

LEAK AND WORKOVER SUMMARY MONUMENT AGI D #2

Completion work on Monument AGI D #2 began on January 19 2017 and ended with workover procedures on March 22 2017. The permanent packer placed in Monument AGI D #2 is built from Incoloy CRA components and was placed at 8 293 feet within the CRA 7 inch diameter casing. Just above the packer is a Halliburton HAL ROC® Pressure Temperature (PT) gauge located at a depth of 8 281 feet. Above the PT gauge are 7 joints of SM2550 Nickel CRA tubing followed by 256 joints of J55 8RD fiberglass lined tubing with cross over and pup joints in between (Figure 1). The SSSV was placed at a final depth of 302 feet with cross over and pup joints above and below.

Shortly after initiation of injection in February 2017 a rise in the annulus pressure indicated a potential leak in the injection tubing permanent packer or Christmas tree. The built up pressure was bleed off and detections of H₂S were encountered. After a detailed investigation the source of the leak was determined to be in a defective crossover joint located at approximately 308 feet which was above the SSSV. This leak was identified using temperature and noise surveys conducted along the tubing and confirmed by a pressure hydro test of the SSSV and crossovers in Halliburton's shop after they were pulled. The SSSV and new crossover joints were pressure tested prior to installing them back into the well. The tubing was reinstalled again and mechanical integrity tested. The second mechanical integrity test failed as the pressure on the backside continued to significantly drop overnight indicating another leak in the tubing.

It was determined that the second tubing leak was the result of compromised connections/threads in the UCP J2 tubing. In addition some damages were noted on the tubing hanger and bowl which were then sent to a machine shop for redressing and repair. All the valves in the Christmas tree were serviced and successfully pressure tested. The defective UCP J2 tubing was replaced with fiberglass lined J55 8RD tubing. The J55 8RD tubing was readily available as it came from Monument AGI #1. The amount of time it would cost to obtain and redress new tubing was outweighed by flaring considerations. The replacement tubing was installed between March 17 2017 and March 20 2017 and each connection was hydro tested by GatorHawk to ensure they were properly sealed. The Christmas tree was successfully installed and pressure tested followed by a successful mechanical integrity test conducted on March 22 2017. The mechanical integrity test was witnessed by George Bower with the NMOCD Hobbs office. Monument AGI D #2 is currently accepting TAG within the approved injection pressure and temperature.

A review of the annular pressure surface injection pressure bottom hole pressure surface injection temperature and bottom hole injection temperature while injecting between March 23 2017 and March 29 2017 has shown no indication of a tubing casing or packer leak at Monument AGI D #2 (Figure 2). Surface pressure was gradually increased to 1500 psi where it has minimally fluctuated. The annular pressure steadily increased from approximately 300 psi to just below 500 psi. The annular pressure continues to increase slightly due to the increased surface injection pressure and warming effects of the surrounding rocks and atmospheric conditions. Once the annular pressure stabilizes from normal operations and geothermal gradients which typically takes a few weeks a new well the backside will be bled down to approximately 300 psi and appropriately recorded by Targa. Continued increases in annular pressure without corresponding increases in the factors normally affecting the annular pressure would be indicative of a potential tubing leak. For this reason these parameters will continue to be monitored continuously to assure compliance with NMOCD's approved immediate notification parameters and reported on a quarterly basis to NMOCD as required by the NMOCD order.



