SOUTHERN CALIFORNIA GAS COMPANY

30-Day Aliso Canyon Withdrawal Report

Response Dated April 3, 2018

PUBLIC VERSION

Purpose

On November 2, 2017 the Energy Division of the California Public Utilities Commission ("CPUC-ED") issued the Aliso Canyon Withdrawal Protocol ("Withdrawal Protocol"). The Withdrawal Protocol specifies the circumstances and conditions when Southern California Gas Company ("SoCalGas") may execute a withdrawal operation from the Aliso Canyon storage field. In addition, the Withdrawal Protocol contains certain noticing and reporting requirements, including the following:

> Within 30 days after a withdrawal, SoCalGas shall provide the Energy Division with a full description of the events and conditions leading up to the withdrawal, all actions taken prior to the withdrawal, and any observations or recommendations concerning the execution of future withdrawals. Further, SoCalGas shall identify and describe any steps or actions not taken that could have diminished or eliminated the need for a withdrawal and make comments and/or recommendations for future consideration.[1]

Pursuant to the Withdrawal Protocol, SoCalGas provides the following 30-day report with respect to the withdrawals from Aliso Canyon that occurred between February 19, 2018 and March 5, 2018.

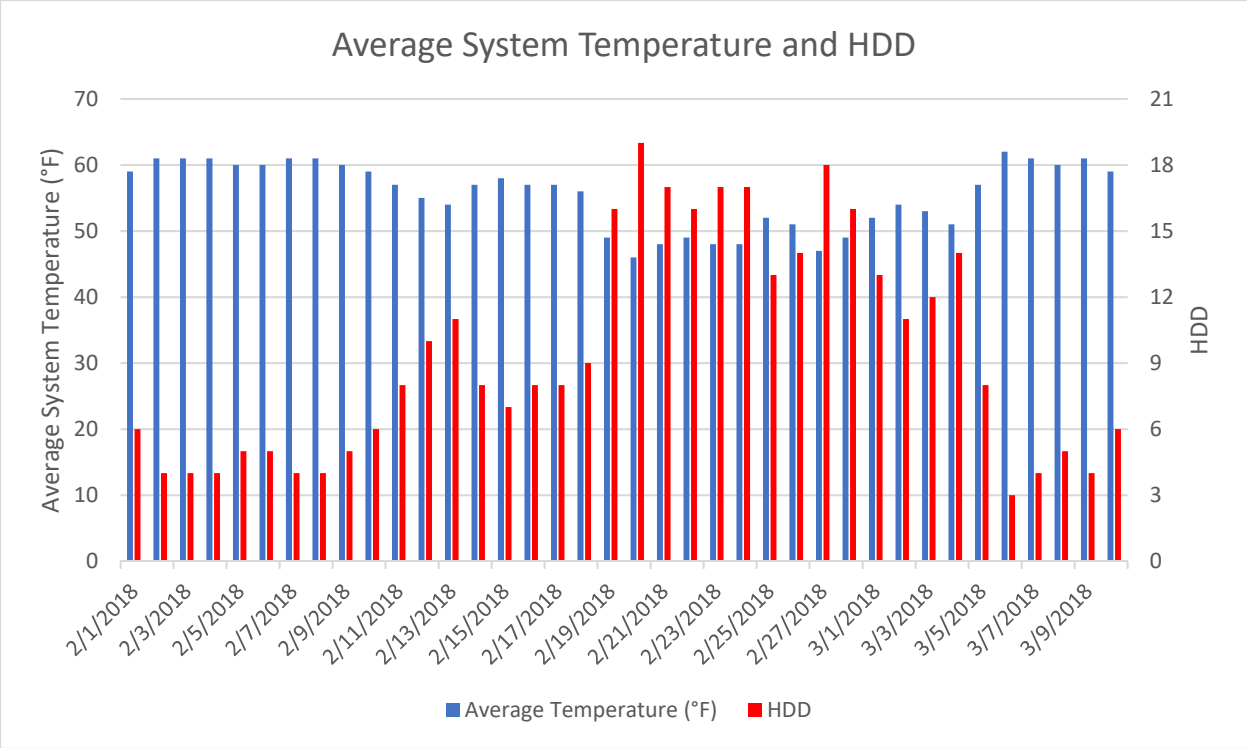
Background

Withdrawals from Aliso Canyon were based on forecasted and known conditions including but not limited to weather, gas demand, and the operating conditions of the SoCalGas system.

