ATTACHMENT 10.103
GHD: SECURITY OF SUPPLY ASSUMPTION RESPONSE & REVISED RISK ASSESSMENT

ATCO 2020-24 REVISED PLAN

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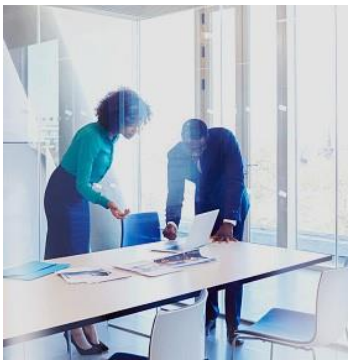

AA5 Security of Supply Assumption Response & Revised Risk Assessment

ATCO Gas Australia

9111050-REP-0002-Rev 1

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1. Introduction

ATCO Gas Australia, (ATCO) has submitted its capital expenditure plan for their Mid-West and South-West Gas Distribution Systems Access Arrangement revenue to the Economic Regulation Authority (ERA). This covers the period from 1 January 2020 to 31 December 2024 (otherwise referred to as the fifth access arrangement period or AA5).

The ERA handed down a draft determination that rejected ATCO's proposed security of supply capex projects and two Parmelia Gas Pipeline (PGP) Interconnection projects. The ERA has relied on advice from technical consultants, Energy Market Consulting associates (EMCa), in arriving at their decision.

This report provides GHD's advice on ATCO's Security of Supply Risk Assessment methodology and assumptions.

The report is designed to be read in conjunction with ATCO's Security of Supply Assumptions Response [Ref. 5].

Each Section of this report aligns with the Sections in ATCO's Security of Supply Assumption Response [Ref. 5]. Sections are aligned to assist the reader to follow the original discussions of ATCO and EMCa from ATCO's report and compares it with GHD's advice on each subject.

1.1. Scope of this report

This report provides GHD's advice on ATCO's AA5 Security of Supply Risk Assessment methodology and assumptions, based on documents received and reviewed, and referenced in section 5.

2. AA4 Final Decision Feedback

No comment (not part of GHD's Scope).

3. AA5 Draft Decision Feedback

3.1. Frequency – Loss of Gas Supply

3.1.1. Frequency Description and Risk Tolerance Criteria

ATCO's quantitative descriptions for remote and hypothetical are considered in a broader context than just AS/NZS 4645.1:2018. The following key points should be considered when establishing the values and assumptions for determination of likelihood of various events for ATCO's pipelines.

- The relevant suite of standards applicable to the construction and operation of ATCO's high pressure steel pipelines > 1900 kPa Maximum Allowable Operating Pressure (MAOP) is AS/NZS 2885.
- In AS/NZS 2885.6:2018, the frequency class Table F1 of Appendix F, highlights 10^{-3} to 10^{-5} events/1,000 km/year for Remote likelihood level. This frequency is per 1,000 km, so is equivalent to 10^{-4} to 10^{-6} likelihood of events per year for a 100 km pipeline, which is more typical of the lengths of some of ATCO's assets.
- The likelihood Table B2 of Appendix B of AS/NZS 4645.1:2018, highlights 10^{-3} to 10^{-5} events/year for a "Remote" likelihood level. The likelihood classification in AS/NZS 4645.1:2018 does not have any distance factor for pipelines (i.e. kilometre or metre), but is assigned for each location. The standard is not particularly clear in this regard. However, GHD understands this relates to a very specific position that is in keeping with the rest of the document. Based on GHD's experience in risk management, this would require risk for a range of locations is an aggregated value that should be considered for loss of supply, outage or overall societal assessment of safety.
- The frequency table of ATCO Report TCO RP 0283 Section 5.6, mentions 10^{-4} to 10^{-6} events/km/year for Remote Frequency. This frequency is per one kilometre.

ATCO's risk management framework, used to assess its security of supply projects, has been developed with consideration of the urban land planning standards that apply in ATCO's network area, and the relevant standards for gas transmission pipelines and gas distribution networks. ATCO's risk management framework is therefore developed based on all of the relevant standards.

GHD considers that the adoption of this approach of combining urban planning standards with relevant standards for gas transmission pipelines is reasonable due the nature of the pipelines being considered in the security of supply projects. Whilst AS/NZS 4645 is the prevailing standard for assessing supply impact of distribution networks, AS/NZS 2885 is the prevailing standard for the high pressure steel pipelines > 1900 kPa MAOP on the ATCO network. It is common for gas distribution networks to have key supply laterals constructed and operated to AS/NZS 2885 connecting to transmission pipelines.

AS/NZS 4853 should also be contemplated within the scope of a risk management framework.

3.1.2. Link between Puncture and Supply Outage

The approach undertaken by ATCO using industry standard flow modelling software (Synergee) is an approach that GHD expects to be used by a prudent network operator. This modelling has included sensitivity analysis with respect to gas demand profiles in the distribution network. The model takes into account the interconnection within the low pressure distribution network. The analysis is in line with what would be expected by a competent and prudent gas distribution operator in Australia and New Zealand.

