



A CMS Energy Company

April 5, 2019

Ms. Kavita Kale
Executive Secretary
Michigan Public Service Commission
7109 West Saginaw Highway
P.O. Box 30221
Lansing, MI 48909

General Offices:
One Energy Plaza
Jackson, MI 49201

Tel: (517) 788-0550
Fax: (517) 768-3644

*Washington Office:
1730 Rhode Island Ave. N.W.
Suite 1007
Washington, DC 20036

Tel: (202) 778-3340
Fax: (202) 778-3355

Writer's Direct Dial Number: (517) 788-0835
Writer's E-mail Address: bret.totoraitis@cmsenergy.com

LEGAL DEPARTMENT
CATHERINE M REYNOLDS
Senior Vice President
and General Counsel

MELISSA M GLEESPEN
Vice President, Corporate
Secretary and Chief
Compliance Officer

SHAUN M JOHNSON
Vice President and Deputy
General Counsel

Bret A Totoraitis
Kelly M Hall
Eric V Luoma
Assistant General Counsel

Ashley L Bancroft
Robert W Beach
Ian F. Burgess
Don A D'Amato
Robert A. Farr
Gary A Gensch, Jr.
Emerson J. Hilton
Chantez P Knowles
Mary Jo Lawrie
Jason M Milstone
Rhonda M Morris
Deborah A Moss*
Michael C. Rampe
Scott J Sinkwitts
Adam C Smith
Theresa A G Staley
Janae M Thayer
Anne M Uitylugt
Aaron L Vorce
Attorney

RE: Case No. U-20463 - In the matter, on the Commission's own motion, to commence an investigation into a January 30, 2019 fire at Consumers Energy Company's Ray Compressor Station in Macomb County.

Dear Ms. Kale:

Enclosed for electronic filing in the above-captioned case is **Consumers Energy Company's Ray Compressor Station Fire Report**.

This is a paperless filing and is therefore being filed only in PDF format.

Sincerely,

Bret A. Totoraitis

Consumers Energy Company

Ray Compressor Station Fire, Jan. 30, 2019

MPSC Commission Order in Case No. U-20463

April 5, 2019

Introduction

Consumers Energy Company's (Consumers Energy or the Company) natural gas storage fields are critical assets for Michigan's energy infrastructure and reliability. The unique geological features at our sites allow us to buy and store many billions of cubic feet of natural gas at lower prices, then withdraw and distribute the gas during the winter when prices and demand are higher. Consumers Energy purchases gas during periods of low demand, injects the gas into depleted wells and withdraws it during the winter avoiding both seasonally higher prices and limitation in pipeline capacity.

The Ray Natural Gas Compressor Station, including the Ray Storage Facility, is our largest storage asset and has served our customers and the people of Michigan safely and effectively since the initial equipment was installed in 1966. The station's evolving design, culminating with the addition of Plant 3 in 2013, is resilient and provides three pathways for gas to flow in and out of the station.

Extreme cold weather hit Michigan Jan. 29 through Feb. 1. Consumers Energy entered this record cold weather period with 61.9 billion cubic feet (Bcf) of working natural gas inventory — above our target of 61.4 Bcf during a typical winter. We planned to fulfill demand during this cold period using baseload production storage fields, Ray field and pipeline supply as the primary sources with our peaker fields in reserve to support system packing and any potential interruptions in pipeline supply, baseload fields and compressor stations.

At approximately 10:30 a.m. on Jan. 30, a fire occurred at our Ray Natural Gas Compressor Station in Macomb County. The Ray facility, the largest source of working gas capacity in Michigan, is a combination compressor station and nearby storage field where we store natural gas until it is needed by customers. The fire, which did not cause injuries, reduced the amount of natural gas we could deliver to customers from underground storage located in the Ray field near the compressor station. The damage to our largest storage and delivery system, which occurred during historically high natural gas demand due to cold temperatures, prompted us to take steps to ensure natural gas deliveries to our state's residential and most vulnerable customers continued uninterrupted. These steps included requests for voluntary reductions in gas usage of all customers. The Company also, for the first time in its history, implemented an Operational Flow Order (OFO) for natural gas transportation customers which required those customers to match their natural gas deliveries to Consumers Energy's system to their usages. When the requests for voluntary actions and the OFO did not result in the reductions in gas usage necessary to stabilize our system, we implemented, for the first time in the Company's history, a mandatory curtailment of gas deliveries to large business customers which required them to reduce their natural gas usage down to minimum loads required to protect equipment. In addition, in cooperation with Gov. Whitmer, we requested all natural gas customers in Michigan to conserve natural gas by dialing down their thermostats. On Thursday, Jan. 31, we announced that the appeal for assistance would end at 12:00 a.m. on Feb. 1 for all customers — commercial, industrial and residential.

On Feb. 7, the Michigan Public Service Commission (MPSC or the Commission) issued an Order in MPSC Case No. U-20463 requiring Consumers Energy to submit a report addressing nine items regarding the Ray Compressor Station fire. Specifically, the Commission required the report to set forth the following:

- (1) the origin of the fire;
- (2) how Consumers Energy responded to the fire, both at the site and at its corporate office;
- (3) the Company's implementation of gas curtailment procedures;
- (4) whether there is evidence of a failure on the part of Consumers Energy to properly maintain its equipment or any non-compliance with Commission rules;
- (5) whether the Company properly responded to the natural gas shortage;
- (6) estimated reductions in natural gas usage from large customer curtailments and residential conservation over time during the emergency with corresponding timeframes of actions (e.g., public appeals, emergency alerts) by Consumers Energy and the State of Michigan;
- (7) Consumers Energy's coordination and communication with State of Michigan officials and local emergency response agencies;
- (8) actions directed toward physical security and cybersecurity before, during and after the event; and
- (9) the total cost of the incident, including gas lost on site, emergency natural gas purchases, estimates of customer curtailment impacts and repair of the facility.

As directed by the Commission, Consumers Energy submits this report providing responses to the items outlined in the order.

1. Origin of the Fire

On Jan.30, Plant 3 at the Ray Compressor station detected an abnormal operating condition in the Det-Tronics control system. As part of the emergency safety fire-gate process, the plant released natural gas into the atmosphere through Plant 3 blowdown silencers. A fire-gate event is a rapid de-pressurization of natural gas from a compressor station plant along with all of its piping. Compression stations are protected from extreme fire damage by fire-gate systems where, manually or automatically, the station piping is evacuated through vents at the perimeter of the station so that any fire within the equipment will be quickly extinguished due to lack of fuel to burn. The natural gas discharge is routed away from the compressor plant and personnel to an isolated location on the station. This safety protocol blows down the plant from approximately 950 pounds per square inch gauge (psig) to near atmospheric pressure over the course of about 10 minutes. Since being placed in service in 2013, Ray Plant 3 has successfully completed both planned and unplanned fire-gate evolutions successfully without incident.

The natural gas released from the fire-gate event migrated in a northeast direction over the Plant 2 processing equipment as a result of the wind conditions occurring at the time of the event. At 10:25:51¹ a.m., a gas plume ignited from the Plant 3 blowdown silencers (suction and discharge). The Plant 2 thermal oxidizer's 1506 degrees F exhaust stream auto-ignited the Plant 3 fire-gate gas plume (see figure 1).

¹ Times have been normalized to align with the security camera timestamps.