Weather

In late February 2018, southern California experienced a period of extended cold weather. The graph below shows how the SoCalGas system average heating degree days ("HDD") increased significantly from February 19 through March 4, 2018. A HDD is a measurement designed to quantify the demand for energy needed to heat a building. It is the number of degrees that a day's average temperature is below 65° Fahrenheit, which is the temperature below which buildings need to be heated. Additionally, the graph below shows the daily custom system average temperature condition for the SoCalGas and San Diego Gas & Electric Company ("SDG&E") service territories before and during the period Aliso Canyon was on withdrawal. The custom system average temperature calculation incorporates data from 12 weather stations across the SoCalGas and SDG&E service territories and is provided by calendar day.

[1] CPUC-ED Aliso Canyon Withdrawal Protocol dated 11/2/2017, page 3.



Status of Storage Fields

In accordance with the Withdrawal Protocol, SoCalGas has placed greater reliance on its non-Aliso storage fields (Honor Rancho, La Goleta, and Playa del Rey) to meet customer demand since the beginning of the winter season on November 1, 2017. This resulted in lower inventory levels at the non-Aliso fields, which in turn led to reduced available withdrawal capacities. In addition, SoCalGas' safety enhancements and integrity assessments at the storage fields have reduced SoCalGas' system-wide withdrawal capacity this winter season (2017-2018) because wells have been taken offline for mechanical integrity testing and conversion to tubing-only flow. These conditions resulted in decreased storage withdrawal capabilities to respond to this late-winter cold event. The following table provides the inventory and approximate withdrawal capacity of each of the storage fields at the beginning of the cold weather event.

Storage Field	Inventory (Bcf)	Withdrawal Capacity (MMcfd)
Aliso Canyon	22.78	
Honor Rancho		
La Goleta		
Playa Del Rey		
Total Storage W/O Aliso	33.62	1,030
Total Storage W/ Aliso	56.40	1,850

Flowing Pipeline Capacity & Supplies

Several major transmission pipelines on the SoCalGas system were also out of service or operating at a reduced pressure during the winter season, reducing the amount of interstate pipeline supply available by 720 million cubic feet per day (MMCFD). The following table shows the receipt point capacity of the SoCalGas system during the cold period and the average scheduled quantities. It can be seen that, although SoCalGas declared Low OFOs almost every day, customers did not schedule gas to fully utilize the pipeline system and storage was needed to mitigate the imbalance between demand and supply.

February 19, 2018 – March 5, 2018		
Transmission Zone	**Capacity (MMCFD)**	**Average Scheduled Quantities (MMCFD)**
California Production	110	87
Southern Zone	1210[1]	1054
Northern Zone	870[2]	783
Wheeler Ridge Zone	800	761
Total System	2,990	2,685
Restrictions on Flowing Supplies [1]Southern Zone capacity is 1210 MMCFD (Blythe Sub-Zone is 1008 MMCFD – L2000 MOP Reduction, Loss of 202 MMCFD to Blythe Sub-Zone). [2]Northern Zone capacity is 870 MMCFD (L3000 Necessary Remediation – Loss of 540 MMCFD to TW/EP – Topock Sub-Zone; L235-2 – Loss of 530 MMCFD to TW/QST Needles Sub-Zone).		

Customers are responsible for scheduling and delivering gas supplies to the SoCalGas and SDG&E system to meet their usage. SoCalGas has few tools besides its storage fields to manage the mismatch between what customers bring onto the system in supplies and their usage. SoCalGas must rely on regulatory tools in place to try to manage the system's reliability, integrity and safety. These tools include the low operational flow order ("low OFO"), the high operational flow order ("high OFO"), the emergency flow order ("EFO"), and curtailment procedures.

Per the table below, SoCalGas declared Low OFOs every day during the period except for 2 days. Further, it should be noted that SoCalGas declared two Stage 4 Low OFOs for the first time since the Low OFO procedures were implemented.

Low OFO Declarations		
February 19	Stage 2	-5%
February 20	Stage 3	-5%
February 21	Stage 4	-5%
February 22	Stage 4	-5%
February 23	Stage 3	-5%
February 25	Stage 3	-5%
February 26	Stage 3	-5%
February 27	Stage 3	-5%

March 1	Stage 2	-5%
March 2	Stage 2	-5%
March 3	Stage 3	-5%
March 4	Stage 3	-5%
March 5	Stage 2	-5%

Actions Taken Prior to Withdrawal

Curtailment Actions

Per the Withdrawal Protocol, SoCalGas took actions available to meet demand and to avoid curtailments including (as discussed in additional detail below) working with the Balancing Authorities (the California Independent System Operator [CAISO] and the Los Angeles Department of Water and Power [LADWP]) to reduce or limit electric generation demand through voluntary curtailments. An extraordinary amount of coordination took place between SoCalGas and the Balancing Authorities during this period, having multiple interactions per day with both management and the real-time control room operators to manage the system reliability of three energy delivery systems (CAISO, LADWP, and SoCalGas) in near real-time.

