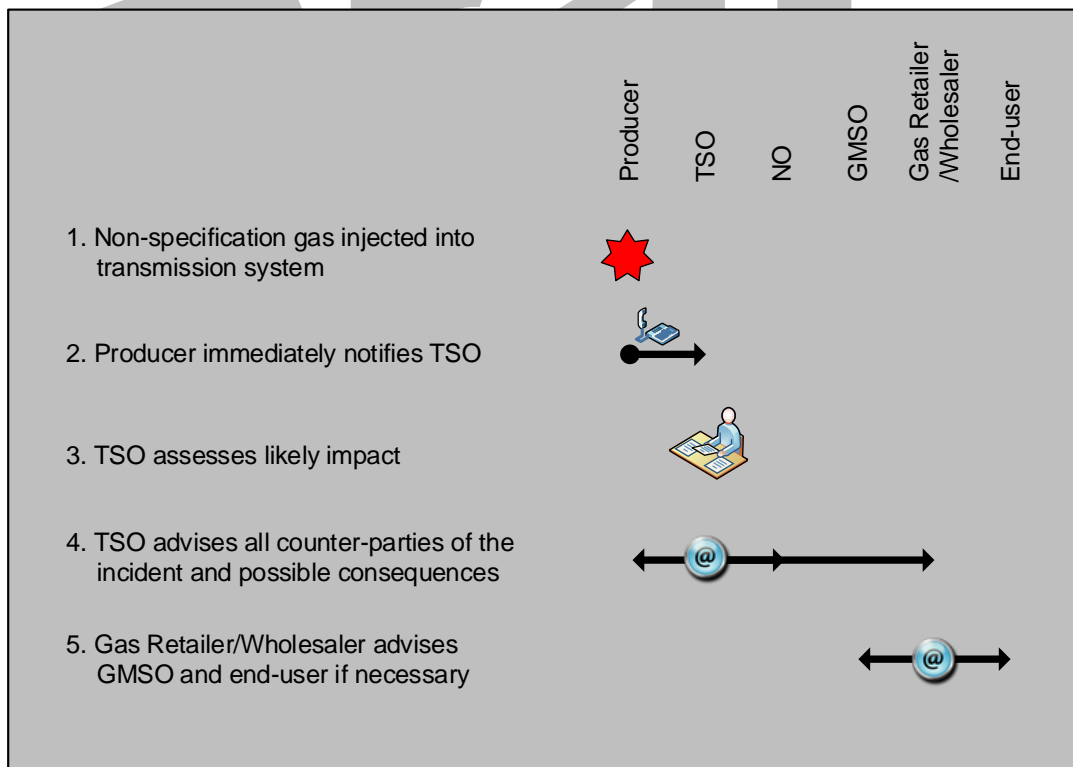


Figure 3 – communication during a gas specification incident

The order of communication during the gas specification incident is:

1. The monitoring required of an injecting party by its ICA should alert it when a non-specification gas incident occurs.
2. The ICA also requires the party injecting gas to notify the TSO of non-specification gas. For example, s17.5 of the MPOC provides that: 'If a Welded Party detects or, in its reasonable opinion, suspects non-specification gas is flowing, or is likely to flow, through a Welded Point with its Pipeline, then as soon as reasonably practicable upon becoming aware of it, that Welded Party shall notify MDL (except where MDL has given that party notice of the non-specification gas).'
3. The MPOC and VTC provide that the TSO must act as a Reasonable and Prudent Operator (RPO). Inherent in this must be some consideration of what consequences are likely to arise from a non-specification gas incident. The actions taken by the TSO may vary accordingly. For example, if the non-specification incident is minor and short lived (say a transient involving gas at over 40°C being injected for a short period), it is unlikely that it would be reasonable or prudent to curtail injections.

Experienced operators are likely to assess the severity and likely consequences of an incident rapidly. Where a more lengthy analysis is required, it may be prudent to issue notices of the event (item 4) and follow up these notices at a later time with advice on the likely consequences.

4. The MPOC and VTC require the TSO to promptly notify system users on a non-specification gas incident. For example s17.6 of the MPOC provides that: 'As soon as reasonably practicable upon detecting or, in its reasonable opinion, suspecting that Non-Specification Gas is flowing, or is likely to flow, through a Welded Point, MDL shall notify all Welded Parties and shippers of the same.'

