Critical Contingency Operator

Draft Critical Contingency Performance Report

Production Station Unplanned Outages 24 May 2016

Report Published on 13 July 2016

This Performance Report is issued by the CCO pursuant to regulation 65 of the Gas Governance (Critical Contingency Management) Regulations 2008.

Submissions are invited on this performance report and, to assist submitters, a feedback template is available on the CCO website (www.cco.org.nz).

Please send all submissions to cco@cco.org.nz by Friday, 29 July.

Contents

1. Introduction

In accordance with regulation 65 of the Gas Governance (Critical Contingency Management) Regulations 2008 and 2013 Amendments (the Regulations), the Critical Contingency Operator (CCO) must prepare and publish a performance report within 30 business days, or as otherwise agreed between the CCO and the industry body, after making a determination to terminate a Critical Contingency under regulation 60.

This report has been produced in relation to the Critical Contingency that was declared at 18:30 on 24 May 2016 and was subsequently terminated at 23:00 on the same day. The Incident Report related to this event required by regulation 64 was published on 31 May 2016.

The purpose of this Performance Report is to assess the effectiveness of the Critical Contingency Management Plans (CCMPs), Communications Plan and Information Guide and the extent to which the Regulations and these associated documents achieved the purpose of the regulations. The report also identifies any amendments to the regulations and associated documents that the CCO considers would better achieve the purpose of the regulations.

The report has been prepared in consultation with the affected Transmission System Owners (TSOs) and any other parties considered necessary. At the time of the event, the affected TSOs were Maui Development Ltd (MDL) and First Gas Ltd (First Gas). This report therefore refers to these parties when referring to TSOs in this report, despite ownership of the Maui pipeline having since changed to First Gas. The TSOs have provided all the information and assistance requested by the CCO for the purpose of preparing this report.

TSOs must prepare proposed revised CCMPs consistent with any identified amendments recommended in this report in accordance with regulations 26-30.

The CCO must amend and publish a revised Communications Plan and/or Information Guide consistent with any identified amendments recommended in this report in accordance with regulations 35 and 37 respectively.

2. Executive Summary

At approximately 16:22 on 24 May 2016, an event on the Transpower electricity transmission network resulted in unplanned outages at the Pohokura, McKee, Kupe and Kapuni gas production stations.

Some large consumers of gas were also affected by the electricity network event however the effect on the producer side was significantly greater than on the consumption side, causing a large negative imbalance on the pipeline system.

The greatest amount of production lost to the system was from the Pohokura Production Station resulting in a rapid decline in Maui linepack levels and system pressures in the connected First Gas pipelines.

The TSO alerted the CCO to the unplanned production outage in accordance with the TSOs' CCMP and the CCO Communications Plan.

At 18:05 on 24 May 2016, the CCO determined a Critical Contingency when the pressure threshold on the First Gas pipeline at Kapuni Gas Treatment Plant (KGTP) of 3 hours to 37.5barg was breached.

The pressure threshold on the Maui pipeline at Rotowaro compressor station of 3 hours to 32barg did not breach but reached a low point of 4.2 hours to 32barg.

The TSOs' pipeline operating codes set operational linepack levels and thresholds and the MPOC approach allows for a contingency volume in the event of unplanned production outages. On this occasion, a Critical Contingency pressure threshold was breached before the linepack contingency volume levels were reached.

After declaring the event, the CCO began preparing for curtailment while also exploring opportunities for additional gas to be supplied (as it is obliged to under r53 (c)). The response by producers to the Critical Contingency declaration (which was incentivised by the non-regional determination triggering the Critical Contingency imbalance calculation), together with the recovery of the affected production stations, meant that the system recovered without the CCO needing to curtail any consumers.

At 22:45 the CCO consulted with the TSO to determine if the system could be considered "stable".
The TSO and CCO agreed that the Critical Contingency could be terminated at 23:00hours.

This performance report concludes with the CCO's assessment under r65 which are summarised below.

The key documents under regulation 65 (1) (a) were assessed, in the context of this event, as:

Critical Contingency Management Plans	Effective
CCO Communications Plan	Effective
CCO Information Guide	Effective

The extent to which the regulations and key documents were found to have achieved the purpose of the regulations under regulation 65 (1) (b) was assessed, in the context of this event, as:

Regulations	Purpose achieved
Critical Contingency Management Plans	Purpose achieved
CCO Communications Plan	Purpose achieved
CCO Information Guide	Purpose achieved

Specific amendments identified under regulation 65 (1)(c) were:

Regulations	None
Critical Contingency Management Plans	Formalise co-location of the CCO at the TSO's control room as a preferred operating mode for an event when circumstances allow.
CCO Communications Plan	
CCO Information Guide	None

The CCO has also recommended that the TSOs undertake a review of the Rotowaro and KGTP Critical Contingency pressure thresholds. The TSO has indicated their intent to review pressure thresholds in the TSO report from Exercise Kakama. This review could lead to changes to the CCMPs and possibly the regulations.

The CCO is also using the process of submission on this draft report to discuss possible changes to the CCO process for communications with stakeholders, which could result in changes to the Information Guide.

3. Background Information

The following information is included to provide some context and an explanation of the configuration of the transmission pipeline system affected by this Critical Contingency.

The gas transmission pipeline system transports gas at high pressures from Taranaki to towns and cities around the North Island. There are two interconnected pipelines that work together to provide transmission services. On 24 May, one pipeline system was owned by First Gas (recently purchased from Vector), the other by MDL. First Gas provided system and technical operation services to both pipelines. First Gas now own and operate both pipeline systems.

