Avogato CLGC Project
Supplemental Information

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    a. Revised Gas Allocation Plan that utilizes a GOR method to calculate native gas production after a storage event.
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    a. There are 5 test vessels at the CTB. Multiple wells go to individual testers. The testers cannot be used for any well that produces to the CTB due to the facility layout. There are some CLGC wells and offset CLGC wells that share the same tester.
    b. The Well Test Allocation Method obtains higher frequency well tests after a storage event with frequency reduction over time.
    c. Allows for accurate data collection of CLGC and offset wells while providing flexibility to obtain well tests for commingling permits and other obligations.
3. Revised Data Collection Plan
    a. Revised Data Collection Plan with changes.
4. ½ mile AOR map
    a. Includes well trajectories.
5. CLGC candidate selection and sequencing
    a. A statement describing the candidate selection and sequencing.
6. Gas Commingling Permit PLC-596-B
    a. 3 wells have been added to the updated gas commingling permit. All wells produce from the Bone Spring Pool with similar gas composition as the gas analyses previously submitted.
    b. Wells added in the updated gas commingling permit:
        i. RED TANK 30-31 STATE COM 14H
        ii. RED TANK 30-31 STATE COM 24Y
        iii. RED TANK 30-31 STATE COM 34H
    c. No changes are required for the Corrosion Prevention Plan.
7. Avogato 30-31 State Com 11H packer setting depth
    a. The Avogato 11H packer is set at 9092’ TVD. The bottom perf of the offset producing Mule Deer 4H is at ~8883’ TVD.
    b. The packer in the CLGC well will be set beneath the offset producing perforations.

GOR Gas Allocation Plan for CLGC Wells

Application

The following methodology will apply to CLGC wells on a well by well basis. The application will start after a CLGC storage event and will end after 100% of the Storage Gas Injection Inventory is recovered. Afterwards, Gas Allocation will revert to previous accounting procedures.

Overview

During a CLGC storage event, a portion of the combined gas streams from source wells will be stored in a CLGC well. After a storage event, the wellhead gas produced from a CLGC well will consist of three components: Gas Lift Gas, Native Gas, and Storage Gas Production. Both Native Gas and Storage Gas Production are produced from the reservoir, and the combined production is Reservoir Gas.

Wellhead Gas Produced = Gas Lift Gas + Native Gas + Storage Gas Production

Gas Lift Gas is measured continuously for each well. This methodology applies a Gas-Oil-Ratio (GOR) Calculation to determine the Native Gas (owned by the owners of the CLGC well) and Storage Gas Production (owned by the owners of the source wells).

A Well Test Allocation Method will be utilized after a storage event. In the example below, the well tests values are highlighted. The values between are interpolated.

Example

The following data is a simulated, 1-Day storage event.

- 2000 mscf is injected over 24 consecutive hours.
- The well is produced back immediately following a storage event.
- The data has been truncated at 24 days because it is included for illustration purposes.

The input and calculated values for an example well are listed below:

Values	Description
Wellhead Gas Produced, mscf/d	Wellhead gas, measured with well test
Gas Lift Gas, mscf/d	Gas Lift Gas injection, measured with flow meter
Reservoir Gas, mscf/d	Reservoir Gas, the difference between Wellhead Gas and Gas Lift Gas, calculated
Oil, bbl/d	Oil production, measured with well test
Water, bbl/d	Water production, measured with well test
GOR, scf/bbl	Gas Oil Ratio (GOR), engineer calculation based on previous oil and gas well tests before a storage event
Native Gas- GOR Calc, mscf/d	Minimum of Reservoir Gas or Native Gas Production using GOR, calculated
Storage Gas Injection, mscf/d	Storage Gas Injection, measured with flow meter

Storage Gas Injection Inventory, mscf	Storage Gas Injection Inventory, cumulative amount of storage gas injection minus storage gas production, calculated
Storage Gas Production, mscfd	Storage Gas Production, difference between Reservoir Gas and Calculated Native Gas Production, calculated