Note that the TSO will not have a relationship with the GMSO (unless it has an ICA with the TSO), so the gas retailer or wholesaler will need to notify the GMSO, if it considers it necessary to do so (step 5).

5. The terms of gas supply contracts do not generally contain provisions about the notification of events. However if the gas retailer or wholesaler judged that the specification of delivered gas was likely to vary sufficiently to affect the performance of appliances, it would be good practice to notify its customers of this.

The gas retailer or wholesaler may also wish to notify the GMS owner of any likely problem.

## 6.2 Odourisation

### Communication during odourisation incidents

The order of communication in two possible odourant incidents is illustrated below. The first shows an odourisation incident arising from the failure of a Vector odourant plant. The second shows the situation when an NO discovers odourant fade during testing.

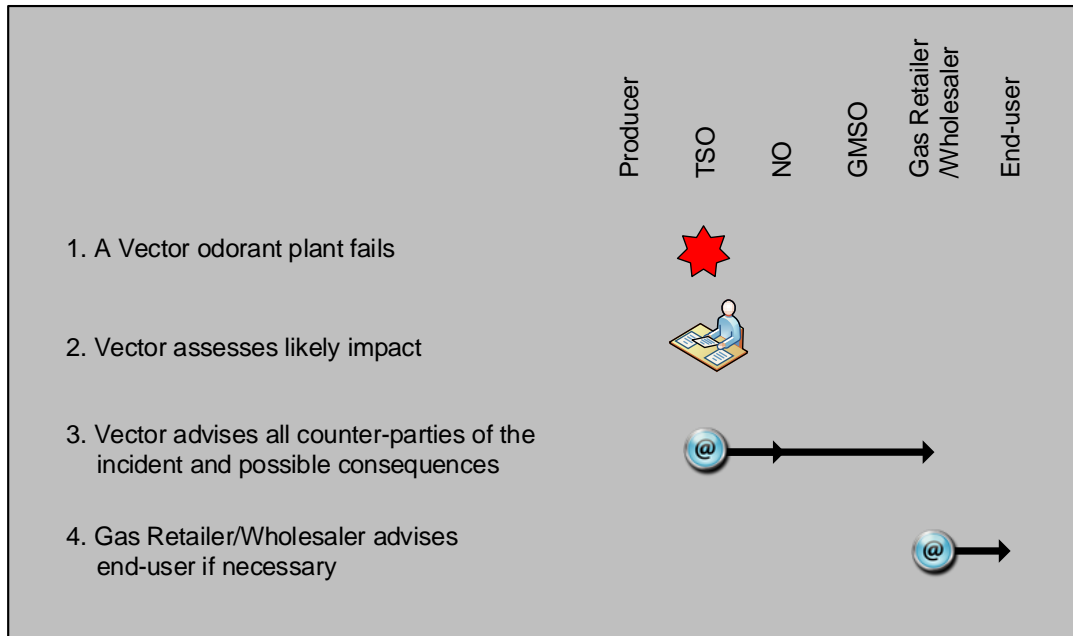


Figure 4 – communication when an odourant plant fails

#### The order of communications during the first odourisation incident is:

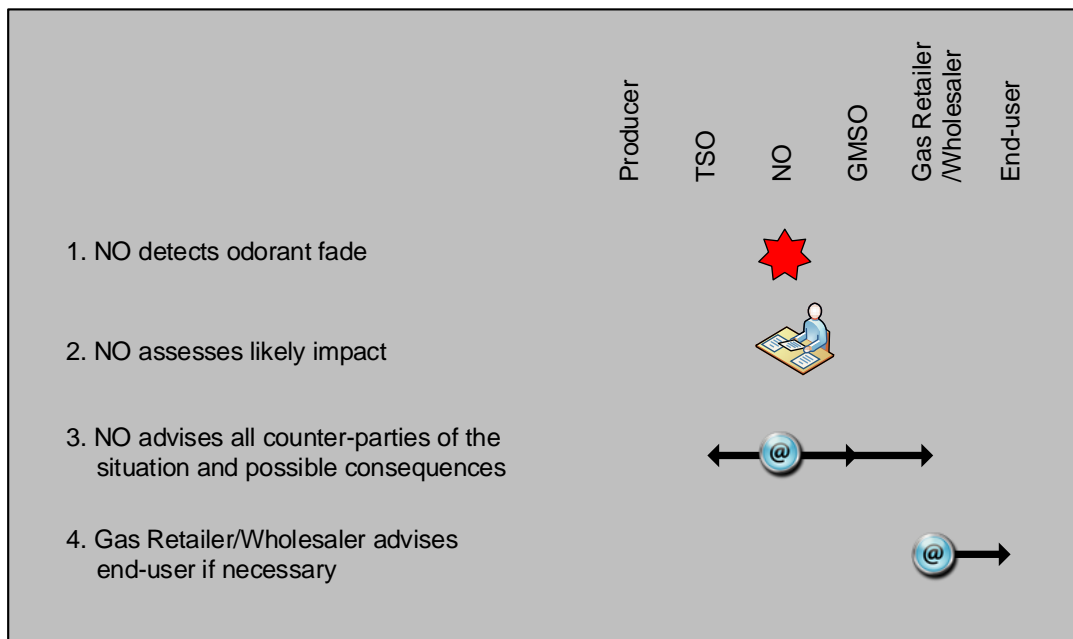
1. Vector continuously monitors the operation of its odourant plants. A SCADA alarm will alert system operators to any failure.
2. As an RPO, Vector will make an assessment of the likely impact of the failure. For example, depending on the configuration of the transmission system a failure may only affect a particular set of users.

Experienced operators are likely to assess the severity and likely consequences of an incident rapidly. Where a more lengthy analysis is required, it may be prudent to issue notices of the event (item 3) and follow up these notices at a later time with advice on the likely consequences.

3. As an RPO, Vector will advise parties supplied directly from the affected odourised pipeline (NOs and any directly connected end users) and gas suppliers of the incident, its likely consequences, and proposed remedy.