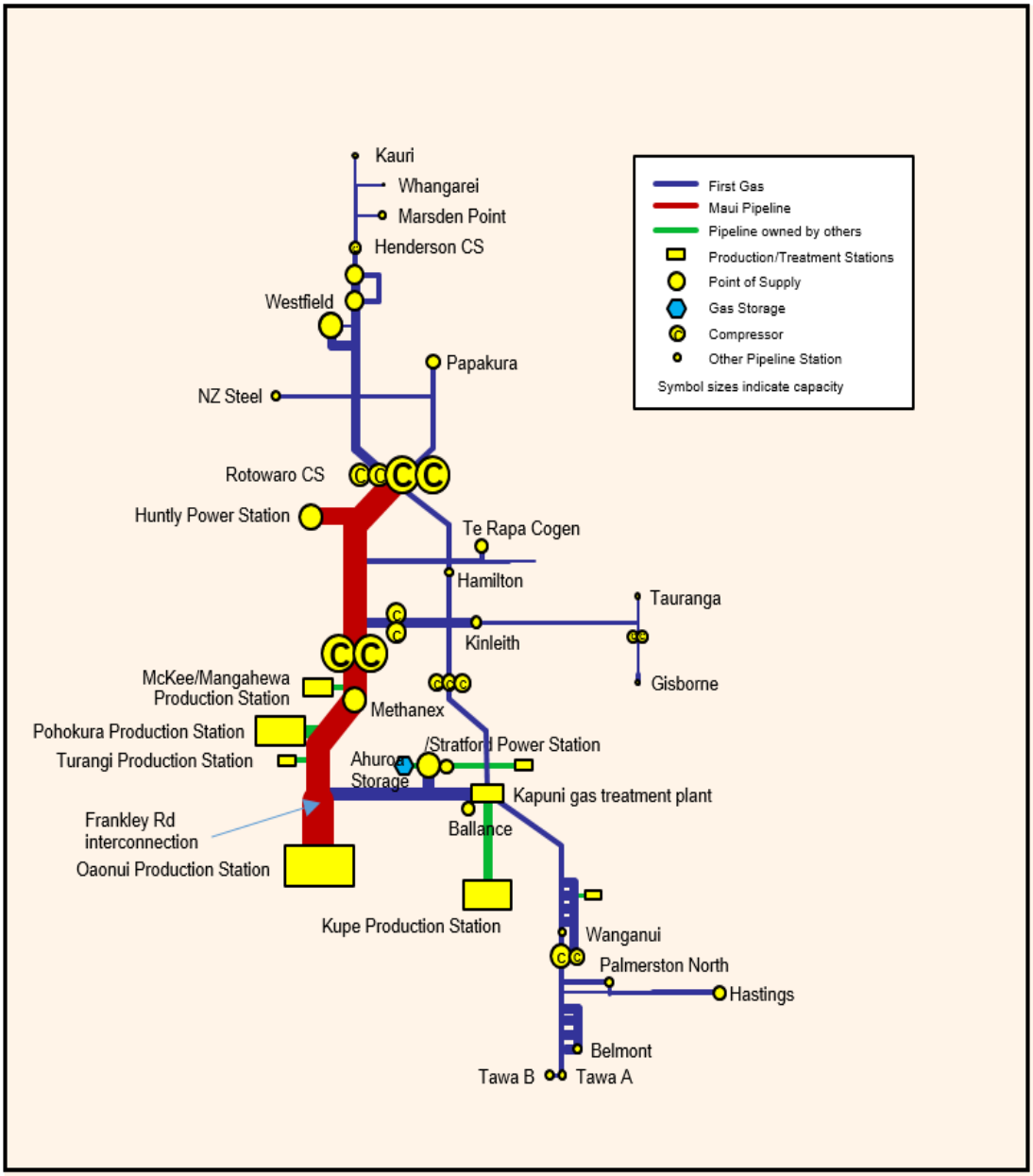

Figure 1

The Maui pipeline (shown in red on Figure 1) receives the majority of the system's gas receipts from Pohokura, Oaonui, McKee/Mangahewa, Kowhai and Turangi productions stations. The First Gas system (shown in blue in Figure 1) also receives some gas receipts, mainly from the Kupe and Kapuni production stations. On 24 May the Maui pipeline's main delivery gas flows were north through Rotowaro to First

Gas' northern pipeline system to Auckland and beyond; to Huntly power station; to Methanex (for methanol production); and through the Frankley Road interconnection into the First Gas 300 pipeline.

The purpose of the regulations is to 'achieve the effective management of critical gas outages and other security of supply contingencies without compromising long-term security of supply.' They are designed to intervene when the 'business as usual' processes cannot cope with the size of the issue. 'Business as usual' is managed using the operating codes of the two pipelines: The Maui Pipeline Operating Code (MPOC) for the Maui pipeline and the Vector Transmission Code (VTC) for the First Gas pipelines.

On 24 May, the Maui pipeline System Operator took action under the MPOC curtailment provisions and associated standard operating procedures. The details of this are outlined later in this report and have been distinguished from the action taken by the CCO under the regulations. First Gas took no VTC action, other than the passing on of relevant notices to their customers.

Determination of a Critical Contingency is decided by how close operational conditions in the gas transmission system are to defined pressure threshold limits at specific strategically selected locations. The relevant thresholds for this event were the Maui pipeline Critical Contingency threshold at Rotowaro and one of the First Gas' Critical Contingency thresholds located at Kapuni Gas Treatment Plant (KGTP). (First Gas has a number of other Critical Contingency threshold locations at the end point of each part of its pipelines, but these others were not close to being breached with regard to this event.) The CCO will determine a Critical Contingency if a threshold is breached or if there is a reasonable expectation that a threshold breach is unavoidable.

The thresholds, as set by the TSOs and defined in the relevant CCMP, for these two locations are:

First Gas 300 pipeline at KGTP: 3 hours to reach pressure of 37.5barg
Maui pipeline at Rotowaro: 3 hours to reach pressure of 32barg.

4. Circumstances Contributing to the Event

The Incident Report describes the event as follows:

> *At 16:20 on the 24th May Pohokura Production Station suffered an unplanned outage. The loss of gas production combined with the large gas demand at the time resulted in depleting linepack and pressures such that the Critical Contingency threshold of 3 hours to 37.5barg at the Kapuni Gas Treatment Plant (KGTP) was breached.*
> *At 18:05 The CCO determined that the Critical Contingency conditions had occurred and was required to declare a Critical Contingency. The Critical Contingency declaration notice was subsequently posted at 18:30.*
>
> *A Critical Contingency was declared at 18:30 on Tuesday 24 May 2016 and was terminated at 23:00 on Tuesday 24 May 2016. The duration of the Critical Contingency was 4 hours and 30 minutes.*
>
> *No curtailment directions under the CCM Regulations were given, no curtailment directions were given by Retailers*
>
> *The Performance Report, to be published within 30 business days of the termination of the event, will review the response in more detail and take into account feedback from stakeholders.*
>
> *However, the CCO would observe at this stage that the declaration brought about the desired response from the industry, in particular the additional supply of gas making curtailment under*

the regulations unnecessary. This additional supply was incentivised by the declaration of a non-regional event, triggering the contingency imbalance provisions.

In order to fully assess performance in this report, the CCO has sought further information to expand the understanding of all the dynamics occurring on the 24 May that played a part in the event. Statements were requested from key producers and large consumers. The following were provided:

Shell Exploration NZ Ltd (SENZL) for the Pohokura Production Station

At approximately 16:22 on Tuesday May 24th, an "auto-reclose" event on the Transpower transmission network resulted in a voltage drop in the electricity supply, sufficient to trigger a total production shutdown trip of the Production Station (as per the design of our safeguarding hierarchy). Operations staff were mobilised to check the plant status, and prepare the plant for restart. The plant was restarted at around 18:06, and production ramped-up to full production by approximately 19:36.

Origin for Kupe Production Station

Kupe experienced a power surge at 16:25 hrs on the 24 May from the 33kv grid supply feeder from the Hawera Sub station, tripping plant (HV and LV) electrical powered equipment, due to the loss of the compressors units, there was reduction in plant throughput until plant equipment was reset and restarted and plant stabilised before returning back to full plant throughput @ 17:00 hrs.

Vector for Kapuni Gas Treatment Plant

16:20 Power outage at KGTP results in a process upset. However, the plant did continue to process gas.
16:50 KGTP stopped processing gas because of the plant was unable to recover from the process upset above. Gas Control at Bell Block notified.
16:51 KGTP received instruction from Vector operational team in Wellington to draw gas from the storage pipeline. Gas flow from the gas storage line began at 17:20.
17:42 KGTP received further instruction from Vector operational team to draw more gas from the storage pipeline. Gas flow out of the gas storage peaked at 3.99 Sm3/s at 17:50.
20:45 With all equipment issues resolved, KGTP started processing gas again.

STOS for Oaonui Production Station

- *At 16:24, Maui suffered a voltage drop event on the incoming electricity supply (the same as was experienced in other parts of Taranaki). This tripped part of the plant (including the hot oil pumps). Maui was able to continue flowing gas while the affected parts of the plant were restarted.*
- *At ~17:08, we were advised of a significant reduction in ID4 nominations, due to a buyer having had part of their plant trip due to the same electricity issue. We started to decrease flow ahead of the start of the ID cycle to meet this reduction.*
- *18:06: Low linepack notice posted, however we were flowing to nominations at Maui.*
- *At 18:24, we received notice that a critical contingency had been declared. The CCO called us within minutes asking for an update at Pohokura then a separate conversation on what assistance could be obtained from Maui. We followed CCO instructions.*
- *~18:30 We phoned Maui to ask them to begin to ramp-up flow to support the outage.*

The CCO notes that no instructions were given to STOS. The conversation with STOS explained that a non-regional Critical Contingency had been declared and that opportunities for additional gas were being explored, but that the CCO had no powers to instruct STOS.

Methanex for the Methanol Plants

- *On May 24 Methanex gas flows were stable at all three welded points (Bertrand Rd, Faull Rd and Ngatimaru Delivery) until the power disturbance at 4:22 p.m. affected the Motunui and Waitara Valley plants, resulting in a significant amount of equipment tripping off line.*

- *The equipment tripping offline required Methanex to reduce gas nominations at the Intraday 4 cycle.*
- *In addition, plant rates were reduced due to a gas supplier curtailment from approx. 8:00 p.m.*

Contact for Ahuroa Gas Storage and Stratford Peaker Power Station

Contact was officially made aware of the CC event at 6.:30pm when the event was declared. At the time we were injecting gas into storage and running the peakers at Stratford. We had earlier had a trip at the storage facility due to a lightning strike which you will see happened about the same time as Pohokura originally tripped for the same reason. Although we had not been asked to curtail gas consumption, once we had evaluated the situation, our position and the pipeline's position we decided we should halt injection until such time as the Pohokura plant resumed production. As a result, we hoped to help stabilise the pipeline and avoid if possible curtailment action. The storage operators were telephoned at 7:11pm and asked to stop injecting gas. Once we saw that Pohokura was back to full production we resumed injection.