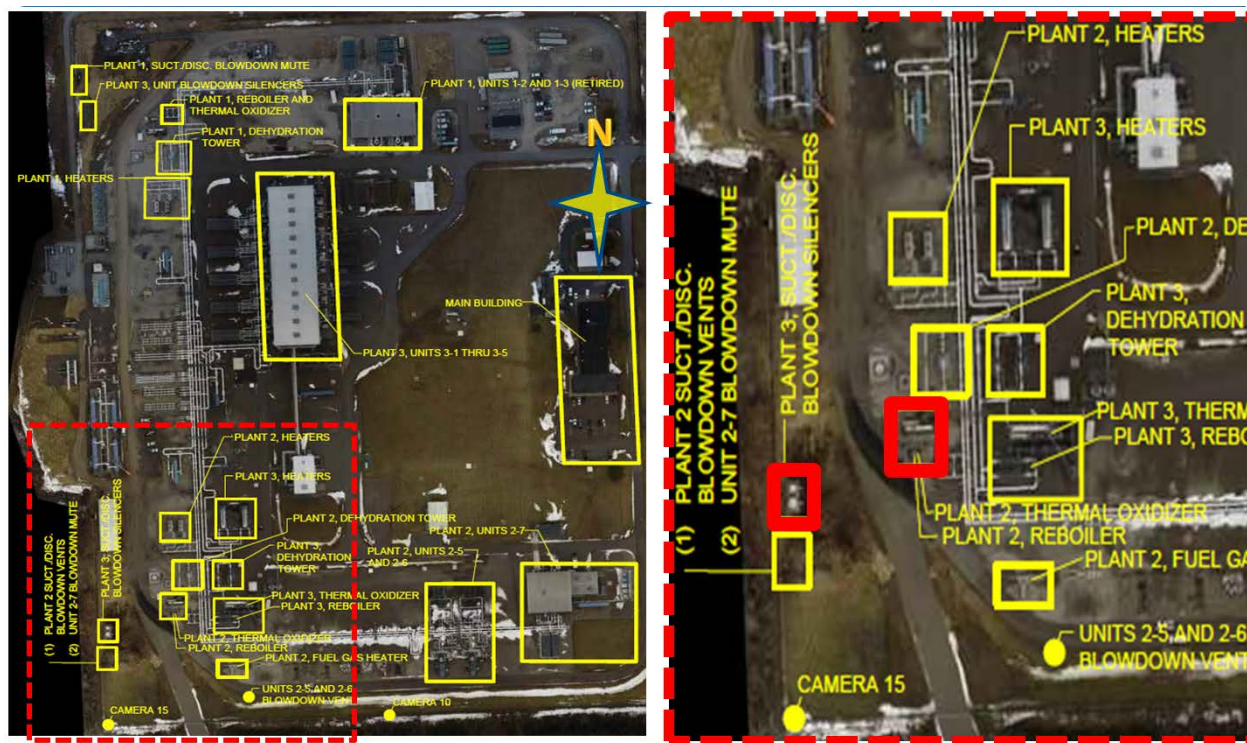


Figure 1. General layout of the Ray Compression Station

Three Elements for Ignition

There are three elements required for a fire to ignite:

- A fuel source;
- Oxidizer (air); and
- An ignition source.

Fuel Source: The blowdown discharge plume provided the fuel for the fire when Plant 3 fire-gated, releasing natural gas from the station.

Oxidizer: As a safety protocol, when a fire-gate is triggered all the gas in a compressor plant is blown down away from the plant, causing depressurization. For Ray Plant 3, the natural gas is typically routed through a silencer which reduces the noise produced by the blow down to a level that is less disruptive to the surrounding community than traditional straight pipe high velocity vents. This is accomplished by reducing the velocity as the natural gas is discharged. With the slow exit velocity, the gas flow is more sensitive to the wind which can enhance the mixing of the natural gas with the surrounding air.

Natural gas needs to be mixed with air to form a flammable mixture (5% to 15% by volume). When that mixture is ignited, it can only burn in the zone where the fuel and air mixture is within the flammable concentration range. The natural gas released by the fire-gate dispersed and mixed with the air when it was discharged. At the time the station was fire-gated, the wind conditions were approximately 20 mph with 28 mph gusts.

The prevailing wind conditions were a necessary factor to make this fire event occur. The blowdown discharge and its interaction with the wind caused a turbulent, highly dynamic natural gas cloud. The high wind speed was a factor in diluting the natural gas to the flammable range. The prevailing southwest wind pushed the natural gas plume directly towards the only competent ignition source, the Plant 2 thermal oxidizer, in that section of the station. The wind was variable and gusting which also led to a chaotic dispersion of the natural gas.

Ignition Source: When the fire-gate occurred, the significant wind directed the gas plume towards the Plant 2 thermal oxidizer (see figure 2). The thermal oxidizer was in operation at the time due to the peak natural gas demands on the system. A thermal oxidizer uses a flame to destroy pollutants from the reboiler. The ignition source was determined to be the Plant 2 thermal oxidizer exhaust which raised the temperature of the plume of natural gas and air mixture above the auto-ignition temperature.

Per National Fire Protection Association (NFPA) 921 Guide for Fire & Explosion Investigations, the auto-ignition temperature of natural gas ranges from 900 degrees F to 1,170 degrees F. Natural gas will auto-ignite at or above this range. At the time of ignition, the Plant 2 thermal oxidizer's exit temperature was 1,506 degrees F per thermocouple historian data. The thermal oxidizer's exhaust temperature was greater than the auto-ignition temperature of natural gas, making the exhaust a competent ignition source.

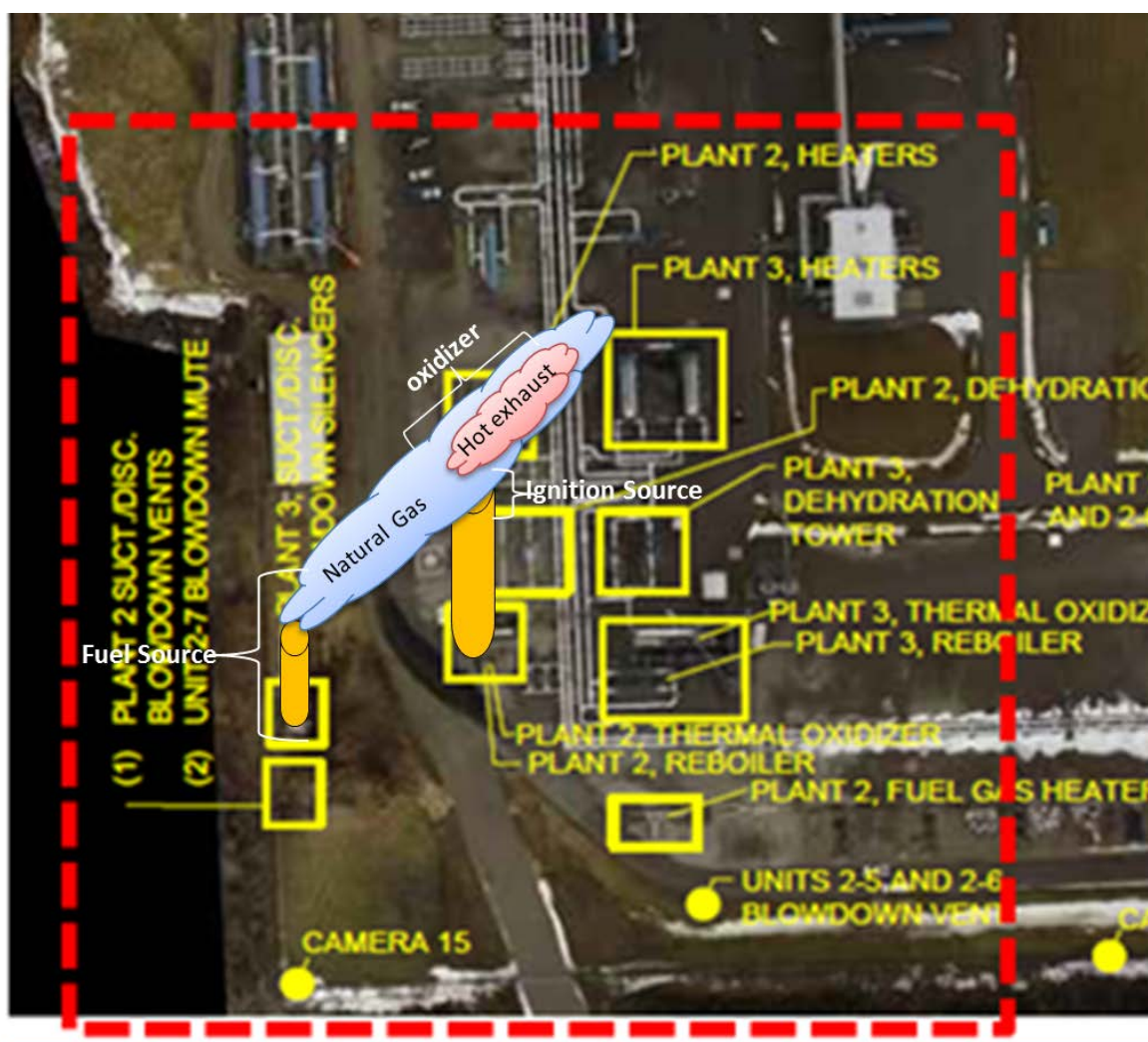


Figure 2. Illustration of ignition elements

We contracted with a third party to validate the internal investigation of the origin of the fire. The third-party consultant performed its investigation in a manner generally consistent with the NFPA's guidance document, NFPA 921 Guide for Fire and Explosion Investigations (2017), and its conclusion aligned with our analysis.

Timeline of Events

On the morning of Jan. 30 at 10:23:10 a.m.,² the Ray Compressor Station lost the pilot air pressure signal for the Plant 3 fire-gate system. As designed, this triggered Plant 3's process equipment emergency shutdown. The plant experienced a priority 1 fire-gate alarm at 10:25:20 a.m. and the station was blown down at 10:25:33 a.m.

² Times have been normalized to align with the security camera timestamps.

