Gas Quality Requirements and Procedures

October 2019

GAS INDUSTRY COMPANY LIMITED

About Gas Industry Co.

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

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

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

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

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Contents

Register of changes

When change was proposed	Who proposed the change	What the proposed change was	Progress of proposed change:
October~~June~~ 2019	Gas Industry Co	An update of the June 2015 document to reflect the anticipated replacement of the Maui Pipeline Operating Code (MPOC) and Vector Transmission Code (VTC) with the Gas Transmission Access Code (GTAC)	~~In train~~ Anticipated to be in place on 1 April 2020~~October 2019~~

1 Introduction

Gas quality has three main aspects: gas specification, odorisation 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.

1.1 Scope

In this document, "gas" means gas injected into, carried through, or withdrawn from the open access gas transmission or gas distribution pipelines and required by the owners of those pipelines to meet the requirements of NZS 5259: Specification for Reticulated Natural Gas.

~~1.1~~1.2 Objective of this report

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. In particular, it describes:

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

The 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 Gas Industry Co who will periodically re-issue the document in accordance with the governance arrangements set out in Appendix B.

~~1.2~~1.3 Principles of good industry practice

Maintaining gas quality is central to the safe operation and good reputation of the gas industry. It is an aspect of gas supply where parties in the supply chain rely on each other to perform their legal obligations and to follow good industry practice. For example, each gas retailer[1] 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.

[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.

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

- openness about all gas quality incidents[2] and exceptions[3] that occur.
- where an aspect of gas quality (specification, odorisation, or pressure) is, or is expected to be, outside agreed limits, parties:
  - 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 Chapter 7~~section 5~~ of this document, that industry participants reasonably need to demonstrate that they are complying with their legal obligations.

~~1.3~~1.4 Content

This document:

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

[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.

2 Overview of gas quality arrangements

In this paper 'gas quality' includes:

- 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.

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 the 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 hydrate[4] formation. Additional liquid separators and filters may also be installed at gas treatment facilities to further reduce the amount of contaminants passing into the gas transmission system[5].

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

[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~~ Assuming that 150PJ of gas is transported in a year~~each year~~, ~~so~~ it is permissible for around 3,000 litres of oil to enter the pipelines during that period~~each year~~.

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

In addition, gas entering most pipelines has odorant added to it to improve its detectability. Exceptions are gas entering the Maui pipeline and Frankley Road pipeline. Both these pipelines carry only unodorised gas[6].

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, p~~Providing all gas entering the system meets the gas specification, the composition of any delivered gas will also meet specification.

Regarding odorisation, 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 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 odorisation services for the industry. First Gas's transmission system Asset Management Plan (AMP) contains helpful descriptions of its role as provider of odorisation services:

> Under the Gas (Safety and Measurement) Regulations 2010 the legal obligations for gas odorisation are placed with the gas distribution network owners and gas retailers. We provide gas odorisation services to gas distributors and retailers by odorising the gas in the Kapuni transmission system. Odorant levels are regularly monitored at selected locations on the gas transmission system and gas distribution network to ensure satisfactory odorant levels are being maintained.
>
> Gas transmitted through the Maui pipeline and the Frankley Road pipeline is unodorised. Gas transmitted through all other pipelines is odorised. We odorise gas using electronic pumped odorant injection systems supported by bulk odorant storage tanks at KGTP and the major receipt points from the Maui pipeline. Those are Rotowaro Compressor Station, Pokuru Compressor Station and Pirongia. All pumped odorisation systems are monitored by the SCADA system. Some pumped odorisation plants incorporate two or more pumped systems to provide operational N-1 redundancy. Pumped systems operate by measuring gas flow and injecting proportional quantities of odorant into the gas stream to meet prescribed levels.

[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.

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

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

Pumped odorisation plants comprise of a number of components including:

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

Mobile bypass odorant plants are self-contained units.

[First Gas AMP, 2018, Section C.12]

Contaminants

While gas is in the transmission pipeline, contaminants can enter into the gas stream in the form of dust accumulated in the pipeline[7] 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 delivery into major plant or distribution systems. These delivery pressures are normally stable and well below the operating pressure of the upstream pipeline. 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

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 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

[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.

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 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 quality 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 thing. 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[8] and NO subject to Commerce Act Part 4 regulation is required to disclose its AMP (or AMP update) each year. The content of an AMP is prescribed in the relevant Commerce Commission information disclosure decision.[9] The AMP has a wide remit and each regulated TSO and NO must provide information on how: assets are being managed for the long-term; the required level of performance is being delivered; costs are efficient; and, performance efficiencies are being achieved. The AMP should also provide a basis for the ongoing assessment of asset-related risks, particularly high impact asset-related risks[10]. ~~reach,~~ The AMPs encompass~~ing~~ a variety of policies, plans, systems, processes, and so on. Essentially, ~~it~~ the AMP describes all the arrangements that support the efficient delivery of pipeline services for the long-term.

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.[11] The 2012 edition of AS 2885

[8] TSO refers to the transmission system owner and/or operator. Currently First Gas owns and operates the transmission system. It is only system owners that are subject to Part 4 regulation under the Commerce Act.
[9] ~~Commerce Commission 1 October 2012 decision NZCC 23 for distribution and NZCC 24 for transmission.~~
[10] Commerce Commission 1 October 2012 decision NZCC 23 for distribution and NZCC 24 for transmission.
[11] 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).

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 PIMP.

A term occasionally used in NZ, often used to mean broadly the same as PMS, 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 (s46A) and SM Regulations (reg 30) require~~s~~ 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.

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

3 Legal framework for gas quality

The primary pieces of legislation relevant to gas quality are:

- the Gas Act 1992 (Gas Act);
- the Health and Safety at Work Act 2015 (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 gas quality. The Acts and Regulations cite various applicable 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 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 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 TSO are different from those on 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. Instead, the TSO develops plans for the operation and maintenance of its 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 distribution pipelines.[12]

In its transmission AMP, First Gas notes that:

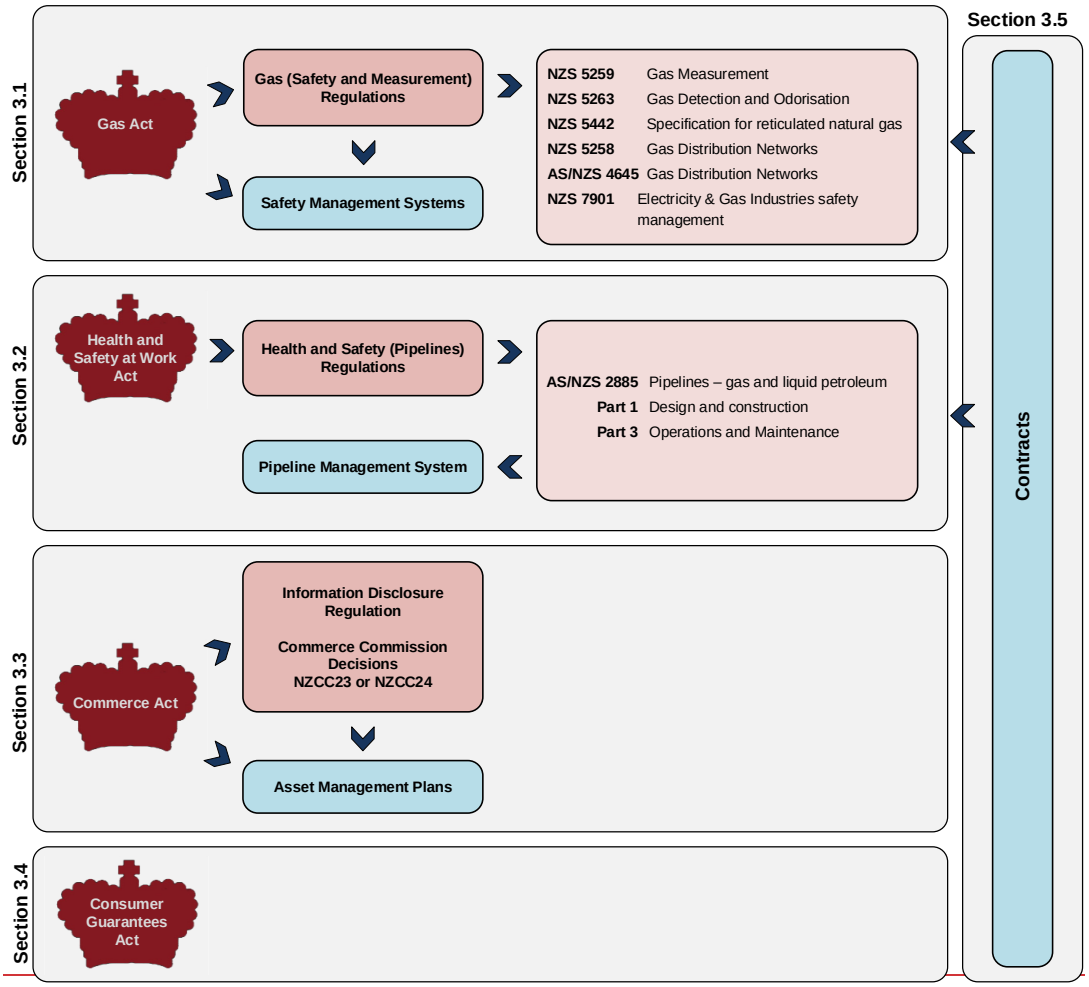
> In accordance with the Health and Safety in Employment (Pipelines) Regulations 1999, First Gas has chosen to adopt AS 2885 (the Standard) as the guiding document for maintaining appropriate standards of safe and sustainable operational practice.