Transpower for the Electricity Transmission Network

Trippings happen often on transmission lines as they can be effected by events like weather, third party damage as well as in rare occurrences, equipment failure. 100% reliability of power supply of both transmission and distribution networks would be exorbitantly expensive (paid for by electricity consumers). End use customers, especially those who have industrial operations reliant on electricity supply, should anticipate as part of their operations, adequate resilience in their plant to power voltage disturbances.

Other parties were asked for comment but chose not to provide a statement. All participants will be given the opportunity to provide comment in this section of the report as a part of the draft report submission process.

It can be seen from these statements (and the data which follows) that an event on the Transpower network caused problems for a number of plant owners. The effect on the producer side was greater than on the consumption side, causing a large negative imbalance on the pipeline system, although lower consumption flows at Methanex due to their plant issues did assist the pipeline situation.

The greatest amount of gas lost to the system was from the Pohokura Production Station. At the time of the outages Pohokura was exporting approximately 7TJs/hr into the Maui pipeline which accounted for 35% of the total inflows. (NB: Pohokura Production Station can typically account for around 50% of the inflows to the Maui pipeline).

However, McKee, Kupe and Kapuni production stations also suffered from the electricity network issue and contributed to the lower gas flows (see Table 2 in Section 5 for more detail). Oaonui also flowed lower between 17:10 and 19:20 although this was due to lower nominations rather than plant issues.

OBSERVATION

This event highlights that the reliability of a number of gas production stations, is very dependent on the reliability and uninterrupted continuity of the electricity power supply.

5. Analysis of the System Data

This section provides an analysis of the relevant linepack, pressures, inflows and outflows across the system on 24 May from 15:00 until termination at 23:00. The system data was provided by the TSOs, supplemented by Vector Ltd with regard to the KGTP.

5.1 Maui linepack

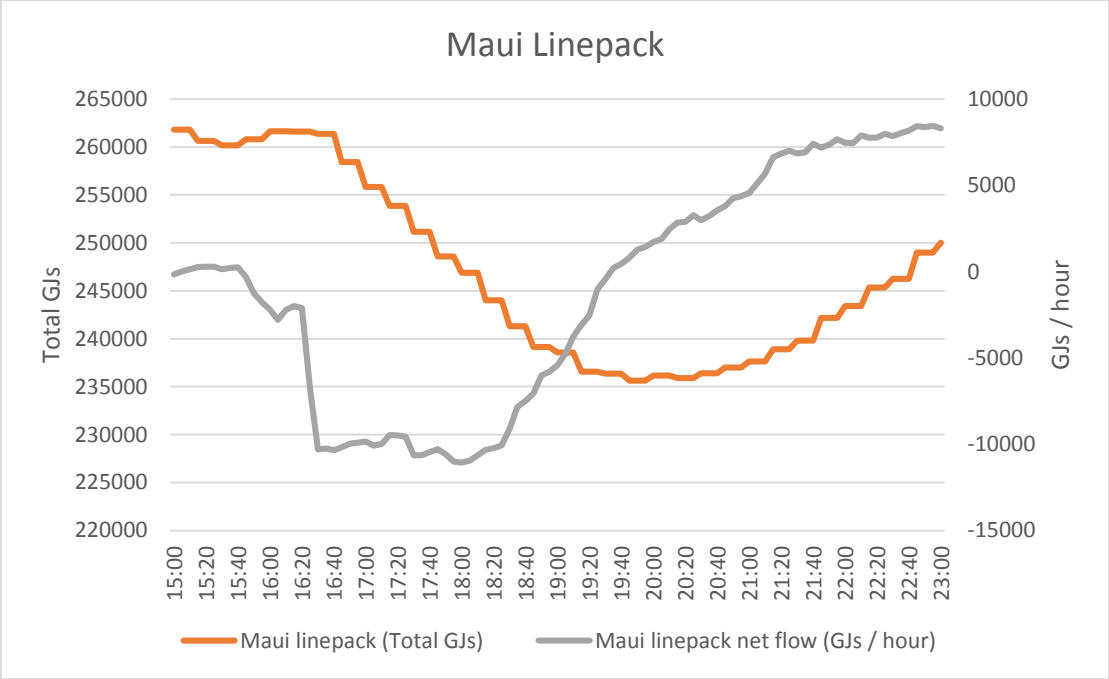

Figure 2

At 16:00, prior to the unplanned outage, the Maui pipeline linepack was 261TJs, close to the target linepack for the day of 263TJs. The imbalance on the system created by users of the pipeline was only negative 2TJs.

By 18:05 when the KGTP pressure threshold on the First Gas 300 pipeline had been breached and the CCO determined that there was a Critical Contingency, the Maui linepack was 247TJs. At its lowest point the linepack was 235TJs.

	Target for 24 May	Prior to outage	Determination of CC	Industry Response to CC Declaration	Lowest point	Termination of CC
Time		16:00	18:05	18:45	19:45	23:00
Total Maui Linepack	263TJ	261TJ	247TJ	239TJ	235TJ	250TJ
Maui Linepack Net Flow		-2TJ/Hr	-11TJ/Hr	-7TJ/Hr	+1TJ/Hr	+8TJ/Hr

Table 1

Figure 2 also shows the sharp change in the net flow on the Maui pipeline from an approximately balanced position of 0GJs/hour at 15:45 (i.e. a balance of receipt and delivery flows) to approximately negative 10,000 GJs/hour (a significant shortage of receipts compared to deliveries) at 16:30. This ongoing shortfall led to the rapid decline in the total Maui linepack from 261TJs at 16:00, to approximately 235TJs at about 19:45.

The linepack levels in the Maui pipeline in relation to the provisions in the MPOC through the event are shown below:

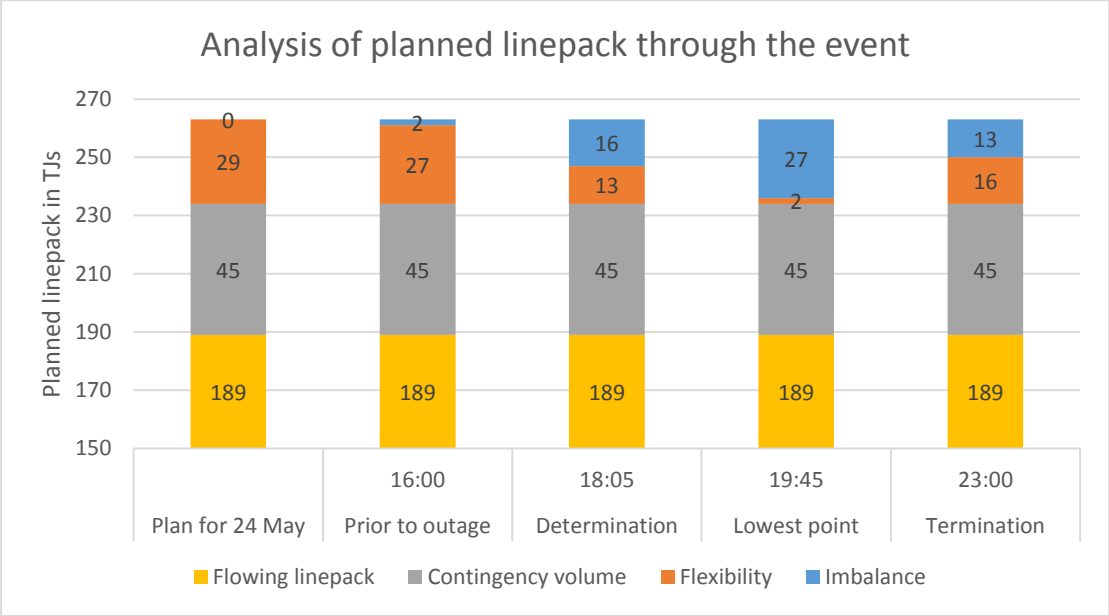

Figure 3

On the 24 May, the total calculated target linepack for the day was 263TJs, which included 29TJs of flexibility gas to allow for "within day" imbalances between receipts and deliveries; 45TJs of gas to allow for contingencies and 189 TJs of flowing gas required to have a functional pipeline.

Figure 3 shows how prior to the production outage only 2TJs of the flexibility gas had been used for imbalance so the actual linepack was close to the target linepack for the day.