The blowdown gas vented through the silencers located at the southwest corner of the station property. This blowdown gas ignited. The wind pushed the flames north eastward. The first visible sign of fire was observed near the Plant 2 thermal oxidizer stack at 10:25:51 am. The fire increased in size and reached the top of the Plant 3 blowdown silencer by 10:26:22 a.m. (see figures 3 and 4)



Figure 3. Initial visible flame



Figure 4. Wind direction and camera angles

Personnel at the Ray Plant manually fire-gated Plant 1 and Plant 2, as part of our standard safety protocols, at 10:27:58 a.m. and 10:28:22 a.m., respectively. At 10:28:48 a.m., there was a second ignition at the Plant 2 vent stack, which is located next to Plant 3's blowdown silencers and is the location where the natural gas is released for Plant 2 (see figure 5). The flames extinguished when the natural gas was completely vented. The fire department arrived on scene at 10:38 a.m. and left at 3:34 p.m.



Figure 5. Progression of the fire

2. Response to the Fire, Both at the Site and at our Corporate Office

Since 2014, we have developed proficiencies and capabilities in emergency management, including the use of the Incident Command System (ICS). These core capabilities enabled the team involved in this event to respond rapidly and organize into an ICS structure that included both a command post and an Emergency Operations Center (EOC). The well-defined chain of command, incident objectives and tactics allowed for effective internal coordination of resources. It also enabled fast, complete and transparent engagement with the MPSC, State Emergency Operations Center (SEOC) and the Governor's office throughout the event. Furthermore, it provided an organized approach to protect life and safety, to stabilize the incident, and to protect property and the environment.

At the outset, we made required emergency notifications and we entered the initial response period. We identified the on-scene commander at the Ray Compressor Station, and the on-scene commander worked through the initial response to stabilize the scene. As the incident was stabilized, the Corporate Emergency Management department's director was informed and a subject matter expert from the team was deployed to the scene to serve as Documentation Unit Lead and to work with local leadership in setting up an ICS structure. We established the Ray Command Post and assigned roles to form both a command and general staff. The ICS team worked to establish a formal Incident Action Plan with all the required ICS elements including ICS forms that contain situational summaries, high level objectives, tactics and the ICS structure.

Meanwhile, due to the classification of the incident and the potential for losses in gas supply to the system, a team involving organizations such as Gas Management Services, Gas Asset Management and Gas Regulatory Compliance assembled at a remote location which would become the EOC. The personnel at the EOC worked to support the Ray Command Post and manage the larger impact on the gas supply system. We deployed a subject matter expert from the Corporate Emergency Management department to the EOC to work with the leadership in establishing an ICS structure and an Incident Action Plan.

We also activated the Crisis Management Team and identified an Officer in Charge, giving this incident the ICS classification of Level 3 - Full Scale Activation. We have four ICS incident classifications including: Level 0: Routine; Level 1: Elevated; Level 2: Serious; and Level 3: Full-Scale. With the Level 3 classification, the ICS structure includes one or more command posts, an EOC and senior level executives functioning as the Crisis Management Team.

Incident Command Structure

With such a complex ICS activation, the ICS structure and gas Emergency Response Plan proved invaluable, providing the framework for an appropriate and coordinated response. The Incident Action Plans developed each operating period at the Ray Command Post and EOC provided a clear operating picture to help guide the response and deliver consistent, accurate communication. This communication followed a clear path from the Ray Command Post to the EOC to the Crisis Management Team. Throughout the ICS activation, which was active from Jan. 30 through Feb. 6, multiple update calls took place. The safety plans developed by the safety officers helped mitigate the safety risks for employees and the public. These safety plans were the priority during the response. We deployed the Mobile

Command Center, a mobile emergency response vehicle, to the Ray Command Post, which provided great value to those working on scene in very harsh conditions.

We had personnel in ICS roles from the following respective areas:

- Safety
- Gas Operations
- Gas Management Services
- Business Customer Care
- Public Affairs
- Rates and Regulatory Affairs
- Logistics
- Finance
- Security
- Legal
- Emergency Management
- Gas Engineering

We demobilized the ICS activation as the incident neared completion. Although work continued, we determined those tasks were manageable through normal daily operations. We held after-action reviews for the Ray Command Post and the EOC, which will allow for continuous improvement opportunities.

Our readiness to respond was the result of advanced planning and preparedness activities. In 2018, for example, a functional exercise at Ray Compressor Station with a scenario involving a fire was held and was helpful in preparing employees to use ICS to manage this incident. We utilize the Homeland Security Exercise and Evaluation program's preparedness activities such as planning, training, exercising and evaluating. We have continuously used these since the Emergency Management program's creation to prepare for this type of emergency. This preparedness was critical in prioritizing life and safety, stabilizing the incident, preserving property and protecting the environment.

3. Implementation of Gas Curtailment Procedures

On Jan. 24, we notified interruptible Act 9 natural gas transportation customers that interruptible service would not be available due to forecasted cold weather conditions beginning on gas day Jan. 25 and continuing until further notice. Those customers included Midland Cogeneration Venture, LP (MCV), SEMCO Energy Gas Company (SEMCO), Michigan Gas Utilities and British Petroleum.

Following those communications, SEMCO requested to flow some gas under the interruptible portion of its Act 9 contract because the cold forecast exceeded SEMCO's current design day expectations and current distribution system deliverability constraint. We granted the requested interruptible service to SEMCO because SEMCO serves residential customers and had identified a critical need for interruptible service. The Commission Staff was notified of this exception on Jan. 29 at 3:36 p.m.

On the morning of Jan. 30, Business Customer Care (BCC) received an alert regarding a problem at the Ray Compressor Station and of the potential for a Gas Curtailment. The timing of events and steps taken by BCC are outlined below:

Jan. 30

11:00 a.m. - BCC first awareness of event at Ray Compressor Station.
11:46 a.m. - OFO communication to Customer Account Manager team.
11:50 a.m. - Curtailment customer list pulled and adapted for efficient BCC use.
12:07 p.m. - Information Posting Website (IPW) notification of OFO order.
12:15 p.m. - BCC team leadership alignment.
12:46 p.m. - Operating concern outreach to 18 specific industrial customer locations regarding low gas pressure in the Warren/Sterling Heights Area.
1:00 p.m. - BCC team alignment. Account managers begin reaching out to 104 of the highest volume customers to request voluntary gas load reductions.
2:00 p.m. - BCC team alignment: outreach progress check-in.
2:55 p.m. - Formal curtailment issued for customers using greater than 1250 Mcf/Month (priorities 2-5 – per section C3.3 Paragraph F of Consumers Energy Rate Book for Natural Gas Service).
3:00 p.m. - BCC team notification of curtailment and outreach communication adjusted to reflect that mandatory reductions are required.
3:08 p.m. - Notification of curtailment posted on IPW.
8:00 p.m. - BCC team check-in outlining reduction estimates by customer totaling approximately 95,000 Mcf/day.
11:30 p.m. - Lansing/Delta City Gate specific customer update regarding low pressure concerns.

Jan. 31

7:30 a.m. - BCC leadership alignment.
8:00 a.m. - BCC team alignment call - event updates to curtailed customers continued generating additional 40,000 Mcf reduction.
4:00 p.m. - BCC team alignment – curtailment end communicated internally.
4:15 p.m. - BCC outreach communication of curtailment lift effective as of 12:00 a.m. on Feb. 1.
4:38 p.m. - Curtailment end posted on IPW.

Feb. 1

8:22 a.m. - IPW notification reiterating curtailment and OFO end at 12:00 a.m. on Feb. 1.

During the day of Jan. 30, the Midcontinent Independent System Operator, Inc. (MISO) experienced a Maximum Generation Event, Step 2b. We communicated with MISO to determine the need to continue to serve Michigan natural gas-powered power plants during the curtailment. MISO indicated we could ask those plants to shut down or reduce operations. We required MCV to cease consuming natural gas delivered from the Consumers Energy gas system and CMS Kalamazoo River to shut down. Other natural gas plants on our system reduced their usage but continued to generate power due to the nature of their customers and the necessity to preserve electric service to them. Those included: the Lansing Board of Water & Light and Michigan State University.

4. Whether there is evidence of a failure on the part of Consumers Energy to properly maintain its equipment or any non-compliance with Commission rules

Based on our review of the event, there was no evidence of a failure to properly maintain equipment.

The current installation meets requirements of Michigan's gas regulations. Additional design enhancements are being considered for current and future installations as we incorporate this most recent event into our plan-do-check-act cycle. As Consumers Energy embarks on its Safety Management System implementation, a critical component to improving safety is to manage changes by incorporating learnings into forward actions.

5. Whether the Company properly responded to the natural gas shortage

Jan. 30, 2019

On Jan. 30, when the Company experienced a fire-gate of the Ray Compressor station, the result was the loss of the ability to deliver approximately 1.8 Bcf/day flowing supply for roughly 12 hours. Our actions included initiating pre-curtailement procedures of requesting voluntary reductions of gas usage and implementing an OFO, dispatching peaker fields, purchasing incremental pipeline supply, asking for additional gas supply above the scheduled amount from interconnecting pipelines and implementing a curtailment (as discussed in section 3) pursuant to Rule C3.3 of the Company's natural gas tariffs. The actions taken by Consumers Energy avoided unplanned customer gas outages due to this event, and preserved service to residential and vulnerable customers during an extremely cold weather pattern.

