



Gas Quality Requirements and Procedures

Date issued: June ~~2019~~2015

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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'.

Executive summary

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 have no direct control of facilities in the physical supply chain, not themselves own or manage pipelines or facilities connected to pipelines. Gas Industry Co's purpose in publishing this *Gas Quality Requirements and Procedures* document is to provide an overview of the various requirements pertaining to gas quality and how those requirements are fulfilled by industry participants, parties in the gas supply chain. It has been finalised following consideration of submissions received on a February 2015 draft of the document.

Legal framework and technical standards that apply to gas quality

This document gives an overview of the legal framework and technical standards that govern gas quality.

Legal obligations for gas quality are principally set out in several Acts and related subsidiary regulations. 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 are requirements for owners/operators of assets in the physical supply chain, downstream of gas treatment facilities, to implement and maintain systems that 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 including a requirement to 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.

Management of gas quality

All parties in the physical and contractual gas supply chain are inter-dependent. For example, gas wholesalers and retailers rely on service providers in the physical supply chain. This document describes the actions each party takes to manage gas quality and meet its legal obligations.

The performance of parties in the physical supply chain can also affect large numbers of consumers, 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

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information is therefore important to stakeholder confidence. This document sets out how possible incidents will be handled and where information about gas quality can be found.

Governance of this document

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

Register of changes

<u>When change was proposed</u>	<u>Who proposed the change</u>	<u>What the proposed change was</u>	<u>Progress of proposed change: Whether the proposed change was: unmodified (U), modified (M) or abandoned (A)</u>
<u>1 June 2019</u>	<u>Gas Industry Co</u>	<u>An update of the June 2015 document to reflect the anticipated replacement of the Maui Pipeline Operating Code (MPOC) and Vector Transmission Code (VTC) by the Gas Transmission Access Code (GTAC)</u>	<u>In-train</u> <u>Anticipated to be in place on 1 October 2019</u>

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1 Introduction

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 have no direct control of facilities in the physical supply chain. This document gives an overview of the legal framework and technical standards that govern gas quality.

Management of gas quality

All parties in the physical and contractual gas supply chain are inter-dependent. For example, gas wholesalers and retailers rely on service providers in the physical supply chain. This document describes the actions each party takes to manage gas quality and meet its legal or contractual obligations.

The performance of parties in the physical supply chain can also affect large numbers of consumers, 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 document sets out how possible incidents will be handled and where information about gas quality can be found.

Governance of this document

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1.1 **Objective of this report**~~Purpose~~

~~This document gives an overview of the legal framework and technical standards that govern gas quality and describes the actions each party takes to manage its legal or contractual obligations. Gas Industry Co's purpose in publishing t~~
 This document provides an overview of the various requirements relating to gas quality and how those requirements are fulfilled by industry participants in the gas supply chain. This document aims to give gas industry stakeholders an understanding of: In particular, it describes:

- the legislation relevant to gas quality;
- how gas quality is managed ~~as gas moves in its journey~~ from production station to consumer; and
- the availability of information about gas quality.

The ~~ise~~ document originated from the work of gas retailers wishing to ensure that they comply with the Gas (Safety and Measurement) Regulations 2010 (SM Regulations), ~~but it is now managed by . However, it became clear that it had broader relevance as an reference and educational resource, so 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 who will agreed to coordinate stakeholder that input, and will now maintain the document and~~ periodically re-issue ~~the document~~ 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 retailer¹ 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:

- openness about all gas quality incidents² and exceptions³ that occur.
- where an aspect of gas quality (specification, odourisation, or pressure) is, or is expected to be, outside agreed limits, parties:

¹ 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.

² 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."

³ An "exception" is where the product deviates from one or more elements of an agreed specification.

- promptly notify each other of the situation; and
- work together to minimise the risks to people and property.
- service providers, gas wholesalers and retailers make available all information that they possess relating to gas quality, as detailed in section 55 of this document, that industry participants reasonably need to demonstrate that they are complying with their legal obligations.

1.3 Content

This document:

- gives an overview of gas quality arrangements (Chapter 22);
- describes the legal requirements for gas quality (Chapter 33);
- describes the technical standards for gas quality (Chapter 44);
- describes the main obligations on market participants and means of complying with those obligations (Chapter 55);
- describes how gas quality exceptions and incidents are handled (Chapter 66);
- identifies what information is relevant to gas quality, who provides it, and where it can be found (Chapter 77); and
- establishes governance arrangements for the on-going review and update of the document (Appendix B ~~Appendix B~~).

2

Overview of gas quality arrangements

In this paper "gas quality" ~~includes~~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 delivery 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 (GPs). 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 from gas treatment facilities and transmission systems; and by dust in the distribution networks.

Consumers 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 thea transmission system

The processing of wellhead products to a gas specification that meets the New Zealand standard (see section 4.1 of this document) 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 hydrate⁴ formation. Additional liquid separators and filters may also be installed at gas treatment facilities to

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

further reduce the amount of contaminants passing into the gas transmission system⁵.

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 gas⁶. 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 other transmission the Vector pipelines, and production station treatment plants that are directly connected with those Vector pipelines. Currently it is First Gas, as owner and operator of the transmission system (TSO) who performs this service.

2.2 Prior to injection into a distribution system

Composition

Once gas has entered the transmission pipeline it may mix with gas from other sources. However, providing all gas entering the system meets the gas specification, and So, the composition of any delivered gas will also meet specification can be affected by the extent of co-mingling.

Regarding odourisation, Also, while gas is in the transmission pipeline, contaminants can enter into the gas stream in the form of dust accumulated in the pipeline⁷ and oil from compressor stations, adding to any contaminants that may have been introduced from production stations. However, while 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. As discussed in section 2.1, the Maui and Frankley Road pipelines carry unodorised gas, so gas supplied into networks from these pipelines

⁵ 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.

⁶ 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.

⁷ 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.

is odorised at the transmission pipeline delivery points. Elsewhere gas is odorised at the transmission pipeline receipt points.

Currently it is First Gas, who performs all odourisation services for the industry. Odourant is added by First Gas/Vector either at transmission pipeline receipt points or, where a transmission pipeline is required to contain unodorised gas (the Maui pipeline and the Vector's Frankley Road pipeline), at the delivery point.

Section C.123 of First Gas's/Vector's transmission system Asset Management Plan (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. ~~We/Vector gas transmission~~ provides gas odourisation services to gas distributors and retailers by odourising the gas in the Kapuni transmission system. Odourant levels are regularly monitored at selected locations on the gas transmission system and gas distribution network to ensure satisfactory odourant levels are being maintained.

Gas transmitted through the Maui pipeline and the ~~Vector 300 line (Frankley Road pipeline interchange with the Maui pipeline to Kapuni Gas Treatment Plant (KGTP))~~ is unodorised. Gas transmitted through all other pipelines is odorised. ~~Vector/We~~ odorises gas using electronic pumped odourant injection systems supported by bulk odourant storage tanks at KGTP and the major receipt points from the Maui pipeline: ~~Those are~~ 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 odourant into the gas stream to meet prescribed levels.

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

Odourant chemical is imported in bulk, this is then distributed to the bulk storage locations and mobile bypass units are refilled as required.

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

Pumped odourisation plants comprise of a number of components including:

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

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

~~[First Gas AMP Vector Gas Transmission Asset Management Plan, 2018–2023, Section C.123.4.4]~~

Contaminants

~~While gas is in the transmission pipeline, contaminants can enter into the gas stream in the form of dust accumulated in the pipeline⁸ and oil from compressor stations, adding to any contaminants that may have been introduced from production stations. However, while dust and oil can be carried by gas as it is transported through the pipeline, filters and separators installed at delivery points are designed to remove most of these contaminants.~~

Pressure

~~Transmission pressures are reduced at delivery points for The pressure at which gas is delivered into major plant or distribution systems. These delivery pressures are —is normally stable and well below the operating pressure of the upstream pipeline—pressure. However, on occasion pipeline conditions such as the operation of compressors and the balance between injection and withdrawal quantities can affect delivery pressures.~~

2.3 Prior to delivery to a gas consumer ('end-user')

Composition

~~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 and/or Operators (NOs) rely on gas delivered into their systems being adequately odorised, but are also required to have arrangements in place for testing the level of odorant concentration in their networks and dealing with odorant incidents and exceptions (often referred to as "odorant fade" or "odorant masking").

Contaminants

~~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~~

⁸ ~~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.~~

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.

Pressure

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 consumer 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.

2.4 An overview of terminology

Gas qQuality is closely associated with gas safety, an area where terminology can be confusing. Similar or identical terms can have different meanings in different jurisdictions or in different contexts, and different terms can describe essentially the same things. so can easily be misunderstood. Here we give an overview of a few key terms and how they relate to each other in the NZ gas industry context.

Asset Management Plans (AMPs)

Each TSO and NO subject to Commerce Act Part 4 regulation is required to disclose its AMP. The content of an AMP is prescribed in the relevant Commerce Commission information disclosure decision.⁹ The AMP has a wide reach, encompassing a variety of policies, plans, systems, processes, and so on. Essentially, it describes all the arrangements that support the efficient delivery of pipeline services for the long-term.

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⁹ Commerce Commission 1 October decision NZCC 23 for distribution and NZCC 24 for transmission.

Pipeline Management System (PMS) and Pipeline Integrity Management Plan (PIMP)

For gas transmission, AS 2885 Pipelines – Gas and liquid petroleum 2012 is an important standard, particularly Part 3: Operation and maintenance.¹⁰ The 2012 edition of AS 2885 effectively replaced the term 'Safety and Operating Plan' with PMS. The PMS is wide-ranging, encompassing everything from a TSO's policies and organisational structure to its work permit arrangements (see Appendix A below). Among other aspects of pipeline management, it includes the Pipeline Integrity Management Plan (PIMP).

A term in-occasionally used common-usage in NZ, often used to mean broadly the same as that is broadly equivalent to PMS, and in common usage in NZ is 'safety case'. According to AS 2885 Appendix E, a safety case generally consists of a facility description, a formal safety assessment, and a safety management system.

Ensuring 'pipeline integrity' generally means ensuring that a pipeline is designed, built and operated in a safe, reliable and sustainable manner throughout its life.