By 18:05 when the KGTP threshold was breached, there was 16TJs of imbalance on the Maui system but none of the Maui pipeline contingency volume had been used. At the lowest point, the system had a total imbalance of negative 27TJs and had not started to use the contingency volume provision.

It was a First Gas Critical Contingency pressure threshold (at KGTP) that was breached, even though the majority of the unplanned production issues manifested as reduced injections into the Maui system.

The KGTP pressure threshold breach occurred prior to the Maui Critical Contingency pressure threshold at Rotowaro being breached and prior to the Maui contingency volume being used.

The KGTP threshold is in relatively close proximity to the other affected producers plant at Kupe and KGTP.

Flows into Ahuroa Gas Storage would also have an impact on the KGTP pressure threshold and its switch to gas storage flows at 17:40 and continuation to 19:11 will have exacerbated the drop in pressure in this part of the system.

OBSERVATION
Although the TSOs have separate CCMPs, the pipeline systems are interconnected and event(s) on one system can impact on the other system.

Regardless of the First Gas threshold breach at KGTP, the CCO would have declared a Potential Critical Contingency given the decline of the Maui system's Rotowaro Critical Contingency threshold. In practice, the actual Critical Contingency declaration related to the KGTP threshold breach and the subsequent response from industry (increased production) prevented the Rotowaro threshold from breaching.

OBSERVATION
The unplanned outage of the Pohokura Production Station was the dominant cause of the rapid drop in linepack on the Maui pipeline, compounded by a concurrent outage at McKee Production Station. This was further compounded by coincidental outages at the Kupe and Kapuni production stations causing an increased flow through Frankley Road to the First Gas 300 pipeline.

5.2 Critical Contingency Pressure Thresholds

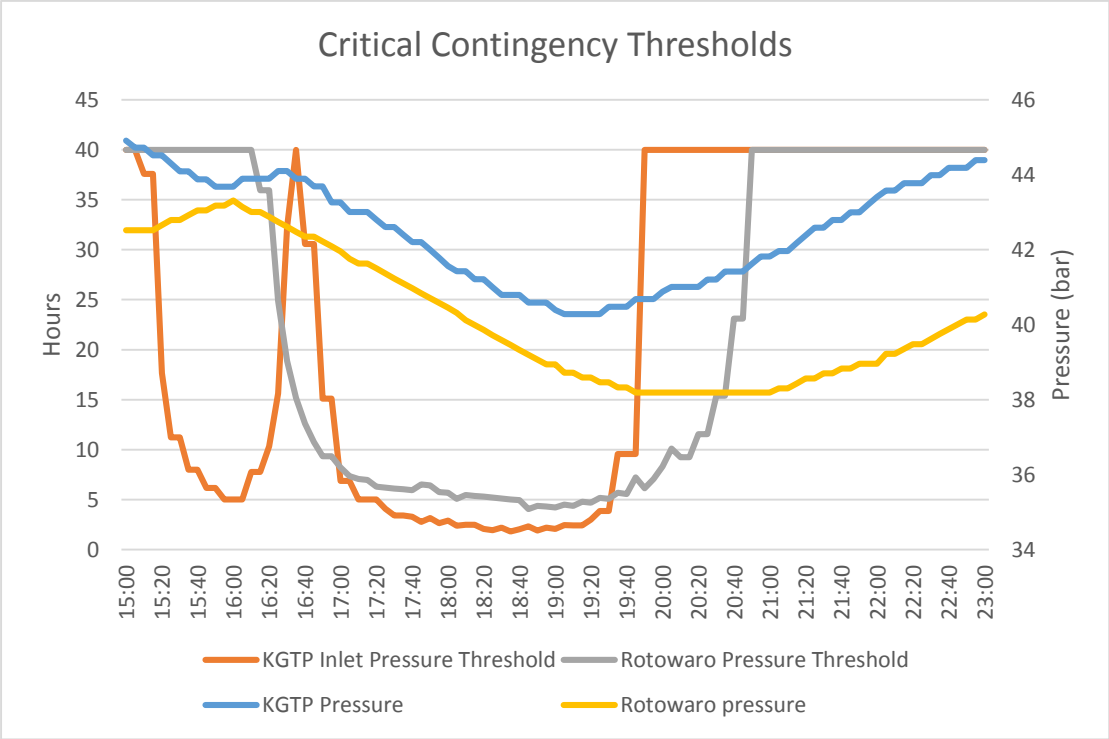

Figure 4

Relevant Critical Contingency thresholds:
First Gas 300 pipeline: KGTP 3 hours to reach pressure of 37.5barg
Maui pipeline: Rotowaro 3 hours to reach pressure of 32barg.

Figure 4 shows the effect of the change in the balance of receipts/deliveries on the Critical Contingency thresholds. It can be seen how the KGTP threshold had dropped significantly at around 15:30 but then recovered. The TSO has confirmed that this data is correct and commented further that it is 'normal' to see such fluctuations. Between 15:05 and 15:45 the pressure dropped 1barg resulting in a change in the rate of change calculation. The threshold minimum was 5.01 hours to 37.5barg, but was a short term transient condition.

However, the Rotowaro threshold dropped significantly at about 16:20, closely followed by another sharp drop in the KGTP threshold. The Rotowaro pressure did not breach the Critical Contingency threshold but reached 4.2 hours at its lowest point. The KGTP pressure threshold did breach and reached 1.9 hours at its lowest point. Both thresholds remained critically low between 17:00 and 19:45.

OBSERVATION
The KGTP pressure threshold can display a significant rate of change over a short period of time brought about by the starting or stopping of large flows in the vicinity of the threshold. This can result in short-term transient changes as seen on Figure 4 prior to the production outages. At the time of determining the Critical Contingency, the CCO was mindful of this effect and verified with the TSO that the rate of change at the time of determination was not just a short-term transient condition.

5.3 Gas Production Levels

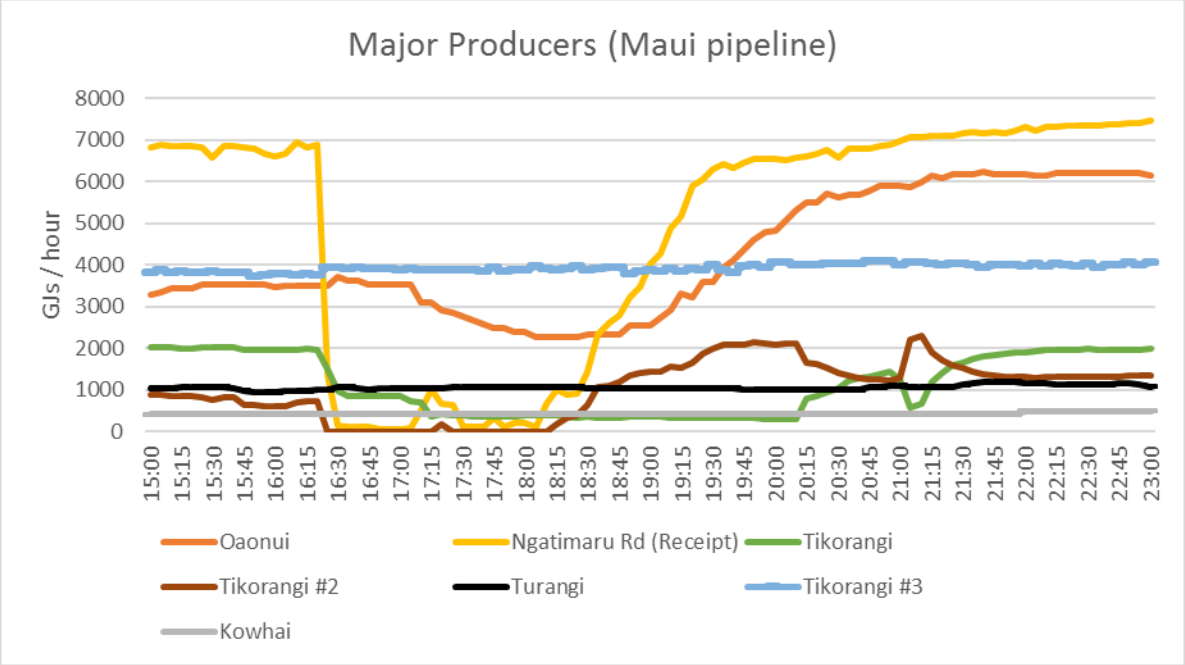

Figure 5

Figure 5 shows how at approximately 16:20 the flow from Ngatimaru Rd (the SENZL Pohokura receipt point) and Tikorangi #2 (the Todd Pohokura receipt point) dropped to zero at the same time as the gas flow from Tikorangi (another Todd receipt point) significantly reduced. Gas receipts from Oaonui reduced between 17:00 and 18:00 although this was due to lower nominations rather than plant issues. Figure 5 also shows how the gradual return of the gas from the two Pohokura receipt points between 18:00 and 19:20, was supported by increased flows from Oaonui from 18:30 (the time of the Critical Contingency declaration notice).

