



**INVESTIGATION OF THE CONTROLLED  
OUTAGES OF FEBRUARY 18, 2006  
BY PUBLIC SERVICE COMPANY OF COLORADO  
Docket No. 06I-118EG**

REPORT TO THE  
COLORADO PUBLIC UTILITIES COMMISSION  
By the Staff of the Colorado Public Utilities Commission

# Situation Overview

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On Saturday, February 18, 2006, Xcel Energy failed to anticipate a significant electric power supply shortfall in Colorado despite numerous power plant failures and high demand on the natural gas system. The rolling blackouts that ensued left more than 371,000 Colorado electric customers of four utility companies without electric power for an average of more than 41 minutes during very cold weather. Serious internal and external communication problems delayed requests for assistance and left many customers without vital information about their electric outages.



# Customer Service Interruptions

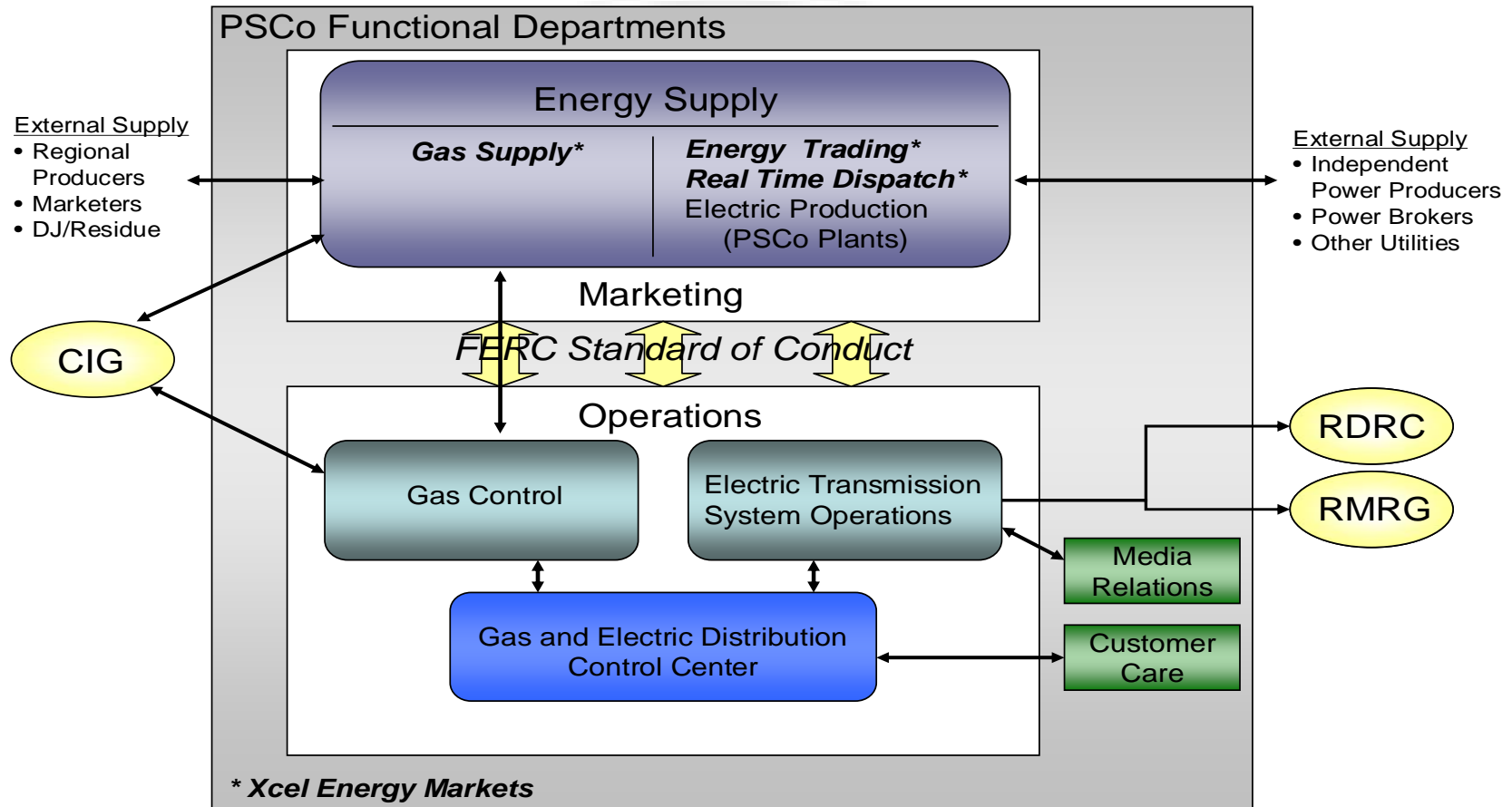
## Colorado Electric Service Interruptions

