Environmental GEO-Technologies, LLC

September 13, 2019

Mr. Allan Batka
United States Environmental Protection Agency
Region 5 (WU-16J)
77 West Jackson Blvd.
Chicago, Illinois 60604

Re: EGT Monthly Report (in conformance with MI-163-1W-C010 & MI-163-1W-C011)

Dear Mr. Batka:

Environmental Geo-Technologies, LLC ("EGT") hereby timely submits its sixty-ninth Monthly Report ("MR") in conformance with the requirements of its two EPA UIC permits (#s MI-163-1W-C010 & MI-163-1W-C011). Thank you for allowing EGT to submit this information once our computerized system was updated (since a large portion of this report is computerized).

EGT is providing all of the attached information in the same sequence as required by both subject permits, i.e. Part II.D.1 (a-i), Part III, Attachment A, and Part III, Attachment E.G.2 & E.I.

EGT did not accept any F039 waste in July, 2019 so no Page A-3 of 3 laboratory analyses are necessary to be submitted as part of this MR.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

We trust that you find this report satisfactory, however, if you have any questions or comments, please feel free to contact us.

Sincerely,

Richard J. Powals, P.E.
Vice President

cc: J. Frost (EGT)

att. rjp091319/EGTEPAMonthlyReport-July, 2019b

P 734-946-1000 F 734-946-1002 - 28470 Citrin Drive. Romulus, Michigan 48174
www.envgeotech.com

AVERAGE INJECTION RATE

Calculation of Average Injection Rate

CURRENT REPORTING YEAR 2019

CURRENT REPORTING MONTH July

Date (month, year) of the first injection into either well at the Citrin Road Facility

Nov 2013

CURRENT MONTH (all volumes in gallons)

	Injected Waste	Injected Non-Waste	Total injected
MI-163-1W-C010 , Well #1-12			
Current Month	121,267	0	121,267
Since facility first injected			14,513,195
MI-163-1W-C011, Well #2-12			
Current Month	0	0	0
Since facility first injected			4,648,736
		Lifetime Combined	19,161,931

Conversion factors

365.25 days per year ÷ 12 months per year = 30.4375 days per month

30.4375 days per month × 1440 minutes per day = 43,830 minutes per month

Calculations

Whole number of months of injection 67

_____ lifetime number of months of injection × 43,830 minutes/month

= 2,892,780 minutes of injection

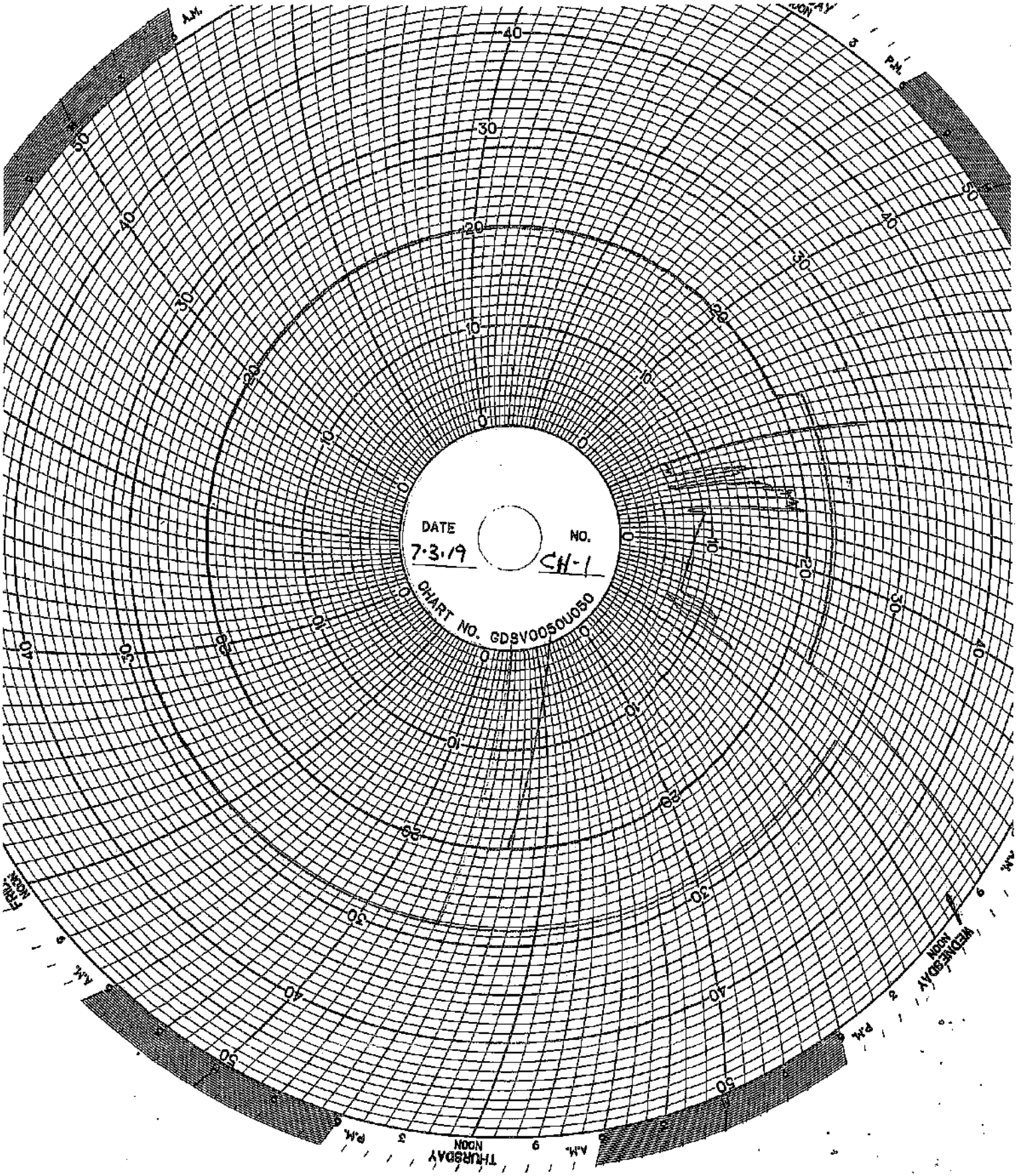
Lifetime combined injected volume 19,161,931 ÷ 2,892,780 minutes of injection