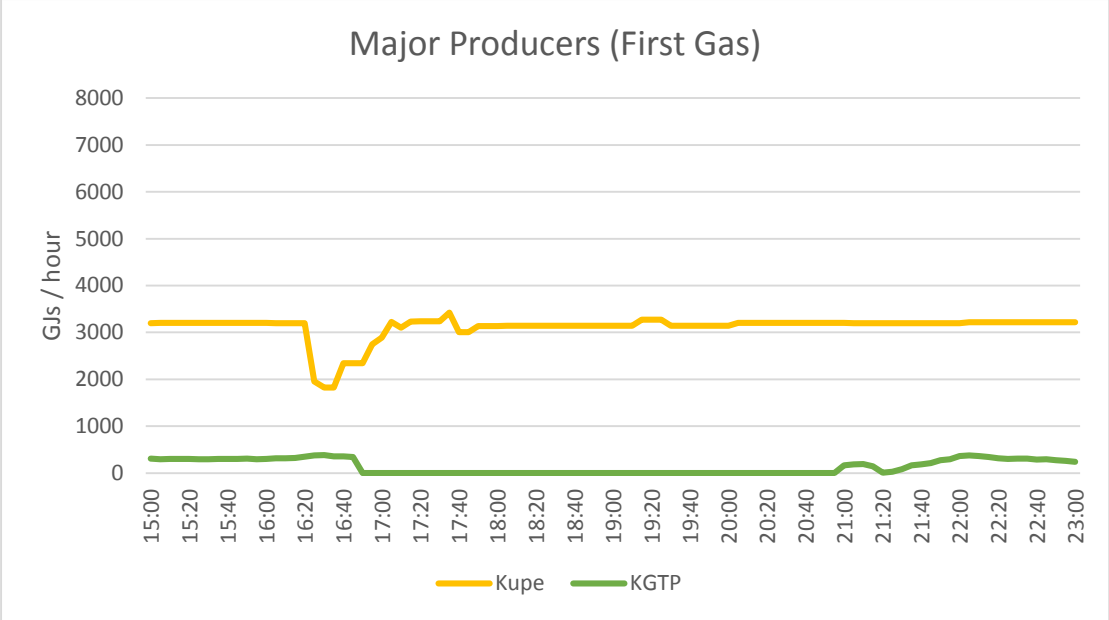

Figure 6

Figure 6 shows that at approximately 16:20 the Kupe flow reduced by approximately 40% but then returned to normal levels by about 17:00. KGTP flow dropped to zero at 16:50 and commenced production again at 20:45.

The table below shows the amount of gas not injected into the system by each receipt point affected by production issues during this period of reduced flows. The losses in production total 31TJs.

Receipt point	Production lost (TJs)	Period of low flow
Maui System:		
Ngatimaru Rd - Pohokura	16.9	16:25 to 20:20
Tikorangi - McKee	6.8	16:25 to 21:25
Oaonui	2.1	17:10 to 19:20
Tikorangi #2 - Pohokura	1.4	16:25 to 18:30
Turangi	NIL	None
Tikorangi #3 – McKee/Mangahewa	NIL	None
Kowhai	NIL	None
First Gas system:		
KGTP	2.8	16:50 to 23:25
Kupe	0.7	16:25 to 17:00
TOTAL (Maui and First Gas)	**30.8**	

Table 2

NB Production is defined as being 'lost' for the purposes of this table, if the receipt point flowed below its 16:00 flow rate, the deficit of gas resulting until the receipt point returned to its 16:00 flow rate.

5.4 Consumption Levels

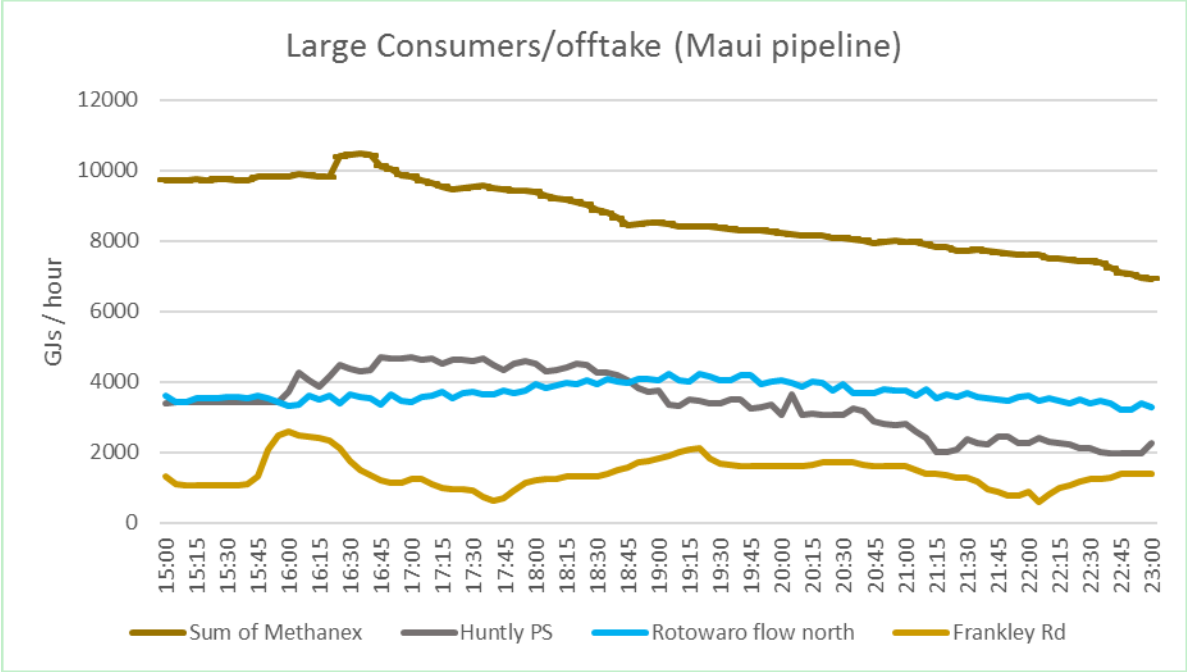

Figure 7

Figure 7 shows how the unplanned field outage(s) coincided with peak flows at Huntly Power Station. The total flow from the Maui pipeline north through Rotowaro gradually increased between 17:40 and 19:00. A decrease in deliveries to Methanex from 16:30 onwards due to plant issues alleviated the decline in the gas system. Flows through Frankley Rd to the 300 line increased from 17:40, compounding the decrease in linepack in the Maui pipeline.