Consumers Energy entered the record cold weather period of Jan. 30 to Feb. 1 with 61.9 Bcf of working gas inventory in storage. The demand plan for 10:00 a.m. on Jan. 30 to 9:59 a.m. on Jan. 31 included delivery of over 3.0 Bcf for the 24-hour period with a peak hourly rate of 3.7 Bcf/day occurring on the morning of Jan. 31 between the hours of 8:00 a.m. and 10:00 a.m. The plan called for setting a record for total day and peak hour demand on our system.

The supply and operations plan for the day was to fulfill demand using baseload storage fields, Ray Field, and pipeline supply as the primary sources, with peaker fields in reserve to support system packing and any potential interruptions in supply. Pipeline suppliers issued critical notices for this period. We issued an internal notice to ensure critical facilities and equipment were ready when needed. The daily supply plans and actuals for Jan. 30 and Jan. 31 are shown in Figure 6.

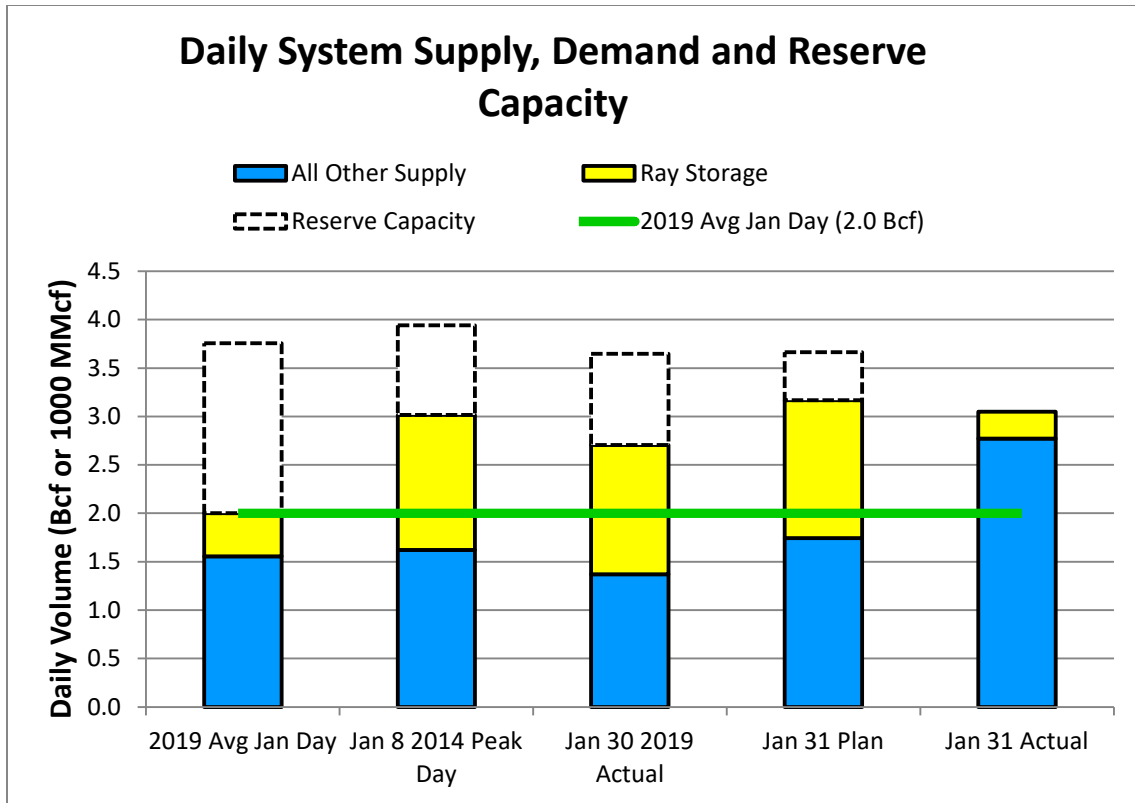


Figure 6. Daily supply plans and actuals for Jan. 30 and Jan. 31

The system was operating according to plan until 10:28³ a.m. on Jan. 30 when Gas Control received a Ray Plant 2 fire-gate alarm and the instantaneous rate at Ray reduced from approximately 1,800 MMcf/day (1.8 Bcf/day) to zero. Due to the alarm, the first response to the restriction on access to our natural gas supply began in our Gas Control Center. Gas Control notified leadership and the appropriate operations personnel at approximately 10:30 a.m. As shown in Figure 7, the loss of Ray flow caused the system to begin unpacking at an excessive rate. Unpacking means the amount of gas and the available pressure in the pipeline system are decreasing. Unpacking occurs when the rate of total system supplies is lower than the rate of total deliveries to customers. Figure 7 depicts the status of system supply, demand, rate of system unpack, Ray Field flow prior to the fire-gate alarm through peak hour of Jan. 30 at 11:00 p.m. and the peak hour of the next day at 8:06 a.m. on Jan. 31. The loss of Ray and the rate at which the pipeline system was unpacking caused key system pressures to decline at excessive rates.

³ Time based on gas logs; normalized time to video surveillance is 10:33am.

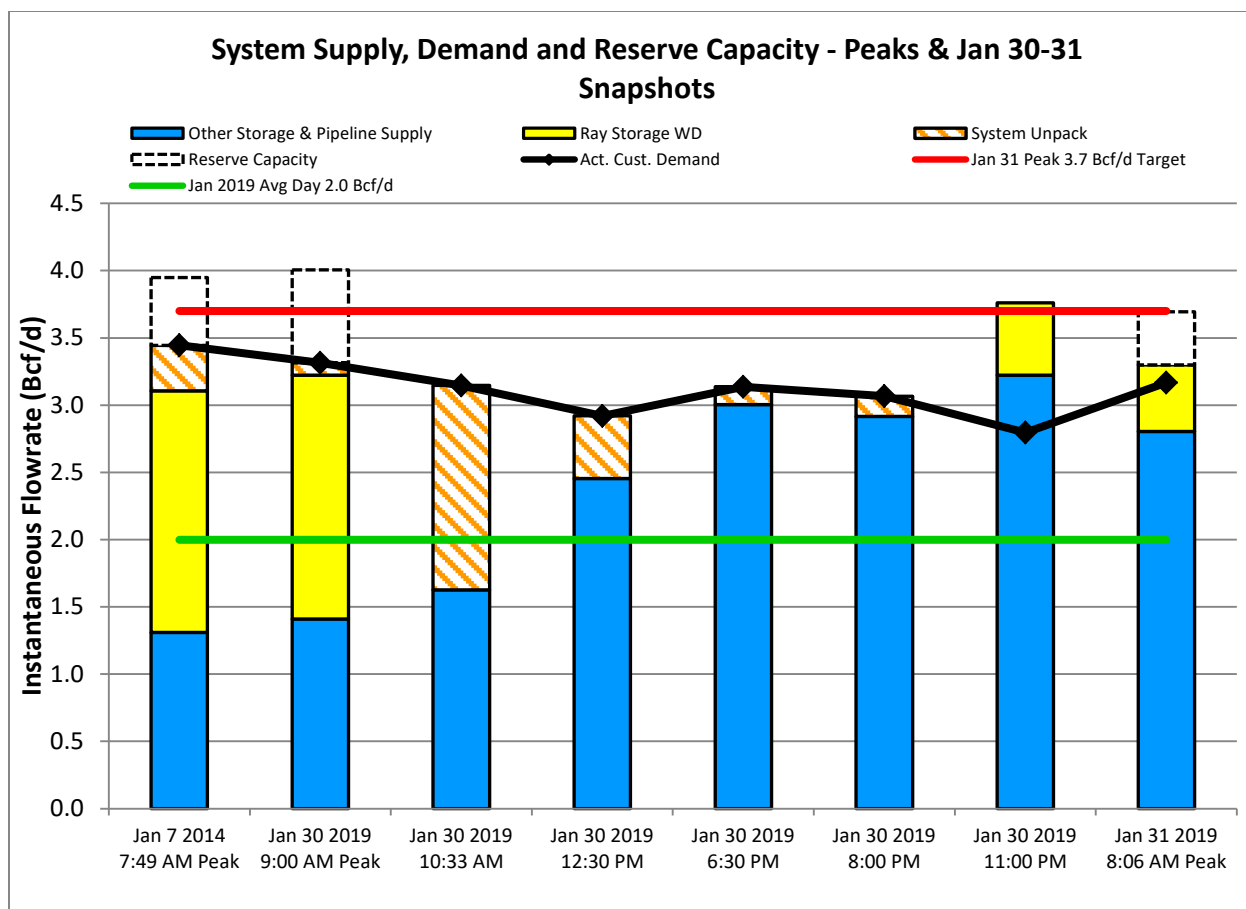


Figure 7. System supply, demand and reserve capacity

Dispatch of Peaker Fields

Shortly after the fire-gate alarm was received, Gas Control adjusted the storage field rate orders to dispatch all peaking storage fields at maximum flow rates including those fields on standby. The peaking storage fields dispatched at maximum rates included Lenox and Ira located in the St. Clair area and Lyon 34, Lyon 29 and the Northville Reef located in the Northville area. Lenox field, which received a dispatch order prior to the fire, began flowing and ramping up at about 9:15 a.m. The St. Clair, Northville and Ray storage areas are identified in Figure 8. The Northville Reef began flowing to system at 10:57 a.m. and Lyon 29 and Lyon 34 began flowing to system at 11:30 a.m. Ira began flowing to the system at 12:46 p.m. The peaking storage fields added approximately 975 MMcf/day of supply to the system. The dispatch of the peaking fields maximized the total amount of storage supply delivered to the system and reduced the system unpack rate. This peaking capacity, however, was forecasted to decline by approximately 500 MMcf/day by the next morning's peak hour as field inventories depleted. We considered the peaker field flow reduction in the gas supply procurement decisions throughout the day. As shown in Figure 7, the supply from the peaker fields significantly reduced the system unpack rate. It did not provide enough supply to begin repacking the system as demand remained relatively steady.