4. The terms of gas supply contracts do not generally contain provisions about the notification of events. However if the gas supplier judged that the odourant plant



failure was likely to significantly affect an end user's ability to detect a leak, it would be good practice to notify its customers of this.



**Figure 5 – communication when odorant fade is detected**

**The order of communications during the second odourisation incident is:**

1. NO periodically test odorant levels at key network locations and may identify incidents of odorant fade. The mechanisms of odorant fade or odorant masking are not fully understood.
2. As an RPO, the NO will make an assessment of the likely impact of the low odourant detectability. For example, experience may indicate that the odorant fade is related to a particular set of circumstances, or configuration of gas flows in the distribution network, and only likely to affect a particular set of users for a particular length of time.

Experienced staff are likely to assess the severity and likely consequences of an incident rapidly. Where a more lengthy analysis is required, it may be prudent to issue notices of the event (item 3) and follow up these notices at a later time with advice on the likely consequences.

3. As an RPO, the NO will advise gas retailers who supply end-users on the affected section of the distribution network and, if necessary Vector and GMSOs, of the incident, its likely consequences and proposed remedy.
4. The terms of gas supply contracts do not generally contain provisions about the notification of events. However if the gas supplier judged that the odorant fade situation was likely to significantly affect an end-user's ability to detect a leak, it would be good practice to notify its customers of this.

Note that GMSOs are generally not affected by odorant failures.

## 6.3 Pressure

### Communication during pressure incident

The order of communication during a pressure incident originating, for example, from a network incident causing the isolation of part of that network is shown below.