= 6.6 gpm average injection rate

WELL 1 DATA

WELL 01 Monthly Data

Date	Min Injection Pressure (PSIG)	Max Injection Pressure (PSIG)	Min Sight Glass Level (in)	Max Sight Glass Level (in)	Min Annulus Pressure (PSIG)	Max Annulus Pressure (PSIG)	Min Injectate pH	Max Injectate pH	Min Flow Rate (GPM)	Max Flow Rate (GPM)	Min Differentail Pressure (PSIG)	Max Differential Pressure (PSIG)
7/1/2019	-5.8	1.5	23.9	24.2	150.3	173.7	7.4	7.4	0.0	0.0	151.1	173.7
7/2/2019	-10.0	1000.0	13.5	24.2	143.4	1314.5	7.4	7.4	0.0	0.0	-76.9	1249.3
7/3/2019	-4.5	-4.5	21.3	21.5	866.9	898.0	7.4	7.4	0.0	0.0	871.4	902.5
7/4/2019	-4.5	-4.5	21.3	21.5	862.3	867.0	7.4	7.4	0.0	0.0	866.8	871.5
7/5/2019	-4.5	-4.5	21.3	21.6	860.0	862.4	7.4	7.4	0.0	0.0	864.6	866.9
7/6/2019	-4.5	-4.5	21.3	21.5	858.6	860.4	7.4	7.4	0.0	0.0	863.1	864.9
7/7/2019	-4.5	-4.5	21.3	21.5	857.6	859.1	7.4	7.4	0.0	0.0	862.1	863.6
7/8/2019	-4.5	-4.5	21.3	21.5	856.4	858.1	7.4	7.4	0.0	0.0	860.9	862.6
7/9/2019	-4.5	-4.5	21.3	24.1	194.5	857.2	7.4	7.4	0.0	76.2	199.0	861.7
7/10/2019	-4.5	-4.5	23.8	24.1	194.7	724.2	7.4	7.4	0.0	75.8	199.2	728.7
7/11/2019	-9.9	999.3	23.8	24.1	199.6	749.4	7.4	7.4	0.0	64.0	-714.9	753.9
7/12/2019	-10.0	606.2	23.8	24.1	214.6	616.7	7.4	7.4	0.0	64.9	-18.3	625.1
7/13/2019	-9.8	-9.8	23.8	24.1	238.0	251.8	7.4	7.4	0.0	0.0	247.7	261.6
7/14/2019	-9.8	-9.8	23.8	24.1	234.4	238.0	7.4	7.4	0.0	0.0	244.2	247.8
7/15/2019	-9.8	-9.8	23.8	24.1	232.3	234.5	7.4	7.4	0.0	0.0	242.1	244.3
