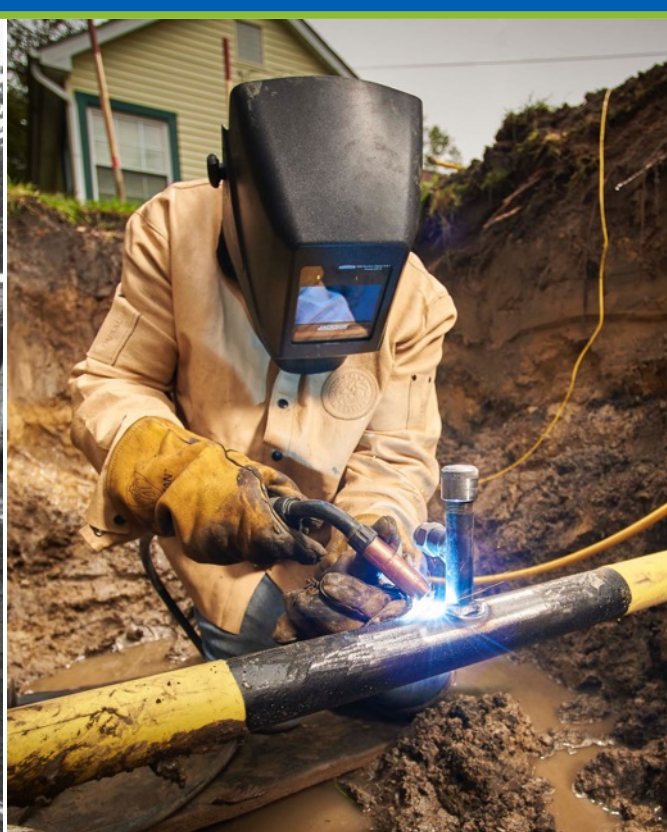


Ray Compression Fire Briefing October 2019

The logo for Consumers Energy, featuring the company name in blue text with a green swoosh underline.

Consumers Energy

Count on Us®



Service is in our DNA.

A Brief History

1966: Initial construction of Plants 1 and 2

1995: Plant 2, Units 2-7, installed

2013: Plant 3 in service

- \$176M investment

2015: Plant 3, Dehy Reboiler, acoustic wall installed

2016: Plant 3, Stack/Silencer, upgrade installation completed



Polar Vortex 2019



Polar Vortex 2019: Michigan Overview

		25-Jan	26-Jan	27-Jan	28-Jan	29-Jan	30-Jan	31-Jan	1-Feb
Grand Rapids:	High / Low	19/8	17/-2	15/5	16/5	15/2	2/-8	4/-10	18/-2
Lansing:	High / Low	20/6	15/-3	15/-3	20/-1	15/3	3/-14	4/-14	15/-7
Detroit:	High / Low	24/11	20/8	19/1	36/-2	25/1	1/-13	3/-14	16/-1
Events		MISO Weather Alert, MISO Footprint*			MISO Weather Alert, North and Central		Ray Compressor Fire	MISO Max Gen Events	Emergency Appeal Ended (12am)
					State of Emergency - Weather		Emergency Appeal Began		
							MISO Max Gen Events		

*Consumers Energy not included in the alert.

Unrelated electric and gas events intertwined and led to some customer confusion.

Ray Compressor Station

January 30, 2019



Consumers Energy

The logo features the text "Consumers Energy" in a bold, blue, sans-serif font. It is partially enclosed by a green swoosh that starts under the 'C' and ends under the 'y'. Below the swoosh, the tagline "Count on Us" is written in a smaller, blue, sans-serif font.