The 2012 edition of AS 2885 introduced a requirement for the TSO to develop a PIMP to provide a greater focus on the technical aspects of integrity management.

Although PIMP is not a term commonly used at the distribution level, some NOs do have Integrity Management Plans to cover specific steel pipelines.

Safety Management Systems (SMSs)

At the distribution level, the Gas Act and SM Regulations requires each NO, gas measurement system owner or operator (GMSO), and owner of equipment forming part of a system for conveying more than 10 terajoules of gas a year, to have an SMS. An SMS aims at preventing serious harm to the public or significant damage to property by identifying, assessing and dealing with hazards. The detailed content of an SMS is prescribed by NZS 7901.

Pipeline Management Plans (PMP) Formal Safety Assessments (FSAs) and Safety and Operating Plans (SAOPs)

For gas distribution, AS/NZS 4645 Gas Distribution Networks 2018 is an important standard. It requires:

- an FASSA to identify hazards, determine the threats from those hazards, assess the risk of those threats and determine the level of control to remove or reduce the risk to an acceptable level; and

¹⁰ In AS 2885, the organisation responsible for the design, construction, testing, inspection, operation and maintenance of a pipeline is known as the 'Licensee'. Generally, this is the organisation named in a pipeline licence issued by a regulatory authority. The equivalent term in the NZ context, and the one used in this document, is Transmission System Owner/Operator (TSO).

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Commented [A1]: References to AS 2885 need to be checked. There was a new release in 2018. It's now AS/NZS 2885.1 2018.

There is also a new part 6 – Pipeline Safety Management AS/NZS 2885.6.

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- An SAOP, to identify and implement the controls necessary to mitigate the risks identified in the FSA.

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Legal framework for gas quality

The primary pieces of legislation relevant to ~~g~~Gas ~~q~~Quality are:

- the Gas Act 1992 (Gas Act);
- the Health and Safety ~~at Work Act 2015~~~~in Employment Act 1992~~ (HSE Act);
- the Commerce Act 1986 (Commerce Act); and
- the Consumer Guarantees Act 1993 (CG Act).

Regulations made under these Acts are also relevant to ~~g~~Gas ~~q~~Quality. The Acts and Regulations cite various applicable ~~New Zealand~~ Standards as relevant means of compliance. These Standards are also cited in the web of bi-lateral contracts for buying, selling and transporting gas that bind the industry participants.

~~Figure 1~~~~Figure 1~~ provides a road map of how the Acts, subsidiary legislation, contracts and standards relate to each other, and points to the sections of this chapter where they are discussed. The reddish areas indicate regulatory requirements. The bluish areas indicate industry developed documents. Arrows indicate the relationship between the documents. For example, the Gas Act requires the development of ~~Safety Management Systems (SMSs)~~ and allows for the promulgation of the SM Regulations, which specify what matters an SMS must cover.

When considering this material, it may help to bear in mind that the obligations on ~~First Gas as the owners and/or operators of the transmission systems (TSOs)~~ are different from those on ~~the owners and/or operators of distribution networks (NOs)~~. The Gas Act requires owners of gas supply systems to maintain SMSs specifying all practicable steps to prevent the gas supply system from presenting a significant risk of harm to people or damage to property. However, this requirement does not apply to ~~the TSO transmission systems~~. Instead, ~~the~~ TSOs develop plans for the operation and maintenance of ~~its~~~~their~~ pipelines as part of the requirement to obtain a certificate of fitness under the Health and Safety in Employment (Pipelines) Regulations 1999 (HSE Pipeline Regulations). ~~These regulations do not apply to include distribution pipelines.~~¹¹

¹¹ HSE Pipeline Regulations s2(c)(iv) excludes pipelines operating at 2000 kPa or less.

In its transmission AMP, First Gas notes that:

In accordance with the Health and Safety in Employment

(Pipelines) Regulations 1999, First Gas has chosen to adopt AS 2885 (the Standard) as the guiding document for maintaining appropriate standards of safe and sustainable operational practice.

Section 2 of AS 2885.3:2012 requires operators to have a documented and approved Pipeline Management System (PMS). The Standard does not prescribe the structure of the PMS, but sets minimum requirements for content, management, review, approval and communication.

The Standard focuses on the operational aspects of the pipeline, whereas the Gas Transmission Business (GTB) has additional considerations to manage, such as interface with corporate expectations and requirements; commercial aspects of operation; third party services provided to owners of other pipelines etc. The overall management system for the GTB is, therefore, somewhat broader and more complex than that required by the Standard.

[First Gas AMP, Gas Transmission Asset Management Plan, 2018, Section H.2.3 under sub-heading Pipeline Management System Manual]

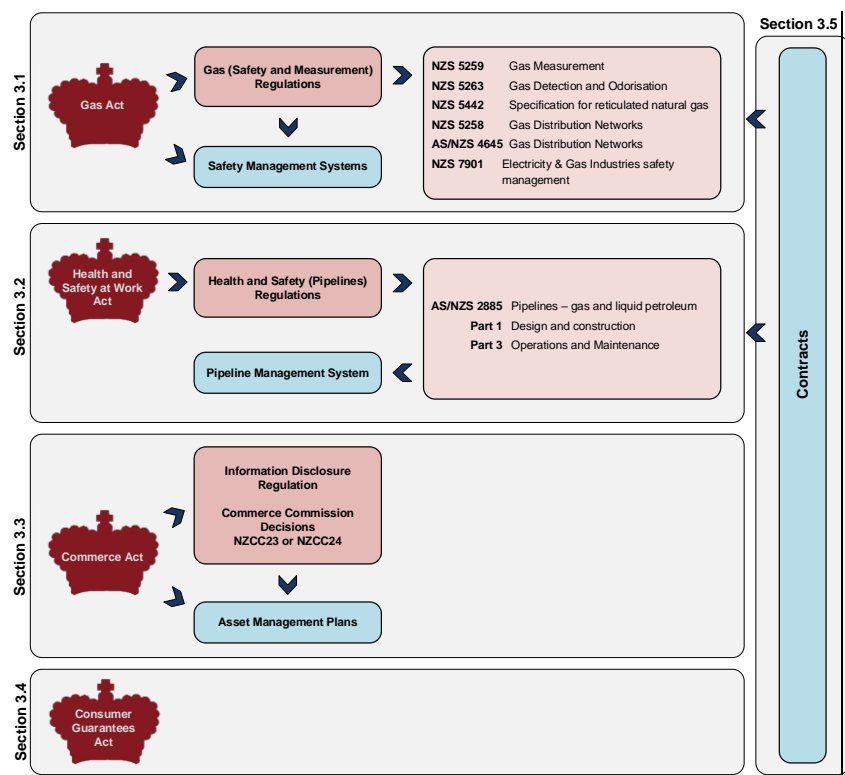
AS/NZS 2885 sets out the requirements for these plans, called Safety and Operating Plans. A Safety and Operating Plan is broadly similar to an SMS in that it involves the systematic identification of hazardous events, their potential causes and consequences, and proposed safeguards that would prevent such events causing damage to plant, equipment, operating personnel, the community and the environment. The Australian version of the standard is more recent (AS2885.3 (2012)) and requires Pipeline Management Systems, which are more comprehensive than Safety and Operating Plans. MDL has advised that Vector, under its management contract for the Maui Pipeline, developed and implemented a Pipeline Management System (PMS) Manual in 2013 to meet the requirements of AS2885.3 (2012). This document replaced the Safety and Operating Plan required under AS2885.1 (2007). The PMS Manual applies to both Vector and MDL assets.

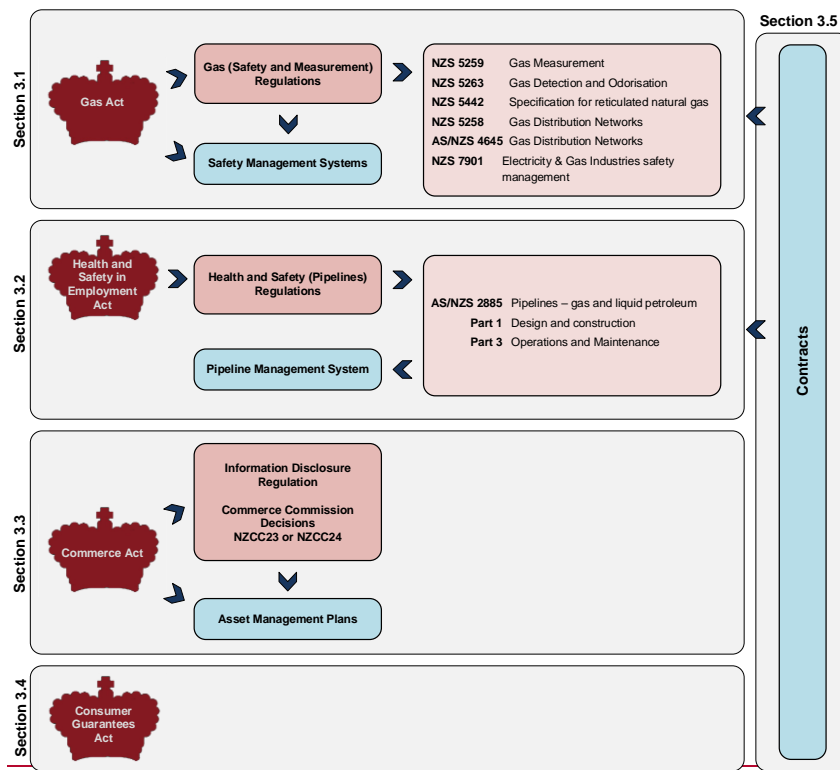
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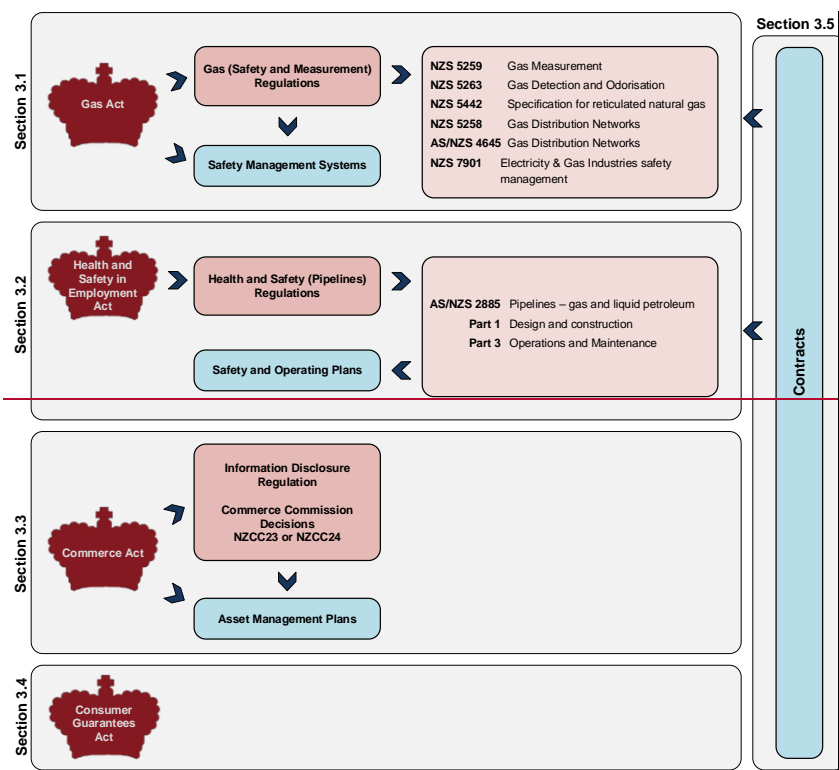