7/16/2019	-9.8	-9.8	23.9	24.1	232.5	232.5	7.4	7.4	0.0	0.0	242.3	242.3
7/17/2019	-9.8	-9.8	23.8	24.0	232.5	232.5	7.4	7.4	0.0	0.0	242.3	242.3
7/18/2019	-9.8	389.4	-12.5	53.0	174.9	1035.8	7.4	7.4	0.0	269.5	106.6	928.5
7/19/2019	-3.5	399.3	21.1	21.3	859.0	1036.7	7.4	7.4	0.0	260.0	637.4	921.8
7/20/2019	116.6	119.4	21.1	21.3	908.7	913.2	7.4	7.4	0.0	0.0	790.3	794.5
7/21/2019	116.9	118.9	21.0	21.3	906.2	908.7	7.4	7.4	0.0	0.0	787.6	790.8
7/22/2019	-4.1	468.0	21.0	21.2	905.1	1056.5	7.4	7.4	0.0	122.3	584.5	912.4
7/23/2019	-4.1	-1.7	21.0	21.2	902.9	906.0	7.4	7.4	0.0	0.0	905.3	909.2
7/24/2019	-3.7	-1.8	21.0	21.2	900.6	903.0	7.4	7.4	0.0	0.0	903.0	906.1
7/25/2019	-3.7	-2.0	21.0	21.2	899.4	901.4	7.4	7.4	0.0	0.0	901.7	904.6
7/26/2019	-3.2	764.5	21.0	21.3	856.1	1270.3	7.4	7.4	0.0	116.5	452.0	903.3
7/27/2019	126.2	135.3	21.0	21.3	905.5	930.3	7.4	7.4	0.0	0.0	778.6	795.6
7/28/2019	124.5	126.9	21.1	21.3	901.2	905.5	7.4	7.4	0.0	0.0	775.6	779.2
7/29/2019	-4.7	125.8	21.1	21.3	897.7	901.3	7.4	7.4	0.0	0.0	773.8	903.1
7/30/2019	-4.3	-2.6	21.0	21.3	896.6	898.5	7.4	7.4	0.0	0.0	899.4	902.2
7/31/2019	-4.5	-2.5	21.0	21.2	895.2	896.8	7.4	7.4	0.0	0.0	898.0	900.9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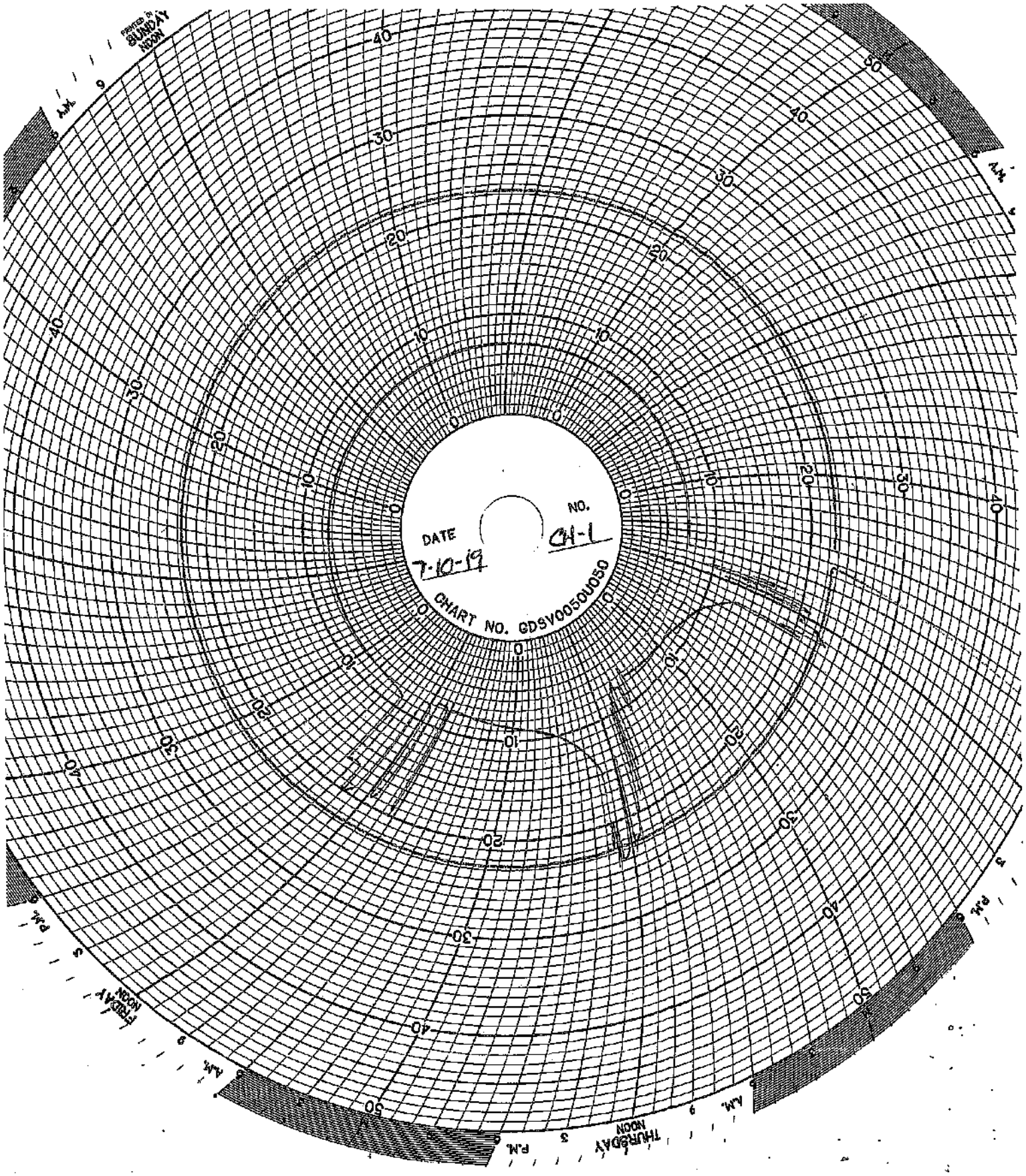
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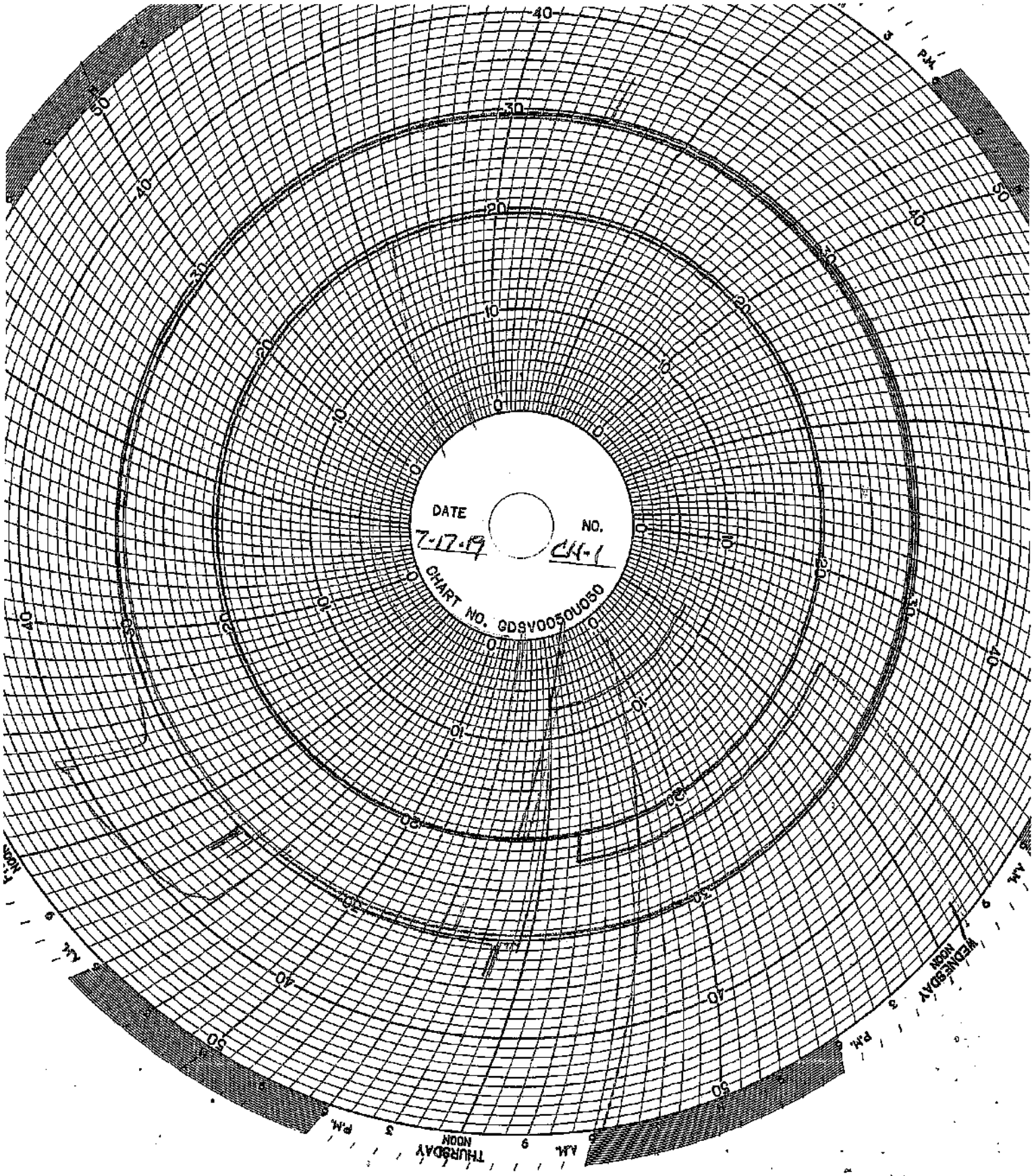
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WELL 2 DATA