Column	1	2	3	4	5	6	7	8	9	10
Calculation or measurement	Well Test	Flow Meter	1-2	Well Test	Well Test	Engineer Analysis	MIN (3,4*6/1000)	Flow Meter	8-10 + 9_PreviousRow	IF(9>0, 3-7,0)
Day	Wellhead Gas Produced, mscf/d	Gas Lift Gas, mscf/d	Reservoir Gas, mscf/d	Oil, bbl/d	Water, bbl/d	GOR, scf/bbl	Native Gas-GOR Calc, mscf/d	Storage Gas Injection, mscf/d	Storage Gas Injection Inventory, mscf	Storage Gas Production, mscfd
-90	626	500	126	63	103	2,005	126	0	0	0
-60	625	500	125	62	101	2,032	125	0	0	0
-30	624	500	124	60	99	2,053	124	0	0	0
1	623	500	123	59	96	2,081	123	0	0	0
2	0	0	0	0	0	2,050	0	2000	2000	0
3	850	500	350	45	80	2,050	92	0	1743	257
4	741	500	241	50	86	2,050	102	0	1604	139
5	713	500	213	52	88	2,050	107	0	1498	106
6	685	500	185	54	91	2,050	111	0	1424	73
7	675	500	175	55	92	2,050	113	0	1362	62
8	665	500	165	56	93	2,050	115	0	1313	50
9	661	500	161	57	93	2,050	116	0	1267	45
10	657	500	157	57	94	2,050	117	0	1227	40
11	653	500	153	57	94	2,050	117	0	1192	35
12	649	500	149	58	95	2,050	118	0	1161	31
13	647	500	147	58	95	2,050	118	0	1133	28
14	645	500	145	58	95	2,050	119	0	1106	26
15	643	500	143	58	95	2,050	119	0	1082	24
16	641	500	141	58	95	2,050	119	0	1060	22
17	640	500	140	58	95	2,050	119	0	1038	21
18	639	500	139	58	94	2,050	119	0	1018	20
19	639	500	139	58	94	2,050	119	0	998	20
20	638	500	138	58	94	2,050	119	0	980	19
21	637	500	137	58	93	2,050	119	0	962	18
22	636	500	136	58	93	2,050	119	0	945	17
23	635	500	135	58	93	2,050	119	0	930	16
24	634	500	134	58	92	2,050	119	0	915	15

Well Test Allocation Method

Following an injection period, the allocation of oil and gas production shall be based on the production life of each CLGC well as measured for three periods: (a) the initial production period shall be measured from the end of the injection period until the peak gas production rate is reached; (b) the plateau period shall be measured from the end of the initial production period to the peak decline rate; and (c) the decline period shall be measured from the end of the plateau period until the well has recovered the previously-injected volume.

During the initial production period, the oil and gas production for each CLGC well shall be allocated using daily well tests or separated and metered individually prior to commingling.

During the plateau period, the oil and gas production for each CLGC well shall be allocated using a production curve calculated from a minimum of three (3) well tests per month. The production curve shall be calculated by interpolating daily production for each day using the known daily production obtained by well tests and shall use a method of interpolation that is at minimum as accurate as maintaining a constant rate of change for each day's production between the known daily production values.

During the decline period, the oil and gas production for each CLGC well shall be allocated using a production curve calculated from a minimum well testing frequency as follows: (a) a minimum of three (3) well tests per month when the decline rate is greater than 22% per month; (b) a minimum of two (2) well tests per month when the decline rate is between 22% and 10% per month; and (c) a minimum of one (1) well test per month when the decline rate is less than 10% per month. The production curve shall be calculated by interpolating daily production for each day using the known daily production obtained by well tests and shall use a method of interpolation that is at minimum as accurate as maintaining a constant rate of change for each day's production between the known daily production values.