On the evening of February 19, 2018, SoCalGas worked with CAISO and LADWP to reduce their demand by approximately 240 million cubic feet (MMCF) over two peak periods lasting four hours each (30 million cubic feet per hour [MMCFH]), beginning the next operating day, February 20. The three operators worked to maintain this level of reduction throughout the cold event. Despite these efforts, SoCalGas evaluated its capacity to meet demand and found that available pipeline and storage supplies were insufficient and reliability was at risk without additional gas supply from Aliso Canyon. In preparation for this cold weather event, all fields were contacted on February 18 to have the withdrawal processes ready and on standby.

Envoy Postings

On February 19, 2018, SoCalGas provided an initial Envoy posting providing notification to customers that due to forecasted low temperatures and expected high customer demand, that SoCalGas and SDG&E were issuing a system-wide curtailment for electric generation customers effective at 7:00 AM on February 20, 2018. In addition, SoCalGas put in effect a system-wide curtailment watch for all other noncore customers. SoCalGas followed this initial Envoy posting with updates to the system-wide curtailment notice on February 20, February 22, and March 2 informing customers that the weather throughout the SoCalGas and SDG&E service territories continues to remain cold and customer demand remains high and that the system-wide curtailment for electric generation customers remains in effect until further notice. On March 5, 2018, SoCalGas provided an Envoy posting lifting the system-wide curtailment for electric generation customers effective at 7:00 AM on March 6, 2018.

Restricted Maintenance Operations

On February 19, 2018 at 12:11 PM, Gas Control declared restricted maintenance operations at transmission pipeline compressor stations, transmission pipelines, and storage facilities, noting anticipated high customer demand to forecasted low temperatures. This anticipated high system demand combined with pipeline outages increased the risk of jeopardizing system integrity and thus required all other facilities to be ready and available to maintain system integrity.

Maintenance personnel were instructed to request clearance before performing any maintenance that could possibly impact station or pipeline operations.

Demand Response

SoCalGas initiated two Demand Response events, from February 20-23 and February 26-March 2. As of March 2 a total of 13 activations were called. Customers participating in the Demand Response program received a notice at least two hours before the events occurred with the exception of Nest's second event in a day, which notifies the customer at the time of the event. During the Demand Response activations, thermostats were lowered four degrees from their current setpoint. Once the peak period came to an end, thermostats were returned to their original setpoints.

Events and Conditions Leading up to each of the Withdrawals Periods

While the winter season had been remarkably mild, a cold weather event that began on the week of February 19, 2018 stressed the SoCalGas system to the point where supply was needed from Aliso Canyon to avoid gas shortages and customer curtailment.[2] This cold weather event continued for several more days, ending on March 5, 2018. The table below shows the total system receipts and demand by day.

Gas Flow Date	Total Receipts MMCF	System Demand MMCF
02/19/2018	2618	3646
02/20/2018	2569	3618
02/21/2018	2795	3449
02/22/2018	2721	3298
02/23/2018	2665	3567
02/24/2018	2757	3100
02/25/2018	2721	2850
02/26/2018	2795	3046
02/27/2018	2688	3602
02/28/2018	2552	3346
03/01/2018	2539	3055
03/02/2018	2614	3029
03/03/2018	2521	2969
03/04/2018	2679	3020
03/05/2018	2755	2891

In the 2017/2018 Winter Assessment, the capacity of the system was calculated to be 3.7-3.9 MMCFD. However, as specified in the assessment, the system capacity calculation was based on a withdrawal capacity of 1,450 MMCFD for the non-Aliso storage fields, or 420 MMCFD more than the capacity on February 19.

[2] Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement: January Situational Update dated January 9, 2018.

Besides the overall daily demand exceeding system capacity without Aliso Canyon, hourly, intraday changes during the peak hours significantly impacted system integrity. The following table shows the change in demand from the beginning of the peak period to the peak demand and the average flowing supplies during the same period. The peak demand period continues beyond the absolute peak.