ATCO's modelling and assessment has considered the physical system in which the pipelines operate. The ATCO distribution network is relatively unusual in the Australian context, where, typically gas distribution networks tend to radiate out consistent with the way the urban region develops. However due to the very coastal nature of the greater Perth metropolitan region, the urban development results in a long and thin distribution network that has several discrete connections from the gas transmission system. An analogous network is the system that supplies the Gold Cost in Queensland.

EMCa's assertion that no network isolation is required to effect a repair on high pressure steel pipelines is inconsistent with current good practice in Australia. Whilst this practice is possible in low pressure distribution networks with plastic pipe, it is not possible for high pressure steel pipelines based on safety requirements.

3.1.2.1. Fifth Risk Reduction Factor – Likelihood that Puncture Results in No Supply Loss

ATCO has completed a comprehensive analysis on the system response to a puncture in the high pressure steel pipelines. Whilst this is a detailed assessment it relies on a number of assumptions. From GHD's review, GHD considers ATCO assessment is reasonable. However, response times for various activities could be of longer duration than used in the assessment by ATCO depending on the severity of the event. This could lead to cascading complexity of response management, which could magnify the consequence of loss of supply.

ATCO's analysis has identified there are network sections at high risk to loss of supply following a puncture during winter peak demand conditions. For these high risk sections, ATCO has assessed that if a puncture were to occur in the high pressure steel pipeline during peak winter conditions then positive pressure would become depleted within the impacted network within 40 to 100 minutes for the assessed pipelines. GHD does not consider a network operator would be able to achieve sufficient curtailment of customers within this duration to prevent rapid pressure loss in the network. As a result of this rapid pressure loss, it would be highly likely that air ingress into the network could occur.

In GHD's experience, third party damage to pipelines generally occurs within typical construction work hours from Monday to Friday. Therefore the most likely time for a puncture to occur could be coincident with the highest demand period during a week. To view the risk with respect only to the consumption level does not take into account the interrelations of causal components of the risk in totality. If the likely timing for a puncture is considered as well as the consumption the real risk may be higher than ATCO has documented in AA5 Security of Supply Assumption Revised Risk Assessment report, which considers the peak flows percentage of the year only.

3.1.3. Repair Methods and Probability of Pipeline Isolation

GHD supports and agrees with ATCO's response to the EMCa review. From our assessment, EMCa does not appear to have considered the mass flow rate that occurs from a puncture in a high pressure pipeline, the urbanised environment where the ATCO high pressure steel pipelines are located; other buried services that could represent a safety threat to first responders; escalating asset damage; and the likely safety zone required being dictated by thermal radiation exposure limits. In assessing risks and responding to punctured pipelines, it is essential to consider all of these aspects.

Contrary to EMCa's assertion, it would be very difficult and potentially unsafe for ATCO to assess the damage to a pipeline once it is punctured with high pressure gas in the pipeline. High pressure steel pipelines operate at high stress levels and to determine if a pipe is stable at the damage location requires measurement of all damage to the pipe, which can't be accessed with gas escaping at high pressure.

The EMCa response of employing a temporary by-pass does not take into consideration the complexity of installing a temporary by-pass, especially the need for hot-tapping and line-stopping on a high pressure steel gas pipeline. The duration of implementing a temporary by-pass repair on this type of pipeline would be longer than the duration to implement a permanent repair.

3.1.4. Concrete Slabbing and Patrolling

With ATCO's updated incorporation of the additional risk reduction factor for higher consequence loss scenarios (seasonality), the specific risk reduction factors of slabbing and patrolling logically reduce the risk from 'High' to 'Intermediate' as a result. Some further semi quantitative analysis could be undertaken to affirm the peak/season factor and level of correlation with strike rate, but this initial approximate value helps set the context at this stage. In GHD's opinion and experience, ATCO's updated approach is reasonable, in keeping with good industry practice, and is likely not to be overconservative.

3.1.5. Australian Pipeline Puncture and Isolation Incidents

GHD supports and agrees with ATCO's response to the EMCa review. ATCO has provided publically available information that demonstrates that EMCa's view is unreasonable, as these events have occurred in Australia and hence there is experience in what needs to be undertaken to mitigate risk arising from these events.

There have been several other events in Australia and New Zealand since the 1970s to those noted in the ATCO response. Details of these are available publicly.

3.2. Consequence – Customer Weeks Lost

Subject to the level of detail in the calculation, ATCO's classification of the different periods of the year, and the corresponding consumption levels is a logical approach to deriving and applying risk reduction factors.

3.2.1. HP Pipeline Isolation and Repair

GHD considers that ATCO's protocol for high pressure pipeline isolation and repair for significant punctures is reasonable and in keeping with good industry practice, consistent with normal occupational health and safety requirements. The approaches of curtailment, when demand and the event conditions allow, are reasonable for managing a range of puncture scenarios. For the lower probability scenario of a peak consumption period, coupled with a puncture/supply disruption, extended outage is unavoidable due to the rapid loss of positive pressure within the network. As discussed earlier, the initial derivation of the Risk Reduction Factor of 0.0825 is an initial value for consideration, but could be higher pending further semi quantitative analysis at the hourly level.