Count on Us®

Origin of the Fire

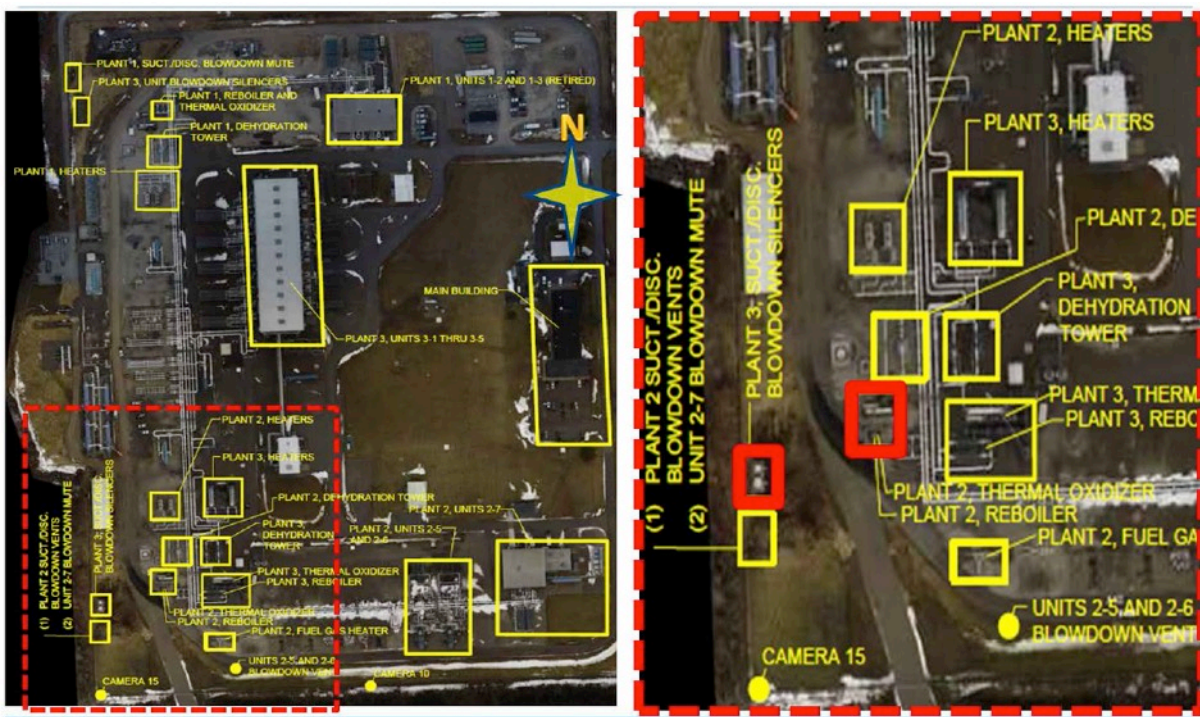


Figure 1. General layout of the Ray Compression Station

- Abnormal condition in Det-Tronics control system
- Fire-gate event
- Natural gas release from Plant 3
- Gas ignited by Plant 2 equipment