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

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, 2018, Section H.2.3 under sub-heading Pipeline Management System Manual]


Section 3.1
Gas Act
Gas (Safety and Measurement) Regulations
Safety Management Systems
NZS 5259 Gas Measurement
NZS 5263 Gas Detection and Odorisation
NZS 5442 Specification for reticulated natural gas
NZS 5258 Gas Distribution Networks
AS/NZS 4645 Gas Distribution Networks
NZS 7901 Electricity & Gas Industries safety management
Section 3.2
Health and Safety at Work Act
Health and Safety (Pipelines) Regulations
Pipeline Management System
AS/NZS 2885 Pipelines – gas and liquid petroleum
Part 1 Design and construction
Part 3 Operations and Maintenance
Section 3.3
Commerce Act
Information Disclosure Regulation
Commerce Commission Decisions NZCC23 or NZCC24
Asset Management Plans
Section 3.4
Consumer Guarantees Act
Section 3.5
Contracts

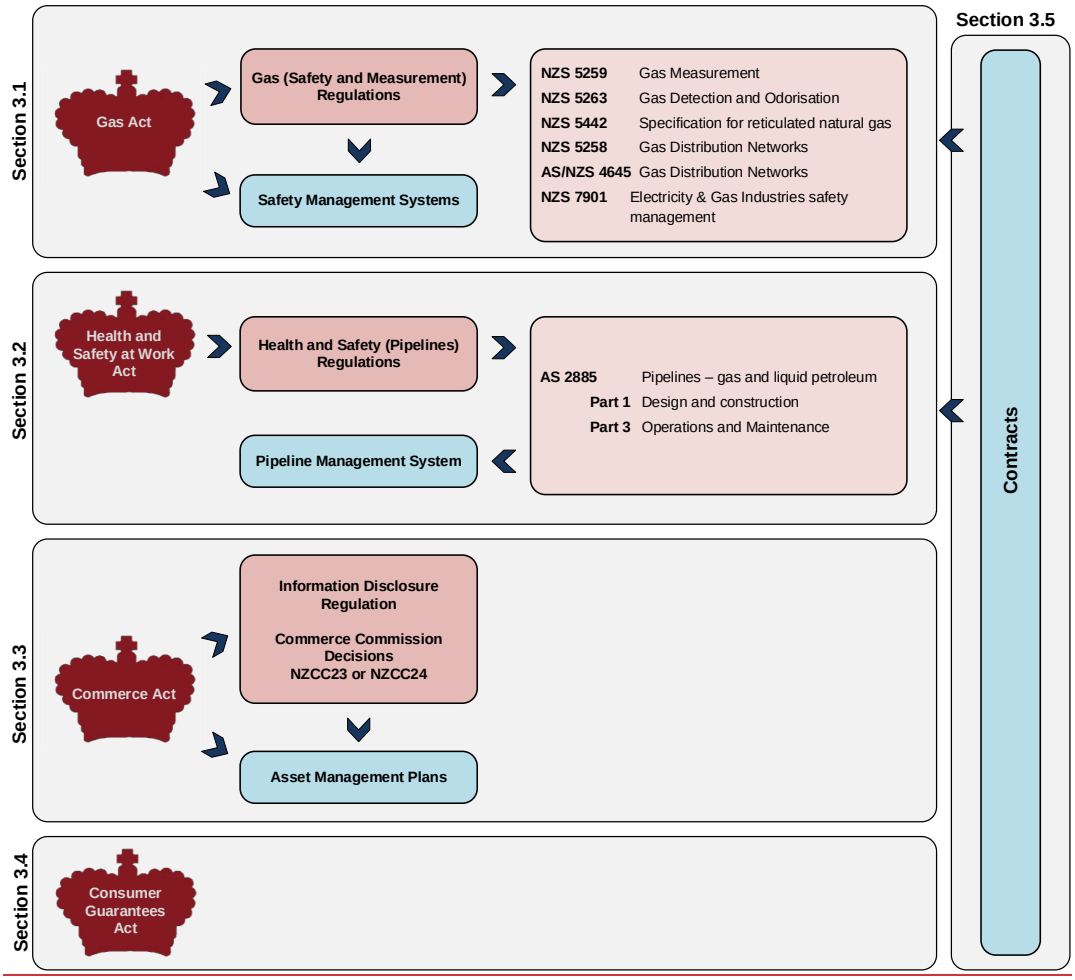


Figure 1 – Road map to which sections of this document discuss each legal area

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 every person who owns or operates a gas supply system[13] to implement and maintain an SMS that prevents, so far as is reasonably practicable,~~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 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, odorisation and pressure.

[13] 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)[14]

SM Regulations reg30 provides that every NO, 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 regs 30 to 40 set out requirements of an SMS and related matters. (As noted earlier, an SMS is not required for a gas transmission system[15], but the TSO develops a PMS, under AS~~/NZS~~ 2885, which is broader in scope, as described in 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 Regulations reg35 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 regs 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.

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.

The SMS operator must make a statutory declaration to WorkSafe the Secretary of Energy, at least once every 5 years, that it has an audit certificate that is still in force (reg37).

The SM Regulations specify requirements for particular characteristics of delivered gas, including gas specification, odorisation, and pressure, described 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 Regulations reg6(2)).

[14] The SM regulations offer alternative provisions depending on whether a distribution system is covered by an audited safety management system (SM Regulations regs30-40) or not (SM Regulations regs 24-28). However owners of all open access distribution systems are covered by audited safety management systems, so only SM Regulations regs 30-40 are considered here.
[15] SM Regulations reg30(5)

Gas specification (SM Regulations reg41)

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 gas complies with the gas specification lies with the retailer or wholesaler who supplies gas to the consumer's point of supply (SM Regulations reg41(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

Odorisation (SM Regulations regs 16-19)

SM Regulations reg16 requires that gas entering, leaving and within a distribution system is odorised 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.

NZS 5263:2003

Gas detection and odorisation

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

SM Regulations reg17 makes every NO responsible for gas entering and within its distribution system being odorised. The gas retailer is responsible for gas being odorised at a consumer's point of supply. In the case of odorised gas supplied directly from a transmission pipeline to a consumer, it is generally the wholesaler[16] who is responsible.

SM Regulations reg18 requires that the odorant selected should not damage the integrity of the distribution system, installations, fittings or appliances.

SM Regulations reg19 requires every NO to have documentation demonstrating that:

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

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

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

Pressure (SM Regulations reg42)

SM Regulations reg42 provides that every gas wholesaler and retailer is responsible for ensuring that the gas it supplies at a consumer's point of supply is at a pressure that ensures its safe use. Such a wholesaler or retailer will rely on parties in the physical supply chain, in particular NOs and GMSOs, to have pressure management arrangements in place.