TARGA

MONUMENT AGI D2
LEA COUNTY, NEW MEXICO
3/21/17

Company Rep.
Tool Specialist

GORDON WHITE
SCOTT WALTON

Office ODESSA
SAP No. 903856682

Final Installation					
Installation	Length	Depth	Description	OD	ID
1	25.00	1.99	KB CORRECTION		
2	0.50	26.99	TUBING HANGER		
3	0.62	27.49	3.5" 9.3# J55 8RD DOUBLE PIN ADAPTER	3.500	2.992
4	28.75	28.11	1 JOINTS 3.5" 9.3# J55 8RD TUBING	3.500	2.670
5	16.10	56.86	3.5" 9.3# J55 8RD TUBING SUBS(10.05 - 6.05)		
6	220.93	72.96	7 JOINTS 3.5" 9.3# J55 8RD TUBING	3.500	2.670
7	6.04	293.89	3.5" 9.3# J55 8RD TUBING SUB	3.550	2.670
8	2.30	299.93	X OVER 3.5" 9.3# 8RD BOX X 3.5" 12.7# VAMTOP PIN	4.000	2.750
9	4.08	302.23	HALLIBURTON TUBING RETRIEVABLE SAFETY VALVE NICKLE ALLOY 925 15,000# PRESSURE RATING 750 PSI CLOSING 781HRE25224 101757100 SN 0003747503-1 3.5" 12.7# VAMTOP B X P 2300 PSI OPENING 2.562 'X' PROFILE IN TOP OF VALVE.	5.610	2.562
10	2.16	306.31	X-OVER 3.5" 12.7# VAMTOP BOX X 3.5" 9.3# 8RD PIN	4.070	2.750
11	5.97	308.47	3.5" 9.3# J55 8RD TUBING SUB	3.550	2.670
12	7713.30	314.44	248 JOINTS 3.5" 9.3# J55 8RD TUBING	3.500	2.670
13	2.38	8,027.74	X-OVER 3.5" 9.3# 8RD BOX X 3.5" 9.2# VAMTOP PIN	3.970	2.980
14	244.58	8,030.12	7 JOINTS 3.5" 9.2# VAMTOP SM2550 NICKEL TUBING	3.500	2.992
15	5.75	8,274.70	3.5" 9.2# VAMTOP BOX X PIN SUB	3.530	2.992
16	4.08	8,280.45	HALLIBURTON ROC GAUGE MANDREL 3.5" VAMTOP BXP 102329817 SN-464192 ROC GAUGE ROC16K175C 101863926 WD#9381-6034 ADDRESS 126 SN-ROC004483	4.670	2.950
17	0.96	8,284.53	X-OVER SUB 3.5" 9.2# VAMTOP BOX X 2.875" 6.5# VAMTOP PIN	3.930	2.441
18	6.09	8,285.49	X-OVER SUB 2.875" 6.5# VAMTOP BOX X PIN	2.900	2.441
19	1.11	8,291.58	2.313" 'X' NIPPLE 2.875" 6.4# VAMTOP BOX X PIN	3.240	2.313
20	1.73	8,292.69	HALLIBURTON SEAL ASSEMBLY STRAIGHT SLOT LOCATOR 2.875" VAMTOP BOX X 2.875 NU 10 INCOLOY 925 (212S3270-D)(102582273)(SN-0003781099-1)	3.950	2.431
21	1.00	8,294.42	SEAL UNIT 212MSF32500-D 102666617 SN 0003779766-5 2.875" NU 10 RD INCOLOY 925	3.200	2.380
22	6.06	8,295.42	3 EXTENSIONS 2.875 NU 10 RD 2.06' EACH NICKEL ALLOY 925 (212X32500-D) (120056337)(SN-0003777400-1)	3.200	2.347
23	4.00	8,301.48	4 -SEAL UNITS 3.250" X 2.875" NU 10RD NICKEL ALLOY 925 1 EA- (212MSF32500-D)(102666617)(SN 0003779766-3 3-EA (212MSA3200-D)(102666512)(SN 0003779766-1 0003779766-4 0003779766-2 (FLOUREL SEALS SAP# 100014586 AFLAS SEALS SAP# 100006529)	3.200	2.380
24	0.52	8,305.48	MULE SHOE GUIDE 2.875" NU 10RD NICKEL ALLOY 925 (812G32500-D) (10143327)(SN-0003777382-1)	3.200	2.380
25	3.99	8,292.69	LAND HANGER WITH 26,000# COMPRESSION PUTS 20,000# COMPRESSION ON PACKER PICK UP WEIGHT IS 68,000# SLACK OFF IS 64,000# HALLIBURTON PACKER ASSEMBLY HALLIBURTON 7" 23-38# BWD PERMANENT PACKER WITH 3.250" BORE, 4" 8UN BOX THREAD, INCOLOY 925 (212BWD7007-D)(101302623) WAS RUN ON WL AND TOP @ 8292.69' ELEMENTS @ 8294'	5.690	3.250
26	9.47	8,296.68	SEAL BORE EXTENSION INCOLOY 925 4" 8UN PXP (PN212N11584)(101468460)(SN-0003744131-1)	4.750	3.250
27	0.56	8,306.15	X-OVER 4" 8UN BOX X 2.875" 6.5# 8RD INCOLOY 925 (212N9343)(101159929-A)(SN-0003777396-1)	5.000	2.430
28	8.10	8,306.71	PUP JOINT 2.875" 6.5# EU 8RD INCOLOY 925	2.880	2.380
29	1.21	8,314.81	HALLIBURTON 2.188" 'R' LANDING NIPPLE INCOLOY 925 (811R21807-D) (102362504) (SN- 0003777399-2) NICKEL ALLOY 925	3.670	2.188
30	8.09	8,316.02	PUP JOINT 2.875" 7.9# EU 8RD INCOLOY 925	2.880	2.290
31	1.31	8,324.11	HALLIBURTON 2.125" 'R' LANDING NIPPLE (811R21286) (102667285) (SN- 0003781497-1) NICKEL ALLOY 925	3.940	2.125
32	4.10	8,325.42	PUP JOINT 2.875" 6.5# EU 8RD INCOLOY 925	2.880	2.380
33	0.58	8,329.52	WIRELINE RE-ENTRY GUIDE 2" 9.3# VAM INCOLOY 925	3.950	2.441
34		8,330.10	BOTTOM OF ASSEMBLY		
			EOC @ 8348' TD @ 9210'		
			DIESEL USED FOR PACKER FLUID		
Filename:					