Saturday, February 18, 2006

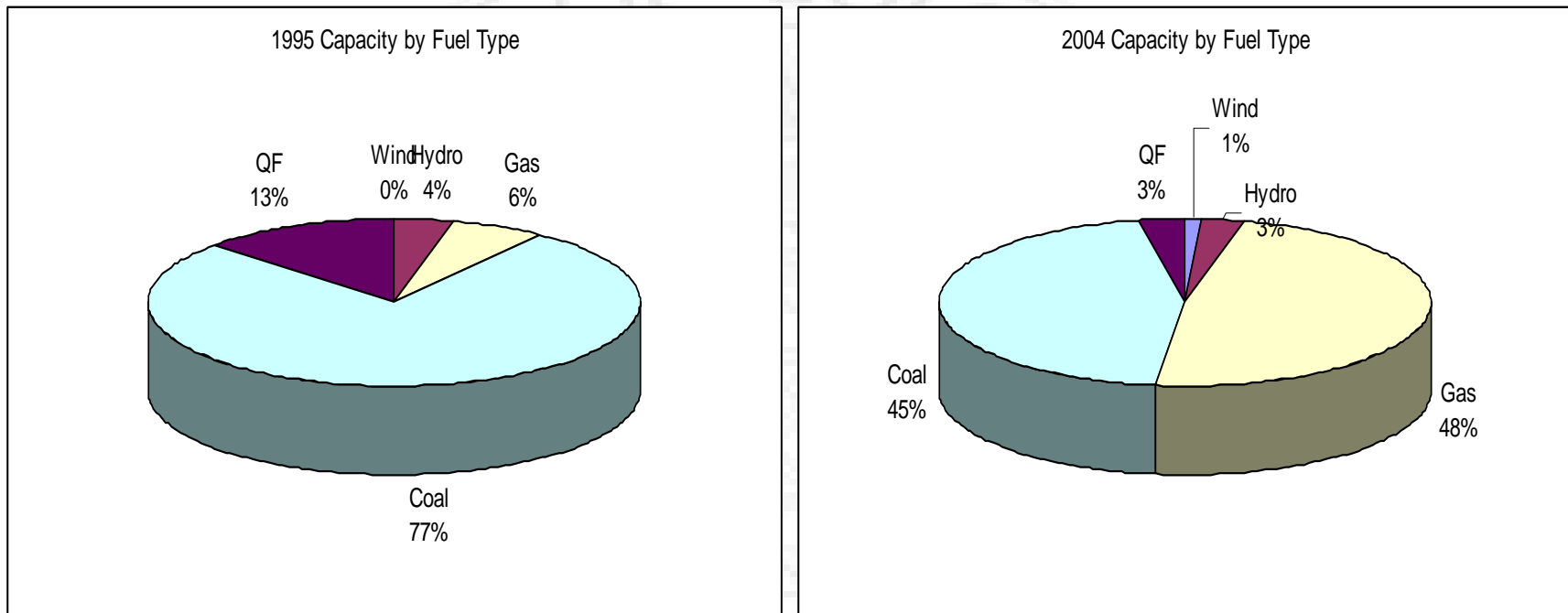
electric utility company	number of electric customers interrupted	total number of electric customers	percent of electric customers interrupted	customer average interruption minutes
Public Service Company of Colorado	323,186	1,240,965	26.0%	44.637
Intermountain Rural Electric Association	0	131,000	0.0%	0.000
Holy Cross Energy	38,984	51,600	75.6%	20.333
Yampa Valley Electric Association	6,181	24,617	25.1%	22.315
Grand Valley Power	3,019	14,800	20.4%	18.000
	371,370	1,462,982	25.4%	41.498