The SM Regulations reference AS/NZS 4645 Gas Distribution Networks as a relevant standard. Currently all NOs have opted to use 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 TSO, AS 2885.

AS/NZS 4645 contains provisions relating to:

- pressure control (AS/NZS 4645 s4.7), including determination of the Maximum Allowable Operating Pressure (MAOP), and design of overpressure protection systems;
- pressure testing (AS/NZS 4645 s5.5); and
- emergency response (AS/NZS 4645 s9.2.1).

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

The SM Regulations reference NZS 5259 Gas Measurement as a relevant standard. NZS 5259 is principally focused on measurement accuracy, including provisions relating to:

- pressure measurement devices (NZS 5259 s2.8.2 and s3.6.4.6~~s1.2.2.4, s1.2.2.6, s2.2.6, s2.5.3.6 & Appendix A~~);
- pressure measurement (NZS 5259 s2.3.4 and s3.3.4 ~~s2.2.3~~); and
- inspections (NZS 5259 s3.6.4~~s2.5.3.3~~).

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

3.2 Health and Safety at Work Act 2015

HSE Pipeline Regulations

The HSE Pipeline Regulations are enacted under the Health and Safety at Work Act 2015.[17] They require each TSO to appoint a Manager to manage pipeline operations (HSE Pipeline Regulations reg5), supervise the health and safety aspects of pipeline operations

[17] The HSE Pipeline Regulations were amended on 4 April 2016 to reference the Health and Safety at Work Act 2015 rather than the Health and Safety in Employment Act 1992

and ensure that the pipeline only operates when it has a current certificate of fitness. The certificate of fitness will be periodically issued by an independent inspection body recognised by WorkSafe (HSE Pipeline Regulations reg11(3)). The inspection body will review the safety of the pipelines and any equipment necessary for the safe operation of the pipelines (HSE Pipeline Regulations reg10(1)(~~ab~~)) and issue a certificate of fitness (HSE Pipeline Regulations reg10(1)(b)). The certificate of fitness must be renewed at least every 5 years (HSE Pipeline Regulations reg9(2)(b)).

First Gas has elected to design and operate its transmission pipelines according to AS 2885, one of the standards cited as a means of compliance by the HSE Pipeline Regulations.

AS 2885.3 requires that a documented Pipeline Management System (PMS) is implemented to provide for continued integrity, monitoring and safe operation of the pipelines (AS 2885.3 s1.1(b)). The PMS will be periodically independently audited (AS 2885.3 s2.2.5.4). The scope of a PMS is illustrated in Appendix B of AS~~/NZS~~ 2885.3, and in Appendix A below.

AS~~/NZS~~ 2885:1997
Pipelines - Gas and liquid petroleum

Part 1 – Design and construction
Part 2 – Welding
Part 3 – Operation and maintenance
Part 4 – Submarine pipeline systems
Part 5 – Field pressure testing

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

As explained in the earlier quote from Section H.2.3 of the First Gas transmission AMP, the PMS exists within First Gas's broader management system. To demonstrate that all elements of the PMS have been addressed, First Gas maintains a PMS Manual that it describes as a bridging document, providing a map between the Standard and the control processes in place, so that it serves as a demonstration of compliance for audit and certification purposes.

One component of a PMS is a 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 annual disclosure of 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

Price-quality regulation of gas pipelines was introduced on 1 July 2013 and amended in 2017. It currently applies to the transmission system owned by First Gas, and the distribution systems owned by First Gas, GasNet, Powerco, and Vector. There are two types of price-quality paths relevant to businesses that supply~~iers of~~ gas pipeline services (GPBs). All GPBs~~businesses~~ start on a 'default' price-quality path (DPP). The Commission use relatively low-cost approaches to set these paths across the industry. However, i~~I~~f a default path does not suit the circumstances of a GPB~~business however~~, it can apply for and propose its own 'customised' path. Customised price-quality paths (CPP) use more business specific information, and rely on more in-depth audit, verification, and evaluation processes.[18]

Price-quality regulation helps ensure services important to consumers are provided at a quality they demand. However~~Currently~~, gas ~~quality~~ specification and ~~odorisation~~odorisation currently do~~es~~ not feature as ~~one of the~~ quality standards required by price-quality regulation.[19]

As background information, we note that ~~Quality regulation helps ensure services important to consumers are provided at a quality they demand. I~~in setting the second ~~default price-quality path (~~DPP~~)~~ for gas pipeline businesses in 2017, the Commerce Commission retained the single quality measure for NOs: emergency response times (RTE). NOs must respond to all emergencies within 180 minutes and to 80% of all emergencies in 60 minutes or less.

There are two quality measures that apply to the TSO: emergency response times and no major interruptions.

The TSO must respond to all emergencies on the gas transmission network within 180 minutes and there must be no major interruptions.

Consumer groups identified reliability as the most important aspect of quality. As a result, the Commission introduced the major interruption[20] standard into transmission system price-quality regulation. From 1 October 2017, a major interruption results in a breach of the quality path and a reporting requirement.

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[18] For further information refer to the Commerce Commission's website, https://comcom.govt.nz/regulated-industries/gas-pipelines/gas-pipelines-price-quality-paths

[19] ~~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~~The standards are periodically reviewed. For example, t~~T~~he Commission considered adding an interruptions standard for NOs in 2017 but determined this was unlikely to deliver additional benefits as there have been few significant interruptions. So gas quality may come under consideration in future reviews. ~~a gas quality. For example 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. ~~Although~~~~The Commission considered adding an interruptions standard for NOs in 2017 but determined this was unlikely to deliver additional benefits as there have been few significant interruptions.~~

[20] A major interruption means an incident on the transmission assets owned or controlled by First Gas that causes or contributes to a critical contingency which results in curtailment directions being issued in respect of any band beyond Band 1.

~~, 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 price-quality determinations have so far only set one quality measure: emergency response times.~~

Information disclosure

Commerce Commission Decision NZCC 23 sets out the information disclosure requirements for gas distribution businesses, and Decision NZCC 24 sets out the information disclosure requirements for gas transmission businesses. Both decisions are dated 1 October 2012 and have had a series of amendments. 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 schedule 10 of the annual information disclosures and the fleshing out of the detail required in the AMPs of regulated businesses. Schedule 10a and 10b of the information disclosure provides information on the network's reliability, integrity and aspects of product quality.

Asset Management Plans

An AMP 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.[21]

3.4 Consumer Guarantees Act 1993

The Consumer Guarantees Act (CG Act) potentially adds to the consumer-related obligations on industry participants arising from the Gas Act and Commerce Act, described in sections 3.1 and 3.2 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 generally a residential gas user.[22]

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

[21] 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 (for the TSO). ~~For example, there is currently no requirement on the TSO or NOs to disclose the number of incidents of non-specification gas entering a pipeline, although this should be an important concern to consumers. It should be noted that~~However, The TSO reports the number of incidents relating to gas specification in schedule 10b of the annual information disclosure.

[22] '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.

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, clarifies what the guarantee of acceptable quality is in relation to the supply of gas and electricity, and CG Act s7B, describes the relationship of CG Act s7A with rest of CG Act. 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 a consumer's attention before that consumer 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 consumer could have a right of redress against its supplier (that is, the retailer) and against the manufacturer (that is, the producer).