Figure 1 – Road map to which sections of this document discuss each legal area for discussion on documents most relevant to gas quality

3.1 Gas Act 1992

Many aspects of gas quality are governed by regulations and standards under the Gas Act. Of particular relevance is Gas Act s46A, which requires ~~that~~ every person who owns or operates a gas supply system¹² ~~to~~must implement and maintain an 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 ~~who~~that owns or operates the gas supply system.

The more detailed requirements for an SMS are set out in the SM Regulations, issued under Gas Act s54. The SM Regulations also set requirements and responsibilities for gas specification, odourisation and pressure.

¹² Gas Act s46A 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."

SM Regulations

Requirement for safety management systems for distribution pipelines (SM Regulations 30-40)¹³

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SM Regulation 30 provides that every 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. ~~(As noted earlier, Note that~~ an SMS is not required for a gas transmission system¹⁴, but ~~the~~each TSO develops a ~~Pipeline Management System (PMS) Safety and Operating Plan~~, under AS/NZS 2885, which is broader ~~in scope~~ similar to an, as described in SMS (see Section 3.2).

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.

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

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

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.

¹³ The SM regulations offer alternative provisions 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.

¹⁴ SM Regulation 30(5)

Gas characteristics

The SM Regulations specify requirements for particular characteristics of delivered gas, including gas specification, odourisation, and pressure, described ~~in the following sections below~~. Failure to comply with any of these requirements is considered a "level 2" penalty, which would expose the company responsible to a fine not exceeding \$50,000 (SM Regulation 6(2)).

Gas specification (SM Regulation 41)

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

Responsibility for ensuring ~~that the~~ gas complies with the gas specification lies with the retailer or wholesaler ~~who supplies~~ gas to the consumer's point of supply (SM Regulation 41(4)).

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

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Odourisation (SM Regulations 16-19)

SM Regulation 16 requires that gas entering, leaving and within a distribution system is odourised and complies with NZS 5263 Part 2. 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 gas that is supplied to large customers connected to the transmission system with alternative means of detection.

SM Regulation 17 makes every NO responsible for gas entering and within ~~its the~~ distribution system being odourised. The gas retailer is responsible for gas being odourised at a consumer's point of supply. In the case of odourised gas supplied directly from a ~~transmission Vector~~ pipeline to a consumer, it is generally the wholesaler¹⁵ 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

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

SM Regulation 19 requires every NO to have documentation demonstrating that:

- gas in ~~its the~~ system is odourised;
- quality assurance and emergency procedures are in place; and

¹⁵ Gas Act s2(1) provides that a gas wholesaler is Vector, and anyone who supplies gas for resupply.

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

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The SM Regulations reference AS/NZS 4645 Gas Distribution Networks as a relevant standard. Currently all ~~Most, if not all,~~ NOs have opted to use ~~use have now adopted~~ AS/NZS 4645 in preference to NZS 5258. Although both standards cover substantively the same material, AS/NZS 4645 has the more recent update and is closely aligned with the pipeline standard adopted by the TSOs, ~~AS/NZS~~ 2885.

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 5259:2015~~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

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place", so that it "serves as a demonstration of compliance for audit and certification purposes," but also as an overview of the key systems and processes in place for any reader to gain a good understanding of the important components of safe operation."

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One component of a PMS each TSO's Safety and Operating Plan is a Pipeline Integrity Management Plan (PIMP). The PIMP identifies how integrity related risks will be managed. It addresses pipeline structural integrity, external interference, station integrity, anomaly assessment, defect repair, and remaining life review.

3.3 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 of gas pipelines was introduced on 1 July 2013. It currently applies to the transmission systems owned by First Gas, MDL and Vector, and the distribution systems owned by First Gas, GasNet, Powerco, and Vector.

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Currently, gas quality does not feature as one of the quality standards required by price-quality regulation¹⁷, 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 determinations have so far only set has one quality measure: emergency response times.

¹⁷ 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 gas transmission and distribution emergencies; and 60 minutes or less to respond to 80% of emergencies.

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 of the Commerce Act is being met. Of particular relevance to gas quality is the fleshing out of the detail required in the AMPs of ~~the~~ regulated businesses.

Asset Management Plans

~~An~~ AMPs sets 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 24.¹⁸

3.4 Consumer Guarantees Act 1993

The CG Act potentially adds to the consumer-related obligations on industry participants ~~already~~ arising from the Gas Act and Commerce Act, described in sections 3.13.1 and 3.23.2 of this document. In this section, we use the CG Act definition of consumer, which is narrower than the definition used elsewhere in this document. Under the CG Act, a consumer is a residential gas user ~~and, potentially, asome small business gas users~~.¹⁹

Under the CG Act, consumer rights are expressed as a series of "guarantees" that a seller automatically makes when a consumer buys goods or services. Amendments to the CG Act 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 CG Act.

A further revision to the CG Act in 2013 introduced CG Act s7A, clarifesing what the guarantee of acceptable quality is in relation to the supply of gas and electricity, and CG Act s7B, descriesing the relationship of CG Act s7A with rest of CG Act.

¹⁸ 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 NOs) or ~~PMS~~Safety Operating Plans (for the TSOs). For example, there is currently no requirement on the 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.

¹⁹ "Consumer" under the CG Act 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 CG Act does not apply to business transactions.

Basically, there is a guarantee that the supply of gas by a gas retailer is of an acceptable quality, ~~meaning~~ as safe as a reasonable consumer would expect it to be, and ~~able to~~ be used consistently for the things that a reasonable consumer would expect to use it for. CG Act s7A(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 that consumer ~~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, a consumers could have a right of redress against its~~the~~ supplier (that is, the retailer) and against the manufacturer (that is, the producer).

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

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.

3.5 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.

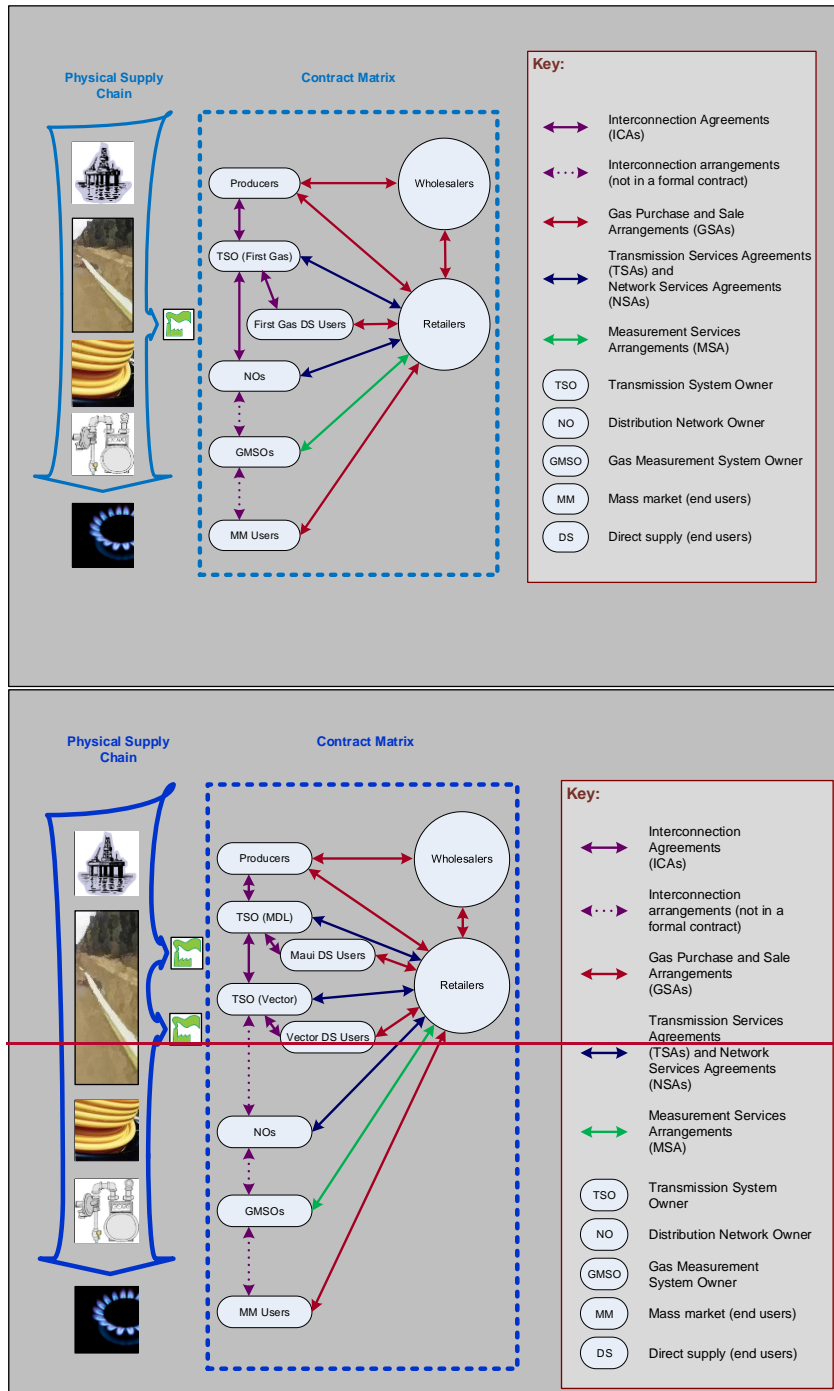
Contracts related to buying, selling and transporting gas invariably have provisions relating to gas quality. In general, the legislative requirement is for a party selling gas to be responsible for the specification of the product it sells. However, where that party is not in direct control of the gas 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 contracts²⁰. All transmission receipt points have associated ICAs, but some transmission delivery points do not.