Gas Transmission System

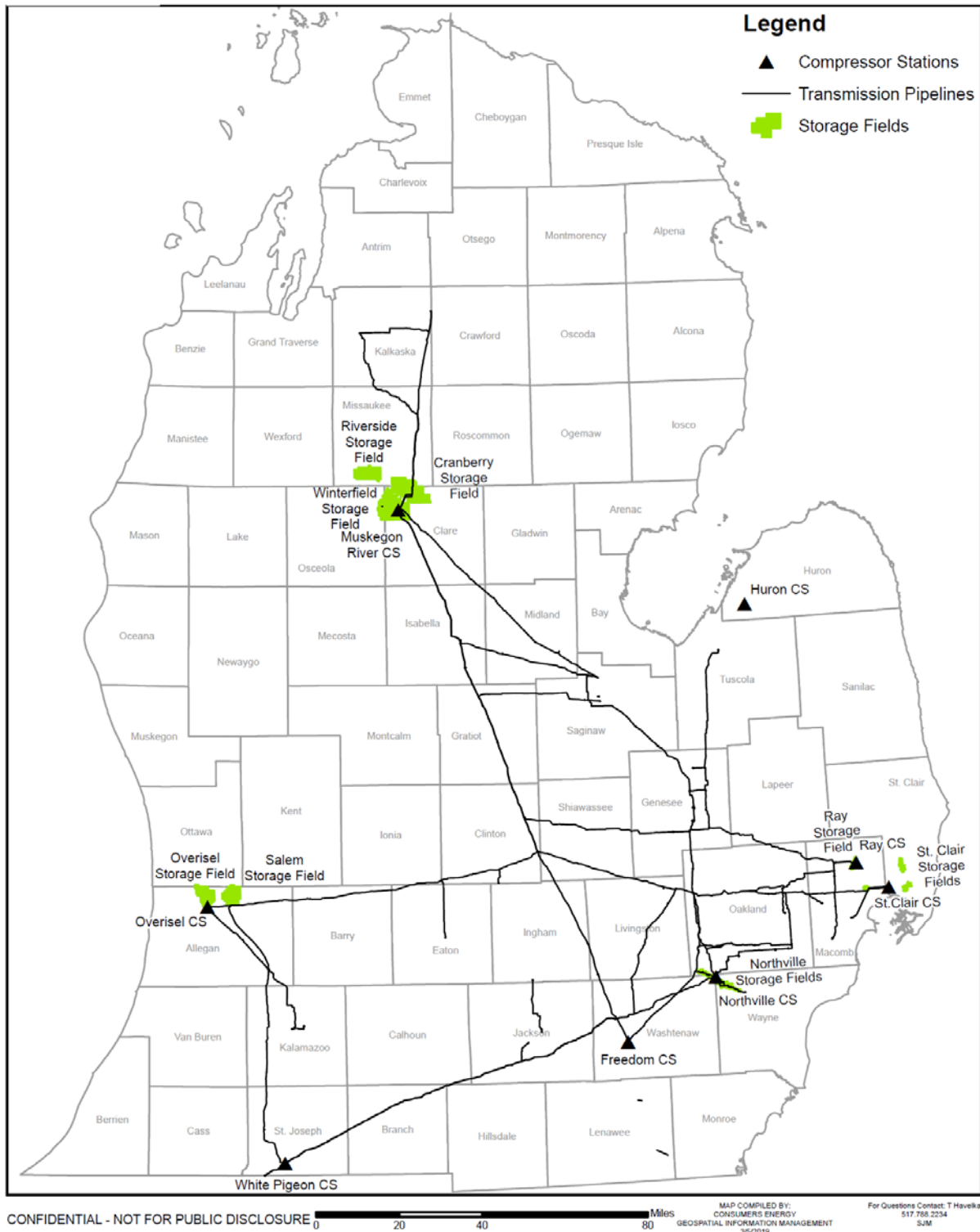


Figure 8. Map of Consumers Energy compression stations and storage fields

Assistance from Other Pipelines

At 10:41 a.m. on Jan. 30, Gas Control was notified of a fire at Ray Compressor Station. This notification contributed to the Gas Control response to seek additional gas deliveries as assistance from other interconnecting pipelines. Phone calls for assistance began as early as 10:45 a.m. We made phone calls to five major pipelines interconnected to Consumers Energy and all agreed to provide assistance on a best efforts basis. Communications continued periodically throughout the day to align on the volumes and constraints. This additional supply and the peaker field supply are reflected in the blue supply bars in Figure 7 above. The amount received from other pipelines varied somewhat throughout the day of Jan. 30. At times, it was uncertain how long and how much assistance gas could be provided to us. At 12:30 a.m. on Jan. 31, the net gain above the scheduled nominations was approximately 309 MMcf/day.

Procurement of Additional Supply

While Gas Control contacted other pipelines for assistance, Gas Control leadership assessed the system status. We quickly determined procurement of additional gas supply had to begin as soon as possible due to the uncertain return of Ray flow and the approaching 11:00 a.m. intraday North American Energy Standards Board (NAESBE) nomination deadline. An initial target of 500 MMcf/day for gas days Jan. 30 and Jan. 31 was established and provided to Gas Supply. This amount of gas for same day (gas day Jan. 30) delivery had never been procured before by our Gas Supply which created uncertainty about how much could be contracted and scheduled, particularly given the extreme cold weather conditions and the accelerated time frame.

At about 10:45 a.m. on Jan. 30, Gas Supply began the procurement process of the 500 MMcf/day. Due to the short time line, Gas Supply was not able to schedule any gas by the 11:00 a.m. deadline. This meant the scheduling of procured gas wouldn't begin until 3:30 p.m. for an earliest delivery time of 7:00 p.m., following the NAESBE Nomination Timeline. Receiving assistance from other pipelines and dispatching the peaker fields helped stabilize the system until procured supply was scheduled and delivered.

Implementation of Pre-Curtailment and Operational Flow Order

Next, we completed a more detailed assessment of the projected weather, customer demand and available supply over the next 24 hours. The assessment excluded any uncertain or unknown supply volumes at the time such as gas that may be loaned from other pipelines and any partial return of Ray's flowrate capacity. The assessment indicated the potential of a supply shortfall. At 10:57 a.m., the Vice President of Gas Engineering and Supply was informed of the potential of a supply shortfall over the next 24 hours given the weather and demand forecast. Shortly thereafter, we decided to begin the pre-curtailment process and we issued an OFO notification.

Throughout the day on Jan. 30, we completed periodic system assessments based on the conditions depicted in Figure 7. Demand through the period continued in line with projections near or above the

rate of 3.0 Bcf/day. The system assessments led to increases in the same-day gas supply purchase targets. The increases were aimed at repacking the system and closing the gap between the supply available and the projected 3.7 Bcf peak hour demand for Jan. 31. At 12:48 p.m., the target for Gas Supply increased by an additional 130 MMcf/day of point specific supply on the southeast side of the system for Jan. 30 and Jan. 31. The purpose of the point specific supply was to increase pressures in the southeast market area of our system. At 2:37 p.m. on Jan. 30, the total gas supply procurement target increased to 830 MMcf/day. We increased the target to reflect fewer hours that remained before the Jan. 31 peak hour to repack the system and increase system pressures.

Implementation of Curtailment

At 2:41 p.m. on Jan. 30, Gas Supply provided a status update that 544,243 dth/day or about 520 MMcf/day had been procured for gas day Jan. 30. Gas Supply shared concerns about finding enough gas to purchase to meet the procurement target with executive leadership. With key pressures dropping within the southeast market area and the Lansing region putting over 400,000 customers at risk, we determined reducing industrial demand was necessary to ensure uninterrupted service to critical, priority, and residential customers. This information also initiated discussions about other potential supply options such as diverting gas supply away from our Zeeland and Jackson gas-fired electric generating plants to our gas system. During discussions with suppliers, Gas Supply became aware of upstream interstate capacity constraints which prevented the diversion of Zeeland supply. Gas Supply was able to procure an additional 31 MMcf/day by diversion away from the Jackson plant.