# Xcel Energy Marketing & Operations



# Evolution of PSCo Electric Generation



# Timeline of Events

Time & Date	Event
before 2/17/06	PSCo Cabin Creek Unit B down for reconstruction. Unavailable electric generation capacity of 162 MW.
before 2/17/06	PSCo Arapahoe Unit 4 down for maintenance. Unavailable electric generation capacity of 111 MW.
08:00 2/17/06	Start of Gas Day 2/17/06.
11:30 2/17/06	Air temperature at Denver International Airport rises to high of 14°F (-10°C).
12:38 2/17/06	Rocky Mountain Energy Center taken off line. Loss of 651 MW of electric generation capacity.
16:15 2/17/06	West Town Border natural gas pressure drops to low of about 320 psi.
23:54 2/17/06	PSCo Fort Saint Vrain Unit 1 trips off line. Loss of 302 MW of electric generation capacity.
00:00 2/18/06	West Town Border natural gas pressure rises to high of about 390 psi.
00:35 2/18/06	PSCo Valmont Unit 5 trips off line. Loss of 186 MW of electric generation capacity.
04:00 2/18/06	West Town Border natural gas pressure drops below 310 psi.
04:07 2/18/06	PSCo Fort Saint Vrain Unit 4 taken off line for blend. Loss of 146 MW of electric generation capacity.
04:10 2/18/06	PSCo Cherokee Unit 4 taken off line. Loss of 352 MW of electric generation capacity.



# Timeline of Events continued

Time & Date	Event
04:24 2/18/06	PSCo Cabin Creek Unit A switched from pump mode to generate mode to compensate for lost electric generation capacity.
06:00 2/18/06	Air temperature at Denver International Airport drops to low of -13°F (-25°C).
06:26 2/18/06	PSCO Balancing Authority initiates interruption of interruptible customers.
07:16 2/18/06	Reliability Center declares PSCO Level 1 Energy Emergency Alert.
08:00 2/18/06	PSCo Operational Flow Order in effect for Gas Day 2/18/06.
08:41 2/18/06	Front Range Power units trip off line. Loss of 204 MW of electric generation capacity.
08:47 2/18/06	PSCO Balancing Authority begins rolling blackouts to reduce obligation load by 400 MW.
08:51 2/18/06	Reliability Center declares PSCO Level 3 Energy Emergency Alert.
09:00 2/18/06	West Town Border natural gas pressure drops to low of about 240 psi.
10:30 2/18/06	PSCO Balancing Authority ends rolling blackouts. Equipment failures leave 20,507 customers without power.
11:28 2/18/06	Reliability Center declares PSCO Level 2 Energy Emergency Alert.
14:00 2/18/06	Air temperature at Denver International Airport rises to high of 7°F (-14°C).
15:13 2/18/06	PSCo restores the last of its firm electric service customers.
16:09 2/18/06	Reliability Center terminates PSCO Energy Emergency Alert.
17:00 2/18/06	PSCo terminates interruption of interruptible electric service customers.
08:00 2/19/06	PSCo Operational Flow Order ends with Gas Day 2/18/06.