GTAC Receipt Point ICAs

~~Under transmission system~~ Under both the MDL and Vector Receipt Point ICAs, based on the Gas Transmission Access Code (GTAC) Schedule 5, place responsibility for monitoring and ensuring gas quality with the injecting party ~~it is the injecting party who is responsible for monitoring and ensuring gas quality.~~²¹ GTAC Schedule 5 s6.10 sets out the required frequency for measuring the various characteristics and components of the gas. (See ~~Table 1~~ Table 1 on page 28) It

Both MDL's and Vector's ICAs stipulate minimum frequencies for monitoring gas components. They ~~also~~ allows for that less frequent testing where it can be demonstrated that a relevant limit set out in the Gas Specification is not relevant or cannot be exceeded. ~~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.~~

GTAC s12.2 requires First Gas to ensure that any new RP ICA requires the injecting party to:

- Ensure all injected gas is specification gas;
- indemnify First Gas for any loss it suffers as a result of the injection of non-specification gas; and
- on First Gas request, demonstrate to it that adequate facilities, systems, procedures and monitoring are in place to ensure only specification gas is injected.

These IP obligations are reflected in the Common Receipt Point Interconnection Agreement Provisions at GTAC Schedule 5 s6.

Each injecting party indemnifies First Gas for damages if it injects non-specification gas. First Gas in turn indemnifies pipeline Shippers for any loss they incur as a result of non-specification gas being injected.

²⁰ 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 consumers.

²¹ Although ~~the both~~ TSOs monitor aspects of gas quality, ~~it only does so to in order to~~ determine the energy content of the gas ~~for billing purposes~~.

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GTAC Receipt Point 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 party²². Injecting parties are required to notify MDL of any non-specification gas, and MDL is in turn required to notify other affected parties. MPOC s17 requires direct injecting parties to monitor gas quality as shown in Table 6, and Injecting Welded Parties to ensure that Indirect Injecting Parties monitor the same gas quality components and characteristics.

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.

GTAC Delivery Point Vector pipeline ICAs

Under its Delivery Point ICA, First Gas is not required to monitor gas quality (GTAC Schedule 6 s6.2), and is unlikely to be able to prevent the delivery of non-specification gas (GTAC Schedule 6 s6.3).

If the First Gas pipeline is stipulated as 'odorised', gas in the pipeline must be odorised (GTAC Schedule 6 s7.1). First Gas will inject enough odorant that in normal circumstances will ensure that the gas delivered from downstream distribution networks complies with NZS 5263, but First Gas has no liability for loss of odorisation (GTAC Schedule 6 s7.3). Vector Transmission Code (VTC) s 12 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

²² MPOC s17.1 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.

- ~~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, Vector must promptly notify the interconnected party who is required to stop the 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)

In respect of gas specification, the GTAC requires that Shippers and First Gas ensure that contracts with third parties to buy or sell gas transported in the transmission system require such gas to be specification gas (GTAC s:12.1).

First Gas indemnifies a Shipper for loss where the Shipper takes non-specification gas at a DP, unless the Shipper contributed to that outcome, or failed to mitigate

the loss (GTAC s12.10), regardless of whether First Gas was the causer (GTAC s12.11).

In respect of odorization, First Gas will continue to odorise gas unless ~~in the pipelines that are currently odorised. First Gas can cease odorisation of gas in a pipeline or at a DP if all Shippers agree to cease odorisation (GTAC s13.1), or First Gas by providing~~ 18 months' notice of doing so (GTAC s13.6). First Gas must inject odorant to meet (in normal circumstances) NZS 5263 detectability requirements. If First Gas becomes aware that detectability standard is not being met, it will promptly advise each affected Shipper and take all reasonable steps to remedy the situation (GTAC s-13.3).

Where First Gas receives what it considers to be a reasonable Shipper request, it will conduct odorant spot checks (GTAC s13.4).

Each month, First Gas will publish the results of any odorisation spot checks completed in the previous month. Each year, First Gas will publish a summary report on the facilities, systems, procedures and monitoring it has in place to comply with the requirements of NZS 5263:2003 for the odorisation of pipelines: (GTAC s13.5). 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, MPOC s17 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.~~

VTC s12 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;~~

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- 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, VTC s13 provides that:

- Vector may begin or cease to odourise gas entering a pipeline if all shippers using the pipeline request a change;
- where gas in a pipeline is odourised, Vector will inject enough odourant that in normal circumstances will ensure that the gas delivered from downstream distribution networks complies with NZS 5263;
- Vector will check odourant 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 odourant.

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

Network Services Agreements (NSAs) (also known as Use of Systems Agreements)

Four³¹ NOs offer open access to their distribution networks: First Gas, 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; it excludes events beyond the NO's reasonable control.

In 2014³² some distributors and retailers renegotiated their NSAs have to include service standards relating to the development, monitoring and use of distribution networks. Of particular relevance to gas quality are service standards providing for:

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- Response times to emergencies;
- Communication during interruptions; and
- Information requests.

Gas sale agreements (GSAs)

GSAs deal with the purchase or sale of gas. Although a consumer 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 consumers. The producer therefore will generally have a GSA with the retailer, and the retailer will generally hold a GSA with each of its consumers. 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 ~~would can be expected to~~ specify ~~a~~the point of sale as a transmission receipt point (where gas from either a gas treatment plant, storage facility, 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 a consumer. Each retailer will offer its ownThe standard residential and bespoke commercial ~~retail GSAs are available from each retailer~~.

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Technical standards for gas quality

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

- NZS 5259 Gas Measurement sets requirements for the on-going calibration and inspection of equipment that forms part of a GMS;
- NZS 5263 Gas Detection and Odourisation identifies when and where odourisation is required as the means of detection, the minimum odourant concentrations, and where other means of detection can be used;
- NZS 5442 Specification for ~~R~~eticulated ~~N~~atural ~~G~~as prescribes ranges and limits for the various components of gas, and testing requirements;
- ~~AS/NZS 4645~~~~NZS 5258~~ Gas Distribution Networks contains a number of provisions related to the control, testing and monitoring of pressure ~~(~~AS/NZS 4645~~ Gas Distribution Networks ~~is now used by all NOs, displacing is progressively superseding~~ NZS 5258, Gas Distribution Networks)~~;
- NZS 7901 Electricity & Gas Industries ~~S~~safety ~~M~~management; and
- AS/NZS 2885 Pipelines – ~~G~~gas and ~~L~~iquid ~~P~~petroleum.

A number of other standards relate to the specification of particular pieces of equipment. For example, ~~coalescers, filter separators and~~ odourant vessels are managed under ~~First Gas~~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. Odourant 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.

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Also, NZS 5442 s5.4 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 First Gas transmission Maui and Vector pipelines, as specified in contracts, are provided in Appendix BAppendix A.

NZS 5442 s4.2.1 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).

4.2 Odorisation

NZS 5263 Part 2, which SM Regulation 16 requires odourised gas to comply with, deals with odourant selection, odourant concentration, testing, supplementary odourisation, situations where odourisation is not required, emergency and contingency planning, quality assurance, and guidance/education.

Odorant levels and concentrations are to be tested. Odorant levels ~~being~~ measured by a trained individual smelling different concentrations of gas in air, using an odormeter, ~~and~~ ~~o~~-Odorant concentrations ~~being~~ measured using mercaptan detector tubes or other odorant sensors. (NZS 5263 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. (NZS 5263 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. (NZS 5263 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. (NZS 5263 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 Gas Distribution Networks 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 an Formal Safety Assessment (FSA) and aa_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 '...identify and address any supply and pressure problem likely to jeopardize the proactively identify and address any supply and pressure problems likely to jeopardise the future safety and performance of the gas distribution network. Gas flow and/or network pressure shall be routinely monitored to achieve this objective.' (AS/NZS 4645 s3.4).

AS/NZS 4645 s6.3 deals with network pressure management. In particular, it requires controls to maintain minimum operating pressures (AS/NZS 4645 s6.3.2) and over pressure systems to ensure that the maximum allowable operating pressure (MAOP) is not exceeded (AS/NZS 4645 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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Obligations and means of compliance

The previous chapters set out the legal and technical requirements governing gas quality. This chapter identifies the specific²⁴, key gas quality obligations²⁵ 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. It is important that all parties in the supply chain communicate gas quality information. In addition to the specific means of compliance set out in the table below, W/Rs need to be confident that:

- the ~~Safety and Operating Plan~~SAOPs of TSOs and SMSs of 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 ~~appropriately~~ with the maintenance and replacement of equipment associated with gas quality (gas chromatographs, filters, separators etc); and
- non-specification gas events will be promptly reported and dealt with.

Generally, W/Rs achieve this by having service provider agreements in place that recognise the ~~these~~ requirements, and give W/Rs access to supporting information²⁶.

²⁴ In addition to the specific obligations identified in this chapter, a number of ~~more general~~non-specific obligations may also apply. For example, contracts ~~each party to a applying to participants in the supply chain contract is required require them~~ to act as a Reasonable and Prudent Operator.

²⁵ 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.