Three Elements for Ignition

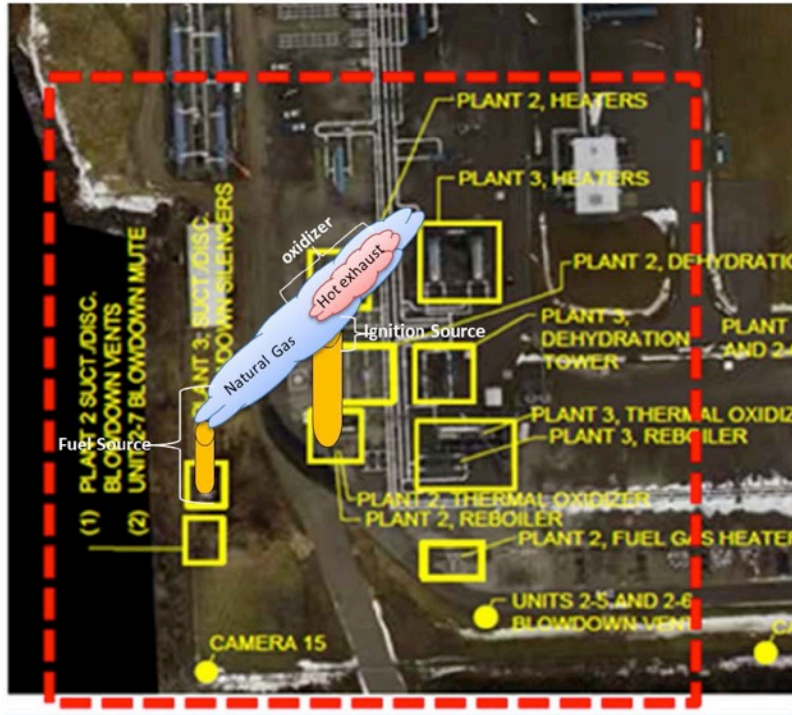


Figure 2. Illustration of ignition elements

1. Fuel source: Natural gas
2. Oxidizer: Air
3. Ignition Source: Plant 2 thermal oxidizer (T/O)

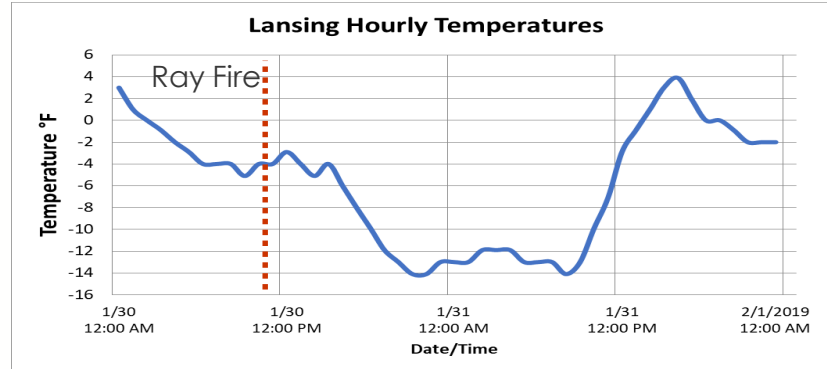
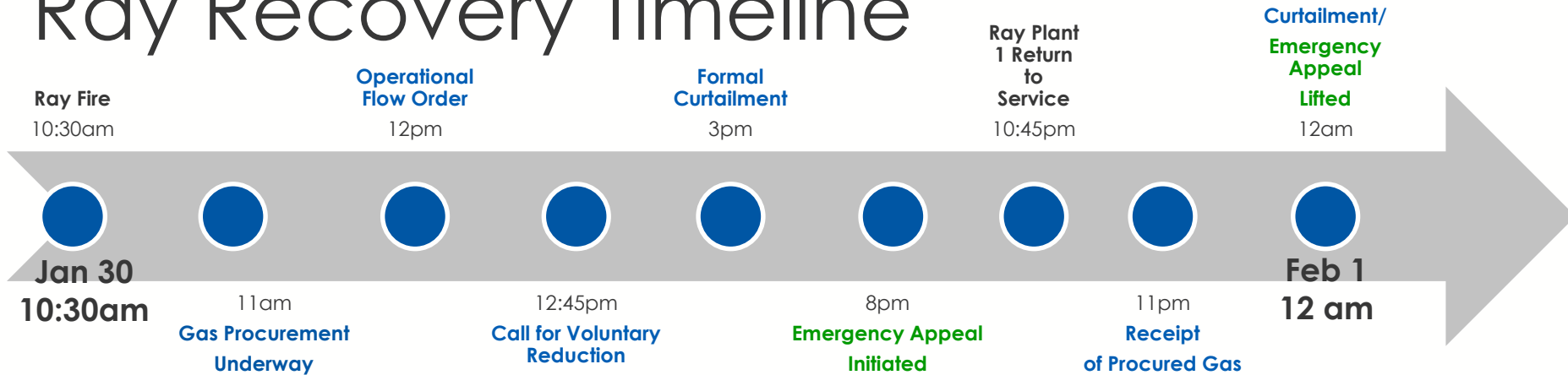
Timeline of Events