# Energy Emergency Alerts

Energy Emergency Alerts				
Saturday, February 18, 2006				
time period	NERC Alert	symbol	balancing authority	reliability center
07:16–08:51	Energy Emergency Alert Level 1	EEA1	PSCO	RDRC
EEA2 not declared until 11:28 despite ISOC interruptions 06:26–17:00				
08:51–11:28	Energy Emergency Alert Level 3	EEA3	PSCO	RDRC
11:28–16:09	Energy Emergency Alert Level 2	EEA2	PSCO	RDRC





# Energy Emergency Alert Criteria

<b>Energy Emergency Alert Criteria</b>					
Saturday, February 18, 2006					
alert criteria	event time	significant event	alert declared	time declared	delay minutes
EEA1	04:10	Loss of 490 MW of Capacity	EEA1	07:16	186
EEA2	06:26	Start of ISOC Interruptions	EEA3	08:51	145
EEA3	08:41	Loss of 204 MW of Capacity			10
EEA2	10:30	End of Firm Load Interruptions	EEA2	11:28	58
EEA0	17:00	End of ISOC Interruptions	EEA0	16:09	-51

# PSCo Feeder Circuit Breaker Failures

## Failed Electric Distribution Feeder Circuit Breakers

Saturday, February 18, 2006

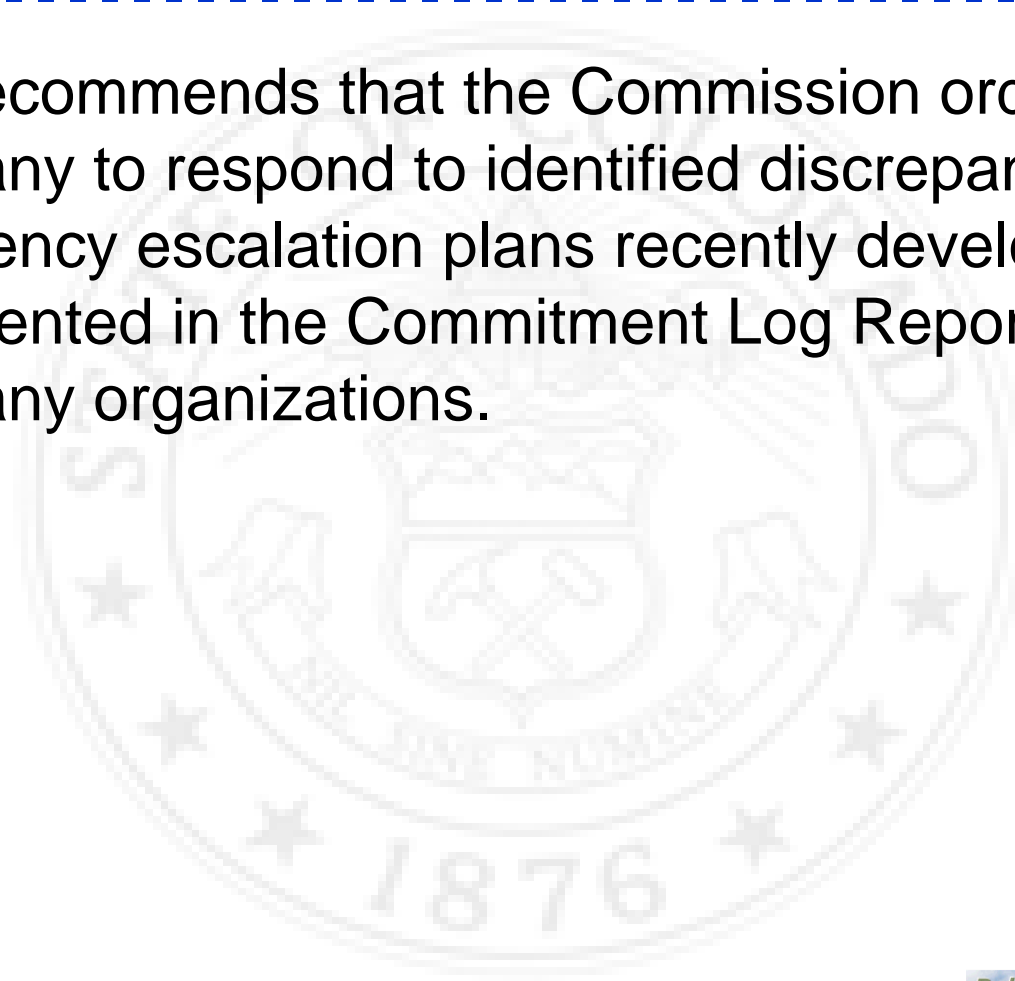
<i>substation</i>	<i>circuit breaker</i>	<i>type of mechanism</i>	<i>source of failure</i>	<i>time opened</i>	<i>time failed</i>	<i>time closed</i>	<i>outage minutes</i>
Havana Substation	1937	air-magnetic	lubricant	08:48	09:20	12:48	240
Greenwood Substation	1436	air-magnetic	control fuse	08:50	09:24	13:00	250
Leggett Substation	1322	air-magnetic	lubricant	09:19	09:49	12:39	200
Littleton Substation	1738	air-magnetic	SCADA	09:19	09:49	10:53	94
Bancroft Substation	1816	air-magnetic	lubricant	09:19	09:52	13:04	225
NCAR Substation	1557	air-magnetic	lubricant	09:24	09:54	15:13	349
Semper Substation	1953	air-magnetic	lubricant	09:30	09:58	15:09	339
Greenwood Substation	1438	air-magnetic	lubricant	09:52	10:14	13:05	193
Boulder Terminal	1357	air-magnetic	lubricant	09:55	10:14	14:02	247
Sullivan Substation	1806	air-magnetic	close coil	09:55	10:15	10:15	20
North Substation	1425	vacuum	SCADA	09:56	10:15	10:59	63