At approximately 3:00 p.m. on Jan. 30, we decided to implement a curtailment of gas deliveries pursuant to Rule 3.3 of the Company's natural gas tariffs in order to help stabilize the system and maintain deliveries to residential and vulnerable customers.

Around 6:00 p.m. on Jan. 30, we determined Gas Supply would not meet the 830 MMcf/day target with firm gas supply contracts for Jan. 30. Gas Supply had procured what was available on a firm basis. Ray field had not been returned to service and the system was still unpacking as reflected in the 6:30 p.m. snapshot in Figure 7. Based on this information, we decided to add interruptible supply contracts in an attempt to access supply on an interstate pipeline segment that we believed may have a sufficient capacity. Gas Supply executed approximately 191 MMcf/day of interruptible purchases close to the last nomination deadline. Gas Supply reported to leadership uncertainty about how much gas would be confirmed, scheduled and delivered later that day.

By 8:00 p.m. on Jan. 30 and for gas day Jan. 30, Gas Supply had entered into 925 MMcf/day of incremental supply deals, consisting of 679 MMcf/day of firm citygate gas, 55 MMcf/day of point specific supply, and 191 MMcf/day of interruptible supply. City gate gas is not point specific as the supplier has flexibility to deliver the gas to Consumers Energy at any available supply interconnect. Of the 925 MMcf/day procured, approximately 80% was confirmed in the scheduling process and 61% — or 564 MMcf/day — was ultimately delivered. By 11:00 p.m., all of the incremental gas began to be delivered, and is reflected in Figure 2. The undelivered volumes consisted of 191 MMcf/day of

interruptible supply and 170 MMcf/day of firm supply. The firm supply cuts reflect the lack of timely information underpinning the NAESBE Nomination and Scheduling process for pipeline supply. In this case, the Company believes that the speed of market transactions likely outpaced the speed at which pipeline receipt and delivery point available capacity volumes become public and known to market participants, resulting in points being oversold and cuts to supply. For gas day Jan. 31, Gas Supply procured 585 MMcf/day, which was confirmed and scheduled for delivery starting at 10:00 a.m. on Jan. 31 which included 149 MMcf/day of point specific supply in the southeast.

Request for Assistance from the State Emergency Operations Center

From noon to 9:00 p.m. on Jan. 30, system pressures continued to drop and pipeline gas increased less than expected — possibly due to scheduling limitations and congestion in upstream pipeline systems. Industrial load reduction was not occurring as quickly as hoped, and load was growing from below 3 Bcf/day to over 3 Bcf/day in hourly flow rates. Given the adverse pressure trends shown in Figure 9, we worked with the SEOC and Gov. Whitmer's office around 8:00 p.m. to utilize the Emergency Broadcast System along with public appeals from CEO Patti Poppe and Gov. Whitmer to ask residential customers to help reduce natural gas usage.

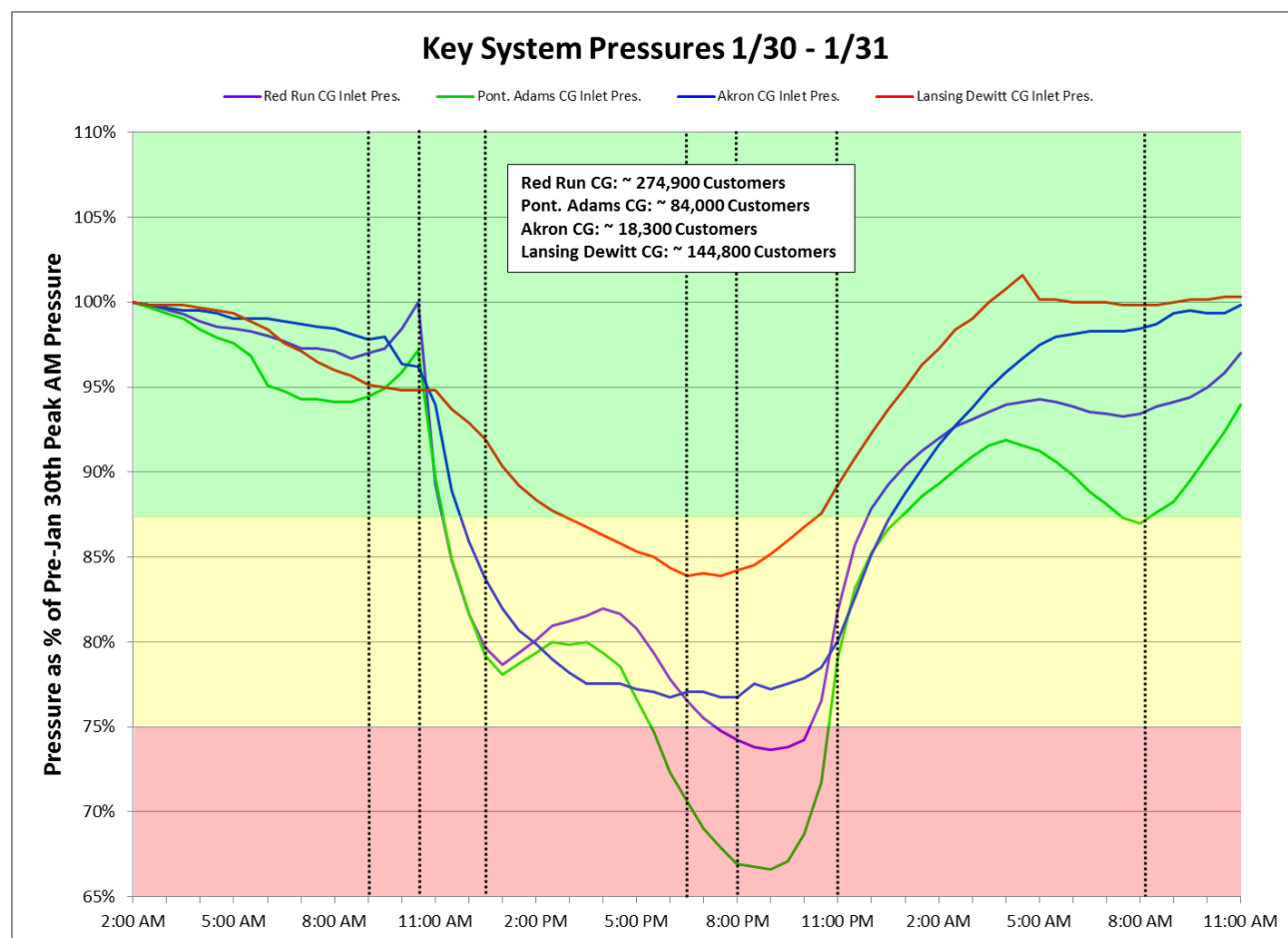


Figure 9. Gas pressure trends

At around 10:40 p.m. on Jan. 30, the Ray Compression station was able to provide about 30% of its originally intended supply through the minimally damaged Plant 1 unit. This supply — combined with the reduction of demand and the receipt of growing pipeline supply — enabled Gas Control to stabilize at-risk areas in the statewide system and repack the entire network.

Jan. 31, 2019

The actions taken on Jan. 30 enabled the successful delivery of high flow rates through the night and successful delivery of gas through the 8:06 a.m. peak hour on Jan. 31. The peak hour flow rate was reduced to 3.2 Bcf/day from a forecast of 3.7 Bcf through the curtailment of industrial and commercial customers and the Jan. 30 appeal for voluntary reductions in all loads, including residential demand.

Curtailment Lifted

The demand reduction measures were lifted effective at 12:00 a.m. on Feb. 1, earlier than anticipated due to rapid stabilization of the system from Ray plant and expanded pipeline supplies achieved through aggressive procurement. To ensure supply and storage deliverability for the balance of winter, we refilled the peaker fields depleted during the Ray event and secured incremental market supply using short-term contracts.

6. Estimated reductions in natural gas usage from large customer curtailments and residential conservation over time during the emergency with corresponding timeframes of actions (e.g., public appeals, emergency alerts) by Consumers Energy and the State of Michigan

Communications

The incident at Ray Compressor Station required a swift and strategic communications response to ensure the safety of those close to the facility, to keep customers abreast of the impact statewide and — perhaps most importantly — to appeal for assistance in managing our natural gas supply amid extreme temperatures. We connected quickly and effectively with our business and residential customers to seek their help in curtailing natural gas use. Their decisive response was vital to successfully managing the situation and helping us continue to provide natural gas service for Michigan.

Our comprehensive approach included personal outreach and communications through a wide variety of channels, including social, owned, earned, and paid media. Please see the appendix for a detailed breakdown of our communications activities.

From the start, we committed to being transparent and timely in our communications, utilizing the ICS structure as our guide and framework. Utilizing ICS and working in tandem with operations and legal,

the structure truly helped keep controls in place, particularly for ensuring disciplined and accurate messaging.