²⁶ TSOs and NOs may facilitate this by posting relevant support material, ~~not already disclosed,~~ 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 is met
Gas Producers/Treatment Station Owner/Operator (GP) gas specification obligations and actions	
Obligation	Each GP must only inject gas that meets the gas specification <u>into the transmission system</u> . (ICA between injecting party and the TSO, as per GTAC Schedule 5 s6.1(a)) <u>On becoming aware that it has injected or is injecting Non-Specification Gas, the GP will immediately halt injections until the matter is investigated and resolved. (ICA between injecting party and the TSO, as per GTAC Schedule 5 s6.5(a))</u>
Means of Compliance	Each GP maintains <u>one or more</u> on-line chromatographs and/or other monitoring equipment <u>and</u> monitors gas quality, <u>as required</u> . Where it detects or suspects that non-specification gas is flowing, or is likely to flow, it notifies the TSO as soon as reasonably practical ²⁷ . Notifications of excursions are made via phone, email or alternative immediate form of communication; and a written record of any communications is kept. NZS5442 provides guidance on quality assurance and auditing.
Obligation	Each GP must test gas injected into the transmission system at specified frequencies. (ICA between injecting party and TSO, <u>as per GTAC Schedule 5 s6.10</u>) <u>On First Gas request the GP must promptly provide copies of monitoring, measuring or testing results for up to 5 years prior. (ICA between injecting party and TSO, as per GTAC Schedule 5 s6.16)</u> <u>Note that NZS5442 provides guidance on quality assurance and auditing.</u>

²⁷ This is a requirement of GTAC Schedule 5 s6.5. However, 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 all such breaches 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 GP tests at the frequencies specified (see Table 1 Table 1) and keeps test results to provide to First Gas on request as evidence that testing has occurred. ²⁸ Where the GP does not test at the prescribed frequency, it notifies 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. NZS5442 provides guidance on quality assurance and auditing.
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Transmission System Owner/Operator (TSO) gas specification obligations and actions	
Obligation	<p>TheEach TSO must ensure all practicable steps are taken to ensure that the transmission systempipeline is designed, constructed, operated, and maintained, and suspended or abandoned (as the case may be), in accordance with the appropriate part or parts of AS/NZS 2885. (HSE Pipeline Regulation 8(1)(a))</p> <p>AS/NZS 2885 does not specifically address gas specification, but does require that a documented PMSSafety and Operating Plan is implemented to provide for continued integrity, monitoring and safe operation of the pipeline will be in place to address, among other matters, the safe operation and maintenance of the pipeline. (AS/NZS 2885.3 s1.13.3.1(b))</p> <p>Where First Gas owns a delivery point it will install and maintain equipment to ensure that the dust/compressor oil contamination does not exceed the gas specification limit. (GTAC s12.9)</p> <p>Where First Gas does not own a delivery point its ICA will require the owner to install similar equipment. (GTAC Schedule 6 ICA Schedule Two: Technical Requirements)</p>
Means of Compliance	<p>Regarding gas specification, theEach TSO discharges its obligations by entering into an ICA with each GP requiring that each GPs to only inject specification gas into the transmission system, to indemnify First Gas for any loss arising from the injection of non-specification gas, and to monitors the quality of gas it injects. (As per GTAC Schedule 5 s6.1)</p> <p>Regarding liquid and dust contaminants, where the TSO could have more direct responsibility than it does for gas specification, the TSO</p>

²⁸ ~~GTAC Schedule 5 s6.16 requires the Interconnected Party to provide data to First Gas on request, for up to 5 years prior.~~

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	<p>documents develops, maintains and implements a PMS. The PMS Safety and Operating Plan that, for example, will identify how coalescers and filter/separators are used to protect downstream facilities such as compressors, pressure regulators and meters from fine particles or liquid contaminants and impurities in the gas streams.²⁹ (See First Gas 2018 AMP C.13 and C.21)</p> <p>Coalescers and Filer/Separators are managed under First Gas's Pressure Equipment Management Plan. (See First Gas 2018 AMP K.4 p164) liquid and dust contamination of gas delivered from the system is within specification (through, for example, the maintenance of equipment (filters and separators) and systems). The maintaining of the gas specification would also be addressed.</p> <p>Where First Gas does not own the Delivery Point, it will enter into ICAs that require the owner to install similar equipment. (As per GTAC Schedule 6 ICA Schedule Two: Technical Requirements)</p>
Obligation	The Each TSO must notify shippers if it the TSO believes that non-specification gas has flowed or may flow through a Receipt Point or a Delivery Point. (GTAC MPOC s17.6 and VTC s12.4)
Means of Compliance	Unless otherwise agreed (for example through an industry agreement specifying thresholds for escalating actions depending on the severity of an incident), the each TSO notifies shippers of non-specification gas incidents that are likely to affect pipeline users. Such notification includes sufficient detail for shippers to assess the likely effects on consumers.
Obligation	The TSO, on receiving a written request from a Shipper, will ask the GP to demonstrate it has adequate facilities, systems, procedures and monitoring to ensure that it only injects specification gas. (GTAC s12.6)
Means of Compliance	First Gas will obtain the necessary information from the GP when necessary, and publish a report on its findings.
Distribution Network Owner/Operator (NO) gas specification obligations and actions	
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 develops, maintains and implements an SMS that, for example, provides allows for the maintenance of equipment (such as filters at

²⁹ First Gas is also undertaking a project to identify what contamination control facilities are required onsite to ensure that future pigging operations will have minimal impact to normal operations within the Kapuni Gas Treatment Plant. (First Gas 2018 AMP p97)

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	district regulator stations) and systems to ensure that dust contamination of gas delivered from the system is, as much as practicable, within specification.
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Distribution Network Owner/Operator (NO) gas specification obligations and actions	
Obligation	Each <u>delivery point Interconnected Party must notify First Gas if it becomes aware or suspects that a non-specification gas has flowed</u> NO <u>must notify gas retailers if the NO believes that non-specification gas may flow through a Receipt Point or a Delivery Point. (ICA between TSO and NO, as per GTAC Schedule 6 s6.5Network Services Agreements)</u>
Means of Compliance	<u>NO notifies First Gas when necessary</u> Unless otherwise agreed (for example through an industry agreement specifying thresholds for escalating actions depending on the severity of an incident), each NO notifies shippers of all non-specification gas incidents. Such notification includes sufficient detail for gas retailers to assess the likely effects on consumers, providing as much information as possible on the circumstances.
Gas Measurement System Operator/Operator (GMSO) gas specification obligations and actions	
Obligation	None.
Wholesalers/Retailers (W/R) gas specification obligations and actions	
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	Because gas specification is not <u>in-under</u> their direct control, it is sensible for W/Rs to use 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. Each W/R also maintains emergency procedures that provide for notifying categories of end user of quality excursions via the most suitable communication channels, and for keeping written records of such communications. <u>AThe GTAC also Shipper may also write to the -The TSO, on receiving a written requesting from a Shipper, will it to ask at the GP to demonstrate that it has adequate facilities, systems, procedures and monitoring to</u>

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Means of Compliance	<p><u>Each Month, First Gas will publish on OATIS the results of any odorisation spot checks completed in the previous Month. First Gas shall also publish on OATIS not less than once during each Year a summary report describing the facilities, systems, procedures and monitoring that it uses in order to verify compliance with GTAC s13.2. (GTAC s13.5)</u></p> <p><u>First Gas must maintains documentation demonstrating that staffall persons carrying out odorisationthe testing and monitoring of the odorisation are competent to carry out those functions. (SM Regulation 19(1)(d))</u></p> <p><u>First GasVector maintains documentation demonstrating that all persons carrying out the testing and monitoring of the odorisation are competent to carry out those functions (SM Regulation 19(1)(d))</u></p> <p><u>First Gas Vector conducts spot checks from time to time (but not at all delivery points), and on the reasonable request of Shippers, to tests thatwhether gas leaving its pipelines meets the detectability requirements set out in NZS 5263.</u></p> <p><u>What does AMP say about odorization? If not, First GasVector advises affected shippers and NOs as soon as reasonably practicable and takes all reasonable steps to remedy the situation. (VTC s13.3)</u></p> <p><u>First Gas operates an odorization plant maintenance programme involving periodic checks ranging from monthly testing of instrumentation and pumps to ten yearly internal inspections of transportable odorant vessels. (First Gas 2018 AMP K.4 Table 58 p163)</u></p> <p><u>First Gas publishes the results of any odorisation spot checks each month and a summary report on the facilities, systems, procedures and monitoring it has in place to comply with the requirements of NZS 5263:2003 for the odorisation of pipelines each year, as required by GTAC s13.5.</u></p> <p><u>Regarding staff competencies, First Gas maintains a training and development plan to ensure that pipeline personnel involved with the operation and maintenance of the asset are appropriately trained. These have been developed in accordance with the requirements of AS2885 and audited by Lloyd's Register as part of the Certificate of Fitness. (First Gas 2018 AMP B.5 Table 58 p67).</u></p>
Distribution Network Owner/Operator (NO) gas odorisation obligations and actions	
Obligation	Each NO must ensure all gas in the distribution system complies with Part 2 of NZS 5263 (SM Regulations 16-18)

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Means of Compliance	Each NO conducts spot checks from time to time to test whether the gas in its the distribution network meets the detectability requirements set out in NZS 5263. Where a test fails If not, the NO advises affected gas retailers as soon as reasonably practicable and takes all reasonable steps to remedy the situation. (Good industry practice. For example, see Powerco 2018 AMP <u>s4.5.2 Operational Reliability</u>)
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Distribution Network Owner/Operator (NO) gas odourisation obligations and actions	
Obligation	Each NO must have documentation that demonstrates compliance, including a quality assurance procedure that tests and monitors whether the gas is odorised at all times to the required level, contingency plans, and staff competency documentation. (SM Regulation 19)
Means of Compliance	Each NO develops and regularly reviews competency and testing procedures and keeps test results. At the reasonable request of a gas retailer, the NO makes odorisation documentation available (Good industry practice. For example, see Powerco 2018 AMP Appendix 2, Schedule 13, and s8.8 Asset management improvement programme) (as provided for in NSA service standards)
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's -SMS (and/or AMP) addresses odorisation by, for example, including <ul style="list-style-type: none"> • a contingency plan for responding to emergencies (under/over odorised gas, odour masking, etc); and, • unless the NO relies entirely on <u>First Gas Vector Transmission</u> and has no capability of its own to add odorant: <ul style="list-style-type: none"> ○ a description of odorant injection plant, its location, its maintenance regime, its operation, and service performance; ○ information on the specification of odorant used; and ○ a description of odorant equipment testing and reporting arrangements <p>⇐ (Good industry practice. For example, see Powerco 2018 AMP s6.2.1 Public Safety, s8.7.2 Safety and Hazard Management, and Appendix 2, Schedule 13)</p>
Gas Measurement System Operator/Operator (GMSO) gas odourisation obligations and actions	
Obligation	None.