Whether a consumer has a right of 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 have a right to redress in all circumstances where it is affected by a gas supply issue. 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 a 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

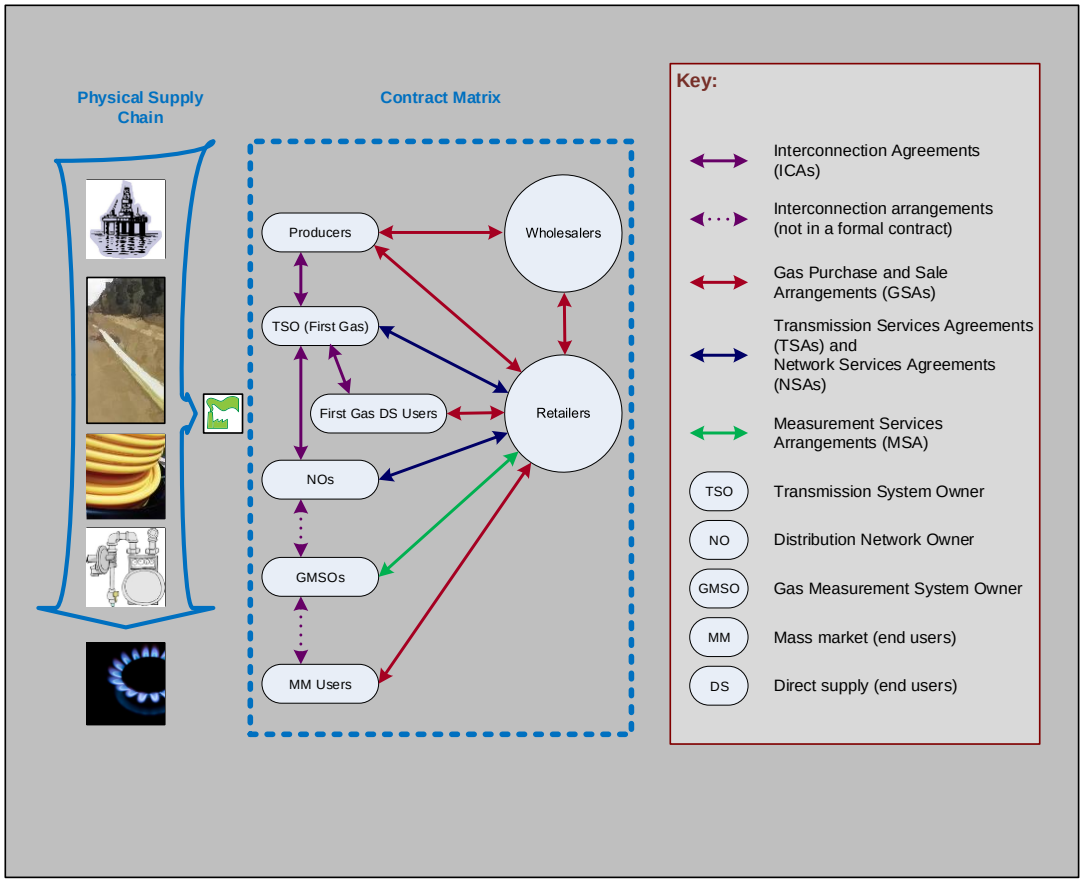
Contracts do not displace the legislative requirements or any associated criminal liability. However, they can allocate responsibilities for the work/costs of meeting those requirements, and may allocate civil liability.

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

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

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

Figure 2 – contracts with significant gas quality provisions



Interconnection agreements (ICAs)

ICAs are contracts between the owners of interconnecting assets, such as gas treatment facilities, and transmission pipelines. ICAs are not always formally recorded in written

contracts[23]. All transmission receipt points have associated ICAs[24], but some transmission delivery points do not.

GTAC Receipt Point ICAs

The ~~T~~transmission system 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.[25] GTAC Schedule 5 s6.10 sets out the required frequency for measuring the various characteristics and components of the gas. (See Table 1 ~~above~~ below) It also allows for less frequent testing where it can be demonstrated that a limit set out in the Gas Specification is not relevant or cannot be exceeded.

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

- ~~E~~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 injecting party~~IP Interconnected Party~~ 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.

GTAC Delivery Point 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).

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[23] For example there are generally no documented ICAs between GMSOs and consumers.

[24] Such ICAs may be under the new GTAC or under the ex-Vector receipt point ICAs. Parties may choose to remain on the ex-Vector ICA until their existing agreements expire or are terminated. The ex-Vector ICAs have very similar provisions for gas quality as the new GTAC ICAs.

[25] Although the TSO ~~monitors~~ records aspects of gas quality such as CV, First Gas says that it only does so to determine the energy content of the gas for billing purposes. This information is referred to as "Gas Composition Data" in the GTAC. GTAC s5.8 includes an obligation on First Gas as transmission network owner to "publish on OATIS not less than once during each Year a summary report describing the facilities, systems, procedures and monitoring it uses to verify that the [Gas Composition] data published pursuant to GTAC ~~s~~section 5.8 is accurate"

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 s12.1).

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).[26] ~~, regardless of whether First Gas was the causer (GTAC s12.11).~~

In respect of odorisation, First Gas will continue to odorise gas unless all Shippers agree to cease odorisation (GTAC s13.1), or First Gas provides 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 s13.3).

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).

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

Four 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.

Some NSAs have service standards relating to the development, monitoring and use of distribution networks. Of particular relevance to gas quality are service standards providing for:

[26] The indemnity is subject to the limitations and exclusions of GTAC ss16.2-16.7 (GTAC s12.11), and also GTAC s16.1 if First Gas caused or contributed to the gas becoming non-specification (GTAC s12.12).

- ~~R~~response times to emergencies;
- ~~C~~communication during interruptions; and
- ~~I~~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 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 specify a 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 own standard residential and bespoke commercial GSAs.

4 Technical standards for gas quality

This chapter broadly describes the technical requirements 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 Odorisation identifies when and where odorisation is required as the means of detection, the minimum odorant concentrations, and where other means of detection can be used;
- NZS 5442 Specification for Reticulated Natural Gas prescribes ranges and limits for the various components of gas, and testing requirements;
- AS/NZS 4645 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 NZS 5258 Gas Distribution Networks);
- NZS 7901 Electricity & Gas Industries Safety Management; and
- AS~~/NZS~~ 2885 Pipelines – Gas and Liquid Petroleum.

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

4.1 Gas specification

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

Characteristics and components

In regard to testing, NZS 5442 s5 requires that the methods used must allow for the value of a characteristic or component to be determined with 95% confidence. The frequency of

testing is to be such '…that any potential deviations beyond the limits are likely to be detected when they occur'.

Also, 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.

Table 1 sets out the limits on gas 'characteristics and components' specified in NZS5442, and the frequency of testing specified in the GTAC.

Table 1 - Gas specification characteristic and component NZS 5442 limits and GTAC testing frequency

Characteristics and components	NZS 5442 Limit		GTAC testing frequency
Wobbe Index	Minimum Maximum	46.0 MJ/scm 52.0 MJ/scm	continuously
Relative density	Maximum	0.80	continuously
Oxygen - for gas to be transported through medium and low pressure systems only	Maximum	1.0 mol %	continuously
- In all other cases	Maximum	0.1 mol %	
Hydrogen	Maximum	0.1 mol %	as required but not less than quarterly
Hydrogen sulphide	Maximum	5 mg/scm	as required but not less than quarterly
Total sulphur (after odorant addition)[27]	Maximum	50 mg/scm	as required but not less than quarterly
Water	Maximum	100 mg/scm	continuously
Total halogens	Maximum	25 mg/scm	-
Hydrocarbon dewpoint temperature	Maximum	2 ºC at 5 MPa	continuously
Temperature	Minimum Maximum	2 ºC 40 ºC	continuously

Contaminants

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

[27] The amount of sulphur added at normal odorant injection rates is of the order of 6 mg/scm.

of oil in gas downstream of the compressor station to 20ml/TJ, but does not specify the method or frequency of monitoring for contaminants (either oil or dust).

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

4.2 Odorisation

NZS 5263 Gas Detection and Odorisation Part 1 deals with performance standards when gas is expected to be detected by odour. For example, the required documentation – such as monitoring and testing records, and information exchange between parties in the supply chain – is listed, and a code compliance checklist is provided.

Compliance with NZS 5263 Part 2, is deemed by ~~which~~ SM Regulations reg16(2) to meet the odorisation requirement of SM Regulations reg16(1). SM Regulations reg16 also~~requires odorised gas to comply with,~~ deals with odorant selection, odorant concentration, testing, supplementary odorisation, situations where odorisation is not required, emergency and contingency planning, quality assurance, and guidance/education.

