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State of New Mexico  
Energy, Minerals and Natural Resources

Form C-103  
Revised July 18, 2013

OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

<b>SUNDRY NOTICES AND REPORTS ON WELLS</b> (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)		WELL API NO. Maljamar AGI#1 30-025-40420 Maljamar AGI#2 30-025-42628
1. Type of Well: Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other: Acid Gas Injection Well <input checked="" type="checkbox"/>		5. Indicate Type of Lease STATE <input type="checkbox"/> FEE <input type="checkbox"/> FEDERAL <input checked="" type="checkbox"/>
2. Name of Operator Frontier Field Services LLC		6. State Oil & Gas Lease No. NMLC029509A
3. Address of Operator 65 Mercado Street, Suite 250, Durango, CO 81301		7. Lease Name or Unit Agreement Name Maljamar AGI
4. Well Location AGI#1 Unit Letter <u>O</u> : <u>130</u> feet from the SOUTH line and <u>1,813</u> feet from the EAST line AGI#2 Unit Letter <u>O</u> : <u>400</u> feet from the SOUTH line and <u>2,100</u> feet from the EAST line Section <u>21</u> Township <u>17S</u> Range <u>32E</u> NMPM County <u>Lea</u>		8. Well Number #1 and #2
11. Elevation (Show whether DR, RKB, RT, GR, etc.) AGI#1 4,016 (GR) AGI#2 4,019 (GR)		9. OGRID Number 221115
		10. Pool name or Wildcat AGI: Wolfcamp

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

PERFORM REMEDIAL WORK ☐ PLUG AND ABANDON ☐  
TEMPORARILY ABANDON ☐ CHANGE PLANS ☐  
PULL OR ALTER CASING ☐ MULTIPLE COMPL ☐  
DOWNHOLE COMMINGLE ☐  
CLOSED-LOOP SYSTEM ☐  
OTHER: ☐

SUBSEQUENT REPORT OF:


REMEDIAL WORK ☐ ALTERING CASING ☐  
COMMENCE DRILLING OPNS. ☐ P AND A ☐  
CASING/CEMENT JOB ☒  
OTHER: Annual 2018 Report ☒  
per NMOCC Order R-13443

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

This represents the 2018 report for the AGI#1 and AGI#2 dual well AGI system at Frontier Field Services LLC's Maljamar Gas Processing Plant pursuant to the quarterly reporting required under NMOCC Order R-13443. AGI#2 has bottom-hole PT sensors which provide data on reservoir pressure and temperature that have been performing very well. This report includes an analysis of the surface and bottom-hole data from AGI#2 and is also the annual report for the two well system, as required under the order referenced above. For 2018 the flow from the plant was sent to both AGI#1 and AGI#2. During 2018 Frontier conducted some interference testing between the wells which had all the flow going to each well for a 30 day period when the other well was idle. Frontier currently operates this system by keeping flow constant to AGI#2 while allowing AGI#1 to take the fluctuations in overall plant flow. Average flow rate for each well is shown in Figures 1 and 2 and the total flow for both is shown on Figure 4. Note that flows are relatively stable and pressures are similarly stable. This report demonstrates correlative behavior of injection pressure, injection temperature and annular pressure when both wells are operating and clearly demonstrate the continued integrity of both wells.

All of the graphs in Figures 1-4 further confirm the continued integrity of both Maljamar AGI#1 and Maljamar AGI#2, and the overall analysis demonstrates that both wells are fully in compliance with all applicable requirements of the NMOCC orders governing the operation of this AGI system.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE  TITLE Consultant to Frontier Energy LLC DATE 2/14/2019  
Type or print name Alberto A. Gutierrez E-mail address: aag@geolex.com PHONE: 505-842-8000  
**For State Use Only**

APPROVED BY: \_\_\_\_\_ TITLE \_\_\_\_\_ DATE \_\_\_\_\_  
Conditions of Approval (if any): \_\_\_\_\_

**ANALYSIS OF ANNUAL TRENDS AND REQUEST TO CONTINUE WITH APPROVED IMMEDIATE NOTIFICATION PARAMETERS FOR OPERATION OF MALJAMAR AGI #1 AND MALJAMAR AGI #2 (API #s 30-025-40420 AND 30-025-42628) UNDER R-13443-all**