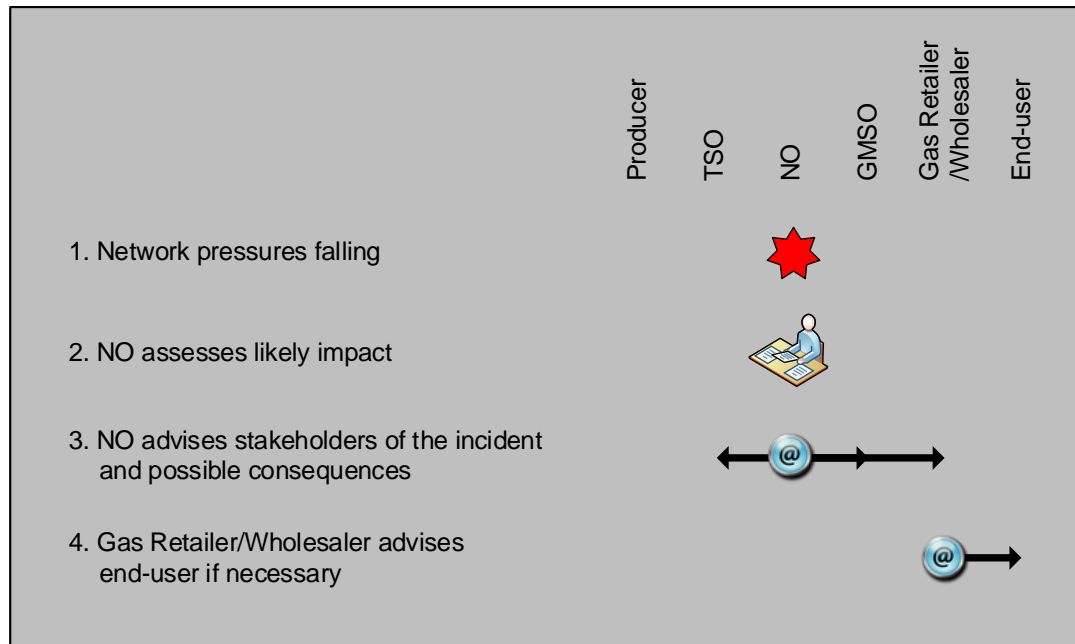


Figure 6 – communication during a pressure incident

#### The order of communications during the pressure incident is:

1. NOs continually monitor key network pressures via telemetry systems and manual checks of data loggers and pressure gauges, so will be alerted to emerging pressure difficulties. Or, in the case of third-party damage, the NO may be notified by the public or emergency services.
2. The NO will make an initial assessment of the situation and determine if the pressure situation cannot be stabilised without curtailing demand, and whether its emergency plan should be invoked.
3. The NO will advise stakeholders in accordance with its communications protocols and contract obligations. The communication would describe the incident, its likely consequences and proposed remedy.
4. The terms of gas supply contracts do not generally contain provisions about the notification of events. However if the gas supplier judged that the pressure of delivered gas was likely to cause curtailment, or fall below the agreed supply pressure, it would be good practice to notify its customers of this.

# 7

## Gas quality information

This chapter identifies the information that is available about gas quality, who provides it, who has access to it, and where it can be found.

**Table 5 – available gas quality information**

<b>Information category</b>			
Information	Requirement to provide information	Where public information can be found	Who can access the information
<b>Contracts</b>			
Gas purchase and sale agreements (GSAs)	No requirement to make these contracts public	Not public	Only parties to contract
Interconnection agreements (ICAs)	No requirement to make these contracts public	Maui pipeline ICAs can be found on OATIS	Maui pipeline ICAs are public Only parties to contract can view other ICAs
Transmission services agreements (TSAs)	NZCC24 requires disclosure of 'prescribed terms' of 'prescribed contracts' including contracts for gas transmission services.	All public disclosures are available on TSO websites	Public
Network services agreements (NSAs)	NZCC23 requires disclosure of 'prescribed terms' of 'prescribed contracts' including contracts for gas pipeline services.	All public disclosures are available on NO websites	Public
Gas measurement services agreements (GMAs)	No requirement to make these contracts public	Not public	Only parties to contract
<b>Specification</b>			
Gas composition and/or	s4.1 of MPOC	MDL IX	Public