Applicant shall conduct a well test by separating and metering the oil and gas production from each well for either (a) a minimum of twenty-four (24) consecutive hours; or (b) a combination of nonconsecutive periods that meet the following conditions: (i) each period shall be a minimum of six (6) hours; and (ii) the total duration of the nonconsecutive periods shall be a minimum of eighteen (18) hours.

Revised Data Collection Plan for Avogato CLGC Project

CLGC Well Name	Completion Reservoir	Involved Well (West Side)	Involved Well (East Side)
Avogato 30-31 State Com 11H	Avalon	None	Avogato 30-31 State Com 12H
Avogato 30-31 State Com 13H		None	None
Avogato 30-31 State Com 14H		None	Red Tank 30-31 State Com 14H

Applicant shall provide to the OCD Engineering Bureau at ocd.engineer@state.nm.us, project status updates every twelve (12) months after the approval of this Order and a summary report no later than three (3) months after the cessation of the pilot project or upon request from OCD. Status updates shall include a summary of the actions taken and problems and solutions identified and implemented. The summary report(s) shall include:

a. a summary of all project-related activity;

b. a review regarding any problems and solutions identified and implemented;

c. for each period of injection, a summary of the results, including for each CLGC Well in which injection occurred ("involved CLGC Well"):

i. average and maximum injection flow rates;

ii. injection duration; and

iii. total injected volume.

d. for each period of injection, the following data graphed and tabulated with a resolution of at least: one (1) data point per hour beginning twenty-four (24) hours before the injection (provided adequate notice is received beforehand), four (4) data points per hour during the injection, and one (1) data point per hour ending twenty-four (24) hours after the injection:

i. for each involved CLGC Well, the oil and gas production and injection flow rates and annulus pressure of all casing strings; and

ii. for each well related to each involved CLGC Well, the oil and gas production and injection flow rates and production casing pressure.

iii. for situations where equipment constraints do not allow for data collection at the resolution specified above or injection periods lasting more than twenty-four (24) hours, periodic well tests may be substituted, provided such well tests are conducted by separating and metering the oil and gas production from each well for a minimum of six (6) hours.