The minimum odorant concentration in natural gas is 3 mg/m^3, and the rate of dosage is to be monitored sufficiently frequently to give confidence that this is achieved. (NZS 5263 s2.3.1)

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 odorometer, and 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 FSA and a 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 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).

5 Obligations and means of compliance

The previous chapters set out the legal and technical requirements governing gas quality. This chapter identifies the specific[28], key gas quality obligations[29] 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 Regulations reg41 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 SAOPs of the 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 the 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 these requirements and give W/Rs access to supporting information[30].

[28] In addition to the specific obligations identified in this chapter, a number of more general obligations may also apply. For example, contracts each party to a supply chain contract is required to act as a Reasonable and Prudent Operator.
[29] 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.
[30] The TSOs and NOs may facilitate this by posting relevant support material, 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 Means of Compliance	Primary obligations in respect of gas specification (and where the obligation arises from) 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 into the transmission system. (ICA between injecting party and the TSO, as per GTAC Schedule 5 s6.1(a)) On becoming aware that it has injected or is injecting Non-Specification Gas, the GP will (unless otherwise agreed by First Gas) immediately halt injections until it has investigated the matter and determined that no more non-specification gas will be injected~~the matter is investigated and resolved.~~ (ICA between injecting party and the TSO, as per GTAC Schedule 5 s6.4~~6.5(a)~~)
Means of Compliance	Each GP maintains one or more on-line chromatographs and/or other monitoring equipment to monitor gas quality. 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[31]. 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, as per GTAC Schedule 5 s6.10) 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) Note that NZS5442 provides guidance on quality assurance and auditing.

[31] 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. 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 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) and keeps test results to provide to First Gas on request.

Transmission System Owner/Operator (TSO) gas specification obligations and actions	
Obligation	The TSO must as far as is reasonably practicable ensure all practicable steps are taken to ensure that the transmission system 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 Regulations reg8(1)(a)) AS~~/NZS~~ 2885 does not specifically address gas specification, but does require that a documented PMS is implemented to provide for continued integrity, monitoring and safe operation of the pipeline. (AS 2885.3 s1.1(b)) 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) 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)
Means of Compliance	Regarding gas specification, the TSO discharges its obligations by entering into an ICA with each GP requiring each GP 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 monitor the quality of gas it injects. (As per GTAC Schedule 5 s6.1) Regarding liquid and dust contaminants, where the TSO has more direct responsibility than it does for gas specification, the TSO documents and implements a PMS. The PMS, 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.[32] (See First Gas 2018 AMP C.13 and C.21)

[32] 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)

	Coalescers and Filer/Separators are managed under First Gas's Pressure Equipment Management Plan. (First Gas 2018 AMP K.4 p164) 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)
Obligation	The TSO must notify shippers if it believes that non-specification gas has flowed or may flow through a Receipt Point or a Delivery Point. (GTAC 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 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~~ implement~~ing~~ an SMS. (SM Regulations reg30) The purpose of an SMS is to ensure as far as is reasonably practicable that the supply system does not present a significant risk of serious harm to the public or significant damage to property. (SM Regulations reg3)
Means of Compliance	Each NO develops, maintains and implements an SMS that, for example, provides for the maintenance of equipment (such as filters at district regulator stations) and systems to ensure that dust contamination of gas delivered from the system is, as much as practicable, within specification.

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

Obligation	Each delivery point Interconnected Party must notify First Gas if it becomes aware or suspects that non-specification gas has flowed. (ICA between TSO and NO, as per GTAC Schedule 6 s6.5)
Means of Compliance	NO notifies First Gas when necessary, 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 Regulations reg41)
Means of Compliance	Because gas specification is not under 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. A Shipper may also write to the TSO requesting it to ask a GP to demonstrate that it has adequate facilities, systems, procedures and monitoring to ensure that it only injects specification gas. (as per GTAC Schedule 5 s6.6 and Schedule 6 s6.6)

5.2 Odorisation

Table 3 identifies the primary obligations on each stakeholder in respect of gas odorisation and actions related to those obligations. Requirements for the provision of odorisation information are determined by the service standards in the use of system agreements. Information not specified in use of system agreements should be made available at reasonable request.

Table 3 – odorisation obligations and actions

Obligation	Primary obligations in respect of gas odorisation (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 odorisation obligations and actions	
Obligation	None, unless ICA with the TSO requires that odorised gas is injected into the transmission pipeline.
Means of Compliance	-
Transmission System Owner/Operator (TSO) gas odorisation obligations and actions	
Obligation	The SM Regulations odorisation requirements do not apply to gas in the transmission system. (SM Regulations reg16) However, where First Gas does odorise gas in a transmission pipeline, it is required to inject sufficient odorant that will normally ensure the gas meets the detectability requirements of NZS 5263:2003: Gas Detection and Odorisation. (GTAC s13.2) First Gas is required to conduct spot checks on each odorised pipeline owned by it (but not at all delivery points on any such pipeline) to test the standard is being met. (GTAC s13.3) And where it receives a reasonable written request from a Shipper. (GTAC s13.4) Each Month, First Gas will publish on OATIS[33] 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) ~~First Gas must maintain documentation demonstrating that staff carrying out odorisation testing and monitoring are competent to carry out those functions. (SM Regulations reg19(1)(d))~~
Means of Compliance	First Gas conducts spot checks from time to time, ~~(~~but not at all delivery points (GTAC s13.3), and on the reasonable request of Shippers, tests that gas leaving its pipelines meets the detectability requirements set out in NZS 5263 (GTAC s13.4). If not, First Gas advises affected shippers and NOs as soon as reasonably practicable and takes all reasonable steps to remedy the situation. ~~(VTC s13.3)~~ First Gas operates an odorisation 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)

[33] TACOS (Transmission Access Code Operating System) is the interactive information system that supports the GTAC and replaces OATIS.

	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. 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 AS_2885 and audited by Lloyd's Register as part of the Certificate of Fitness. (First Gas 2018 AMP B.5 Table 58 p67)
Distribution Network Owner/Operator (NO) gas odorisation obligations and actions	
Obligation	Each NO must ensure all gas in the distribution system is odorised and is readily detectable when mixed with air at concentrations equivalent to and in excess of one-fifth of the lower explosive limit of the gas.~~complies with Part 2 of NZS 5263~~ (SM Regulations reg16(1)~~ 18~~)
Means of Compliance	Each NO conducts spot checks from time to time to test whether the gas in its distribution network meets the detectability requirements set out in NZS 5263. Where a test fails, 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 s4.5.2 Operational Reliability)

Distribution Network Owner/Operator (NO) gas odorisation 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 Regulations reg19)
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)
Obligation	Each NO must ~~ensure all practicable steps are taken to prevent the supply system presenting a significant risk of harm or damage, by~~ implement~~ing~~ an SMS. (SM Regulations reg30) The purpose of an SMS is to ensure as far as is reasonably practicable that the supply system does not prevent a significant

	risk of serious harm to the public or significant damage to property. (SM Regulation reg3)

Means of Compliance	Each NO's SMS (and/or AMP) addresses odorisation by, for example, including
	• a contingency plan for responding to emergencies (under/over odorised gas, odour masking, etc); and,
	• unless the NO relies entirely on First Gas and has no capability of its own to add odorant:
	  ○ 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
	(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)

Gas Measurement System Operator/Operator (GMSO) gas odorisation obligations and actions	
Obligation	None.
Wholesalers/Retailers (W/R) gas odorisation obligations and actions	
Obligation	Each gas retailer in respect of reticulated gas and gas wholesaler in respect of non-reticulated gas must ensure that the gas it supplies is odorised. ~~W/R must ensure all gas at a point of supply complies with Part 2 of NZS 5263~~ (SM Regulations reg17) Each W/R must have documentation that demonstrates that the gas it supplies is odorised, and that the odorant will not damage the distribution system, gas installation, fittings or gas appliance~~ compliance, including a quality assurance procedure that tests and monitors whether the gas is odorised at all times to the required level, and contingency plans~~ (SM Regulations regs19, 16 and 18~~r~~)
Means of Compliance	Because odorisation 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: • make available its odorisation 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, it is good practice for each W/R to~~will~~ maintain emergency procedures that provide for notifying categories of consumer about odorisation incidents via the most appropriate communication channels, and for keeping written records of such communications.