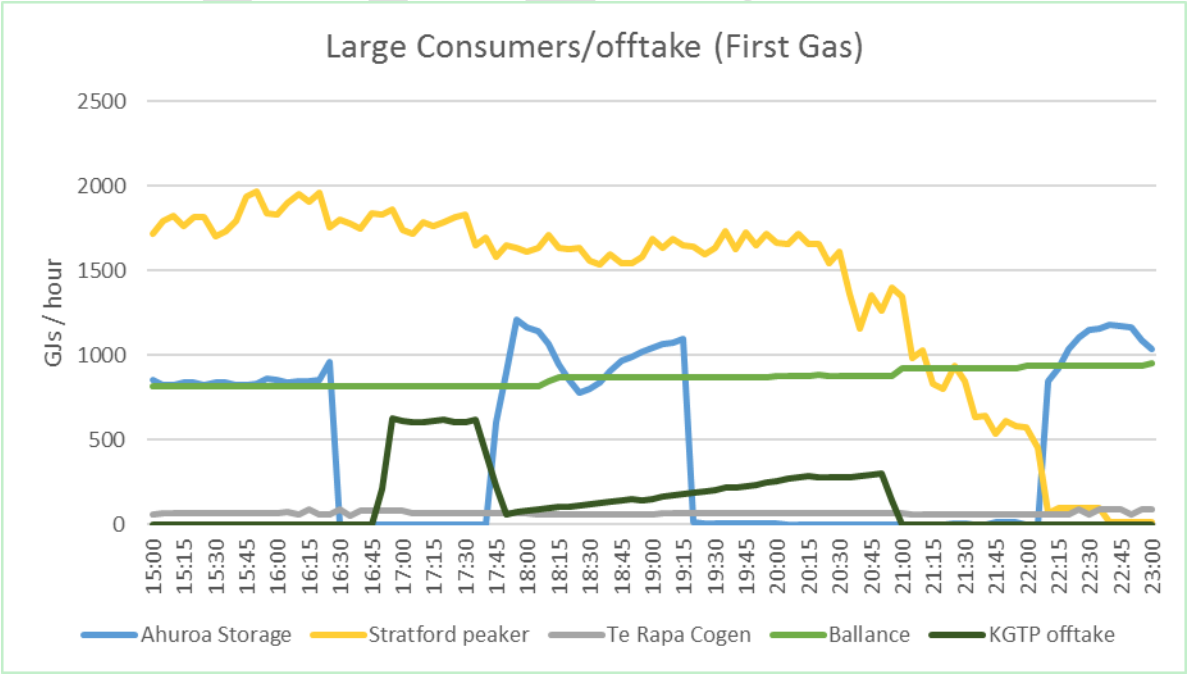

Figure 8

NB: TCC did not flow any gas on 24 May so has been omitted from this graph.

Figure 8 shows how, shortly after the production outages, Ahuroa Gas Storage ceased flowing gas into storage and then restarted taking gas from the pipeline around 17:40. It then ceased flowing gas from the pipeline at around 19:15 in response to the Critical Contingency declaration.

Gas was taken from the First Gas transmission system at KGTP from about 16:45 in response to the KGTP production outage.

OBSERVATION
Recovery from the production field outage(s), together with increased flow by Oaonui and Tikorangi after the Critical Contingency declaration, combined with a reduction in demand from Methanex from about 16:30 and the rest of the system from about 19:00, resulted in recovery of the system without the CCO needing to direct curtailment.

6. Review of the Event Response and Management

A log of the actions taken by the CCO and TSOs immediately before and during the Critical Contingency as provided in the Incident Report, is shown in Appendix 1.

6.1 Prior to Determination of a Critical Contingency event

The initial alert from the TSO to the CCO at 16:28 regarding the unplanned production outages worked well, putting the CCO on alert and was in accordance with the TSO's CCMP and CCO Communications Plan and Communications Protocol.

When the CCO contacted the TSO for an update on the situation at 17:32, the information received was that Pohokura had restarted flowing at around 17:10 and had been increasing flows, but flow was now declining again. Maui pipeline linepack was 251TJs and falling and the system had deteriorated. The CCO suggested, due to his proximity to the First Gas premises, that he attend the First Gas control room to monitor the system and developments. This suggestion was well received by the TSO. As a consequence, the rest of the event was managed by the CCO and TSO from the First Gas control room. On arrival at the First Gas control room at 17:50, the Maui linepack level was at 248TJs, some 3TJs above the start of the Contingency Volume point where the System Operator would start to take action under the MPOC. The Rotowaro pressure threshold was 6.4 hours to 32barg but the KGTP threshold was 3.2 hours to 37.5barg.

The CCO immediately began preparing a Potential Critical Contingency Notice. However, by 18:05 the system conditions had further deteriorated such that a breach of the KGTP threshold had occurred and the CCO determined that there was a Critical Contingency under regulation 48. This determination superseded the need for a Potential Critical Contingency Notice.

6.2 CCO Determination through to TSO written Notification of the Critical Contingency

At 18:05, the CCO determined that Critical Contingency conditions had occurred under regulation 48(1)(a) and verbally advised the TSO Duty Officer that a Critical Contingency declaration notice would be issued as soon as possible.

In conjunction with this, at 18:05, the TSO's System Operator issued a low linepack notice for the Maui pipeline, and followed this with two curtailments and operational flow orders (both under the MPOC, not the Regulations).

The first MPOC curtailment was executed at 18:17 after the CCO had determined that there was a Critical Contingency and that it was a non-regional event but only two minutes after the written Critical Contingency notice had been sent by the CCO.

The second curtailment was executed at 19:51, after the Critical Contingency notice had been received by the TSO System Operator. The TSO was asked to comment on its decision to proceed with these MPOC curtailments and provided the following:

> ***Section 15.1 curtailment of Ngatimaru Road (Receipt)*** *– This curtailment did not actually "take effect" as a result of an OATIS system limitation. However, it is discussed as if it had for the sake of any learnings arising. An underlying premise of the curtailment SOP is that the SO will take no action under section 15.1 MPOC during a non-regional Critical Contingency event. However, the section 15.1 curtailment was actioned in OATIS at 18:17 prior to the Critical Contingency declaration notice being received at 18:24 (which recorded the Critical Contingency declaration time as 18:30). "Pressing the OATIS curtailment button" necessitates the subsequent steps of issuing the OATIS notices notifying affected Shippers and Welded Parties of the curtailment. However, drafting these notices takes time, which means the CCO's Critical Contingency declaration notice was received prior to the OATIS curtailment notices going out. From the TSO's perspective this is just another example of the condensed nature of the sequence of events immediately prior and subsequent to a Critical Contingency declaration. It is also another example of that unique period of time (that both the TSO and CCO face) between a decision being made/set in motion and notification or publication of that decision/action.*
>
> ***Section 15.2 curtailment at Tikorangi #2*** *– The curtailment SOP states that a Welded Party is able to initiate curtailment under section 15.2 during a regional or non-regional Critical Contingency event.*

The TSO has provided information about the effect of the second MPOC curtailment as follows:

> *The affected Welded Points were curtailed by the following amounts during Intraday 4 on 24 May:*
>
Receipt Welded Point	*Total (GJ)*
Tikorangi #2	*5,000*

Delivery Welded Points	*Total (GJ)*
Ngatimaru Road (Delivery)	*3,412*
Faull Road	*1,588*

OBSERVATION
The second MPOC curtailment was under MPOC s15.2 and was executed after the Critical Contingency had been declared and non-regional status had been determined. This was in line with the Maui pipeline System Operator's standard operating procedures.

This curtailment will alter the Critical Contingency imbalance calculations.

OBSERVATION
An observation was received that the TSO notices replicated in the incident report did not show the actual TSO notice content, which was the .pdf attachment. This observer also noted the TSO text messages were sent to retailers without the .pdf. The observer questioned whether being issued with a notice 'to go and get something' was sufficient.

The communication of notices is outlined in both of the CCMPs. They advise that notices will be issued using the proforma templates set out in the CCO Communications Plan, which are reproduced in CCMP Appendices. The process is therefore that the CCO issues notices to the TSO in .pdf format which are then replicated by the TSO on OATIS. What occurred was therefore in accordance with the CCMPs.

SMS alerts are not the notice; they are to alert recipients that a notice has been issued.

6.3 Exploration of Additional Supply and consideration of Curtailment

At the time of the Critical Contingency declaration notice being issued, the situation regarding Pohokura returning to normal operation was still not clear to the TSO and CCO. Although a small flow from Pohokura could be seen on SCADA there was little certainty as to how stable the plant was or when pre-outage flow rates would be achieved.

In a conversation with SENZL at 18:46 the CCO was informed that the issue at Pohokura was understood to be fixed and the production station should resume pre-outage flows within 2 hours. However, the CCO could not be certain that this alone would be sufficient to prevent the need for Critical Contingency curtailment in order to balance the transmission system. The low linepack in the system, together with the fact that the linepack and pressure levels continued to be depleted at a significant rate, meant that curtailment would likely be required without other mitigating factors. Continual lightning strikes in the area also presented a risk of a further electricity supply issue with consequential effect on producers.

The status of the Critical Contingency as non-regional was determined within 10 minutes of determining there was a Critical Contingency and this non-regional status was communicated on the declaration notice issued to the TSO and copied to Stakeholders at 18:28.