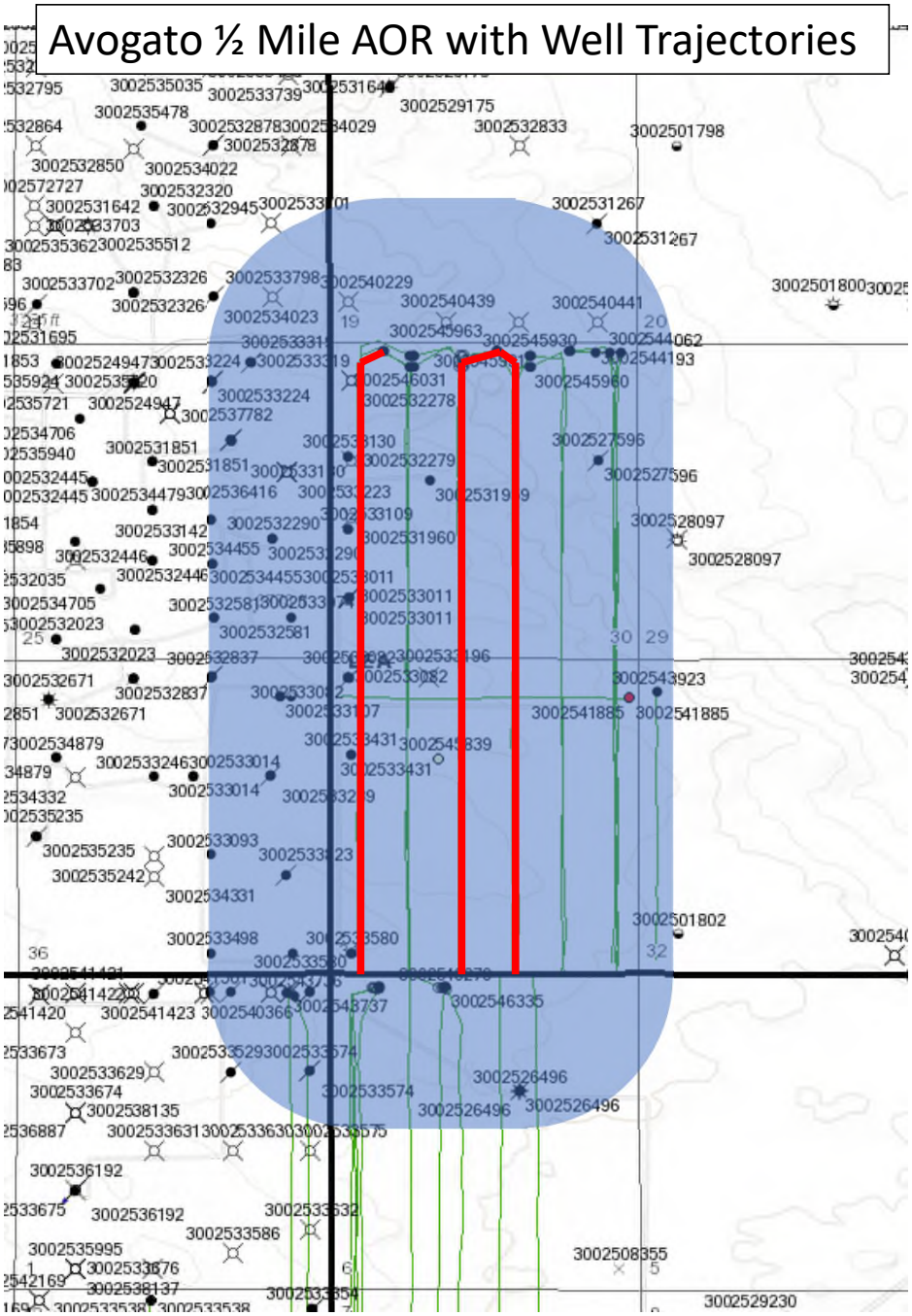
e. for each period of injection, a recovery profile for each involved CLGC Well and for each well related to each involved CLGC Well which experienced a change in production casing pressure or production volume related to the injection during or immediately following the injection. The volume of recovered gas shall be determined by taking the difference between the gas production following the injection and baseline production. The baseline production shall be determined by using well tests to create a production curve that estimates what the production would have been had injection not occurred. The production curve shall be calculated by interpolating daily production for each day using the known daily production obtained by well tests conducted prior to the start of injection and shall use a method of interpolation that is at minimum as accurate as maintaining a constant rate of change for each day's production between the known daily production. The recovery profile shall include:

i. a summary of the results, including the volume and percent of total production recovered and the duration of time required to achieve that recovery; and

ii. a tabulation of daily oil and gas production and baseline production totals; beginning a week before the injection and ending when either the gas production is near equal to its baseline production or Applicant conducts another period of injection on an involved CLGC Well.

f. If any of the CLGC wells or the involved CLGC wells are being produced pursuant to an approved commingling permit, applicant shall not be required to install additional facilities or measurement equipment to collect the data described above in subparagraphs (d) or (e) above.

Avogato ½ Mile AOR with Well Trajectories



CLGC Candidate Selection

In selecting candidates for CLGC injectors, all wells tied into the gas sales system were evaluated based on their native gas production, oil production, and flowing bottom hole pressure (FBHP). To minimize impact to oil production, wells were evaluated based on the Gas Reduced to Oil Ratio (GROR) calculation. This metric is the sum of native gas production and the maximum proposed injection gas (storage volume) divided by the oil production. FBHP was subsequently used to target more depleted wells.

$$GROR = \frac{Native\ gas\ rate\ (mscfd) + Storage\ gas\ rate\ (mscfd)}{Oil\ rate\ (bbl/d)}$$

CLGC Candidate Sequencing

Storage well sequencing will be handled similarly to the candidate selection process. Wells will be prioritized based on GROR (defined above) until the total gas removed from the system is greater than the temporary reduction in takeaway capacity.