Figure 1: Monument AGI D #2 Tubing and Equipment Schematic

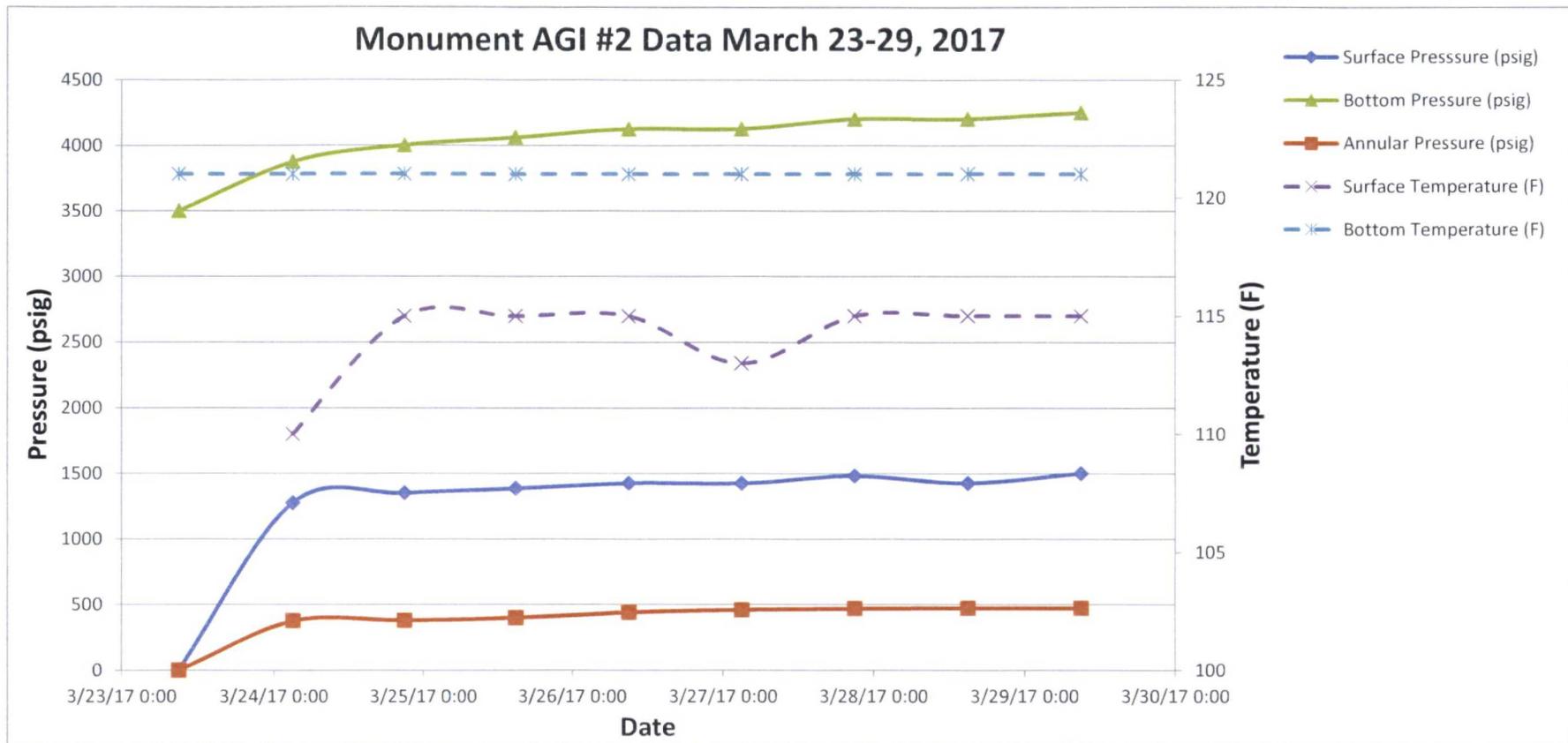


Figure 2: Startup injection and annular data at Monument AGI D #2



Oil Conservation Division
Energy Minerals and Natural Resources Department
State of New Mexico

Monument AGI Well No 1
API 30-025-40002
Chronology of Well Operations
[Sources well file operator e mail reports and RBDMS]

Date	Document	Event Summary
11/18/2008	Order R 13052	Division order issued for approval for AGI well with disposal in Devonian and Fusselman formations (open hole completion from 8350 ft to 9200 ft) Includes COA specific to well <ul style="list-style-type: none"> • permits wastewater from processing to be disposed • remedial requirement for AOR well in Grayburg San Andres waterflood • MIT every two years • MSIP of 1660 psi (for any permitted fluid) • Annular fluid may be either diesel or inhibited water (Extensions of authority approved while pending Re Open case before Commission)
01/03/2010	Form C 101	APD approved by District
03/21/2011	Form C 103 [Subsequent]	Well spud
06/03/2011	Form C 103 [Subsequent]	Operator reports final string (production casing) set at 9261 feet on 04/22/2011
06/03/2011	Form C 103 [Subsequent]	Operator reports open hole drilled from 836 ft to 9203 ft CBL showed prod casing cement from 8361 ft to 3640 ft (intermediate casing set at 5041 ft) rig released 04/26/2011 well suspended on 06/01/2011
11/17/2011	Order R 13052 A	Commission order issued to resolve remedial action requirement for the Apache Corporation AOR well in the Grayburg San Andres waterflood and limited fluid injection to no more than 5000 barrels of process waste per day
12/09/2011	Form C 103 [Subsequent]	Packer and tubing installed (tubing is 3 5 inch 9 3# J 55 EUE Duoline 20) install annular fluid (fresh water with corrosion inhibitor) MIT conducted on 12/02/2011 [on file but not witnessed] well ready for injection
12/2011	Form C 115	Injection commenced [2544 BW 51 Mcf separate notice to District not required under Order R 13052]