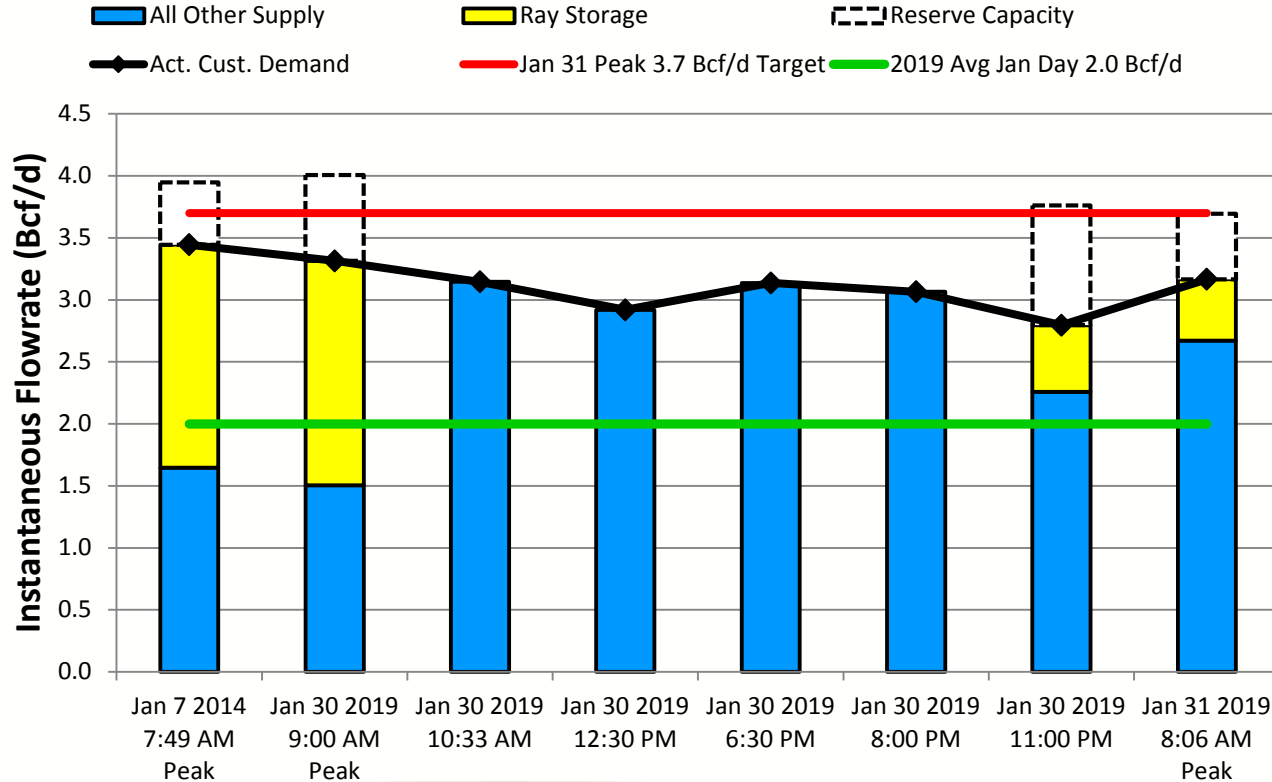
- **10:23** Plant 3 emergency shutdown (fire-gate)
- **10:25** Initial ignition
- **10:27** Plants 1 & 2 manual fire-gate
- **10:28** Second ignition
- **10:38** Fire Department on scene