properties used in the determination of energy; gas Gross Calorific Value, Base Density or Specific Gravity and Wobbe Index; and gas quality data such as moisture content	Also, although there is requirement for Vector to make this information public, it is available, for each of 18 different gas types in the Vector pipeline (ie 18 possible mixes of input gasses).	Vector IX	Public
<b>Odourisation</b>			
Overview	Decision No NZCC 24, Section 6.2.1	Vector's transmission AMP, Section 4.4.4	Public
Odorant vessels maintenance standards, frequency of testing, replacement and renewals, and expenditure forecast	Decision No NZCC 24, Section 6.3.2	Vector's transmission AMP, Section 6.5.4	Public
Anticipated capital expenditure	Decision No NZCC 24, Section 6.6	Vector's transmission AMP, Table 6.9	Public
Report on Asset Condition and Explanatory Notes	Decision No NZCC 24, Section 2.6.1	Vector's transmission AMP, Schedule 12	Public
SMS	Gas Act Section 46A, SM Regulations 30-40, and Decision No NZCC 24, Section 6.2.1	Not public	Private to system owners and/or operators
<b>Pressure</b>			
Transmission pipeline pressures	S6.2 of NZCC24 requires disclosure of a diagram of each transmission system showing pipe design pressure ratings	All public disclosures are available on TSOs websites	Public
Distribution network pressures	S4.2 of NZCC23 requires disclosure of maps of all all main pipes, distinguished by operating pressure	All public disclosures are available on NO websites	Public

Gas Measurement System pressures <sup>23</sup>	No requirement to make this information public	Not public	
	The Gas (Switching Arrangements) Rules 2008 require switching notices, provided by an incumbent retailer to the Registry, to specify the meter pressure		Private to Registry Participants: ie retailers, NOs and GMSOs
	GSAs and GMAs		Private to end user, its retailer and the GMSO

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<sup>23</sup> A proposal is under discussion by the Registry Amendments Project Team (convened by Gas Industry Co) to amend the GAS (SWITCHING ARRANGEMENTS) RULES 2008

# Glossary

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References to a document, standard, act, regulations, rules or agreement includes any subsequent amendment or revision.

**AS/NZS 4645** means AS/NZS 4645.1:2008 Incorporating New Zealand-only Amendment A, Joint Australian/New Zealand Standard, Gas distribution networks Part 1: Network management.

**asset management plan (AMP)** means a plan meeting the purposes set out in NZCC 23 and NZCC 24, ie broadly providing sufficient information to allow stakeholders to assess: how the assets are being managed; that the required level of performance is being delivered; and that costs are efficient.

**distribution network** means a distribution system as defined in the Gas Act 1992.

**gas measurement services agreement (GMSA)** is an agreement between a GMSO and (generally) a retailer for any services association with the use of the GMS.

**gas measurement system (or GMS)** has the same meaning as in the Gas Act 1992, and may include a meter, corrector, other time of use device, pressure regulator, filter, over-pressure protection device, pressure and temperature transducers, and telemetry equipment.

**gas retailer** has the same meaning as in the Gas Act 1992.

**gas specification** means NZS 5442:2008 Specification for Reticulated Natural Gas.

**GMSO** means the owner and/or operator of a Gas Measurement System

**GP** means a gas producers, or gas treatment station owner/operator

**ICP** means installation control point being the point at which a consumer installation is deemed to have gas supplied, represented by a unique ICP identifier on the registry assigned by the NO.

**maui pipeline** means the high pressure gas pipeline running from the outlet of the Maui Production Station at Oaonui to Rotowaro and including the laterals to the New Plymouth and Huntly power stations including associated items of plant, equipment, fixtures and fittings.

**MPOC (Maui Pipeline Operating Code)** means the document that sets out the multi-lateral term of access to the maui pipeline.

**network services agreement (NSA)** is an agreement between a network user (generally a shipper) and the NO for any services associated with the use of the distribution network.

**NO** means the owner and/or operator of an open access gas distribution network

**NZS 5259** means NZS 5259:2004 Gas Measurement.

**NZS 5263** means NZS 5263:2003 Gas Detection and Odourisation.

**OATIS** has the same meaning as in the Gas Governance (Critical Contingency Management) Regulations 2008.

**odorant** comprises sulphur compounds added to gas to give it a distinctive and unpleasant odour so that leaks are readily detectable.

**safety management system (SMS)** has the same meaning as in the Gas (Safety and Measurement) Regulations 2010.

**shipper** means the party who contracts with a TSO/NO to have gas transported.

**SCADA (System Control and Data Acquisition)** is a system for remote control and monitoring. It allows TSOs and NOs to monitor key metrics such as pressures and major gas flows on their system, and remotely start/stop compressors and open/close valves.