At 18:46, the CCO explored the opportunity for additional supply with the largest alternative producer, Oaonui Production Station. STOS, the operator of Oaonui advised that they did have additional capacity and subsequently took action to increase production rates.

In addition to this, McKee Production Station advised their intention to increase production and Ahuroa Gas Storage advised that they would be halting storage. Methanex had started to reduce their consumption following plant issues associated with the power interruption as well as curtailment by one of their suppliers

The combined effect of the above was that the CCO was able to hold back from issuing curtailment instructions and closely monitor the system for increased gas flows. As can be seen from Figures 2 and 4, the linepack and pressures bottomed out at approximately 19:15. By 19:30 there was sufficient evidence of the early stages of system recovery for the CCO to give the market a status update notice suggesting that Critical Contingency curtailment may not be required. However, at this time the recovery was fragile and not sufficient to terminate the event.

6.4 System Recovery and Termination of Critical Contingency

At 19:33, the CCO issued a Status Update Notice advising that Critical Contingency curtailment may not be required if the system continued to recover. The CCO continued to monitor the system to see if the balance of receipt/delivery flows continued to support stabilisation of linepack and to observe if the production stations were now operating reliably.

By about 22:30 the CCO had seen sufficient evidence of stabilisation and linepack recovery to begin consideration of the termination of the Critical Contingency with the TSO. The termination notice was issued and published at 23:00.

OBSERVATION
The CCO has received feedback from one industry participant that another status update before termination advising that curtailment would not be required would have been useful to them.
The CCO acknowledges that stakeholders and in particular, gas users, wish to be kept informed of the status of Critical Contingencies. While the CCO acted in accordance with the regulations and the CCO Information Guide it is acknowledged that additional communication would have been useful. As part of the submission process on this report, the CCO will seek feedback on suggestions for streamlining communications to keep Stakeholders informed as to the status of a Critical Contingency.

7. Assessment and Identified Amendments

The purpose of the regulations is to achieve the effective management of critical gas outages and other security of supply contingencies without compromising long-term security of supply.

In accordance with regulation 65 (1) (b), and in the context of this event, the CCO considers the regulations, CCMPs, Communications Plan and Information Guide achieved the purpose of the regulations. The Critical Contingency declaration triggered the desired response from the industry, in particular the additional supply of gas, making curtailment under the regulations unnecessary. This additional supply was incentivised by the declaration of a non-regional event, triggering the contingency imbalance provisions.

In accordance with regulation 65 (1) (a), and in the context of this event, the CCO considers that the CCMPs, the CCO Information Guide and CCO Communications Plan were all substantially effective with the following observations and recommendations:

CCMPs

This event was somewhat complex in nature in that the dominant event, the unplanned outage of the Pohokura Production Station, is an event that would be expected to primarily impact on the Maui pipeline and the related pressure threshold at Rotowaro as specified in the Maui pipeline CCMP. However, in this instance, it was the pressure threshold specified in the First Gas CCMP at KGTP that breached first.

OBSERVATION
Production outages are not an uncommon event. An event similar to this happened on 29 February this year when Pohokura Production Station tripped at around 14:00 due to an electricity supply issue, ceasing all production. Maui linepack at the time of the trip was 290TJs (30TJs above the target linepack for the day). Flows into the Maui pipeline from the McKee/Mangahewa Production Station also reduced at this time resulting in a net out-flow from the Maui pipeline of 11.25TJs/hour. Pohokura production re-started at 14:35 and achieved a flow rate of 6.5TJs/hour by 16:00. Maui linepack dropped to a low-point of 261TJs and the Kapuni pressure threshold reached 4.2 hours to 37.5barg. The CCO considered declaring a Potential Critical Contingency for this event, however the Maui linepack at the start on the outage was significantly higher than the planned level. Had the linepack "start point" been at or below the target level for the day, the pressure threshold would have been at significant risk of being breached.

The effect of the Pohokura outage on this occasion was compounded by other outages, however the total volume of "lost" production from all of the affected producers was a relatively modest 30.8TJs. This is within the stated contingency volume levels for the Maui pipeline.

The pressure threshold breach occurred before any action had been taken by the TSO's System Operator under the MPOC in relation to levels of linepack on the Maui pipeline. It is also arguable that, but for the Critical Contingency declaration and the response by other producers, the rate of depletion of linepack from the Maui pipeline meant that the Rotowaro threshold was at significant risk of being breached.

Similarly, some industry participants may have found that the action that was taken under the MPOC immediately prior to and subsequent to the Critical Contingency declaration rather confusing, leading to a risk of conflicting instructions from the TSO under the MPOC alongside instructions under the Critical Contingency regulations.

This all leads to question whether the pressure thresholds in the CCMP's are suitably aligned with the linepack thresholds in the pipeline operating codes. The issues stem in part from the difference in

approach - the operating code philosophy uses linepack measured in gigajoules whereas the Critical Contingency thresholds use a defined time in hours to a minimum pressure.

- It is recommended that both the Rotowaro pressure threshold in the Maui pipeline CCMP and the KGTP threshold in the First Gas CCMP be reviewed by the TSO to assess their alignment with the associated pipeline operating code and determine whether the linepack thresholds in the operating codes should be changed to align with the Critical Contingency pressure thresholds, or vice versa. Consideration should also be given to the impact on pressure thresholds as the result of an event on an interconnected system.

The TSO has indicated their intent to review pressure thresholds in the TSO report from Exercise Kakama.

CCO Communications Plan

All communications and the issuing of notices from the CCO to the TSO were carried out in accordance with the requirements and time-frames specified in the Communications Plan.

The co-location of the CCO and TSO facilitated effective communication and removed the need for several of the processes set out in the Communications Protocol. Co-location at the First Gas control room may not always be practical depending on the CCO location at the time of the event and the speed with which a response may be required, but it should be a preferred mode of operation when circumstances allow.

In accordance with regulation 65 (1) (c), based on the experience of this event, the CCO has identified the following amendments that would better achieve the purpose of the regulations:

- It is recommended the CCMPs and the CCO Communications Plan be amended to formalise co-location of the CCO at the TSO's control room as a preferred operating mode for an event when circumstances allow.

CCO Information Guide

All communications and the issuing of notices from the CCO to the TSO were carried out in accordance with the requirements and time-frames specified in the Communications Plan.

No amendments to the Information Guide have been identified at the draft performance report stage. However, as part of the submission process on this report, the CCO will seek feedback on suggestions for streamlining communications to keep stakeholders informed as to the status of a Critical Contingency. This may result in proposed amendment to the Information Guide.

Regulations

No amendments to the regulations have been identified at this stage. However, it is possible that the proposed review of the Critical Contingency thresholds could lead to a requirement to amend the Critical Contingency thresholds limits specified in Schedule 1 of the regulations.

A significant component of the CCMPs is the provisions for the TSO to issue curtailment instructions to Retailers in accordance with directions from the CCO. In accordance with regulation 65 (5) the CCO assessment is that this event did not provide sufficient test of the whether the CCMPs meet the test criteria in regulation 34 (1). Consequently, the planned test exercise (Exercise Kakama) on 22 June still needed to proceed.

Appendix 1 – Incident Report

Log of actions taken by CCO and TSOs immediately before and during the Critical Contingency as provided in the incident report

The CCO and TSO notices referred to in the log of actions are shown in full in the appendices to the incident report.