Figure 5. Progression of the fire

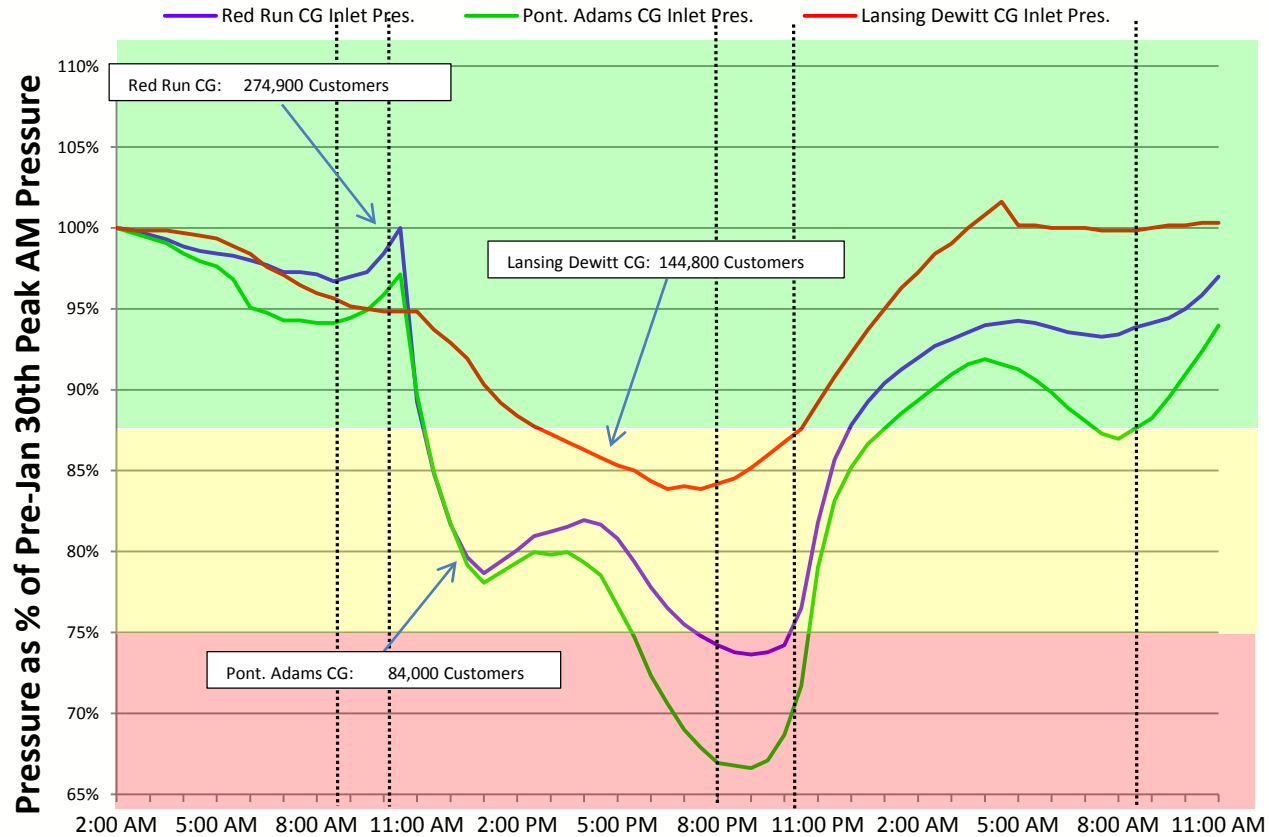
Ray Recovery Timeline



Key Hourly System Demand and Reserve Capacity - Peaks & Jan 30-31

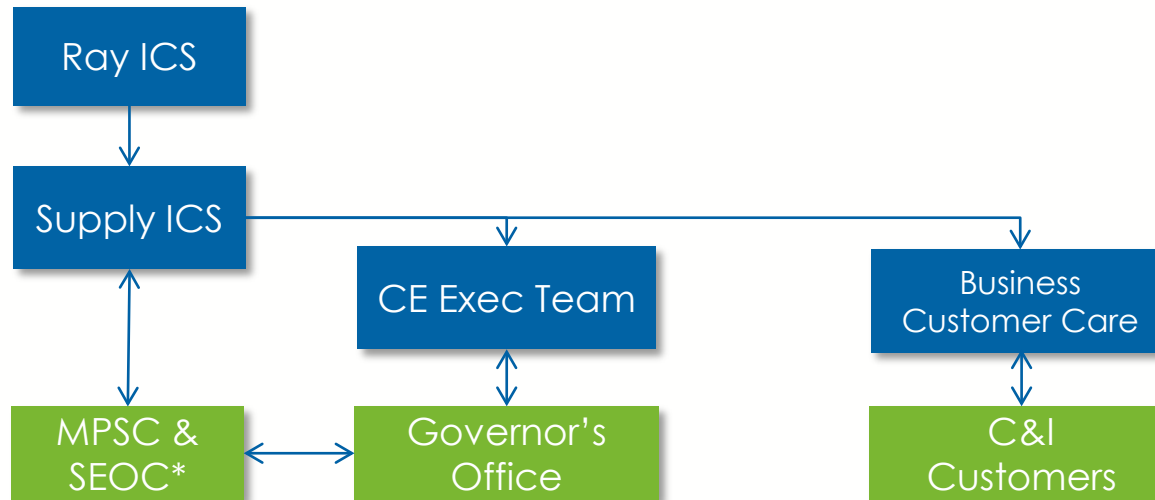


CE System Pressures 1/30 - 1/31



Structured Response and Transparency

Incident Command System Structure



- Commitment to residential safety
- Joint decision to utilize State Emergency System
- Public relations outreach via multi-channels
- After Action Review lessons learned – ICS training & drills

Expanded concurrent communications opportunity:

- Utility Leadership
- MSP
- MPSC
- Elected Officials
- Emergency Managers

* State Emergency Operations Center

Drill Deep: Ray Compressor Station Fire & Recovery

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Det-Tronics Repairs



Ray Detailed Assessments

Consumers Energy employees and third party engineering firms methodically evaluated the condition of components exposed to the fire and the affected heat zone.

The team used technical drawings to map components to visually inspect and track for thoroughness of evaluation.

Plant Hazard Analysis

We immediately contracted a third party consultant to support review of the original Plant 3 hazard analysis injection equipment.