Date	Document	Event Summary
04/16/2012	Form C 103 [Intent]	Pull current completion assembly RIH with work string and re stimulate well re run completion equipment conduct MIT
<i>No record of Form C 103 [Subsequent] being filed for stimulation no MIT submitted</i>		
05/22/2012	Form C 103 [Intent]	Conduct SRT on May 25 2012 (approved on 05/22/2012)
06/06/2012	Form C 103 [Intent]	Reschedule SRT for June 8 2012 (approved on 06/07/2012)
06/14/2012	IPI Application	Approved administrative order IPI 416 MSIP of 3000 psi (any permitted fluid)
<i>No record of Form C 103 [Subsequent] being filed following SRT</i>		
03/07/2013	Form C 103 [Intent]	Replacing seal rings in tubing conduct MIT
<i>No record of Form C 103 [Subsequent] being filed for seal replacement</i>		
09/16/2013	Form C 103 [Intent]	Replacing tubing conduct MIT
10/08/2013	Form C 103 [Subsequent]	<ul style="list-style-type: none"> • RPB below packer not holding pulled RBP • Punch six holes in tubing above packer install tree and BOP pumping 11 4 # CaCl in tubing and casing pulled 226 joints • Unable to kill well with CaCl require 12 8# mud • Install new string of tubing • Reversing out kill fluid released H₂S slug at surface (circulated out through flowback) • Displace kill fluid with brine water and corrosion inhibitor • Complete setting on packer and run MIT
(10/03/2013)	RBDMS	MIT conducted not witnessed accepted
10/23/2014	RBDMS	Annual bradenhead test only passed
<i>10/03/2015 Two year anniversary for MIT no notice or MIT on file no record of inspection in RBDMS</i>		
07/29/2016	OCD e mail in well file	<p>Well fails initial MIT prior to witness test operator meets with OCD in Hobbs on July 27 to provide plan for continued operation and proposed repair of well</p> <ul style="list-style-type: none"> • Casing integrity and additional logging to be conducted on well • Workover to be initiated on August 1 • Notice to producers about situation and alternative plan for gas processing • Install bypass line to Eunice plant
08/08/2016	Operator daily report	Mob workover equipment to well and setup

Date	Document	Event Summary
08/09/2016 Through 09/12/16	Operator daily reports	<p>Significant workover events</p> <ul style="list-style-type: none"> • Unable to set temporary plug at packer due to size discrepancies in the subsurface safety valve (SSSV) • Conduct tracer test on well with tubing still in place Operator identifies casing hole at 5856 feet and initiates effort to use polymers/KWM to kill well and then pull tubing • August 24 tubing out of well RBP placed above packer run casing integrity log • August 25 the service subcontractor initiated efforts to repair the shallowest leak of two casing leaks identified by a tracer tests this squeeze cement work was not successful since the equipment used for the repair could not be removed from the production casing subcontractor made several attempts to remove this blockage over the following ten days but was unable to either remove the equipment or advance past this blockage in the production casing • Operator attempts to advance mill bit past 5586 ft but unable to show any significant progress since 09/02/2016 District requests P&A plan
09/15/2016	Form C 103 [Intent]	Operator files plan to P&A well District approves with modifications
09/22/2016	RBDMS	P&A completed witnessed by OCD Form C 103 [Subsequent] outstanding