5.3 Pressure

Table 4 identifies the primary obligations on each stakeholder in respect of gas pressure, and actions related to those obligations. However, for mass market 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 Means of Compliance	Primary obligations in respect of gas pressure (and where the obligation arises from) An example of how the obligation will be met
Gas Producers/Treatment Station Owner/Operator (GP) gas pressure obligations and actions	
Obligation	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))
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.
Transmission System Owner/Operator (TSO) pressure obligations and actions	
Obligation	First Gas 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. (AS 2885.3 s6.3.1(b)) 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))
Means of Compliance	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)

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 Regulations reg30) The purpose of an SMS is to ensure as far as is reasonably practicable that the supply system does not present a significant risk of serious harm to the public or significant damage to property. (SM Regulations reg3)
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 GMS, at safe pressures. (Good industry practice. For example, see GasNet 2018 AMP s5.3 Network Pressure Control)
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. (Good industry practice. For example, see GasNet 2018 AMP s10.13 Safety and Operating Plan)
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. (Good industry practice.)
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 Regulations reg42)

Means of Compliance	Each W/R holds service provider agreements with the 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 reg42, giving full details. Where necessary W/Rs will share 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.)

6 Exceptions and Incidents

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

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

6.1 Gas specification

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.

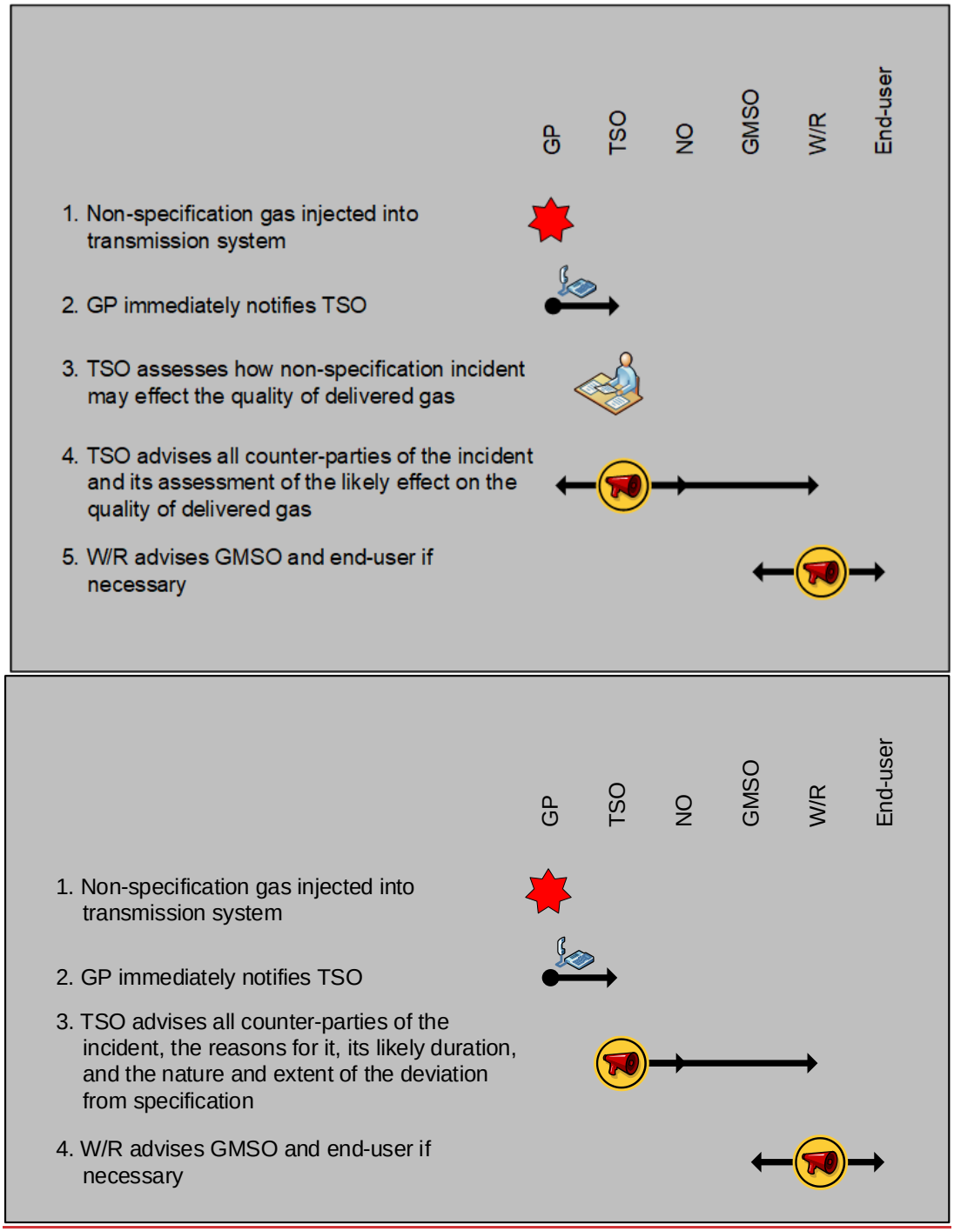


Figure 3 – communication during a gas specification incident

Communication arising from the injection of non-specification gas into a transmission pipeline:

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

2. The ICA requires the GP to notify the TSO of non-specification gas. For example, GTAC Schedule 5 s6.5~~6~~ provides that:

> 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:
>
> (i) the reason why Non-Specification Gas was injected;
>
> (ii) the likely time during which Non-Specification Gas was injected and the estimated quantities of Non-Specification Gas injected; and
>
> (iii) the extent to which, in terms of the gas characteristics and components referred to in section 6.10, the gas it injected was Non-Specification Gas,
>
> (b) mitigate to the maximum extent practicable the effects of any Non-Specification Gas injected (and assist First Gas to do likewise); and
>
> (c) remedy the cause of the injection of Non-Specification Gas before injecting any further Gas at that Receipt Point, and take all practicable steps to prevent further injection of Non-Specification Gas.

~~3. The GTAC provides that First Gas 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 may conclude that there will be no significant effect on the quality of delivered gas. This is an assessment that First Gas 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 may vary according to this assessment.~~

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

~~4.~~3. The GTAC requires First Gas to promptly notify system users of a non-specification gas incident. For example, GTAC s12.4 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.

The GTAC also provides that First Gas must act as a Reasonable and Prudent Operator (RPO). Depending on the circumstances, this may involve assessing the effect a non-specification gas incident 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 may conclude that there will be no significant effect on the quality of delivered gas. This is an assessment that First Gas 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 may vary according to this assessment.

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

~~5.~~4. Note that the TSO will not have a relationship with the GMSO (unless the GMSO is party to ~~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 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.

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

6.2 Odorisation

The order of communication in two possible odorant incidents is illustrated below. The first illustration (Figure 4) shows an odorisation incident arising from the failure of a First Gas odorant plant. The second illustration (Figure 5) shows the situation when an NO discovers odorant fade during testing.[34]

[34] Over-odorisation 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-odorisation incidents.