**time-of-use (ToU) meter** refers to a GMS with functionality to record usage. ToU meters are frequently attached to telemetry to allow a retailer, for example, to 'dial up' the meter remotely to download consumption information.

**transmission services agreement (TSA)** is an agreement between a transmission pipeline user (a shipper, who is also likely to be a wholesaler, retailer or major user) and the TSO for use of the system.

**TSO** means the owner and/or operator of an open access gas transmission system

**Vector** means Vector Gas Limited.

**Vector Transmission** means Vector acting in its role as transmission system operator.

**Vector transmission code or VTC** means the document that sets out the multi-lateral term of access to Vector's open access gas transmission pipelines.

# Appendix A Testing frequencies for components of gas entering transmission pipelines

Table 6 – required monitoring frequencies for gas characteristics and components

Gas entering Maui pipeline		Gas entering Vector pipeline	
Characteristic/Component	Specified Frequency of Monitoring	Characteristic/Component	Specified Frequency of Monitoring
(MPOC s2.13 & s17.15) (MDL ICA s6.9)		Vector Receipt Point ICA 14/1/11 s5.22 & s7.10	
nitrogen	when requested	nitrogen	when requested
methane	when requested	methane	when requested
ethane	when requested	ethane	when requested
propane	when requested	propane	when requested
iso-butane	when requested	iso-butane	when requested
normal butane	when requested	normal butane	when requested
iso-pentane	when requested	iso-pentane	when requested
neo-pentane	when requested	-	-
normal pentane	when requested	normal-pentane	when requested
hexanes and heavier components (either separately or as a combined Hexanes-plus fraction)	when requested	hexanes and other hydrocarbons of equal or greater molecular weight	when requested
-	-	carbon monoxide	when requested
-	-	carbon dioxide	when requested
-	-	normal-hexane	when requested
-	-	normal-heptane	when requested
-	-	normal-octane	when requested
-	-	normal-nonane	when requested
-	-	normal-decane	when requested
-	-	helium	when requested



Gas entering Maui pipeline		Gas entering Vector pipeline	
-	-	argon	when requested
-	-	neo-pentane	when requested
Gross Calorific Value	continuously	Gross Calorific Value	continuously
Nett Calorific Value	continuously	Nett Calorific Value	continuously
Base Density or Specific Gravity	continuously	Base Density or Specific Gravity	continuously
Wobbe Index	continuously	Wobbe Index	continuously
oxygen	continuously	oxygen	continuously
hydrogen	as reasonably required, but at least quarterly	halogens and hydrogen	as reasonably required, but at least quarterly
hydrogen sulphide	as required, but at least quarterly	hydrogen sulphide	as reasonably required, but at least quarterly
total sulphur	as required, but at least quarterly	total sulphur	as reasonably required, but at least quarterly
water	as required, but at least daily	water	as reasonably required, but at least daily
hydrocarbon dewpoint	as required, but at least daily	hydrocarbon dewpoint	as reasonably required, but at least daily
-	-	temperature	continuously

# Appendix B Governance of this Protocol

Gas Industry Co wishes this protocol to accurately reflect the views of industry participants on what the responsibilities for gas quality are, and how they are managed. It is therefore necessary to seek the views of stakeholders on any changes that are made to the document and to note any areas where there is no consensus on its content. It is also necessary to provide arrangements that allow any participant to propose changes, to have that proposal considered by other stakeholders and for a new version of the protocol to be issued if required. These arrangements are described in this Appendix.

## **Proposing changes**

Any person may propose a change to this protocol by writing to Gas Industry Co describing the proposed change and the reasons why the person believes it is worth making.

## **Processing proposed changes**

On receiving a request to change the protocol, Gas Industry Co will discuss it with the proposer and consult on it with interested parties. Gas Industry Co will decide on the best means of consultation on a case by case basis. It may decide to package several proposed changes together if it believes that will result in a more effective consultation.

## **Issuing a revised protocol**

Gas Industry Co will decide whether the protocol should be changed or not but, regardless of its decision, it will maintain a register of all proposed changes together with a summary of any dissenting participant views. When reissued the protocol will be given a revision number and a table of revisions will be included in the document.