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Wholesalers/Retailers (W/R) gas odourisation obligations and actions	
Obligation	Each W/R must ensure all gas at a point of supply complies with Part 2 of NZS 5263 (SM Regulation 17) 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	Because odourisation is a service provided to all network users in common, it is sensible for W/Rs to use service provider agreements with parties in the physical supply chain requiring the service provider to: <ul style="list-style-type: none"> • make available its odourisation monitoring documentation on request; • make available odorant test results at least monthly; and • promptly advise if monitoring indicates odorant levels are outside the limits Also, each W/R will maintain emergency procedures that provide for notifying categories of consumer about odourisation incidents via the most appropriate communication channels, and for keeping written records of such communications. The GTAC requires First Gas to publish the results of any odourisation spot checks each month and a summary report on the facilities, systems, procedures and monitoring it has in place to comply with the requirements of NZS 5263:2003 for the odourisation of pipelines each year. (GTAC s13.5) This should assist each W/R to meet its obligations.

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5.3 Pressure

~~Table 4~~Table 4 identifies the primary obligations on each stakeholder in respect of gas pressure, and actions related to those obligations. However, for mass market consumers supplied from distribution networks, pressure incidents are only likely to arise from problems occurring on the distribution network or the 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
Gas Producers/Treatment Station Owner/Operator (GP) gas pressure obligations and actions	

Obligation	<u>Each GP must not cause the Maximum Allowable Operating Pressure (MAOP) of the pipeline to be exceeded. (ICA between injecting party and the TSO, as per GTAC Schedule 5 s3.1(c))</u> Each GP must only inject gas up to an agreed limit, usually the rated pressure of the transmission pipeline (ICA between injecting party and the TSO).
Means of Compliance	Each GP designs and operates suitable pressure control equipment and, where it detects or suspects an over-pressure incident, it notifies the TSO as soon as reasonably practical.

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Transmission System Owner/Operator (TSO) pressure obligations and actions

Obligation	<u>First Gas</u> Each TSO will ensure that an overpressure control system is in place to ensure that the pipeline pressure does not exceed the MAOP, and that transient pressure does not exceed 110% of MAOP. manage pipeline pressures within declared limits and below the MAOP. (MPOC s2.5, AS/NZS 2885.3 s6.3.1(b), and good industry practice) <u>Between Oaonui and the Turangi Mixing Station First Gas will maintain the Target Taranaki Pressure between 42 and 48 Bar gauge. (GTAC s3.33(a))</u>
Means of Compliance	<u>First Gas operate pipelines rated at a range of MAOPs: some rated at 8,620 kPa, some at 7,240, and some at 6,620 kPa. First Gas also operates pressure reduction facilities at transmission system Delivery Points serving major users and distribution networks. From the late 1990s, the transmission pipelines have been designed and operated according to the AS 2885 Pipelines - Gas and Liquid Petroleum suite of standards. Lloyds also carry out an annual audit comparing First Gas practice to AS/NZS 2885 and each five years issue a certificate of fitness. (First Gas 2018 AMP sH.4.7 Compliance)</u> Each TSO designs and operates 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 declares a pipeline emergency

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Distribution Network Owner/Operator (NO) gas pressure obligations and actions

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 develops, maintains and implements 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, normally into a

	<u>GMS, at safe pressures. (Good industry practice. For example, see GasNet 2018 AMP s5.3 Network Pressure Control)</u>
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 designs and operates suitable pressure control equipment and notifies affected parties of any pressure excursions or emergencies where it believes gas cannot be delivered at safe operational pressures. <u>(Good industry practice. For example, see GasNet 2018 AMP s10.13 Safety and Operating Plan)</u>
Gas Measurement System Operator/Operator (GMSO) gas pressure obligations and actions	
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 designs and operates suitable pressure control equipment and advises affected retailers where it becomes aware that gas cannot be delivered at agreed metering pressures as a result, for example, of low inlet pressures or GMS malfunction. <u>(Good industry practice.)</u>
Wholesalers/Retailers (W/R) gas pressure obligations and actions	
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 holds service provider agreements with TSOs and/or NOs and/or GMSOs, with delivery pressure related provisions. Also, each W/R promptly advises their customers of any breach of SM Regulations 42, giving full details. <u>Where necessary W/Rs Consideration should also be given to maintaining and will sharing with NOs the consumption profiles of industrial customers (greater than 10 TJ) or customers on networks where capacity is limited, in order that NOs are able to maintain pressure requirements across their distribution networks. (Good industry practice.)</u>

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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

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.

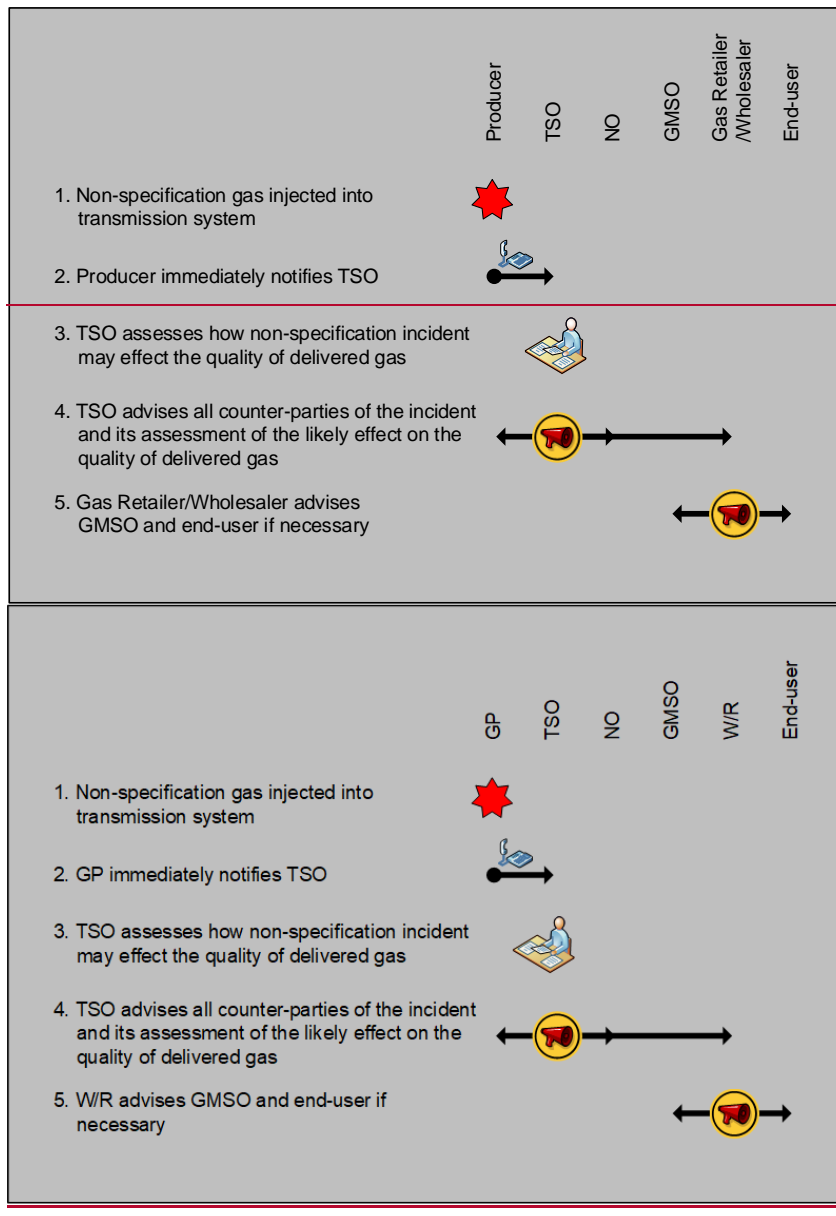


Figure 3 – communication during a gas specification incident

1. The monitoring required of ~~a GPa-injecting party~~ by its ICA should alert it when a non-specification gas incident occurs.

Where it finds that it did inject, or was injecting, Non-Specification Gas (or suspects that it may have done so), the Interconnected Party shall:

(a) notify First Gas as soon as practicable, together with the following information:

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(b) mitigate to the maximum extent practicable the effects of any Non-Specification Gas injected (and assist First Gas to do likewise); and

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3. The GTACMPOC and VTC provides that First Gas the TSO must act as a Reasonable and Prudent Operator (RPO). Inherent in this must be some consideration of what possible effect a non-specification gas incident may have on the quality of gas delivered from the transmission system. For example, if the excursion is for a spike in the calorific value of gas from a minor field where the gas stream will be dispersed into larger flows from other fields, First Gas the TSO may conclude that there will be no significant effect on the quality of delivered gas. This is an assessment that First Gas the TSO is best placed to make since it has the necessary information at hand and is responsible for the safe operation of its system. The actions taken by First Gas the TSO may vary according to this assessment.

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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 ~~GTAC MPOC and VTC~~ requires ~~First Gas the TSO~~ to promptly notify system users ~~on of~~ a non-specification gas incident. For example, ~~GTAC s12.4 -s17.6 of the MPOC~~ provides that:

~~If First Gas becomes aware that Non-Specification Gas has flowed at a Receipt Point, or suspects that it may flow at a Delivery Point, it will notify all Shippers and Interconnected Parties via OATIS as soon as practicable and provide a summary of any details of which it is aware in relation to:~~

- ~~(a) the reason why that gas was or may be Non-Specification Gas;~~
- ~~(b) the likely period of time during which Non-Specification Gas was or may be injected at a Receipt Point, or taken at a Delivery Point; and~~
- ~~(c) the nature and extent of the deviation from the Gas Specification.~~

4. ~~“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.”~~

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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).