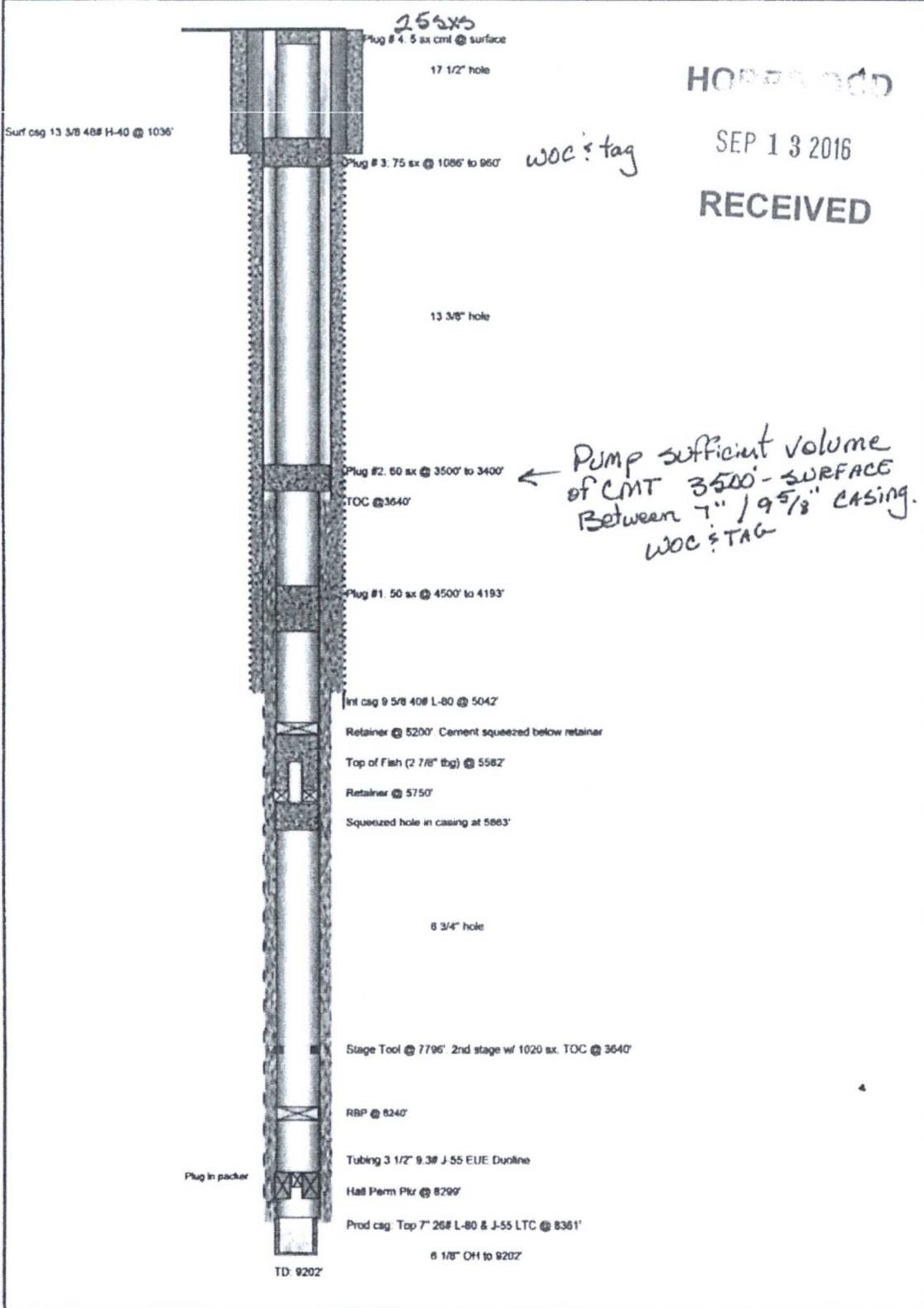
Summary

- Estimated well life 30 years actual well life 4 years 7 months (12/02/2011 to 07/27/2016)
- Compromised tubing is the primary source of casing corrosion and eventual failure of casing
- Additional sources contributing to premature failure
 - 1 Early use for injection of wastewater with gas
 - 2 Use of water as annular fluid
 - 3 Possible impact from San Andres formation fluids due to ongoing waterflooding in area
- New orders for Monument AGI wells contain the following changes
 - Annual MIT
 - Diesel with biocide as annular fluid
 - Pressure/temperature monitoring
 - Operators design of double casing and cement of formations

Proposed P+A

Cambrian Management EXECUTIVE SUMMARY WELLBORE DIAGRAM

WELL NAME:	Monument AGI #1	FIELD:		STATE:	New Mexico						
LOCATION:	S36-19S-R36E-86Z-FSL & 251Z-FEL	COUNTY:	Lea	SPUR:		TD:	Completion				
ELEVATION:	3571'	DATE:	13-Sep	DATE:							
AP#		PREPARED BY:	C. Gaddy	TVD	9203	P8TD	Permit Depth				
Drill Contractor		Total Depth	9203				9203				
	DEPTH	HOLE SIZE	SIZE	WEIGHT	GRADE	THREAD	CMT	CMT VOL	TOC	Method	DV Depth
Coed CASING:											
Surf CASING:	1036	17.5	13 3/8	48	H-40	STC	Class C	1003 ax	Surf		
Int CASING:	5042	12 1/4	9 5/8	40	HCK-55 & J-55	LTC	Class C	700 ax	Surf		
Long CASING:	8361	8 3/4	7	26	L-80 & J-55	LTC	Class H	1157 ax	3640		7796
OH:	9202	6 1/8									
Tubing:											



HOBBS OCD

SEP 13 2016

RECEIVED

Plug and abandon the Monument AGI #1

- 1 Pick up 7 packer on work string and run in hole to 5200'
- 2 Set packer and attempt to pump into collapsed casing area
- 3 Establish pump in rate and pressure call the Cambrian office to get cement volumes
- 4 Pull out of hole with packer and run in hole with 7" retainer, set retainer at 5200
- 5 Pump Class C cement as per recommendation from Cambrian and approved by OCD
- 6 Displace cement below retainer sting out of retainer and reverse out any cement
- 7 Pull out of hole with work string LEAVE 35' CMT ON RETAINER

- 8 If unable to pump into collapse area pull out of hole with packer
- 9 Go in hole open ended to 5560 and spot 50 sx of Class C from 5560 to 5253 ↑ WOC & TAG
- 10 Pull up hole to 4500' and spot 50 sx of Class C from 4500' to 4193'

- 11 Pull out of hole with tubing
- 12 Rig up wireline and perforate 7 26# J 55 casing at 3500
- 13 Establish circulation between 7 casing and 9 5/8"

- 14 Run in hole with packer on 2 7/8" work string and set packer at 3000' 2900' PUMP SUFFICIENT volume
- 15 Re establish circulation and pump 60 sx of Class C set balanced plug TO C. 10 CMT TO SURFACE
- 16 Pull out of hole with work string and packer WOC + TAG NO DEEPER THAN 3000'