Well 02 Monthly Data

Date	Min Injection Pressure (PSIG)	Max Injection Pressure (PSIG)	Min Sight Glass Level (in)	Max Sight Glass Level (in)	Min Annulus Pressure (PSIG)	Max Annulus Pressure (PSIG)	Min Injectate pH	Max Injectate pH	Min Flow Rate (GPM)	Max Flow Rate (GPM)	Min Differentail Pressure (PSIG)	Max Differential Pressure (PSIG)
7/1/2019	0.0	0.0	29.6	30.1	405.3	408.2	7.4	7.4	0.0	0.0	5.0	5.0
7/2/2019	0.0	0.0	29.6	30.1	405.5	408.4	7.4	7.4	0.0	0.0	5.0	5.0
7/3/2019	0.0	0.0	29.6	30.1	406.1	409.0	7.4	7.4	0.0	0.0	5.0	5.0
7/4/2019	0.0	0.0	29.6	30.1	406.1	409.2	7.4	7.4	0.0	0.0	5.0	5.0
7/5/2019	0.0	0.0	29.6	30.2	405.2	409.0	7.4	7.4	0.0	0.0	5.0	5.0
7/6/2019	0.0	0.0	29.6	30.1	406.1	408.9	7.4	7.4	0.0	0.0	5.0	5.0
7/7/2019	0.0	0.0	29.5	30.0	406.0	408.7	7.4	7.4	0.0	0.0	5.0	5.0
7/8/2019	0.0	0.0	29.5	29.9	406.1	409.0	7.4	7.4	0.0	0.0	5.0	5.0
7/9/2019	0.0	0.0	29.4	29.9	406.2	409.1	7.4	7.4	0.0	0.0	5.0	5.0
7/10/2019	0.0	0.0	29.5	29.9	406.5	409.8	7.4	7.4	0.0	0.0	5.0	5.0
7/11/2019	0.0	0.0	29.5	30.0	407.5	410.3	7.4	7.4	0.0	0.0	5.0	5.0
7/12/2019	0.0	0.0	29.6	29.8	408.0	410.8	7.4	7.4	0.0	0.0	5.0	5.0
7/13/2019	0.0	0.0	29.5	29.9	408.3	411.7	7.4	7.4	0.0	0.0	5.0	5.0
7/14/2019	0.0	0.0	29.5	29.9	407.6	410.9	7.4	7.4	0.0	0.0	5.0	5.0
7/15/2019	0.0	0.0	29.5	29.9	407.9	410.8	7.4	7.4	0.0	0.0	5.0	5.0
7/16/2019	0.0	0.0	29.5	30.0	409.0	409.0	7.4	7.4	0.0	0.0	5.0	5.0
7/17/2019	0.0	0.0	29.5	30.0	409.0	409.0	7.4	7.4	0.0	0.0	5.0	5.0
7/18/2019	0.0	0.0	-12.5	29.9	0.0	409.0	7.4	7.4	0.0	0.0	5.0	5.0
7/19/2019	0.0	0.0	29.4	30.0	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/20/2019	0.0	0.0	29.4	30.0	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/21/2019	0.0	0.0	29.4	29.9	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/22/2019	0.0	0.0	29.5	29.6	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/23/2019	0.0	0.0	29.4	29.6	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/24/2019	0.0	0.0	29.4	29.6	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/25/2019	0.0	0.0	29.3	29.7	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/26/2019	0.0	0.0	29.3	29.8	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/27/2019	0.0	0.0	29.4	30.2	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/28/2019	0.0	0.0	29.5	30.0	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/29/2019	0.0	0.0	29.5	30.0	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/30/2019	0.0	0.0	29.5	29.9	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0
7/31/2019	0.0	0.0	29.6	29.7	0.0	0.0	7.4	7.4	0.0	0.0	5.0	5.0

Circle Chart Index

Environmental Geo-Technologies, LLC 28470 Citrin Drive Romulus, MI 48174

Chart Recorder #1

Channel #1

Blue Pen - Well 1 Injection Pressure (chart value x 30)