# Recommendation No. 1

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1. Staff recommends that the Commission order the Company to respond to identified discrepancies in the emergency escalation plans recently developed and documented in the Commitment Log Report by various Company organizations.



# Recommendation No. 2

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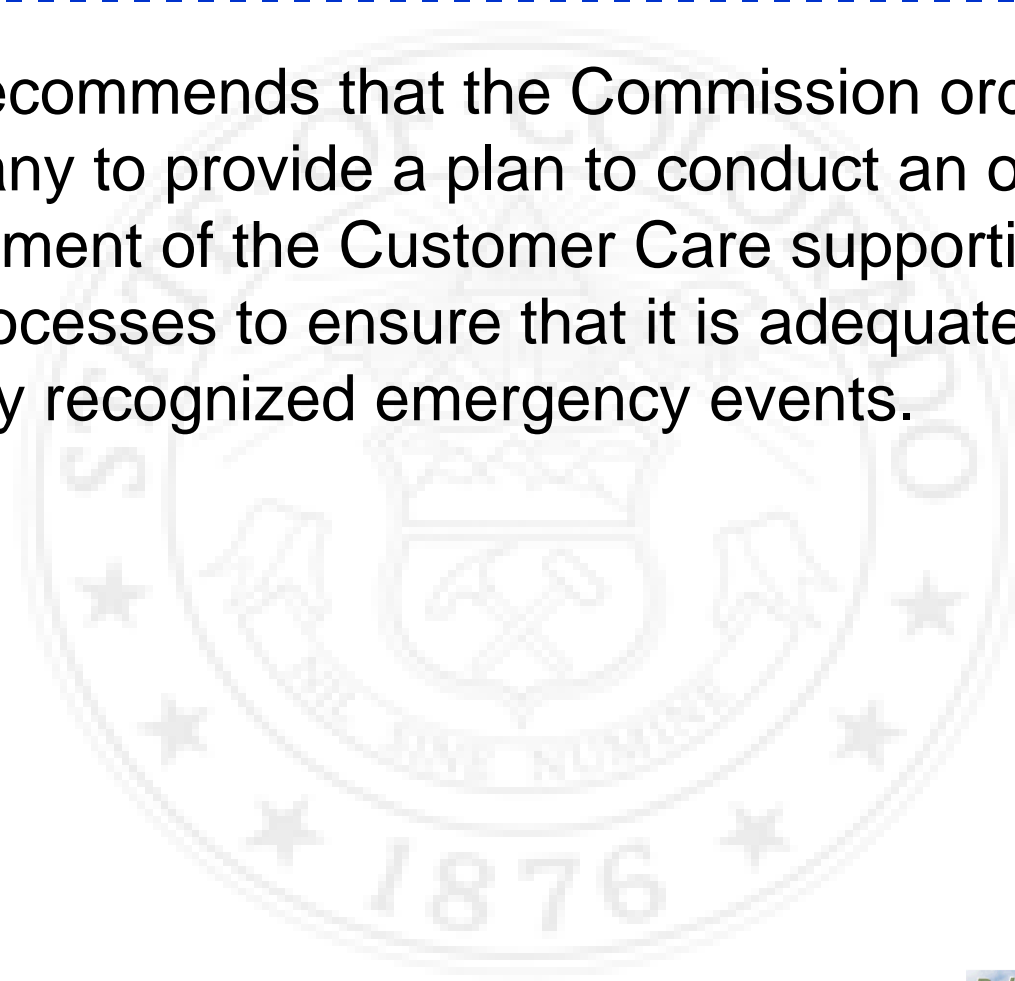
2. Staff recommends that the Commission order the Company to identify and implement short-term (or interim) solutions for the following in addition to longer term solutions identified in the Commitment Log Report and in addition to the recommendation detailed in the last recommendation below:
- Accurate and timely customer communications.
  - Making gas supply adjustments during off-hours (for example, nights, weekends and holidays) and summer as well as winter peaks.
  - Emergency intra-hour power purchasing processes.
  - Timely communication between Dispatch and Transmission for maintaining system integrity and control.