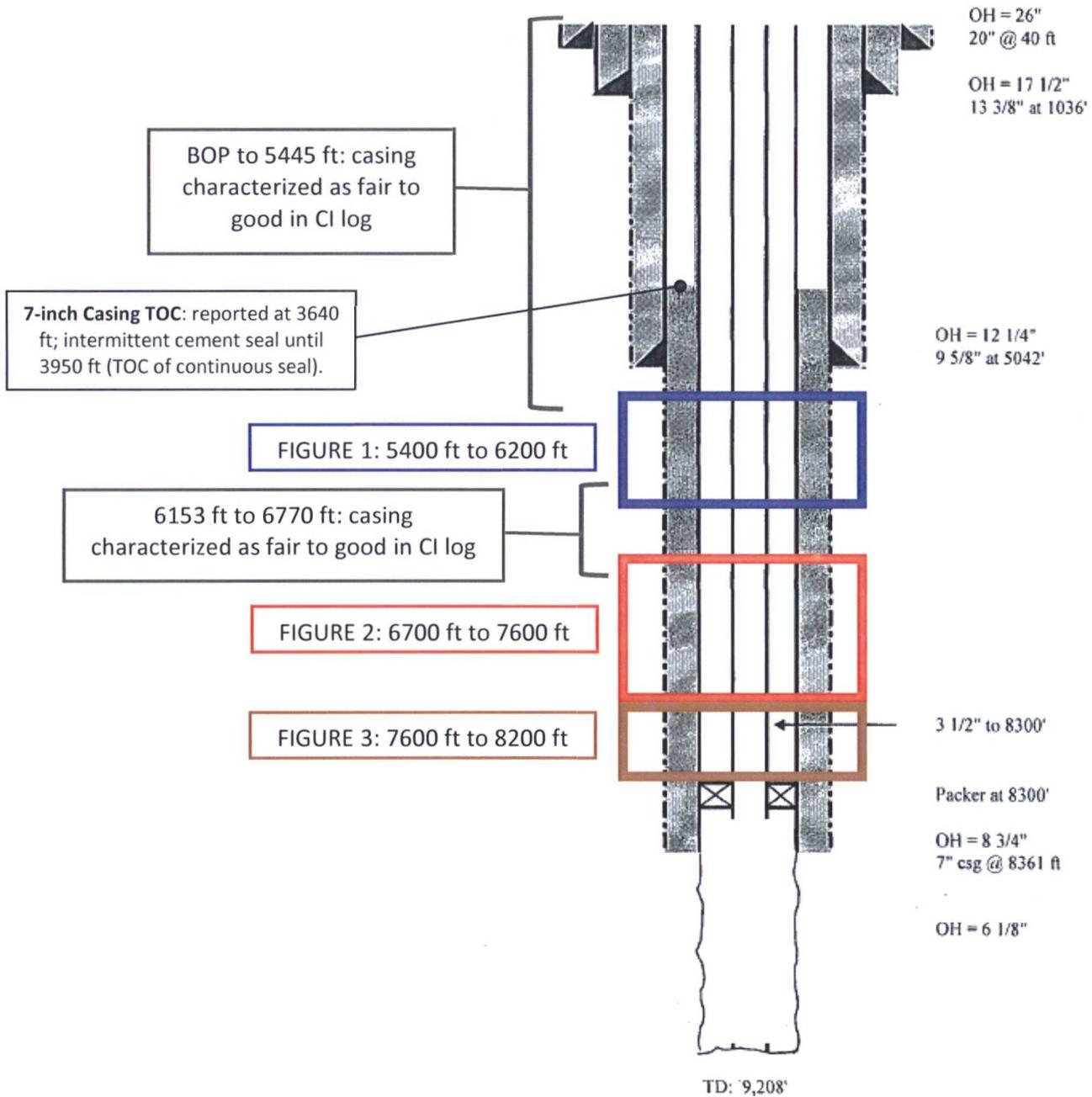
SPOT 30 SXS CMT

- 17 Perforate 7" at 1086 WOC & TAG NO DEEPER THAN 986'
- 18 Establish circulation between 7 and 9 5/8 annulus
- 19 Run in hole with packer on 2 7/8 work string and set packer at 800
- 20 Pump 75 sx Class C cement balance plug
- 21 Pull out of the hole
- 22 Spot 5 sx Class C cement at surface and cut off casing and weld on cap

25 SXS @ 150' TO SURFACE VERIFY CMT TO SURFACE IN ALL CSG STRINGS

* MUD LADEN FLUID (MLF) BETWEEN ALL CMT PLUGS
 9.5 ppg brine with 12.5# SALT GEL PER BBL

Monument AGI Well No. 1 (30-025-40002)
 Casing Inspection Log: August 24, 2016
 Index of Casing Assessment Figures



Monument AGI Well No. 1 (30-025-40002)
 Casing Inspection Log: August 24, 2016
 Casing Assessment Figure 1: 5400' to 6200'