Channel #2

Red Pen – Well 1 Annulus Pressure (chart value x 30)

Channel #3

Green Pen – Well 1 Flow Rate (chart value x 4)

Channel #4

Black Pen – Well 1 Annulus Tank Level (chart value x 0)

Chart Recorder #2

Channel #1

Blue Pen – Well 2 Injection Pressure (chart value x 30)

Channel #2

Red Pen – Well 2 Annulus Pressure (chart value x 30)

Channel #3

Green Pen – Well 2 Flow Rate (chart value x 4)

Channel #4

Black Pen – Well 2 Annulus Tank Level (chart value x 0)

Chart Recorder #3

Channel #1

Blue Pen – Injection pH Well 1 & 2 (chart value ÷ 3.3)

Channel #2

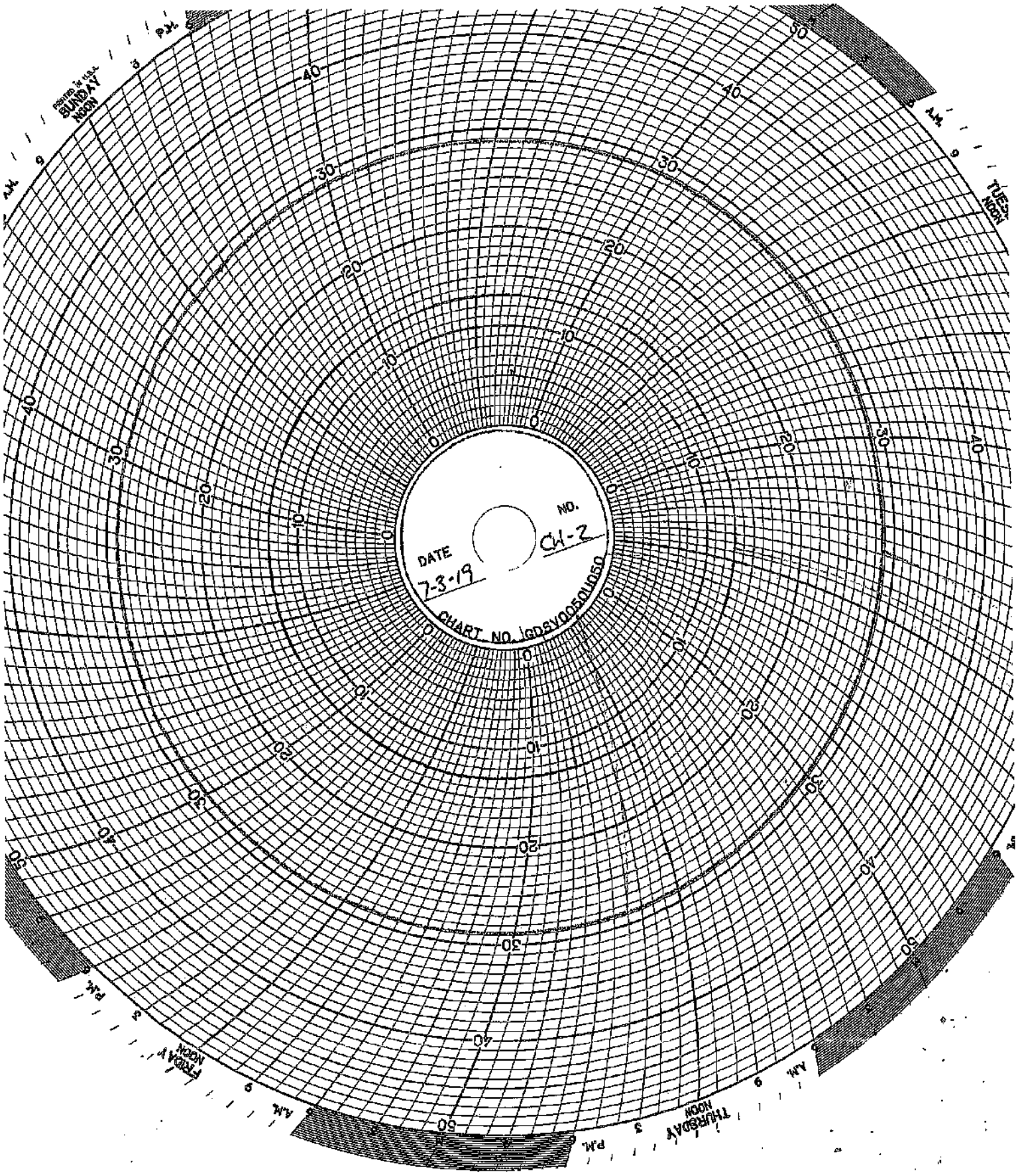
Red Pen – Well 1 Monthly Volume (chart value x 100,000)

Channel #3

Green Pen – Well 2 Monthly Volume (chart value x 100,000)