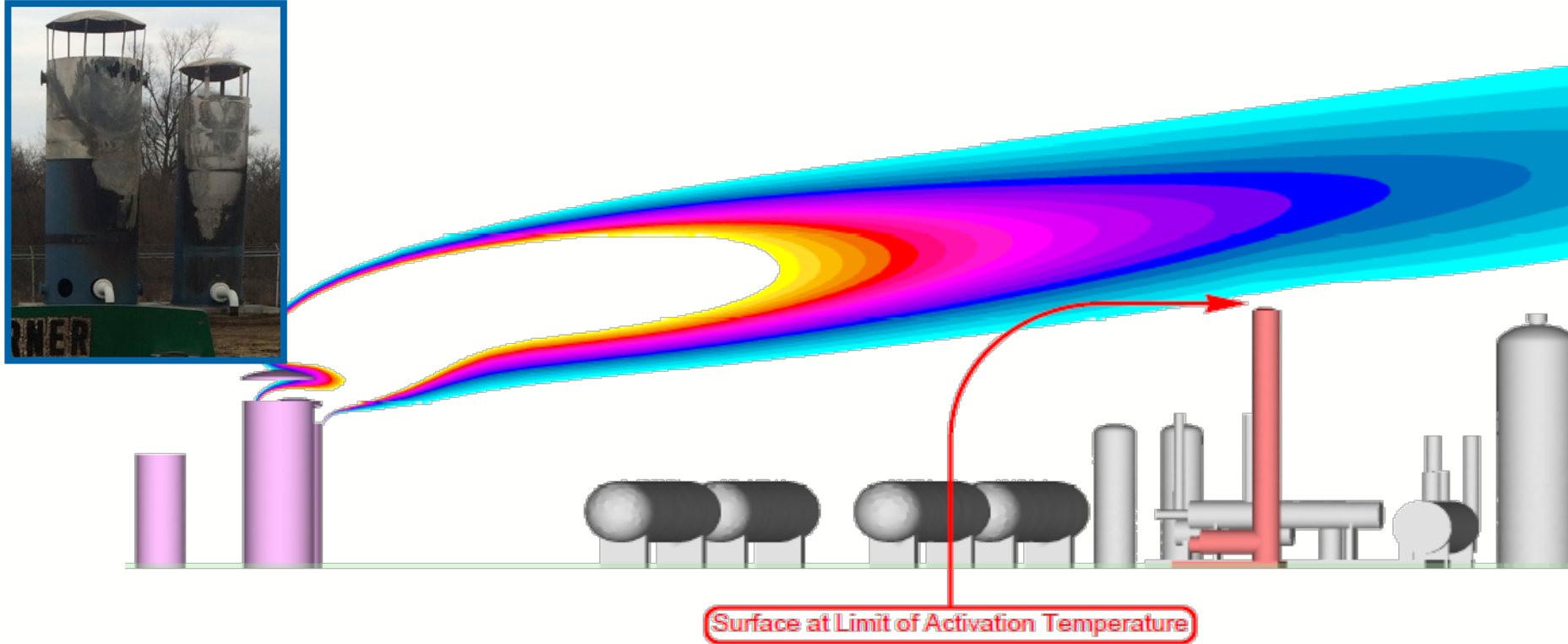
We asked that they review with additional scrutiny related to ignition threats in preparation to restore normal operations.

We are now developing a standard for Plant Hazard Analyses for application to all projects by year end.