Time	Action Taken
16:28	TSO calls CCO to advise of an unplanned outage at Pohokura Production Station. Maui Linepack at the time of the trip was 261.7 TJ. Pohokura was expected to resume production shortly.
17:00	TSO SCADA System indicates Kapuni Gas Treatment Plant (KGTP) Inlet Pressure Threshold at 6.9 hours to 37.5bar but dropping. (Threshold for a Critical Contingency is 3 hours to 37.5bar)
17:32	CCO calls TSO Gas Control for an update on the situation and is informed that Pohokura had restarted flowing around 17:00 and had been increasing flows, but flow was now declining. Maui pipeline linepack was 250TJ and falling. CCO mobilised to Gas Control.
17:40	Ahuroa Storage commences flowing gas from pipeline, which further increased the rate of pressure drop at the KGTP pressure threshold.
17:42	SENZL advises TSO Gas Control that they were sending someone offshore but time to return to full flow rates was at this point not known.
17:50	CCO arrives at TSO Gas Control. Maui pipeline linepack at 247TJ but losing circa 11TJ/hr. KGTP inlet pressure threshold was approaching the CC threshold. CCO consults with TSO and it is agreed that a potential Critical Contingency notice should be issued. CCO commences preparing the Notice.
18:00	CCO discusses the situation with Huntly Power Station to make them aware that potential Critical Contingency conditions exist.
18:00	SENZL advises the TSO that Pohokura would be re-starting soon but it could be a couple of hours before returning to normal flows.
18:05	TSO SCADA system indicates that KGTP Pressure Threshold has reached 2.9 hours to 37.5Bar. CCO consults with TSO to confirm that threshold breach is not a short-term "transient" condition. TSO confirms. **CCO determines that Critical Contingency conditions have occurred under r48(1)(a) and advises the TSO that a Critical Contingency declaration notice will be issued as soon as possible.**
18:05	MDL publishes Critical Notice 32559 on OATIS advising of low linepack and that the System Operator may have to take further action if the situation is not resolved.
18:06	TSO SCADA indicates that Pohokura Production Station has commenced flowing at low rates.
18:07	CCO discusses the situation with Electricity System Operator in order to determine the current need for generation and in particular if they needed Huntly Rankine units.
18:10	CCO discusses the situation with Methanex to make them aware of the situation and to understand the current plant status.

Time	Action Taken
18:15	TSO SCADA indicates that Pohokura Production Station reached a flow rate of 8scms but then reduced slightly and levelled off. (Target flow rate to return to pre-outage conditions would be circa 60scms)
18:15	CCO determines that the Critical Contingency is not a regional contingency.
18:20	CCO consults with TSO on content of CC Declaration Notice and TSO confirms that the Notice concurs with the TSO's understanding of the situation.
18:24	CCO issues Critical Contingency Declaration Notice CC-0022 to TSO, Stakeholders and Interested Parties via email.
18:26	MDL publishes Critical Notice 32560 on OATIS (Maui). MPOC Section 15.1 Curtailment[1] of Ngatimaru Rd (Receipt).
18:28	CCO uploads Declaration Notice and updates "Current CC Events" page on CCO website.
18:30	CCO sends SMS to CCO Stakeholders listed in Information Guide to advise that Critical Contingency Declaration Notice CC-0022 has been issued.
18:30	Methanex calls CCO to advise they had seen the declaration notice and update the CCO on their plant status in order to determine the effects of any curtailment under the CCM Regulations.
18:35	TSO SCADA indicates Maui Linepack at 240TJ and losing 7.8TJ/hr. KGTP Pressure Threshold now 1.8 hours to 37.5bar. Rotowaro pressure threshold now at 5 hours to 32bar. (Threshold is 3 hours to 32bar).
18:35	CCO considers the options and need for curtailment under the CCM Regulations in order to balance the system in consultation with TSO. CCO and TSO concerned about the immediate stability of Pohokura flow given continual lightning strikes in the area but immediate curtailment under the CCM Regulations not considered necessary at this time.
18:38	MDL publishes Critical Notice 32562 on OATIS (Maui). Operational Flow Order MPOC Section 15.1 Curtailment[1] of Ngatimaru Rd (Receipt).
18:40	MDL publishes Critical Notice 32564 on OATIS (Maui). Operational Flow Order MPOC Section 15.1 Curtailment[1] of Ngatimaru Rd (Receipt).
18:43	MDL publishes Critical Notice 32561 on OATIS (Maui). Critical Contingency Declaration Notice CC-0022.
18:44	First Gas publishes Critical Notice 32563 on OATIS (Vector). Critical Contingency Declaration Notice CC-0022.
18:46	The CCO discusses Pohokura situation with SENZL. The plant problem had been resolved and the station would return to full rates within 2 hours. The CCO explored the opportunity to increase gas production from Oaonui Production Station. STOS advises that they have extra capacity and would confirm details shortly.

[1] Curtailment in this context refers to a curtailment under the Maui Pipeline Operating Code, not the Critical Contingency Regulations.

Time	Action Taken
18:55	TSO SCADA indicates Maui Linepack at 238TJ and losing 5.7TJ/hr. KGTP Pressure Threshold 2.2 hours to 37.5bar (improving). Rotowaro pressure threshold dropped to 4.3 hours to 32bar. (Threshold is 3 hours to 32bar). Pohokura Production Station flowing at 34scms.
19:00	SENZL advises CCO that Pohokura should be at full rates in an hour and Oaonui Production Station had started to increase flow rates.
19:02	Todd advises they would be increasing production from McKee/Mangahewa and had also curtailed[2] Methanex.
19:15	Gas Control SCADA indicates Maui Linepack at 236TJ and losing 3TJ/hr. KGTP Pressure Threshold 2.4 hours to 37.5bar (improving). Rotowaro pressure threshold at 4.8 hours to 32bar (improving). Pohokura Production Station flowing at 45scms. Oaonui Production Station increased rates from 17scms to 24scms.
19:15	CCO determines that pressure threshold declines have ceased and curtailment under the CCM Regulations at this time not required although the system is not fully stabilised.
19:20	Ahuroa Storage ceases flowing gas from pipeline.
19:20	CCO prepares Status Update Notice CC-0023 and consults with TSO on content and TSO confirms that the Notice concurs with the TSO's understanding of the situation.
19:30	TSO SCADA indicates Maui Linepack at 235TJ but now gaining 0.15TJ/hr. KGTP Pressure Threshold no longer below threshold. Pohokura Production Station flowing at 59scms. Oaonui Production Station increased rates further to 27scms.
19:33	CCO issues Status Update CC-0023 by email to Stakeholders listed in the Information Guide issued advising curtailment not required at this time.
19:35	CCO uploads Status Update Notice and updates "Current CC Events" page on CCO website.
19:40	CCO sends SMS Message to Stakeholders to advise that Status Update Notice CC-0023 has been issued.
19:44	MDL publishes Critical Notice 32568 on OATIS (Maui). Critical Contingency Status Update Notice CC-0023.
19:46	First Gas publishes Critical Notice 32569 on OATIS (Vector). Critical Contingency Status Update Notice CC-0023.
19:52	CCO updates Electricity System Operator that curtailment under the CCM Regulations of any electricity generation now unlikely provided system continues to recover at current rates and stays stable.
19:52	MDL publishes Critical Notice 32566 on OATIS (Maui). MPOC Section 15.2 Curtailment[1] of Tikorangi #2, Intraday 4
19:54	CCO updates Huntly that curtailment under the CCM Regulations now unlikely provided system continues to recover at current rates and stays stable.

[2] Curtailment in this context refers to a curtailment under normal business arrangements, not under the Critical Contingency Regulations.

Time	Action Taken
19:54	MDL publishes Critical Notice 32567 on OATIS (Maui). MPOC Section 15.2 Curtailment[1] of Tikorangi #2, Intraday 4
19:55	TSO SCADA indicates Maui Linepack at 236TJ and gaining 1.45TJ/hr. KGTP Pressure Threshold no longer below threshold. Pohokura Production Station flowing at 60scms. Oaonui Production Station increased rates further to 33scms.
20:00	CCO updates Methanex that curtailment under the CCM Regulations unlikely provided system continues to recover at current rates and stays stable.
20:56	CCO updates CCO Information Line for CC Declaration.
22:35	TSO SCADA indicates Maui Linepack at 248TJ and gaining 7.9TJ/hr. Pohokura Production Station flowing at 60scms. Oaonui Production Station increased rates further to 43scms.
22:45	CCO consults with TSO to determine if system is now considered "stable" TSO and CCO agree that CCO can be terminated at 23:00hours.
22:50	CCO prepares Termination Notice CC-0024 and consults with TSO on content and TSO confirms that the Notice concurs with the TSO's understanding of the situation.
23:00	CCO uploads CC Termination Notice and updates "Current CC Events" page.
23:01	CCO emails Critical Contingency Termination Notice CC-0024 to TSO, Stakeholders and Interested Parties.
23:02	CCO sends SMS message to Stakeholders to advise that Critical Contingency Termination Notice CC-0024 has been issued.
23:05	CCO updates CCO Information Line for CC Termination.
23:13	MDL publishes Critical Notice 32570 on OATIS (Maui). Critical Contingency Termination Notice CC-0024.
23:15	First Gas publishes Critical Notice 32571 on OATIS (Vector). Critical Contingency Termination Notice CC-0024.