Channel #4

Black Pen – Temperature (chart value x 0)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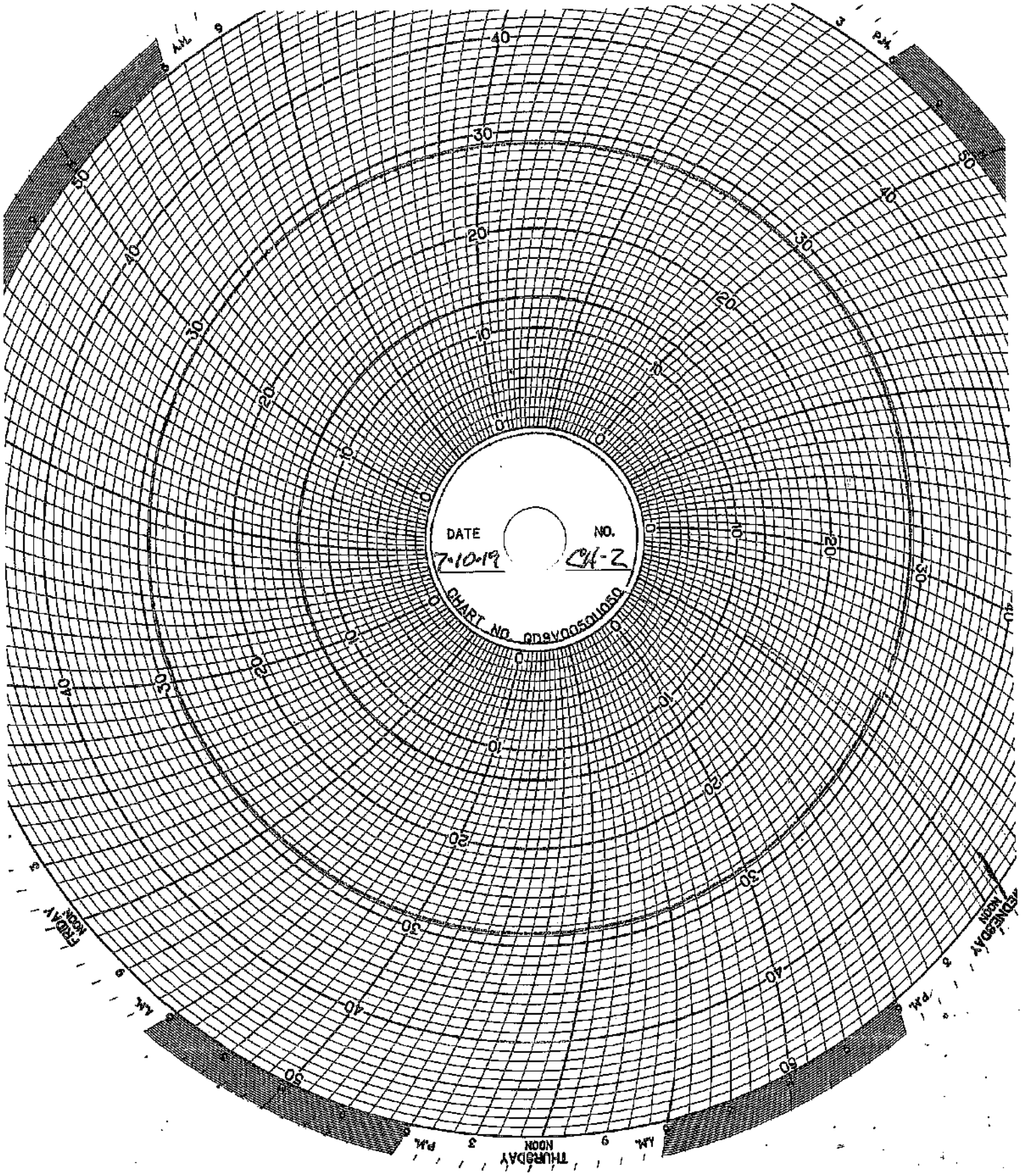
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