5446 to 5529: casing characterized as "bad" in CI log

5500

5572: possible hole identified by CI log
 Not identified in RA tracer log

5550

5572 to 5618: casing characterized as "bad" in CI log

5600

5866: possible hole identified by CI log
 5865: hole identified by RA tracer log

5800

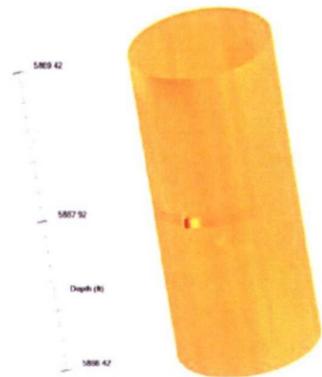
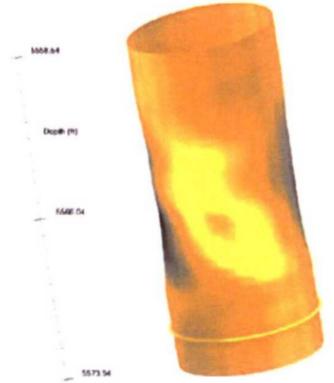
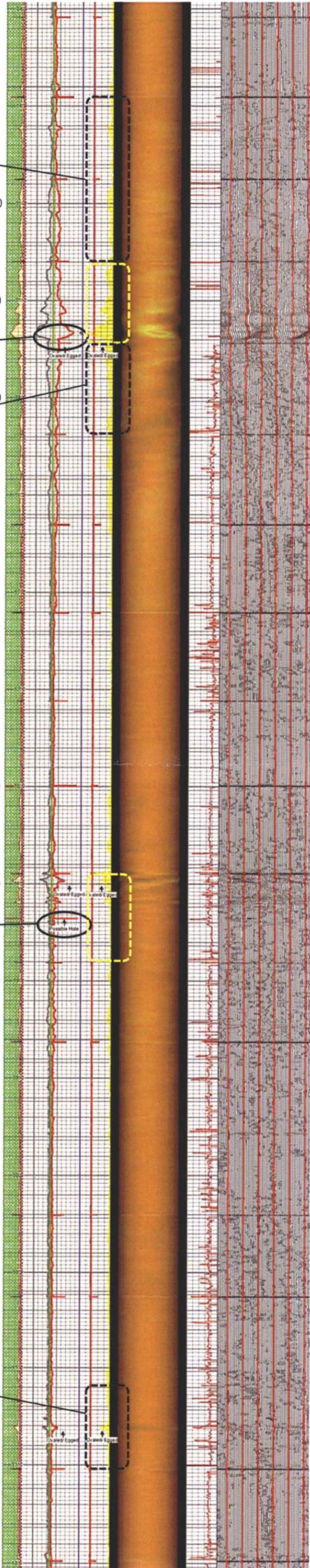
5850

5900

6110 to 6151: casing characterized as "bad" in CI log

6100

6150



Note: Casing without notations was assessed as fair to good condition.

Monument AGI Well No. 1 (30-025-40002)
 Casing Inspection Log: August 24, 2016
 Casing Assessment Figure 2: 6700' to 7600'

Note: Casing without notations was assessed as fair to good condition.

6771 to 6806: casing characterized as "bad" in CI log

6808 to 6982: casing characterized as "severe" in CI log

7008: possible hole identified by CI log
 Not identified in RA tracer log

7018 to 7054: casing characterized as "severe" in CI log

7093 to 7128: casing characterized as "bad" in CI log

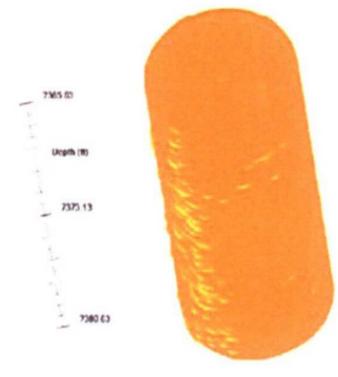
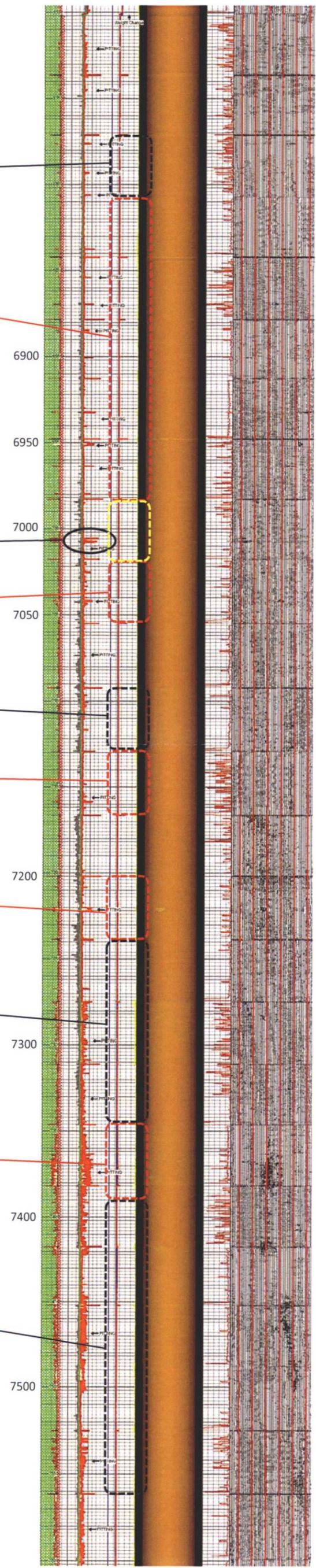
7130 to 7166: casing characterized as "severe" in CI log