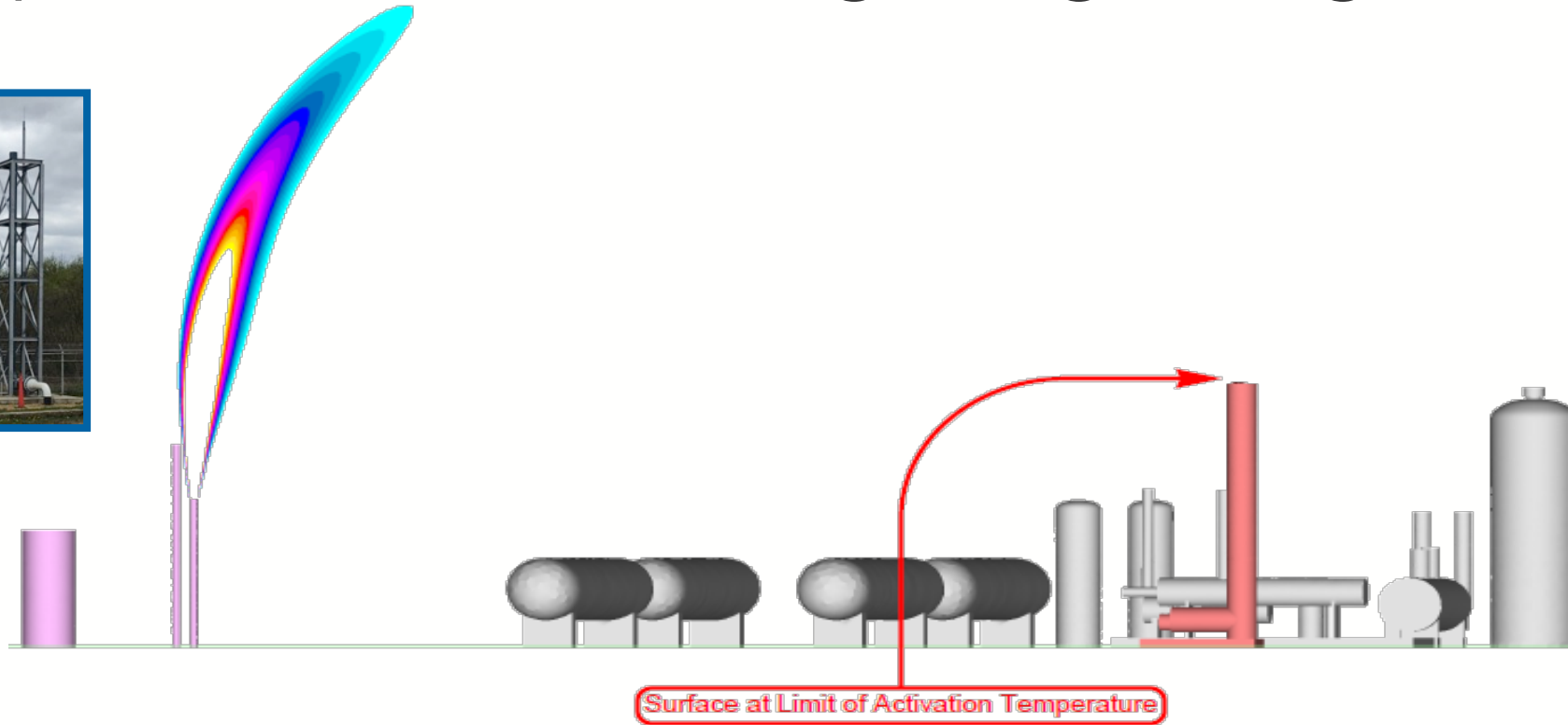
Dispersion Model

We contracted an engineering firm with expertise in Computational Fluid Dynamics (CFD) to provide an air/gas dispersion model that supports both the fire that occurred and mitigating designs.

Dispersion Model: Original Design



Dispersion Model: Mitigating Design



Corrective Actions



Old Design



New Design



Relocated Controls



Relocated Controls

Recovery Schedule

Priority:

- ✓ Plant 1 full restoration of capacity – 1/30/19
- ✓ Plant 3 Flow Path – 5/3/19
- ✓ Plant 2 Fuel Gas – 6/15/19
- ✓ Plant 3 Dehydration and Regulator Run – 9/9/19
- ✓ Plant 2 Injection Gas Flow Path – 10/1/19
- Plant 2 Conditioning Equipment – 11/22/19

Drill Wide: Fleet Preventative Action

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Drill Wide: Fleet Initial Assessments

Local site operations and engineering teams catalogued equipment capable of creating conditions for ignition.

Identified equipment was evaluated by a multi-discipline engineering team with support from union labor safety representation.

Immediate risks were directly secured.

Drill Wide: Fleet Preventative Actions

Priority	Station	Completion Date
1	Ray Plant 3 – Injection	Complete 4/1/2019
2	Ray Station - Withdrawal	Complete 9/15/2019
3	White Pigeon 3	11/1/2019
	St Clair 1,3,and 4	11/1/2019
	Freedom	11/1/2019
4	Huron	2/1/2019
	Overisel	2/1/2019



Resilience in Design & Planning Crisis Management Preparation