This document presents the results from the analyses of the injection parameter data collected from the Maljamar AGI #1 and #2 Wells which serve the Maljamar Gas Processing Facility near Maljamar, NM. Data from the Maljamar AGI #1 have been collected continuously and have been analyzed on a monthly basis by Geolex and transmitted to Frontier for reporting to NMOCD as required by R-13443-C. In addition, the Maljamar AGI #2 well was completed and brought on line in late 2016. The AGI #2 well was completed in the same injection zone as the AGI#1 approximately 2900 feet to the southwest of AGI #1 bottom hole location. From the time that AGI #2 was brought on line, injection has sometimes been solely into one of the two wells or into both wells simultaneously. In 2016 AGI#1 was operated solely most of the time. However, from December 6-21, 2016 Frontier injected into AGI#2 and then went back to using AGI#1 solely until May 3, 2017 when the #2 was brought back online in conjunction with AGI #1 and with a flowrate to AGI#2 set to approximately 1,200 MSCFD and the remainder of the flow of TAG routed to the AGI#1. When AGI#2 was installed, it had bottom hole PT sensing equipment which allows for the monitoring of conditions in the injection zone both when the well is operating and when it is not. This operational mode (utilizing AGI #1 to take variable flows of TAG with the #2 well set to take about 1,200 MSCFD) continued generally throughout 2018. However, in order to obtain reservoir data which is useful in evaluating reservoir conditions, flow may be switched periodically from well to well for periods to allow observations of the pressure responses in the reservoir as measured by the bottom hole PT sensors in the AGI#2. This type of an interference test was conducted during 2018 which demonstrated that the wells and the reservoir continue to be an excellent disposal system well capable of serving the plant for the at least the next 30 years. Presently surface data from both wells is being collected relative to the following parameters:

- Treated Acid Gas (TAG) surface injection pressure (both wells),
- TAG injection temperature (both wells),
- Annular pressure (both wells)
- Bottom Hole pressure and temperature (AGI#2)
- TAG flow rate from compressors to each well separately measured

These above are the key parameters which are currently being measured in both wells in order to monitor the operations of the wells, prevent hydrate formation, reduce corrosion potential. While improvements have been implemented in temperature controls, dehydration of TAG during compression and other systems improvements at the AGI facility, there will always continue to be variations in the desired and normal operating levels of the above-referenced parameters. Since these parameters are useful indicators and predictors of potential operational or mechanical problems in the well, various levels of alarms have been established for each of these parameters. These parameters include three which are measured directly (TAG injection pressure, TAG injection temperature and annular pressure) and one (differential pressure) which is a calculated value (the difference between the two measured parameters of injection and annular pressure). The analyses of the long-term trends in these values have been useful in

smoothing out shorter-term variations which can be observed from detailed inspection of hourly data and in the development of appropriate alarm bands for each parameter.

The Maljamar AGI#2 has generally been used continuously in addition to the AGI#1 since May 2017. As described above, this well is equipped with bottom hole (just at top of packer) P/T measurement capability inside the tubing. The monitoring of these two additional parameters has helped to confirm the appropriate immediate notification parameters which are required by the NMOCC order for AGI #2. In general, the immediate notification parameters for both wells were developed from this long-term analysis of the injection data. Initial testing of the Maljamar AGI#2 indicates that the pressure variations induced by flow rate and temperature fluctuations in the Maljamar AGI#1 are influencing the reservoir as measured in the AGI #2 location. This is to be expected as the new well is completed in the same zone at a distance away from the initial well (AGI#1) which has been injecting for about 5 years.

Data from both wells were continuously collected and analyzed monthly and evaluated and presented to the agency as required by NMOCD on a quarterly basis with the startup of the #2 well. Furthermore, since it is necessary to evaluate the data from both wells to know how the system is operating overall, the surface data from both wells is being collected, analyzed monthly and reported quarterly.

The NMOCD also requires that immediate notification parameters and levels be discussed and agreed upon with the agency, and that these be periodically reviewed and updated as needed based on operational or regulatory changes. The immediate notification parameters for both wells have been approved by NMOCD and Frontier requests no changes in these approved values. With this requirement in mind and for the purpose of protecting the mechanical integrity and safety of both wells and the overall AGI facility, Geolex monitors these data under contract to Frontier to prevent damage to the wells or violation of regulatory requirements or permit constraints.

After analyzing the performance of AGI #1 on a continuous basis, Geolex has assembled the data (Table 1) and has analyzed observed trends for both wells as discussed in this report. as can be seen on Figures 1 through 4.