The terms of gas supply ~~agreements/contracts~~ do not generally contain provisions about the notification of events, all parties in the gas supply chain should have documented plans in place for responding to non-specification events. Accordingly, if the gas retailer or wholesaler judges that the specification of delivered gas is likely to vary sufficiently to affect the performance of appliances, it would be good practice to notify its customers of this.

Commented [A3]: agreements?

Commented [A4R3]: Yes, thanks.

In addition, the gas retailer or wholesaler should notify the GMS owner of any likely problem.

6.2 Odourisation

The order of communication in two possible odourant incidents is illustrated below. The first shows an odourisation incident arising from the failure of a ~~First Gas Vector~~ odourant plant. The second shows the situation when an NO discovers odourant fade during testing.³⁰

³⁰ Over-odourisation incidents may also occur, but are of less concern from a safety point of view. Communication during such incidents would be the same as during under-odourisation incidents.

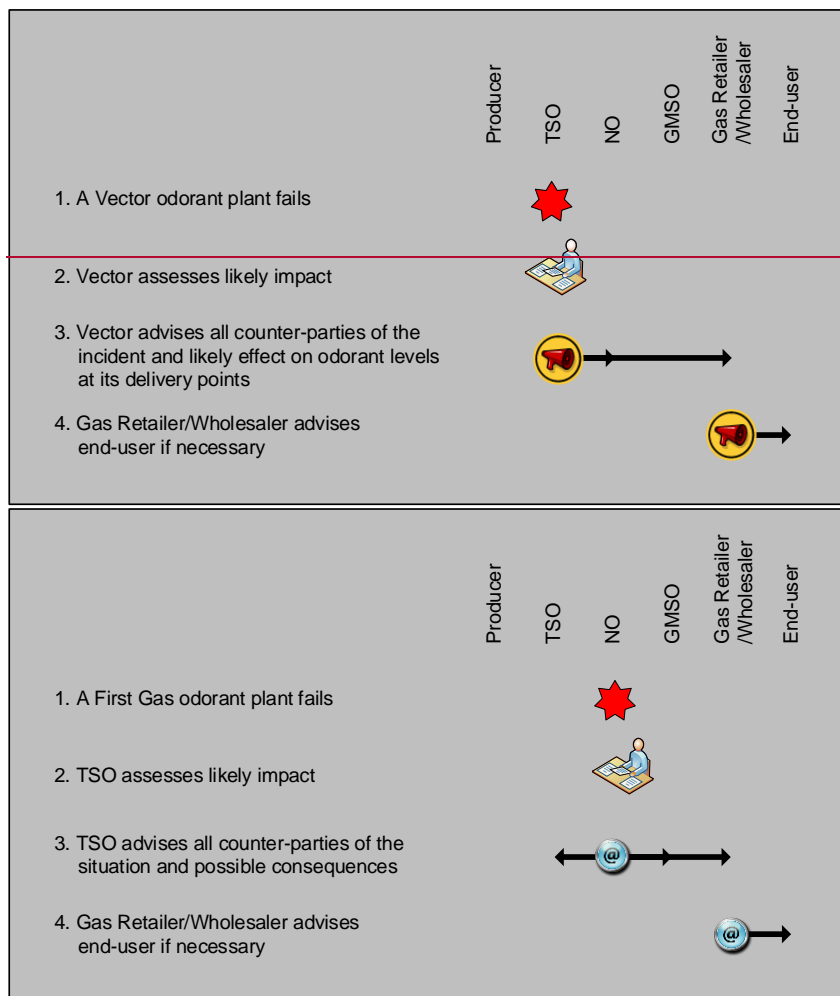


Figure 4 – communication when an odorant plant fails

Communications arising from the failure of a **First GasVector** odorant plant:

- First GasVector** continuously monitors the operation of its larger odorant plants. A SCADA alarm will alert system operators to any failure on these assets.
- As an RPO, **First GasVector** will make an assessment of the likely impact of the failure on the odorant levels of gas at its delivery points. 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 effect 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 when the problem is expected to be resolved.

3. As an RPO, ~~First Gas~~~~Vector~~ will advise parties supplied directly from the affected odorised pipeline (NOs and any directly connected consumers) and gas suppliers of the incident, its likely effect on the odorant levels of gas at its delivery points, the proposed remedy, and when the problem is expected to be resolved.
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 plant failure was likely to significantly affect a consumer's ability to detect a leak, it would be good practice to notify its customers of this.

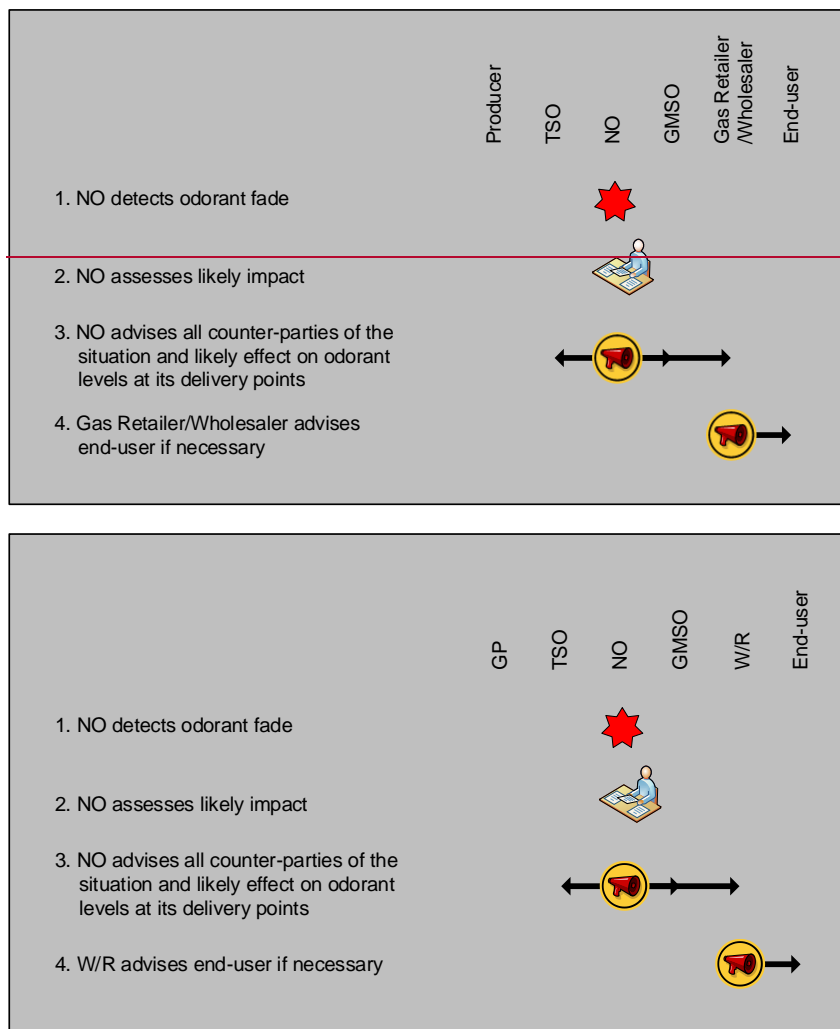


Figure 5 – communication when odorant fade is detected

Communications arising from an NO discovering odorant fade:

1. NOs 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~~ assess the likely impact of the low odourant detectability on odorant levels of gas at its delivery points. 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 effect of an incident rapidly. Where a ~~more-lengthy~~^{lengthier} 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 when the problem is expected to be resolved.

3. As an RPO, the NO will advise gas retailers who supply consumers on the affected section of the distribution network and, if necessary ~~First Gas~~^{Vector} and GMSOs, of the incident, the proposed remedy, and when the problem is expected to be resolved.
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 a consumer'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. GMSOs need gas to be appropriately odorised at all times to ensure any leakage can be detected.~~

Also, when a low odorant incident is reported on a distribution network, ~~First Gas~~^{Vector} ~~Transmission~~ will take a sample at the relevant delivery point to ensure that the cause of the problem is not low levels of odorant in gas delivered to that delivery point.

6.3 Pressure

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.

incident, its likely effect on the pressure of delivered gas, and when the problem is expected to be resolved.

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

Information category			
Information	Requirement to provide information	Where public information can be found	Who can access the information
Contracts			
Gas purchase and sale agreements (GSAs)	No requirement to make these contracts public	Not public	Only parties to contract
Interconnection agreements (ICAs)	Under the MPOG, MDL is required to disclose non-standard ICAs. New ICAs entered into under the GTAC are required to be published in full by GTAC s7.15.	Maui-pipeline ICAs can be found on OATIS	Maui-pipeline ICAs are public Only parties to the contract can view other ICAsPublic
Transmission services agreements (TSAs)	TSAs that are not supplementary agreements are all standard, in the form of GTAC Schedule One. New supplementary agreements entered into under the GTAC are required to be published in full by GTAC s7.6. For older agreements, NZCC24 requires disclosure of "prescribed terms" of "prescribed contracts" including contracts for gas	All public disclosures are available on the relevant TSO's websiteOATIS	Public

	transmission services.		
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 the relevant NO's website	Public
Gas measurement services agreements (GMAs)	No requirement to make these contracts public	Not public	Only parties to the contract
Information	Requirement to provide information	Where public information can be found	Who can access the information
Specification			
Gas composition and/or 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	Although there is no requirement for TSO's to make this information public, both the Maui and Vector IX provide a link to a "Gas Composition Details Page". It provides information on the composition of all gas types (18 in all). GTAC s5.8 requires Gas composition data to be published by 1200 each day.	MDL-OATIS Vector-OATIS	Public Public
Odourisation			
Overview	Decision No NZCC24 s6.2.1	First Gas transmission AMP (for example, First Gas 2018 AMP sC.12 Odourisation Plants) Vector's transmission AMP s3.4.4	Public
Odorant vessels maintenance standards, frequency of testing, replacement and renewals, and expenditure forecast	Decision No NZCC24 s6.3.2	First Gas transmission AMP (for example, First Gas 2018 AMP sK.4 Station Maintenance) Vector's transmission AMP s6.5.4	Public