7202 to 7238: casing characterized as "severe" in CI log

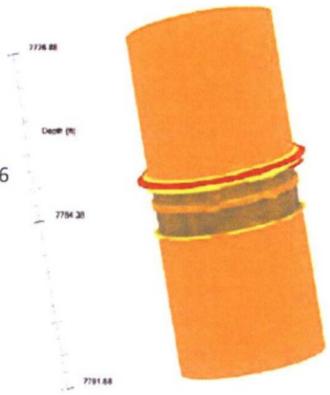
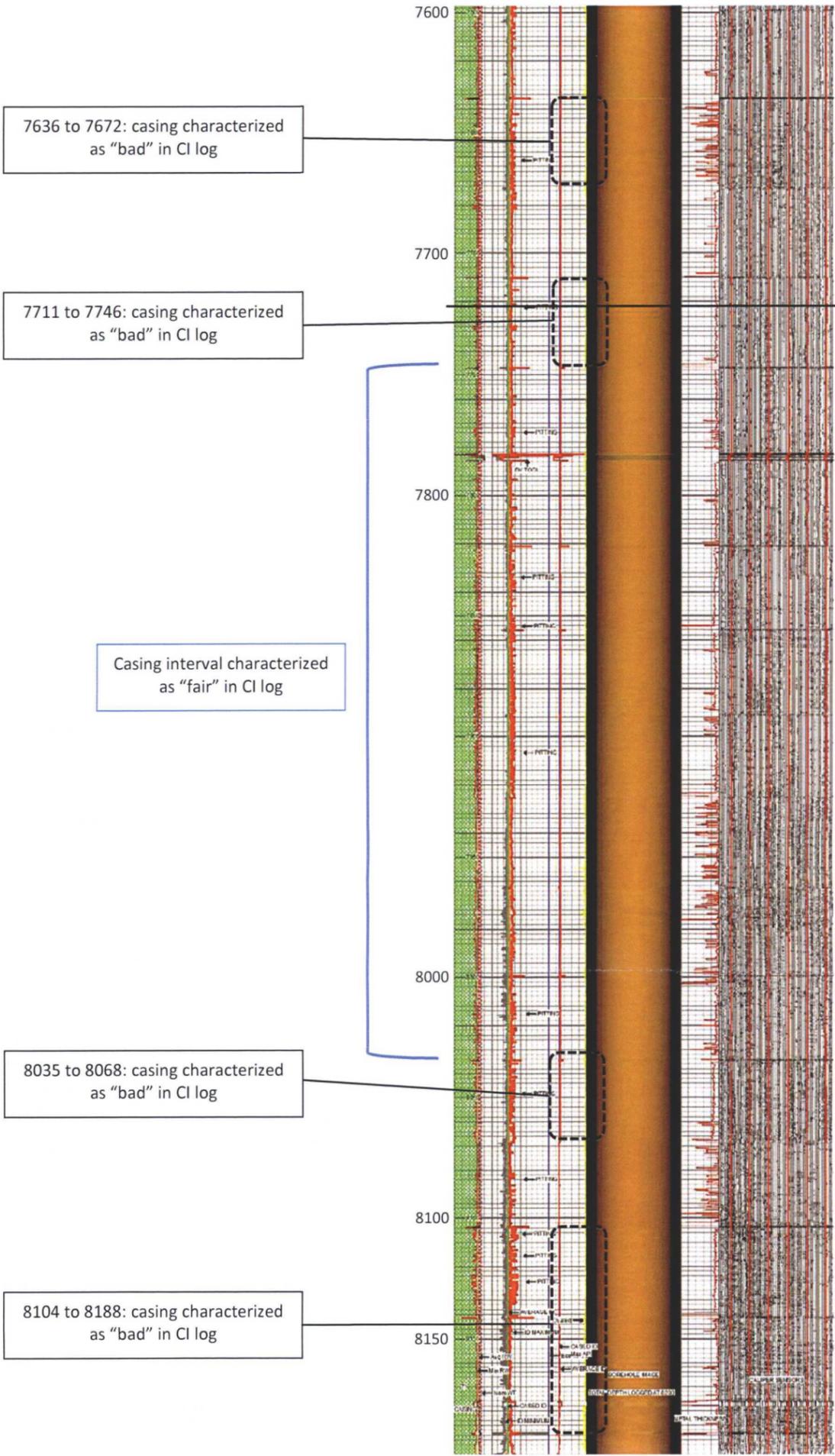
7239 to 7345: casing characterized as "bad" in CI log

7347 to 7381: casing characterized as "severe" in CI log

7382 to 7560: casing characterized as "bad" in CI log



Monument AGI Well No. 1 (30-025-40002)
 Casing Inspection Log: August 24, 2016
 Casing Assessment Figure 3: 7600' to 8200'



Note: Casing without notations was assessed as fair to good condition