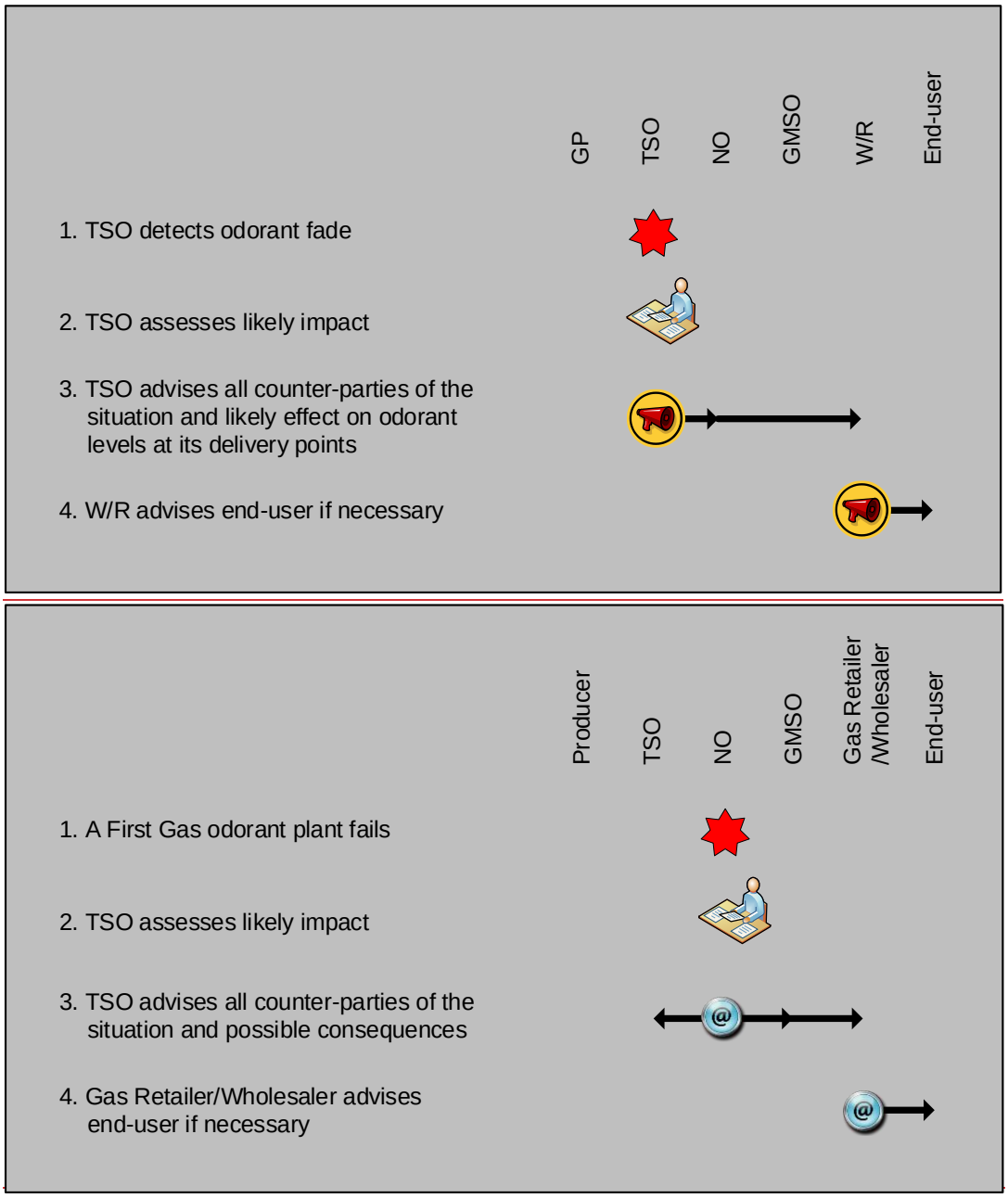


Figure 4 – communication when an odorant plant fails

Communications arising from the failure of a First Gas odorant plant:

1. First Gas continuously monitors the operation of its larger odorant plants. A SCADA alarm will alert system operators to any failure on these assets.

2. ~~As an RPO,~~ First Gas will make an assessment of the likely impact of the failure on the odorant levels of gas at its delivery points. ~~For example, d~~Depending on the configuration of the transmission system a failure may only affect a particular set of delivery points~~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 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.

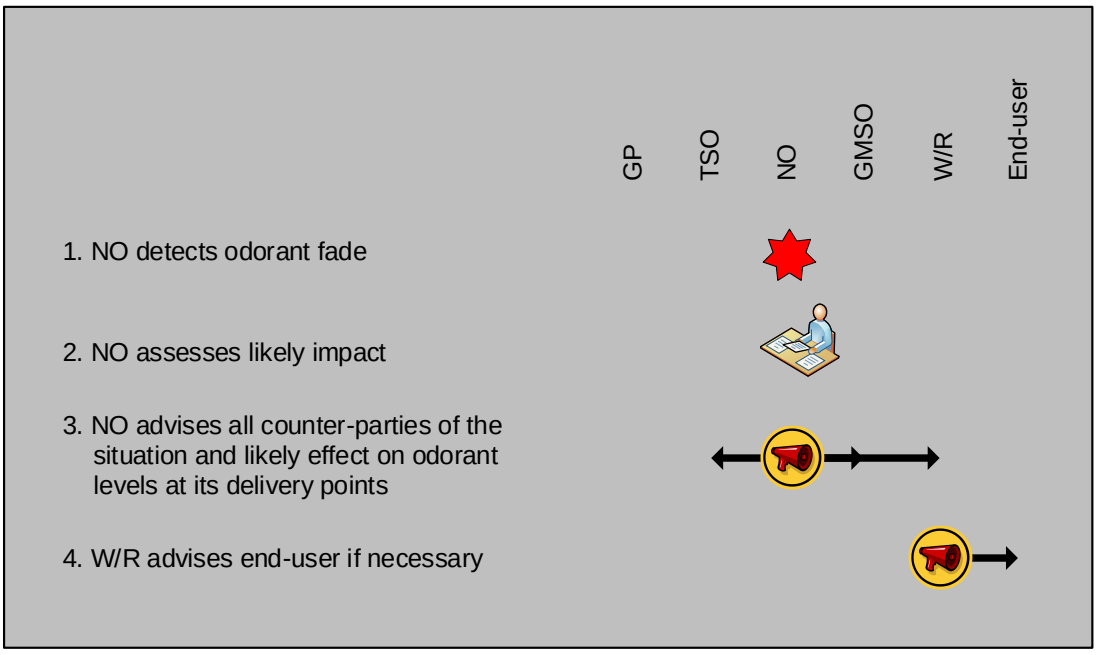


Figure 5 – communication when odorant fade is detected

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, t~~The NO will assess the likely impact of the low odorant 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 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, t~~The NO will advise gas retailers who supply consumers on the affected section of the distribution network and, if necessary First Gas 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 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.

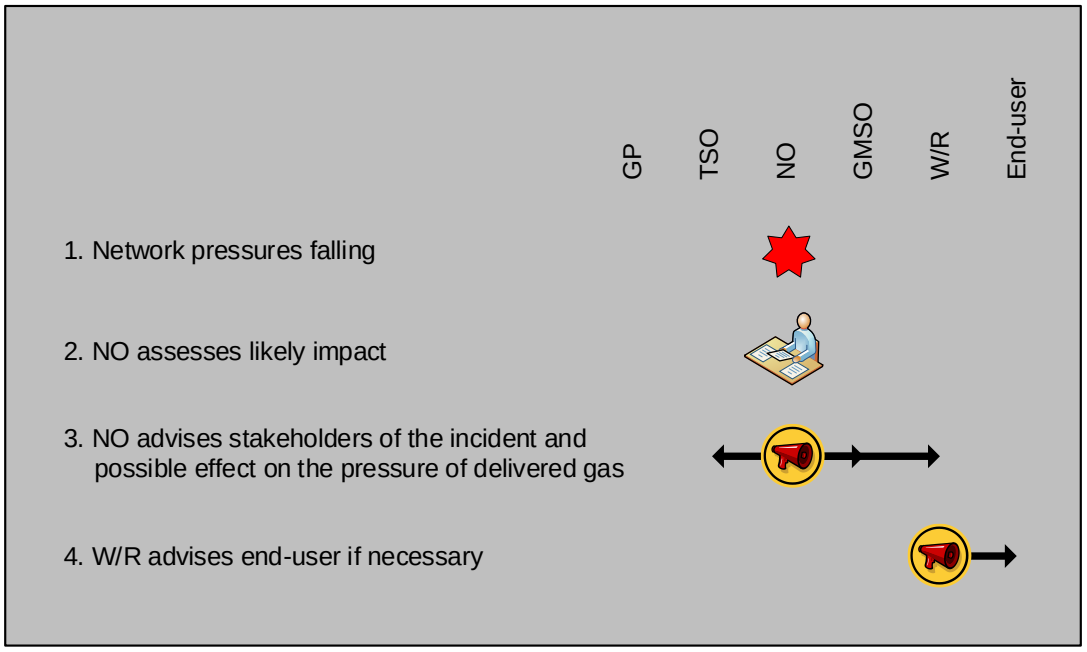


Figure 6 – communication during a pressure incident

Communications arising from the isolation of part of a network:

1. NOs continually monitor key network pressures via telemetry systems and manual checks of data loggers and pressure gauges, so will be alerted to emerging pressure difficulties. Or, in the case of third-party damage, the NO may be notified by the public or emergency services.