Demand Increase During Peak Period and Average Flowing Supplies

Starting Date	Ramping Period (HRS)*	Average Pipeline Flowing Supplies During Ramp (MMCFH)	Demand Start of Ramp (MMCFH)	Demand at Peak (MMCFH)
2/19/2018	4	107	141	226
2/21/2018	4	107	142	224
2/22/2018	4	122	142	225
2/24/2018	5	108	144	202
2/28/2018	4	113	142	231
3/4/2018	4	103	124	175

*Ramping period is the duration of time from "start of ramp" to "demand at Peak"

Beginning in the early evening of February 19, 2018, system demand rapidly increased from 141 MMCFH to 226 MMCFH (a daily equivalent rate of 3.4 BCFD to 5.4 BCFD) over the span of four hours due to a cold temperature event. System stability was deteriorating during this period, even though both Honor Rancho and Playa del Rey storage fields were at maximum withdrawal rates. Because La Goleta primarily provides service to the communities north of Ventura County, that field did not reach its maximum withdrawal rate until the early morning on February 20th.

With pipeline supplies averaging approximately 107 MMCFH and despite the voluntary curtailment of electric generation by the Balancing Authorities, SoCalGas determined that withdrawal from Aliso Canyon would still be necessary to avoid further curtailment and maintain system reliability. The withdrawal began on February 19 at 7:36pm and ended by 11:49 AM on February 20, when system conditions had stabilized to the extent that Aliso Canyon withdrawals were no longer needed.

In the early morning hours of February 21, system demand again increased from 142 MMCFH to 224 MMCFH over a four-hour period. While not as severe as the previous day, system integrity had diminished over this period and was not able to recover, even with maximum withdrawal rates from Honor Rancho and Playa del Rey storage fields (La Goleta, again, was not able to achieve its maximum withdrawal rate until later in the morning). With pipeline supplies once again averaging 107 MMCFH and the Balancing Authorities once more reducing electric generation natural gas demand, SoCalGas determined that additional supply was still needed from Aliso Canyon through the morning peak demand period (5:00 AM to 12:45 PM).

The next morning, on February 22, system demand increased from 142 MMCFH to 225 MMCFH over a four-hour period. Again, the non-Aliso storage fields were on maximum withdrawal and system stability was decreasing. While average pipeline supplies on this day were higher at 122 MMCFH versus the 107 MMCFH of previous the two days, voluntary electric generation curtailment was again determined to be necessary to reduce demand on

SoCalGas' system. After consulting with the Balancing Authorities to determine the extent electric generation demand that could be voluntarily curtailed, Aliso Canyon withdrawal was determined to be necessary to serve the remaining morning demand and maintain system reliability. Withdrawal started at 6:20 AM from Aliso Canyon and was halted at 10:38 AM when the system stabilized.

On February 24, system demand increased from 142 MMCFH to 202 MMCFH over a five-hour period. Again, the non-Aliso storage fields were on maximum withdrawal, average flowing supplies were 108 MMCFH, and system stability was decreasing. SoCalGas, after consulting with the Balancing Authorities to reduce electric generation demand beyond what they already have voluntarily committed, determined that Aliso Canyon withdrawal would be needed through the peak morning period. Withdrawal started at 2:55 AM from Aliso Canyon and was halted at 10:16 AM when the system stabilized.

Although temperatures were milder from February 25 through 27, a similar cold weather situation also occurred on February 28. System demand increased from 142 MMCFH to 231 MMCFH over a four-hour period. Again, the non-Aliso storage fields were on maximum withdrawal, average flowing supplies were 113 MMCFH, and system stability was decreasing. SoCalGas, after consulting with the Balancing Authorities to reduce electric generation demand, determined that Aliso Canyon withdrawal would be needed through the peak morning period. Withdrawal from Aliso Canyon was initiated at 4:15 AM, and halted at 1:45 PM after the system stabilized.

With cold weather forecasted to continue, on March 2, 2018, SoCalGas informed the Commission that heavy reliance on the non-Aliso storage facilities to meet high gas demand had resulted in inventories and withdrawal rates at the non-Aliso storage facilities below or very near minimum levels needed to support withdrawal rates forecasted in the 2017-2018 Winter Technical Assessment. As such, SoCalGas requested authority to "baseload" some Aliso Canyon withdrawal thereby withdrawing at lower, constant rates for longer periods of time to avoid customer curtailment and preserve non-Aliso storage fields' inventories and withdrawal capacities. On March 3, the Commission affirmed that SoCalGas' plan to withdraw gas from Aliso Canyon to maintain inventories in the other fields was consistent with the Withdrawal Protocol.[3]

On March 4, 2018, after consulting with the Balancing Authorities to reduce electric generation demand, SoCalGas initiated Aliso Canyon withdrawal at 9:45 AM with the specific purpose to preserve inventories and withdrawal capacities at its non-Aliso storage fields. Withdrawal from Aliso Canyon was halted at 3:50 PM on March 5, marking the end of the cold weather event.