The following trends have been observed in the data and are reflected on the Figures in the report:

1. TAG injection pressure on the #1 well has dropped significantly after the #2 well was brought online again in 5/2017 reducing the flow to #1 by approximately 1,200 MSCFD which was then injected into the #2 well for the rest of 2017 and all of 2018 (Figures 1, 2 and 4).
2. The TAG injection temperature in the #1 is flat for 2017 at about 100°F and similarly for the #2 well when it was operating (Figures 1 and 2). In 2018 these averages were slightly lower with the #1 well coming in about 95°F and the #2 well about 99°F.
3. The TAG injection temperature for the #2 well is significantly lower during the period when the well was not operating from 1/1/2017-5/3/2017. When it was brought back online the temperature was stable at about 99-100°F in (Figure 2).
4. Pressure in the casing annulus has consistently tracked the correlative nature of variable injection temperature, pressure and flowrate, for both wells as is shown in Figures 1 and 2.

5. The pressure differential between the casing annulus and the TAG injection pressure clearly indicates that no communication currently exists between the tubing and casing annulus in either well (Figures 1 and 2).
6. The generally low annular pressures observed indicate that the production casing/cement still has good integrity.
7. The bottom hole data from the #2 well show the decline of P and increase in T after the well was shut down in late 2016 and then restarted in early May 2017 (Figures 2 and 3).
8. Total flow rate has decreased slightly over the entire reporting period (Figure 4)

Given the observations of the trends in the graphs over the entire reporting period and the effects of fluctuations in average injection temperature and injection volumes, the observed TAG injection pressure behavior is predictable and normal. There is no current indication of the reservoir being pressured up to any significant degree by the injection from Maljamar AGI #1. This was confirmed during the drilling and testing of AGI #2. This was further confirmed in March and April 2018 with the results of the interference testing of the two wells. Upon startup from any shutdown that lasts more than 6-8 hours it is critical to inject methanol along with the TAG for the initial startup period to prevent the formation of hydrates. While this may no longer be necessary due to the changes which were made in the water removal efficiency of the AGI compressor system, it is a good preventative measure.

It is also critical to maintain the temperature control on the injected TAG and to avoid rapid temperature or pressure fluctuations during periods when power failures or other mechanical failures may occur. Frontier's AGI system does an excellent job of controlling this parameter as observed in Figures 1 and 2. This significantly reduces hydrate formation potential in the entire system.

#### **REVIEW OF STATISTICAL ANALYSIS OF INJECTION PARAMETERS, DEVELOPMENT OF AND REQUEST TO CONTINUE WITH APPROVED IMMEDIATE NOTIFICATION PARAMETERS (API #s 30-025-40420 AND 30-025-42628) UNDER R-13443-all**

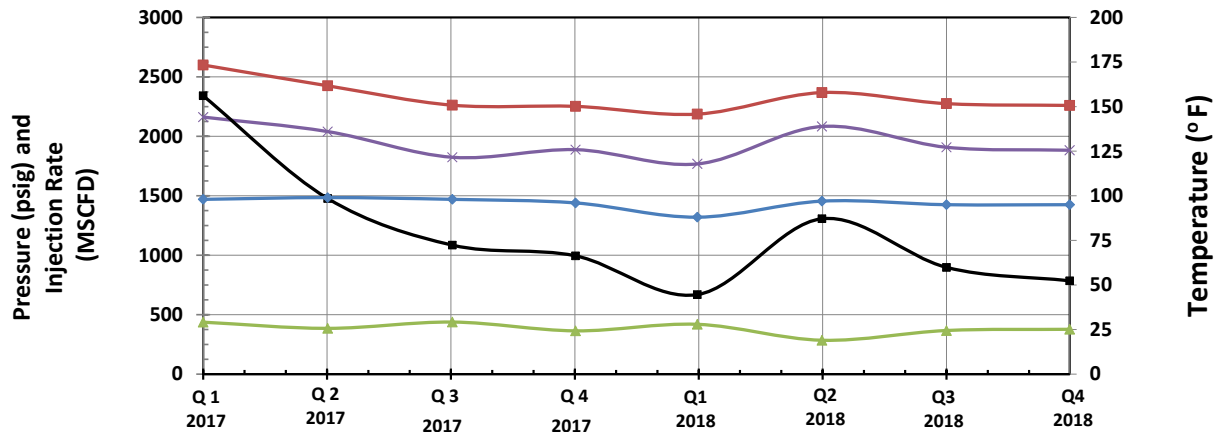
The statistical analyses of the injection parameter data were initially conducted for the purpose of establishing normal operating levels for these parameters which are automatically monitored. Several data filtering steps were accomplished to take the hourly data which forms the basis of the analysis in order to smooth out variability. The bottom hole PT sensors installed in AGI#2 have been providing excellent data and these data are shown on the graph attached here as Figure 3.