ATCO has shown that in the event of loss of positive pressure, the duration to repair the high pressure steel pipeline does not significantly impact the customer weeks lost consequence, as the reinstatement time is significantly impacted by the network isolation purging and reconnection activities.

3.2.2. Network Isolation & Network Reconnection

ATCO has provided factual information to support their basis of purge section determination.

To not properly purge a section and introduce a safety risk to a gas consumer could cause the safety regulator or emergency service to shut-down the purging process. This purging would require that sufficient planning work is undertaken to prove that a purging process can be undertaken without introducing risk to a gas consumer. This will materially delay re-establishing full gas supply to consumers over the timelines that EMCa has indicated.

3.2.3. Customer Isolation

GHD supports ATCO's response regarding customer isolation. The approach is logical on the basis that the network isolation and purging is the longer duration task.

3.2.4. Availability of Resources

GHD supports ATCO's response. The focus of these security of supply projects are for the large scale loss of supply events. EMCa has assumed that a large number of qualified personnel would be available in Western Australia and that this would translate into these people making themselves available to ATCO. EMCa has not shown evidence that they have considered the durations required for communication, engagement, mobilisation, inductions, confirming competence, and coordination of a large group of independent contractors in a safe manner. As seen when any large scale emergency response occurs in Australia, for example from natural disasters in recent years, there is a material amount of effort in coordination of large scale events that results in unit durations that readily exceed those of small scale events.

Additionally, GHD considers EMCa's customer isolation duration numbers are unduly low when accounting for logistics and fatigue management factors that increase the average isolation durations for these types of large scale events.

4. Revised Supply Risk Assessment

GHD considers that ATCO's revised supply risk assessment in response to EMCa's feedback is reasonable based on the following points.

4.1. Application of Risk Reduction Factor

GHD agrees with ATCO that the revised scenarios of loss (CC1) are still high risk due to the decreased likelihood and increase in consequence from incorporating the seasonally related risk reduction factor. However, the addition of the seasonal risk reduction factor has lowered the likelihood within the Remote region of the risk matrix.

4.2. Concrete Slabbing and Pipeline Patrol Risk Reduction

GHD agrees with ATCO that the additional risk reduction factors for slabbing and increased pipeline patrol will reduce the likelihood for the various scenarios in the order of approximately 90%.

4.3. Risk Assessment Review

ATCO's approach is in line with other gas network management organisations and their review cycles for the risks within their responsibility.

5. References

1. ATCO AA5 Security of Supply Assumption and Revised Risk Assessment, TCO RP 0380
2. AS/NZS 4645.1:2018 Gas Distribution Networks – Network Management
3. AS/NZS 2885.6:2018 Pipeline – Gas and Liquid Petroleum , Part 6: Pipeline Safety Management
4. AS/NZS 4853 – 2012 Electrical hazards on metallic pipelines
5. ATCO AA5 Security of Supply Assumptions and Revised Risk Assessment – TCO RP 0380
6. UK HSE, Reducing Risks, Protecting People, HSE's Decision Making Process, 2001
7. Attachment 12.11 Safety Case – ATCO 2020-24 Plan, Public 31 August 2018, ATCO Gas Australia, Gas Distribution System Safety Case, Rev 6
8. ATCO Attachment D – 12.44 Security of Supply – Two Rocks Business Case – ATCO 2020-24 Plan – 1520-GCA1-NM-0040 Rev 1
9. ATCO Attachment E – 12.45 Security of Supply – Bunbury Business Case – ATCO 2020-24 Plan – EIM # 96796172 Rev 1
10. ATCO Attachment F -– 12.46 Security of Supply – Caversham Business Case – ATCO 2020-24 Plan – EIM # 96963270 Rev 1
11. ATCO Attachment G – HP Steel Pipeline Semi-Quantitative Risk Assessment – TCO RP 0253 Rev 0
12. ATCO Attachment H – Supply Interruption Customer Weeks Lost Assessment – TCO RP 0287 Rev 0
13. ATCO Supply Risk Assessment – North Region – TCO RP 0209 Rev 1
14. ATCO Class 300 & 600 Pipelines Semi-Quantitative Risk Assessment – TCO RP 0278 Rev 0
15. ATCO Supply Risk Assessment – Southern, Eastern & Regional Networks – TCO RP 0283 Rev 0
16. EMCa Report – Review of Technical Aspects of ATCO's Proposed Access Arrangement for the Mid-West and South West Gas Distribution Systems, Issued March 2019
17. ATCO Attachment 12.10 – PVC Mains Replacement Strategic Analysis & MRP Tool Overview – ATCO 2020-24 Plan – EIM # 97347227 Rev 1

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