2. The NO will make an initial assessment of the situation and determine if the pressure situation cannot be stabilised without curtailing demand, and whether its emergency plan should be invoked.

3. The NO will advise stakeholders in accordance with its communications documents and contract obligations. The communication would describe the 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)	New ICAs entered into under the GTAC are required to be published in full by GTAC s7.15.	OATIS	Public
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, NZCC 24 requires disclosure of 'prescribed terms' of 'prescribed contracts' including contracts for gas transmission services.	OATIS	Public
Network services agreements (NSAs)	NZCC 23 requires disclosure of	All public disclosures are	Public

	'prescribed terms' of 'prescribed contracts' including contracts for gas pipeline services.	available on the relevant NO's website	
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	GTAC s5.8 requires Gas composition data to be published by 1200 each day.	OATIS	Public
Odorisation			
Overview	Decision No NZCC_24 s6.2.1	First Gas transmission AMP (for example, First Gas 2018 AMP sC.12 Odorisation Plants)	Public
Odorant vessels maintenance standards, frequency of testing, replacement and renewals, and expenditure forecast	Decision No NZCC_24 s6.3.2	First Gas transmission AMP (for example, First Gas 2018 AMP sK.4 Station Maintenance)	Public
Anticipated capital expenditure	Decision No NZCC_24 s26.6	First Gas transmission AMP (for example, First Gas 2018 AMP sB.1 Schedule 11a)	Public
Report on Asset Condition and Explanatory Notes	Decision No NZCC_24 s2.6.61	First Gas transmission AMP (for example, First Gas 2018 AMP	Public

		sB.1 Schedule 12a)	
SMS	Gas Act s46A~~,~~ and SM Regulations regs 30-40~~, and Decision No NZCC24 s6.2.1~~	Not public	Private to system owners and/or operators
Pressure			
Transmission pipeline pressures	NZCC 24 Appendix A 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 website	Public
Information	Requirement to provide information	Where public information can be found	Who can access the information
Pressure			
Distribution network pressures	NZCC 23 Attachment 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	No requirement to make this information public	Not public	
	The Gas (Switching Arrangements) Rules 2008 require switching notices, provided by an incumbent retailer to the Registry, to specify the meter pressure		Private to Registry Participants: ie retailers, NOs and GMSOs
	GSAs and GMAs		Private to 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 safety assessment (FSA) is a requirement of AS/NZS 4645 for Gas Distribution Networks to assess risks.

gas, in this document, means gas injected into, carried through, or withdrawn from the open access gas transmission or gas distribution pipelines and required by the owners of those pipelines to meet the requirements of NZS 5259: Specification for Reticulated Natural Gas.

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, 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.

NZCC refers to a Commerce Commission decision document. 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.

NZS 5259 means NZS 5259:2015~~2004~~ Gas Measurement.

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

OATIS means the online interactive open access transmission information system, or any other replacement information system (see *TACOS*), 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 AS/NZS 4645Gas Distribution to identify and implement the controls necessary to mitigate the risks identified in an FSA.

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

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

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

TACOS (Transmission Access Code Operating System) is the interactive information system that supports the GTAC and replaces OATIS.

Formal Safety Assessment (FSA) is a requirement of AS/NZS 4645 for Gas Distribution Networks.

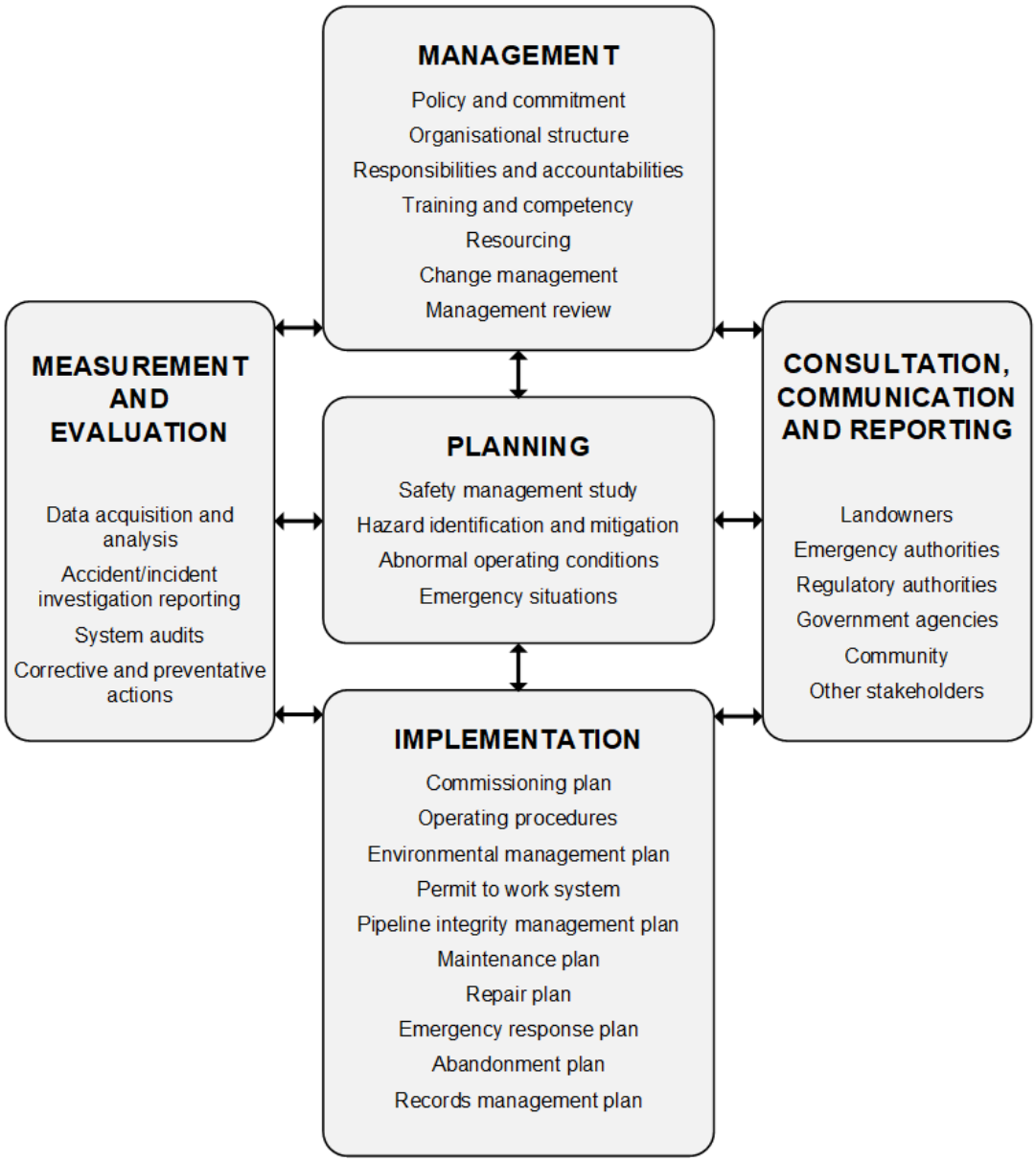
time-of-use (ToU) meter refers to a GMS with functionality to record usage at set intervals. ToU meters are frequently attached to telemetry to allow a retailer, for example, to 'dial up' the meter remotely to download consumption information.

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

TSO means First Gas as the owner and/or operator of an open access gas transmission system.

W/R means gas wholesaler and/or retailer as the context dictates.

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



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 on it with interested parties. Gas Industry Co will decide on the best means of consultation on a case by case basis. It may decide to package several proposed changes together if it believes that will result in a more effective consultation.

Issuing a revised 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.