Our key audiences for the communications included the following:

1. **FIRST RESPONDERS:** Initially, our primary goal was to arm first responders, public officials and neighbors near the Ray plant with the information they needed to perform their jobs safely and to stay out of harm's way;
2. **KEY STAKEHOLDERS:** Once that was accomplished, we shifted our focus to relaying vital information about the fire's impact to the MPSC, the Governor's office, local governmental officials and other key stakeholders through regular briefings;
3. **LARGE BUSINESS:** After issuing an initial news release statement on the incident to the general public, we began communicating with business customers throughout the state, asking for help to conserve natural gas – allowing us to meet the energy needs of all homes and businesses in our service territory.

On Wednesday, Jan. 30, at approximately 3:00 p.m., we notified suppliers of the mandatory curtailment through the IPW and asked them to continue delivering gas for their customers into Consumers Energy's system in order to help stabilize the system. BCC also began phone contacts with customers under Priorities 5, 4, 3 and 2 to inform them about the mandatory curtailment, the reason for the curtailment and to advise them of the need to limit the use of gas at their facilities. By 8:00 p.m., we had commitments for reduction of approximately 95,000 Mcf from 85 customers statewide.

On Thursday, Jan. 31, account managers continued customer outreach. Following the previous evening's media coverage of the event and socialization, curtailment commitments increased resulting in an additional estimated load reduction of about 40,000Mcf. This resulted in a total reduction estimate of 135,000 Mcf/day; and

4. **RESIDENTIAL CUSTOMERS:** While we had already notified Michigan residents statewide of the incident earlier that day, it became clear we needed more reductions from residential customers too. We began executing a voluntary load reduction communications strategy on the afternoon and evening of Jan. 30, which ultimately helped drive reduction. We saw a 10% reduction at the larger metro Detroit city gates in the city-gate throughput after the 10:37 p.m. State of Michigan emergency text message. We attribute this reduction primarily to residential load reductions.

Media Strategy

In order to maintain transparency throughout the event and to reach the maximum number of customers as quickly as possible, we executed a multi-channel media strategy. Specifically, we used technology and social media to reach customers in real time, which was successful in helping residential customers understand the need for a voluntary load reduction of natural gas usage. In addition to the statewide emergency alert used by the SEOC, we maintained communications with stakeholders and customers through various media channels throughout the event. These efforts also included our community affairs managers visiting Ray's immediate neighbors door-to-door during the week of the incident. The following channels and tactics were also used throughout the event:

Social Media: Social media was a powerful tool in helping us deliver key information about the incident and the resulting energy delivery challenges we faced. Over two days, we had 21 posts on Facebook and Twitter on the incident. These posts resulted in 2.7 million impressions and 120,000 engagements over two days. Our 9:00 p.m. Facebook Live post on Jan. 30 featuring CEO Patti Poppe, drew 5,000 viewers in real time and drew 21 times the average number of impressions (30,000) for a Facebook post.

Digital Outreach: We leveraged email and our website to connect with business and residential customers by delivering key information — such as the latest facts and answers to frequently asked questions (FAQs) — on the front page of our Company website and through email. Over the two days we sent 1 million emails to residential customers and 70,000 emails to business customers. Representatives in our contact centers also were prepared with up-to-date information to share with customers who called for assistance.

News Media: Informing print, electronic and broadcast media throughout the state was critical to helping customers and stakeholders understand the situation. We issued five news releases and held two phone news conferences and one in-person news conference on Jan. 31 featuring President and CEO Patti Poppe and Senior Vice President of Operations Garrick Rochow. Patti Poppe was the chief spokesperson and centerpiece of these efforts as the leader of our Company. In addition, our media relations team members and executive officers did more than 50 radio, TV and phone interviews and responded to more than 130 media inquiries related to the Ray Compressor Station situation.

Paid Media: Finally, we tapped the power of paid media, or advertising, to thank our customers following the incident. The response of our business and residential customers was a true game changer that helped us continue to provide natural gas service for Michigan during the incident. In December, we had purchased advertising time in major out-state Michigan markets to air a brand spot featuring the story of Patti Poppe following in the footsteps of her father to work at Consumers Energy. Following the Ray situation, we opted instead to use that time — and one additional ad in the Detroit market — for Patti Poppe to deliver a message of gratitude to customers. In total, the local spots cost less than \$350,000, which we paid from shareholder dollars. The Company did not and will not seek recovery of these costs in customer utility rates.

7. Consumers Energy's coordination and communication with State of Michigan officials and local emergency response agencies

Throughout the event, Consumers Energy was committed to keeping legislative, regulatory, and emergency officials apprised of the situation at Ray Compressor Station and the status of the natural gas system. Communication began early after the fire started and occurred frequently throughout the duration of the event. Consumers Energy quickly established an ICS structure with a meeting cadence designed to support ongoing and transparent briefings to the MPSC, State and Local EOCs, the Governor's office, the Michigan State Police and state and federal legislators.

Governor's Office

Our Senior Vice President of Governmental, Regulatory and Public Affairs maintained contact with Gov. Whitmer's chief legal counsel, throughout the two days following the event to discuss the status and identify potential response activities. Contacts were also made to Gov. Whitmer's Energy and Environmental Policy Advisor. As the event progressed, our senior leadership team participated in several calls with Gov. Whitmer's senior staff to provide updates on the Ray plant and the status of the system and to ask for help via the Emergency Broadcast System. By the afternoon of Jan. 31, our team was able to notify the governor and her senior staff that the system had stabilized, and we planned to issue an "all clear."

Regulatory

Shortly after the fire ignited on Jan. 30, our Senior Vice President of Operations contacted MPSC Commissioners to notify them and share that we were creating a restoration plan. He provided the Commissioners with updates on the Ray Plant and the status of the system throughout the event, and he kept them abreast of communications occurring with the Governor's Office and upcoming press briefings. He also answered their questions about voluntary reductions, exchanged correspondence about providing potential outage information to local EOCs and notified them of the plan to deliver an "all clear" announcement. Our teams were also in close communication with MPSC Staff to provide them plant and system information as the event progressed, such as when Ray 1 came back online.

As part of the response, Consumers Energy's Gas Compliance Technical Analyst and the MPSC's Gas Safety Engineer met onsite on Jan. 30 and Jan. 31 to investigate the incident. They collected information, reviewed records and performed a field observation at the location of the fire. In addition, they collaborated with the Michigan State Police and Bureau of Alcohol, Tobacco, Firearms and Explosives representative on the cause and origin investigation. This included a review of the incident details, a review of the camera footage, a field observation and a timeline development to identify the possible cause/origin.

Emergency Officials

Many communications occurred throughout the event to update the SEOC, local EOCs and the Michigan State Police on the Ray plant and natural gas system. Our Director of Corporate Security, Public Safety Outreach team and senior leaders exchanged multiple calls with the Michigan State Police to provide status updates, discuss potential community impacts, ensure support for local and SEOCs and answer questions. They also provided multiple updates to emergency managers from Macomb, Genesee, Oakland, Monroe, Clinton and Jackson counties, as well as the city of Lansing. Topics of discussion included system status and warming shelter needs. Communications took place with the Armada Fire Department, Sterling Heights Fire Department and Midland 911. Throughout the event, our Public Safety Outreach Team provided copies of media statements to Emergency Managers, Michigan State Police coordinators, Red Cross, LARA and county 911s, and they posted information to the Michigan Critical Incident Management System.

We participated in seven conference calls with the joint MPSC/SEOC to discuss the event and review the status of the natural gas system. The conference calls were led by Consumers Energy Incident Command senior leaders and included MPSC Staff members, Emergency Management and Homeland Security, Michigan State Police, the Governor's Office, Michigan Agency for Energy, and Consumers Energy senior leadership.

The Michigan State Police requested that we provide an onsite representative at the SEOC. We fulfilled this request by having our Executive Director of Gas Distribution Operations report to the SEOC. She participated in the Incident Command Structure and provided updates on system stability, the plant status and other operational items during the 9:00 a.m. and 3:00 p.m. ICS briefings.

Legislative

Shortly after the event started on Jan. 30, our Federal and State Governmental Affairs teams contacted the offices of federal and state legislators to notify their staffs of the Ray fire. They also communicated with representatives who serve on the House Energy and Commerce Committee to inform them of the incident in progress. Updates were provided to key staff for the entire Michigan congressional delegation as we asked our customers to voluntarily reduce their gas usage. Public communications, as described earlier, including links to press conferences, media releases and Patti Poppe's Facebook Live video were shared with legislators and the entire delegation until the "all clear" announcement was made by Patti Poppe on Jan. 31.

8. Actions directed toward physical security and cybersecurity before, during, and after the event

Consumers Energy has an integrated security organization covering both cyber and physical security. This organization allows us to respond in a coordinated manner when major events occur which have a security component.