All the data are summarized in Table 1 and the results of the analyses described above resulted in the immediate notification parameters which were approved for both wells. Frontier requests that these parameters remain the same for 2019.

## FRONTIER MALJAMAR CUMMULATIVE INJECTION DATA (January 2017-December 2018)

			AGI #1 TAG Injection Temperature (°F)	AGI #1 Surface TAG Injection Pressure (psig)	AGI #1 Surface Casing Annulus Pressure (psig)	AGI #1 Surface Injection/Casing Annular Pressure Differential (psig)	Combined Flowrate (MSCFD)	AGI #1 Flowrate (MSCFD)	AGI #2 Flowrate (MSCFD)	AGI #2 Surface TAG Injection Temperature (°F)	AGI #2 Surface TAG Injection Pressure (psig)	AGI #2 Surface Casing Annulus Pressure (psig)	AGI #2 Surface Injection/Casing Annular Pressure Differential (psig)	AGI #2 Average Bottom Hole Pressure (psig)	AGI #2 Average Bottom Hole Temperature (°F)					
																<b>Notes</b>				
																#2 only in Q4 2016 until 12/21/16 except 11/11-11/16 and 12/21-12/31 for #1 only				
Q #1 2017	January thru March 2017	3/30/2017	98	2600	437	2162	2341	2341	0	57	914	343	571	5312	129	Only #1 Well used in Q1 2017;				
Q #2 2017	April thru June	6/30/2017	99	2425	385	2040	2223	1477	746	112	2068	617	1451	5119	125	#1 in use all of Q2 except 4/25-4/27; #2 in use only 5/4-6/30				
Q #3 2017	July thru September	9/30/2017	98	2262	438	1824	2282	1085	1197	110	2080	459	1621	5104	124	Both wells used entire Q3 with #2 at 1200 mscfd and #1 takes the balance of the flow				
Q #4 2017	October thru December	12/30/2017	96	2252	364	1888	2193	995	1198	105	2109	360	1748	5075	124	Both wells used entire Q4 with #2 at 1200 mscfd and #1 takes the balance of the flow				
Q #1 2018	January thru March	3/30/2018	88	2187	419	1768	2190	669	1521	106	2123	448	1675	5041	123	Both wells used entire Q1 with #2 at 1200 mscfd and #1 takes the balance of the flow except during interference test in March/April 2018				
Q #2 2018	April thru June	6/30/2018	97	2368	285	2083	2138	1307	831	95	2095	354	1741	5141	125	Both wells used entire Q1 with #2 at 1200 mscfd and #1 takes the balance of the flow except during interference test in March/April 2018				
Q #3 2018	July thru September	9/30/2018	95	2275	367	1908	2172	898	1274	108	2151	383	1768	5081	124	Both wells used entire Q3 with #2 at 1200 mscfd and #1 takes the balance of the flow				
Q #4 2018	October thru December	12/30/2018	95	2260	377	1883	2075	785	1290	103	2161	298	1863	5053	123	Both wells used entire Q4 with #2 at 1200 mscfd and #1 takes the balance of the flow				
Average for 2018			94	2273	362	1911	2144	915	1229	103	2133	371	1762	5079	124					
Standard Deviation 2018			3.4	64.4	48.5	112.7	43.9	240.5	249.7	4.9	25.7	54.1	67.5	38.6	0.8					
Average for Entire Period			95.8	2328.6	384.0	1944.5	2201.8	1194.6	1007.1	99.5	1962.6	407.8	1554.8	5115.8	124.6					
Standard Deviation Entire Period			3.2	123.7	46.8	127.3	77.1	498.8	447.4	16.8	397.5	93.6	388.9	80.4	1.8					