The following table summarizes the six withdrawals from Aliso canyon that occurred between February 19, 2018 and March 5, 2018.

[3] Available at: http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Letter%20to%20Rodger%20Schwecke.pdf.

Aliso Canyon Withdrawal Initiated	Aliso Canyon Withdrawal Ended	Volume of Gas Withdrawn (BCF)*	Peak Hourly Withdrawal (MMCF)*
7:36 PM February 19, 2018	11:49 AM February 20, 2018	0.43	33
5:00 AM February 21, 2018	12:45 PM February 21, 2018	0.14	22
6:20 AM February 22, 2018	10:38 AM February 22, 2018	0.04	11
2:55 AM February 24, 2018	10:16 AM February 24, 2018	0.08	17
4:15 AM February 28, 2018	1:45 PM February 28, 2018	0.24	35
9:45 AM March 4, 2018	3:50 PM March 5, 2018	0.21	17
*Inventory volumes are based on Gas Control system data and/or OSI Soft PI Historian, and are subject to adjustment based on SoCalGas' routine monthly reconciliation between real-time SCADA system data, and the measurement data recorded by our Measurement Data Operations (MDO) department.			

As indicated in the table above, during the cold weather event, approximately 1.14 BCF of gas supply was withdrawn from Aliso Canyon. If Aliso Canyon withdrawals had not been initiated, SoCalGas estimates that this same level of customer demand would have needed to be curtailed.

Additional Steps or Actions That Could Have Reduced or Eliminated the Need for Withdrawal

As previously stated, SoCalGas proactively worked with the Balancing Authorities each day during the cold weather event to reduce the level on the on-system generation demand prior to withdrawing gas supply from Aliso Canyon. As per the Withdrawal Protocol and subsequent clarification from CPUC-ED, however, SoCalGas withdrew gas from Aliso Canyon when the amount by which the Balancing Authorities could voluntarily curtail demand was insufficient to resolve the shortage of natural gas. SoCalGas could have further curtailed customer demand to reduce or eliminate the need to withdraw gas supply from Aliso Canyon. Per SoCalGas Rule No. 23 and SDG&E Rule No. 14, electric generation demand not necessary to maintain grid reliability is to be curtailed first, followed by other noncore customer demand, and then the remaining electric generation demand. SoCalGas does not consider this to be a reasonable action to reduce or eliminate the need to withdraw gas supply from Aliso Canyon.

Observations and Recommendations

The cold weather event discussed above highlights a number of items or observations regarding SoCalGas' system, assets, and customer demand.

- Although the SoCalGas' non-Aliso storage fields play a significant role in supporting reliability of the gas system, they cannot always provide the necessary reliability during significant events, especially when an event runs multiple consecutive days. Because of its size, physical location on SoCalGas transmission system and its withdrawal capacity, Aliso Canyon Storage Field plays a key role in preventing customer curtailments and protecting the integrity of the SoCalGas system. As we head into the 2018 summer, it

should be a priority to build storage inventories to near max levels to provide reliability for customers.

- Coordinating with the Balancing Authorities is a useful initial step in reducing electric generation natural gas demand, but voluntary curtailments cannot always be relied on because of the dynamic and changing needs of SoCalGas' electric generation customers. For example, the November 28, 2017 Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement prepared by the Staff of the California Public Utilities Commission, the California Energy Commission, the CAISO, and the LADWP indicates that the minimum level of electric generation demand on the SoCalGas system needed to maintain electric system reliability was 293 MMCFD.[4] While this may be true in perfect conditions, on all but five days of the cold weather event, electric generation demand on the SoCalGas system exceeded this minimum level by as much as 214 MMCFD and by 64 MMCFD on average. As such, prudent system reliability planning requires that forecast electric generation demand consider a variety of situations and not rely on minimum level of electric generation demand.
- As previously mentioned above, there was significant coordination between the Balancing Authorities and SoCalGas during the cold weather event. This coordination was critical to successfully operating the energy delivery systems during peak periods. However, the coordination was constrained by the limitations and requirements of the current Withdrawal Protocol. As a threshold matter, no curtailments would have been required if SoCalGas would have been able to more freely use Aliso Canyon as deemed necessary by SoCalGas. As requested in Advice Letter 5275 the Commission should modify the Withdrawal Protocol to allow the System Operator to utilize Aliso Canyon withdrawals without curtailing customers to maintain and build inventory levels and associated withdrawal capacity at the other storage fields.

[4] Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement, Table 7, page 15.