Physical Security

The Security Command Center was notified of a fire at the Ray Compressor site and immediately responded at 10:33 a.m. with a conference call to discuss response from the Security Team. The initial response team included members of Corporate Security, the Director of Corporate Security, and Executive Director of Security. Corporate Security dispatched three Corporate Security personnel to the site to assist in the response to the incident. Corporate Security also arranged for two private security personnel to be on site 24 hours a day during the event and subsequent response. The additional security staff remains onsite today.

The Director of Corporate Security also was added to the ICS structure to lead any security response efforts for the Company. The Ray Compressor site has an intrusion detection system embedded in the fence, a video surveillance system and the buildings at the site have a card reader system that provide secure access into the buildings. The Corporate Security Team reviewed all of these systems after the incident. The Director of Corporate Security spoke with the Federal Bureau of Investigation and reached out to the Michigan State Police Michigan Intelligence Operations Center requesting any information relevant to the incident. It was determined that no known threats were detected.

Cybersecurity

Consumers Energy has developed a stellar cyber security program which focuses on people, process and technology solutions to create a defense in depth approach to cyber security. In addition to our prevention initiatives, we focus heavily on detecting and responding to cyber security events by working with industry, state and federal partners to share relevant information regarding cyber threats. Specifically, the gas compression functions at Ray fall into our Operational Technology (OT) Security program, which includes various security tools aimed at preventing and detecting cyberattacks at Ray and other critical infrastructure facilities. These include: firewalls to separate OT systems, no Internet access, no email, antivirus, end-point detection and response tools and centralized logging and intrusion detection systems.

Cybersecurity was not initially involved during the first day of the incident as there was no indication that anything malicious occurred. While there continued to be no indication of malicious activity, we felt it best to conduct a deep-dive analysis to rule out a cyberattack as a root cause or contributing factor. We reviewed all available data from both a system and network perspective and found no indication of malicious activity. In addition, a team of five Cybersecurity team members visited Ray and conducted

further detailed analysis to validate initial findings. Based upon both assessments, there was no malicious cyberactivity which contributed to or caused this event.

9. Total Cost of the Incident

Gas Lost On Site

The amount of lost and unaccounted for gas as a result of the fire was 3,260 Mcf estimated at \$14,000.

Emergency Natural Gas Purchases

The total cost of emergency natural gas purchases for gas day Jan. 30 and gas day Jan. 31 was approximately \$10.6 million. The incremental cost of these purchases compared to the cost of gas in storage at the time was approximately \$7.2 million.

Purchase of Customer Owned Natural Gas Estimates

Some Gas Transportation customers reduced their consumption of natural gas in response to the curtailment order and some of these customers continued to have gas delivered to the Company's system pursuant to our request as part of the efforts to stabilize the system.

When a transportation customer purchases gas they cannot use in a given month, they normally will continue to own the gas, and it becomes part of their authorized tolerance level balance that carries forward into the next month. This is still true, but with a slight change for customers who reduced consumption on Jan. 30 and 31 in response to our curtailment order. Consistent with our tariffs, we have already waived any load balance penalties incurred for January 2019.

Gas Transportation customers who reduced their consumption in response to our curtailment order and continued to bring gas onto the system above their consumption level have two options under our MPSC-approved tariffs to either:

1. Have the excess of the customer's deliveries over the customer's consumption injected into storage without penalty or additional charges; or
2. Sell the excess of the customer's deliveries over the customer's consumption to Consumers Energy at a price to be negotiated between the Company and the customer subject to certain limitations set forth in our tariffs.

We sent a letter to transportation customers on Feb. 15 outlining these options. If a transportation customer believed they qualified and wanted to sell excess gas to Consumers Energy, we asked them to notify us no later than Mar. 15, 2019. They were required to provide documentation, or other evidence substantiating the volume of excess gas deliveries that are eligible for these options. If the customer did not contact us by Mar. 15, load balancing penalties would continue to be waived on the volume of gas in storage at the end of Jan. 2019.

The estimated cost for the customers who have notified us through Apr. 5 is \$300,000.

Facility Estimated Repair Costs

Immediately after the Ray Compression Station fire, we estimated a high level \$18 million risk based on whether the Ray Plant 2 dehydration system would have to be replaced (\$14 million) and repair/replacement of the Ray Plant 3 support systems (\$4 million). The project team is working on an order of magnitude, scope and forecast. We expect to refine the costs in the near future as more information is gathered.

Cost Estimates	
Lost and Unaccounted For Gas Estimate	\$14,000
Emergency Natural Gas Purchases Incremental Estimate	\$7,200,000
Purchase of Customer Owned Natural Gas Estimate	\$300,000
Ray Compressor Facility Repair Cost Estimate	\$18,000,000
Total Cost Estimate as of 04/05/19	\$25,514,000

Conclusion

Our natural gas delivery system was operating under extraordinary, record-setting conditions on Jan. 30. We were prepared for and projecting a record cold day with record gas deliveries. We had a supply and operating plan with a 16.5% contingency versus our projected record demand. By leveraging our standard mix of storage and pipeline supply, we were positioned to supply this record demand with no cost penalty to our customers. Losing the Ray Station during the peak demand of a near record day on Jan. 30 tested our system resilience to its maximum. We provided continuous gas supply to 100% of our residential customers — resulting in warm homes and safe residents during a dangerously cold night. The heroic team at Ray returned Plant 1 to service in the toughest of conditions and we accessed additional supply through pipeline purchases and the use of the industrial and commercial tariff curtailment options by the Gas Management Services team. The people of Michigan also responded selflessly to our joint request with state government to reduce demand for a brief period. Transparent and detailed communication with officials in the government, SEOC and MPSC made this successful collaboration possible. We provided these stakeholders with regular, frequent and detailed briefings throughout the event. We are grateful for their engagement, assistance and partnership.

The fire and damage at the Ray Station was precipitated by a safety venting fire-gate process that has been proven safe and effective in the past. But under the unique and extreme weather conditions, the process became hazardous to the station equipment. This new failure mode has now been added and new risk mitigation countermeasures will be implemented at the Ray Station and across the fleet to further enhance resilience and help to avoid failure under extraordinary circumstances in the future.

Appendix

Acronyms

BCC = Business Customer Care
Bcf/day = 1,000,000,000 cubic feet per day
Dth/day = Dekatherm per day
EOC = Emergency Operations Center
FAQ = Frequently Asked Question
ICS = Incident Command System
IPW = Information Posting Website
Mcf = 1,000 cubic feet per day
MCV = Midland Cogeneration Venture, LP
MISO = Midcontinent Independent System Operator, Inc.
MMcf/day = 1,000,000 cubic feet per day
MPSC = Michigan Public Service Commission
NAESBA = North American Energy Standards Board
NFPA = National Fire Protection Association
OFO = Operational Flow Order
OT = Operational Technology
Psig = gauge pressure in pounds per square inch
SEMCO = SEMCO Energy Gas Company
SEOC = State Emergency Operations Center

#6. Communications Timeline Enabling Reductions in Natural Gas Usage

Here is a detailed breakdown of internal, external and public affairs communications activities related to the Ray situation on Jan. 30-31:

News media

- 10 Company Statements/News Releases
- 25 Officer Interviews
- 130 Media inquiries
- 3 News Conferences
 - In-Person News Conference w/Patti Poppe & Garrick Rochow on Jan. 31 drew statewide media attention.

Social media

- 21 Social Media Posts
 - Facebook and Twitter
- 1 Facebook LIVE Session
 - Patti Poppe's 9:00 p.m. Facebook Live post saw 21 times more impressions than an average Facebook post (average is: 30,000 impressions); 5,000 people watched it LIVE.

Internal communication

- 3 All-Employee Emails

Customer and stakeholder outreach

- 535,000 residential and business emails
- 4 Website Updates
 - Front page displayed Ray Compressor Update/Gas Reduction Request as our only message as of 6:00 p.m. on Jan. 30.
- Provided Call Center with talking points and FAQ; Worked to change out the Interactive Voice Response hold message to include info on Ray incident at 11:00 p.m. on Jan. 30.

Paid media

- 1 Super Bowl Ad
 - In December, we had already purchased all out-state (Lansing, Grand Rapids, Traverse City and Saginaw/Flint) markets for a brand spot. We were planning to run our "Hard Hat" ad.
 - On Thursday, Jan. 31, we shifted our thinking due to the Ray incident and recorded Patti Poppe that afternoon and evening for a direct "Thank You" ad.
 - We purchased an additional 30-second ad for the Detroit market to hit all five major media markets.

- These were local spots with a **total cost** of less than \$350,000 of non-customer shareholder dollars. The Company did not and will not seek recovery of these costs in customer utility rates.

Public Affairs

- 6 Area Managers went door-to-door to visit with neighborhood residents near the Ray station.
- Internal Governmental, Regulatory, BCC, Call Centers, Digital Customer Experience and Community Affairs made appropriate and aligned external outreach throughout the situation.
- Governor's office contacts were being made regularly with press office, front office and energy policy staff.