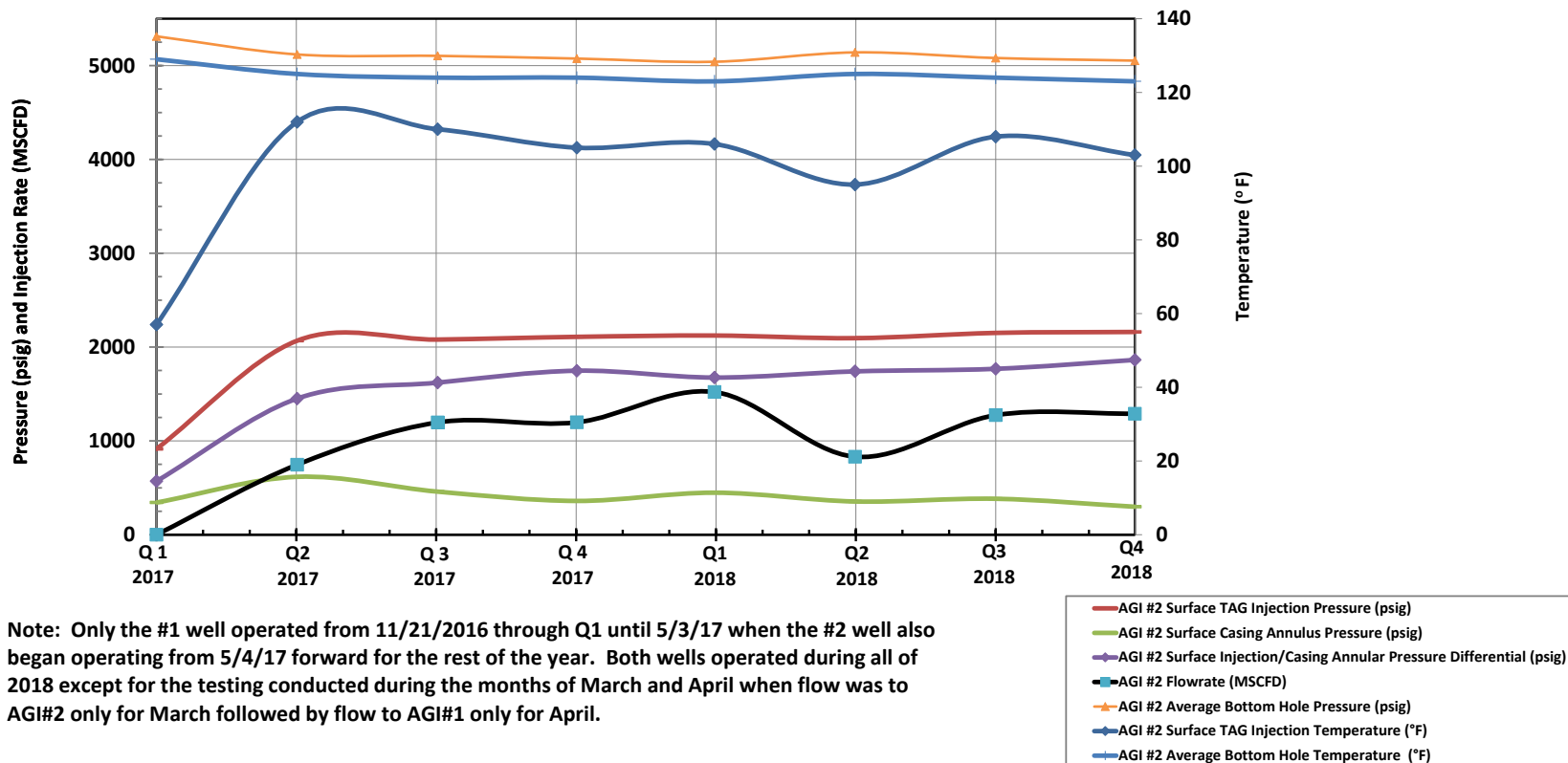
# Figure 1 Frontier Maljamar AGI #1 All Injection Data



**Note:** Only the #1 well operated from 11/21/2016 through Q1 until 5/3/17 when the #2 well also began operating from 5/4/17 forward for the rest of the year. Both wells operated during all of 2018 except for the testing conducted during the months of March and April when flow was to AGI#2 only for March followed by flow to AGI#1 only for April.