Anticipated capital expenditure	Decision No NZCC24 s6.6	First Gas transmission AMP (for example, First Gas 2018 AMP sB.1 Schedule 11a)Vector's transmission AMP, Table 6.9	Public
Report on Asset Condition and Explanatory Notes	Decision No NZCC24 s2.6.1	First Gas transmission AMP (for example, First Gas 2018 AMP sB.1 Schedule 12a)Vector's transmission AMP, Schedule 12	Public
SMS	Gas Act s46A, SM Regulations 30-40, and Decision No NZCC24 s6.2.1	Not public	Private to system owners and/or operators
Pressure			
Transmission pipeline pressures	NZCC24 s6.2 requires disclosure of a diagram of each transmission system showing pipe design pressure ratings	All public disclosures are available on the First Gas-relevant TSO's website	Public
Information	Requirement to provide information	Where public information can be found	Who can access the information
Pressure			
Distribution network pressures	NZCC23 s4.2 requires disclosure of maps of all main pipes, distinguished by operating pressure	All public disclosures are available on the relevant NO's website	Public
Gas Measurement System pressures ³¹	No requirement to make this information public	Not public	
	The Gas (Switching Arrangements) Rules 2008 require switching notices, provided by an incumbent retailer to		Private to Registry Participants: ie retailers, NOs and GMSOs

³¹ A proposal is under discussion by the Registry Amendments Project Team (convened by Gas Industry Co) to amend the GAS (SWITCHING ARRANGEMENTS) RULES 2008

	the Registry, to specify the meter pressure		
	GSAs and GMAs		Private to consumer, its retailer and the GMSO

Glossary

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.

exception means that one or more elements of an agreed product specification is deviated from. For example where gas is found to deviate from the NZS 5442 specification.

~~Formal~~ sSafety aAssessment (FSA) is a requirement of AS/NZS 4645 for Gas Distribution Networks to assess risks.

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.

Gas Transmission Access Code (GTAC) means the code containing the common terms of access incorporated by reference into Transmission Services Agreements.

Gas Transmission Business (GTB) means the business associated with transporting gas on the transmission system.

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

GP means a gas producer^s, 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.

incident is an event (or near miss) which results (or would have resulted) in failure to meet a service standard or in damage to people or property⁻. For example, Schedule 16 of the Gas Transmission Information Disclosure Determination 2012 (Decision No. NZCC 24) describes an incident 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."

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.

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 ~~5259:2015~~²⁰⁰⁴ Gas Measurement.

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

OATIS means the online interactive open access transmission information system, or any other replacement information system, that is used to facilitate information exchange.

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

pipeline integrity and management plan (PIMP) is a component of the PMS. It identifies how integrity related risks will be managed, including pipeline structural integrity, external interference, station integrity, anomaly assessment, defect repair, and remaining life review.

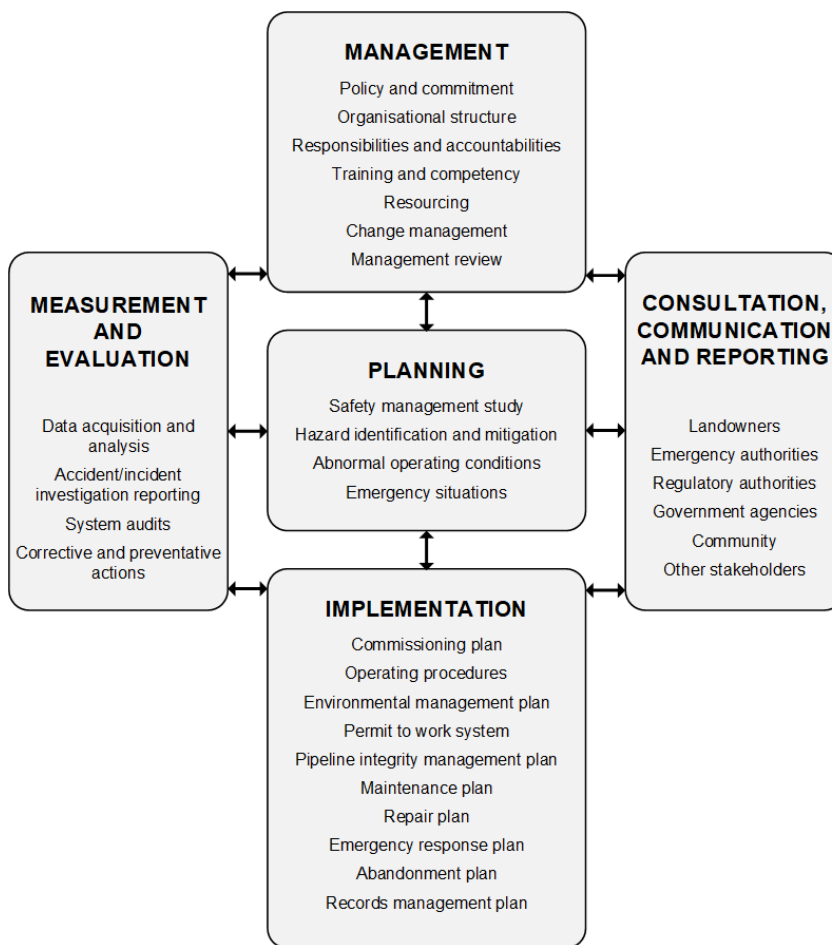
pipeline management system (PMS) has the same meaning as in the AS/NZS 2885.3 s2.1.

safety and operating plan (SAOP) is a requirement of defined by AS/NZS 4645, the Gas distribution network management standard AS/NZS 2885.3 s3.3. AS/NZS 2885 is the standard adopted by TSOs in New Zealand. Gas Distribution to identify and implement the controls necessary to mitigate the risks identified in an FSA.

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Appendix A Pipeline Management System (PMS), as per AS/NZS 2885.3

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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 of Schedule 1 & 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

Gas entering Maui-pipeline		Gas entering Vector-pipeline	
Characteristic/Component	Specified Frequency of Monitoring	Characteristic/Component	Specified Frequency of Monitoring
{MPOC s2.13 of Schedule 1 & s17.15} {MDL ICA s6.9}		Vector Receipt Point ICA 14/1/11 s5.22 & s7.10	
-	-	normal heptane	when requested
-	-	normal octane	when requested
-	-	normal nonane	when requested
-	-	normal decane	when requested
-	-	helium	when requested
-	-	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	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 Document

Gas Industry Co wishes this document 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 document to be issued if required. These arrangements are described in this Appendix.

Proposing changes

Any person may propose a change to this document 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 document, Gas Industry Co will discuss it with the proposer and consult 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 document

Gas Industry Co will decide whether the document 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 document will be given a revision number and a table of revisions will be included in the document.

Appendix C — Responses to Submitters

A draft of this document was released for comment in February 2015. Five submissions were received:

- Genesis Energy
- Greymouth Gas
- Maui Development Limited
- Mighty River Power
- Powerco

The table below summarises the points made in the submissions and Gas Industry Co's responses:

Submitter	Submission	Response
Genesis Energy	Paper sets out penalty for breach of gas specification but not for other quality breaches. Penalty description needs amending. (Section 3.1)	Penalty description has been amended and broadened to cover other quality aspects.
Genesis Energy	Although the Paper set out a number of responsibilities and obligations, how this works in practice need to be clarified. For example, if Genesis Energy considers that the delivered gas is out of specification, or if it wants to clarify values, then the protocol for obtaining this information is unclear.	Gas Industry Co agrees that information should be provided in such circumstances. We encourage the parties to work out a process for ensuring that parties can access gas specification information.
Greymouth Gas	Paper is great as an industry baseline document. Anything without a legislative or factual grounding should be removed. Industry is now working on quality issues; GIC should continue to support.	The purpose of the Paper is both to provide an overview of requirements and to relate how those requirements are met, so we don't intend to delete anything. Gas Industry Co encourages the industry to work through remaining quality issues.
Mighty River Power	Paper is an excellent document and we support its publication and GIC's proposed governance arrangements.	Thank you.
Maui Development Limited	Thinks it too onerous to state that "service providers, gas wholesalers and retailers make available all information they possess relating to gas quality, as detailed in section 5 of this document, that industry participant reasonably need to demonstrate that they are complying with their legal obligations" (Section 1.2)	Gas Industry Co does not agree. The statement is appropriate as a principle of good industry practice.
Maui Development Limited	Provided update on Pipeline Management Systems (Section 3)	Gas Industry Co has adopted the suggested wording.
Maui Development Limited	Provided suggestions on wording of TSO obligations and actions. MDL is looking to standardise the process for injecting parties to demonstrate	Gas Industry Co has reworded the means of compliance section in response to MDL's concerns.

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Submitter	Submission	Response
	compliance with the Gas Specification: (Table 2)	
Maui Development Limited	Has reservations around TSOs being required to assess the "likely consequences" of a gas incident, as the TSO does not have detailed information about downstream users' assets and the effect of an incident will be dependent on other factors such as comingling of gas, the time elapsed, and other specific conditions of the day. (Section 6.1)	Gas Industry Co has reworded so the text talks about "possible effect" and "possible consequences." Gas Industry Co still considers that the TSO is in the best position to provide information about its gas delivery to downstream users.
Maui Development Limited	Non-standard ICAs are required to be published under MPOC (Table 5)	Text amended.
Maui Development Limited	Inaccuracies in references (Table 6)	Corrected.
Maui Development Limited	Provided an appendix of possible opportunities for improvement in gas quality control, monitoring, and reporting.	Gas Industry Co considers that this is useful information and has published it separately on its website.
Powerco	Suggested an addition to the obligations of Wholesalers and Retailers to share information with Nos about industrial customers or where capacity is limited so the NO can work to maintain pressure requirements (Table 4)	Gas Industry Co has added this suggestion to the table.
Powerco	Suggested deleting "if necessary" in relation to reporting to Vector and GMSOs of odorant fade incidents (Bullet 3, section 6.2)	Gas Industry Co has kept the wording, as it is possible that an incident could be so minor that such reporting would not be needed.

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