# Recommendation No. 3

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3. Staff recommends that the Commission order the Company to provide a plan to conduct an overall assessment of the Customer Care supporting systems and processes to ensure that it is adequate to manage industry recognized emergency events.



# Recommendation No. 4

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4. Staff recommends that the Commission order the Company to address each of the specific recommendations made in individual sections of this Report. The Company should provide action plans identifying how and when the recommendations will be addressed, and who in the Company has executive level accountability for ensuring completion and cross-organizational synchronization.



# Recommendation No. 4 continued

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- Review load forecasting creation and application processes to understand ways in which it must be reconstructed to better account for intra-day changes in temperature, demand, and supply.
- Develop a corporate response team approach to corporate-wide emergencies that involve multiple Company departments.
- Incorporate emergency preparedness training relative to controlled outages into the annual training and compliance requirements for all Company staff, as appropriate for their roles and responsibilities.
- Work with industry participants to better define the role of the regional reliability center, and to establish procedures for engaging the center in emergency management and situation analysis.





# Recommendation No. 4 continued

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- Across the Company, assess the processes and preparation for managing controlled outages, and other emergency situations, establish and execute cross organizational emergency preparation training.
- Conduct an overall reassessment of system reliability assumptions and validate backup options and resources.
- Review the Company's organizational structure to determine how to integrate an executive level operational manager. This person would be responsible for maintaining an understanding of cross-system load, supply, reserve margin, options for mitigating shortages and leveraging excess, and balancing across the gas and electric businesses. This operational executive should have accountability for ensuring cross-organizational communication, coordination, and collaboration to provide for system reliability of both gas and electric operations.



# Staff Requests for Commission Action

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- Staff requests that the Commission accept this Staff investigation report.
- Staff requests that the Commission order Public Service Company of Colorado to (1) respond to Staff Recommendations 1, 2, and 3 within 14 days, and (2) respond to Staff Recommendation 4 by August 11, 2006.
- Staff requests that the Commission address the confidentiality concerns of Public Service Company of Colorado as discussed by Commission Counsel.