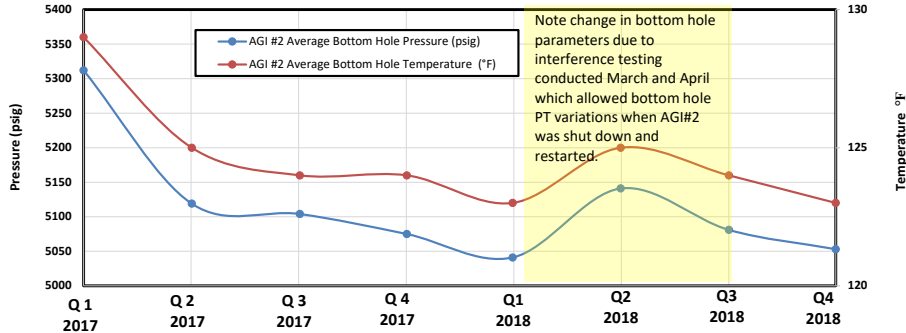
- AGI #1 Surface TAG Injection Pressure (psig)
- ▲ AGI #1 Surface Casing Annulus Pressure (psig)
- ✱ AGI #1 Surface Injection/Casing Annulus Pressure Differential (psig)
- AGI #1 Flowrate (MSCFD)
- ◆ AGI #1 TAG Injection Temperature (°F)

## Figure 2     Frontier Maljamar AGI #2 All Injection Data



Note: Only the #1 well operated from 11/21/2016 through Q1 until 5/3/17 when the #2 well also began operating from 5/4/17 forward for the rest of the year. Both wells operated during all of 2018 except for the testing conducted during the months of March and April when flow was to AGI#2 only for March followed by flow to AGI#1 only for April.

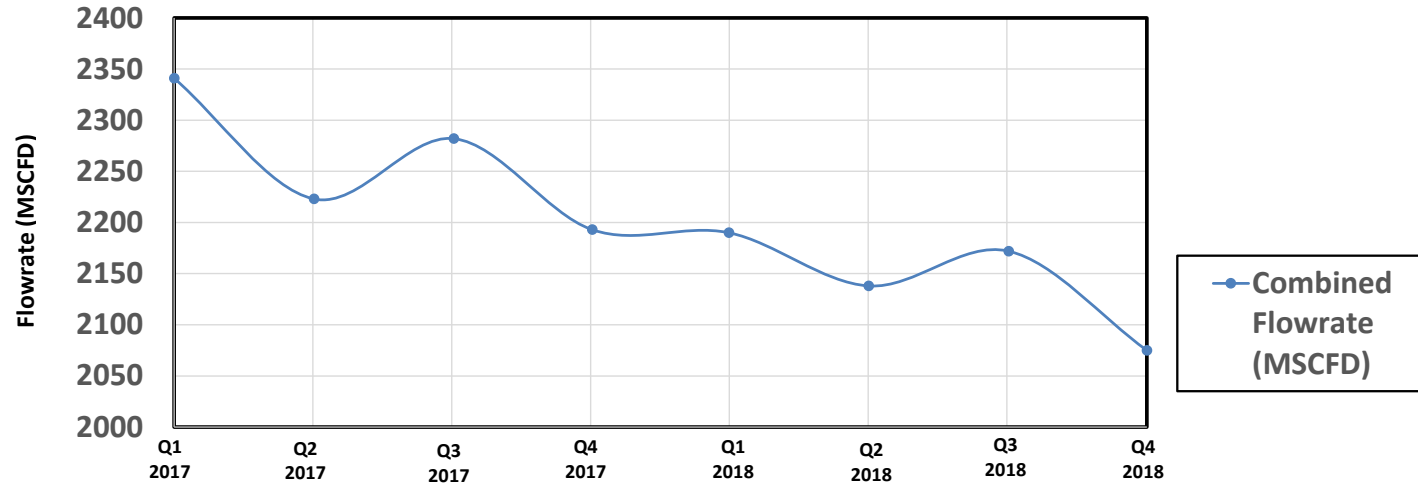
Figure 3 Frontier Maljamar AGI #2 Bottomhole Pressure and Temperature



Note: Only the #1 well operated from 11/21/2016 through Q1 until 5/3/17 when the #2 well also began operating from 5/4/17 forward for the rest of the year. Both wells operated during all of 2018.



**Figure #4 Frontier Maljamar AGI #1 & #2 Combined Flow Rate (MSCFD)**



Note: Only the #1 well operated from 11/21/2016 through Q1 until 5/3/17 when the #2 well also began operating from 5/4/17 forward for the rest of the year. . Both wells operated during all of 2018 except for the testing conducted during the months of March and April when flow was to AGI#2 only for March followed by flow to AGI#1 only for April.