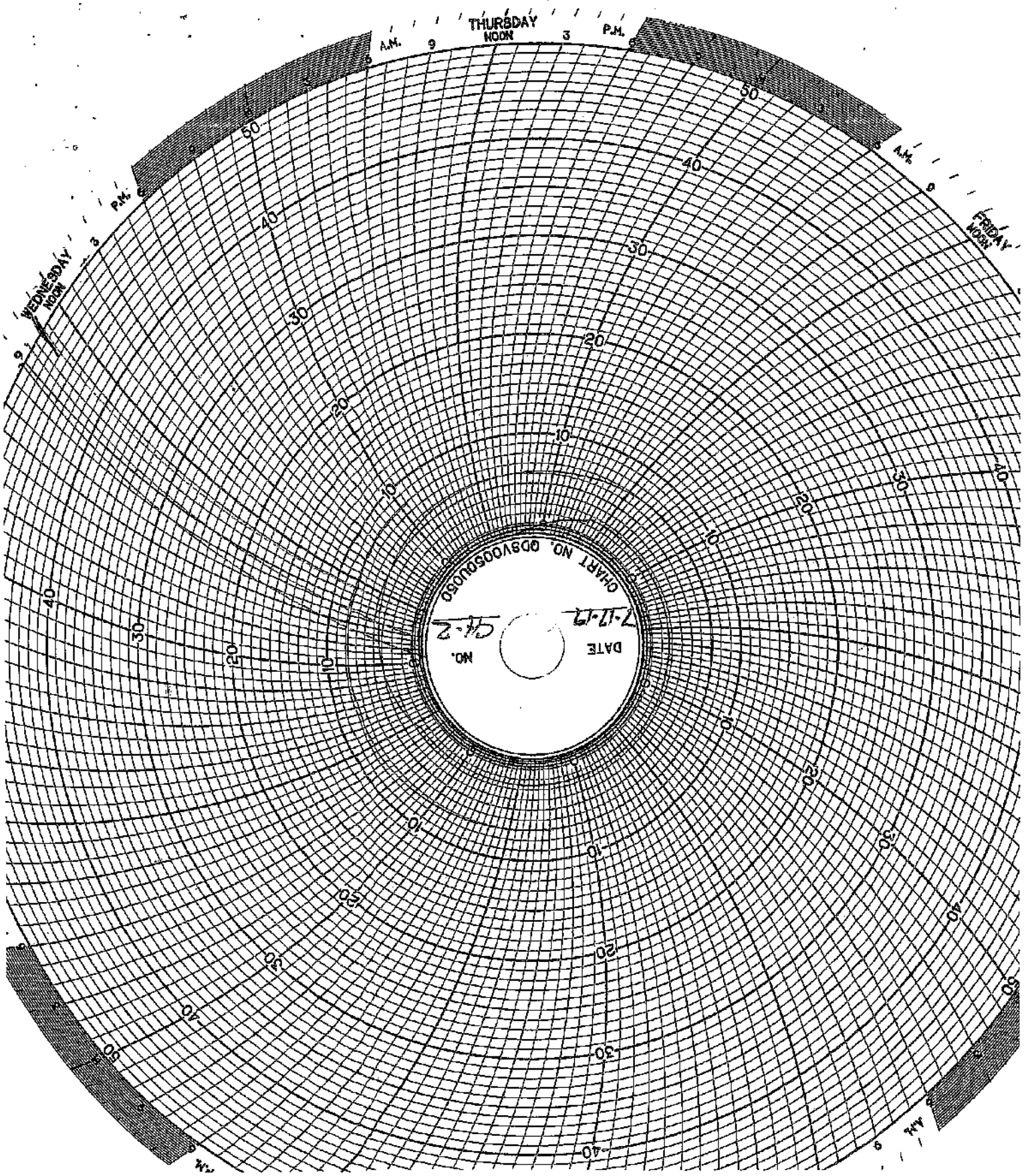
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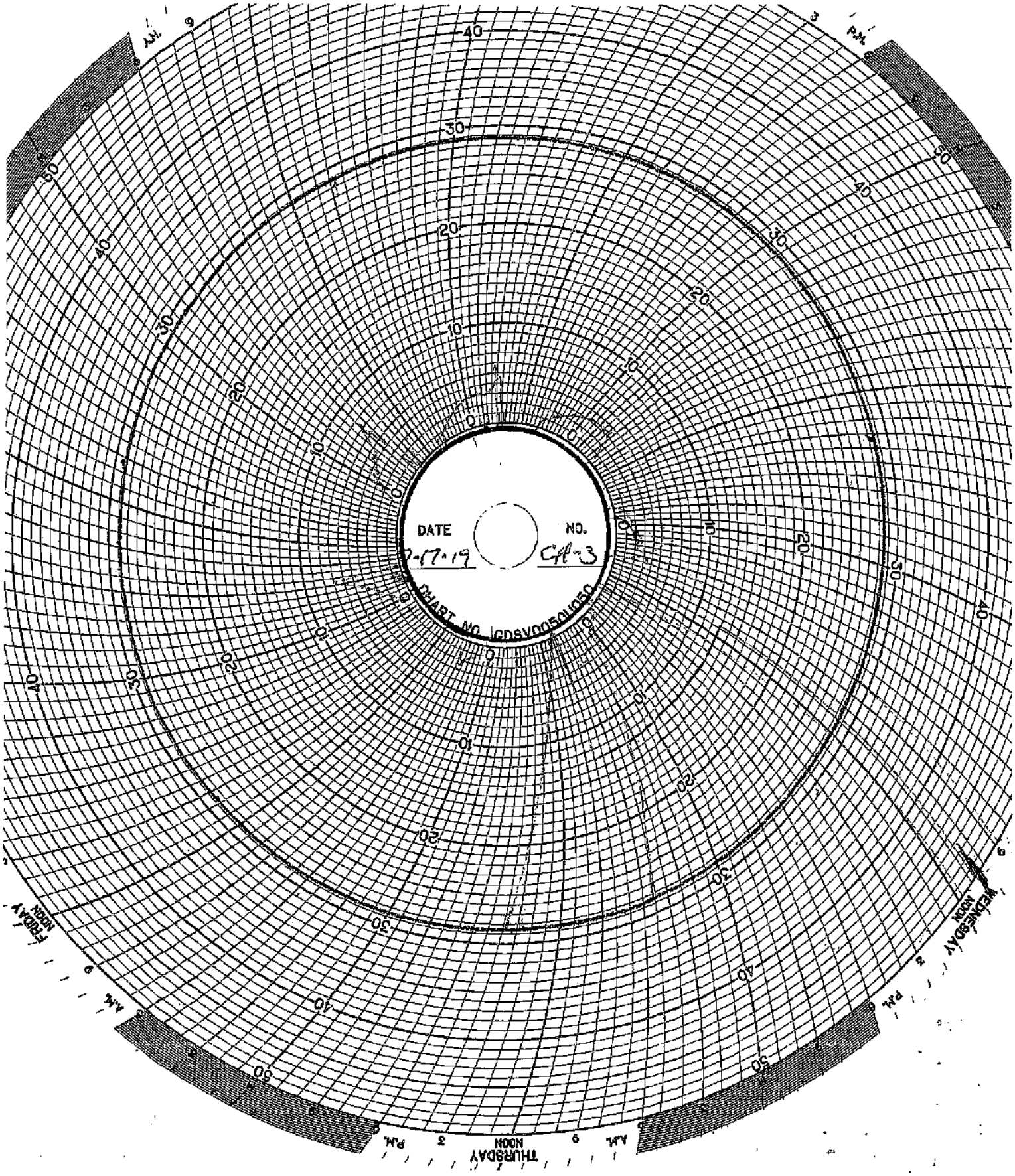
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MAINTENANCE LOG

UIC Monthly Maintenance Log

7/1-31/19	Well 1	See attached report titled EGT NO. 1-12 Romulus Michigan Workover Report

CORROSION MONITORING

CORROSION MONITORING PLAN
COUPON SUMMARY

Date	Hastelloy (C267)	Stainless Steel (316L)	Fiberglass (Redbox)	
12/19/2013	13.330 g	10.848 g	7.309 g	Initial Mass @ start up
2/21/2014	13.329 g	10.846 g	7.306 g	
3/10/2014	13.327 g	10.845 g	7.300 g	
4/18/2014	13.324 g	10.841 g	7.272 g	
5/30/2014	13.328 g	10.818 g	7.226 g	
6/30/2014	13.321 g	10.337 g	7.196 g	
7/11/2014	13.323 g	10.304 g	7.196 g	
8/12/2014	13.328 g	10.045 g	7.182 g	
9/17/2014	13.321 g	9.997 g	7.090 g	
10/30/2014	13.321 g	9.387 g	7.075 g	
11/21/2014	13.320 g	9.386 g	7.069 g	
12/19/2014	13.321 g	9.315 g	7.084 g	
1/12/2015	13.321 g	9.289 g	7.063 g	
2/23/2015	13.339 g	9.286 g	7.005 g	New hastelloy coupon
3/31/2015	13.339 g	9.286 g	7.005 g	
4/27/2015	13.335 g	9.130 g	6.852 g	
5/21/2015	13.336 g	9.124 g	6.809 g	
6/12/2015	13.334 g	9.126 g	6.819 g	
7/27/2015	13.337 g	9.127 g	6.818 g	
8/26/2015	13.337 g	9.022 g	6.780 g	
9/21/2015	13.336 g	8.987 g	6.792 g	
10/19/2015	13.335 g	8.985 g	6.797 g	
11/16/2015	13.334 g	8.982 g	6.788 g	
12/17/2015	13.334 g	8.933 g	6.791 g	
1/29/2016	13.334 g	8.931 g	6.788 g	
2/16/2016	13.332 g	8.799 g	6.757 g	
3/31/2016	13.339 g	9.286 g	7.005 g	
4/22/2016	13.333 g	8.590 g	6.744 g	
5/31/2015	13.334 g	6.084 g	6.784 g	
6/30/2016	13.328 g	10.942 g	6.793 g	New stainless steel coupon
8/3/2016	13.326 g	10.529 g	6.743 g	
8/29/2016	13.325 g	10.020 g	6.723 g	
10/27/2016	13.325 g	8.765 g	6.708 g	
11/29/2016	13.327 g	8.571 g	6.740 g	
12/12/2016	13.323 g	8.223 g	6.717 g	
1/3/2017	13.325 g	8.059 g	6.712 g	
2/28/2017	13.324 g	7.634 g	6.727 g	
3/24/2017	13.325 g	7.370 g	6.732 g	
4/28/2017	13.325 g	6.736 g	6.736 g	
5/11/2017	13.323 g	7.352 g	6.689 g	
6/12/2017	13.323 g	7.357 g	6.689 g	
7/5/2017	13.323 g	7.355 g	6.689 g	
8/30/2017	13.324 g	7.353 g	18.105 g	New Fiberglass coupon
9/28/2017	13.325 g	7.352 g	18.060 g	
10/11/2017	13.324 g	7.350 g	18.038 g	
11/16/2017	13.325 g	7.363 g	18.047 g	
12/12/2017	13.326 g	7.308 g	18.307 g	

CORROSION MONITORING PLAN
COUPON SUMMARY

Date	Hastelloy	Stainless Steel	Fiberglass	
1/29/2018	13.326 g	10.930 g	18.027 g	New stainless steel coupon
2/9/2018	13.325 g	10.932 g	18.044 g	
3/19/2018	13.325 g	10.926 g	18.030 g	
4/16/2018	13.336 g	10.863 g	18.068 g	
5/17/2018	13.325 g	10.858 g	18.037 g	
6/20/2018	13.325 g	10.855 g	18.029 g	
7/12/2018	13.326 g	10.852 g	18.032 g	
8/21/2018	13.326 g	10.854 g	18.031 g	
9/14/2018	13.326 g	10.852 g	18.036 g	
10/10/2018	13.326 g	10.851 g	18.031 g	
11/20/2018	13.326 g	10.853 g	18.032 g	
12/11/2018	13.326 g	10.852 g	18.033 g	
1/14/2019	13.326 g	10.852 g	18.033 g	
2/20/2019	13.326 g	10.850 g	18.033 g	
3/15/2019	13.326 g	10.850 g	18.033 g	
4/10/2019	13.326 g	10.848 g	18.031 g	
5/17/2019	13.326 g	10.849 g	18.036 g	
6/5/2019	13.326 g	10.848 g	18.031 g	
7/8/2019	13.326 g	10.845 g	18.032 g	

CORROSION MONITORING COUPONS BASELINE VISUAL DESCRIPTION

November 4, 2013

Fiberglass

The fiberglass coupon is Red Box 2000 type and is 2-1/2 inches long by 1/2 inch wide and 1/4 inches thick. It is a dark orange (rust) in color with a glossy shine on one side a polished look on the opposite side and the cut edges look sanded.

Hastelloy

The hastelloy coupon is identified as C276 with serial number 1. The dimensions of the coupon are 3 inches long by 1/2 inch wide and 1/4 inch thick. The coupon is silver in color with a lightly sandblasted surface.

Stainless Steel

The stainless steel coupon is identified as 316L with serial number C1562. The dimensions of the coupon are 3 inches long by 1/2 inch wide and 1/4 inch thick. The coupon is silver in color with a lightly sandblasted surface.

GHESQUIERE PLASTIC TESTING, INC.

20450 HARPER AVENUE
HARPER WOODS, MI 48225
PHONE (313) 885-3535
FAX (313) 885-1771

Report Date: November 15, 2013
Test Date: October 15 - November 14, 2013

Report #1310-77651
Performed for:
Environmental Geo-Technologies
28470 Citrin Drive
Romulus, MI 48174

Attention: Mr. Don Anderson

WORK REQUESTED:

Perform Barcol Hardness test on sample submitted.

DESCRIPTION OF SAMPLE:

Sample submitted was identified as a fiberglass test coupon.

(P. O. #Credit Card).

WORK PERFORMED:

Test specimen was prepared as necessary and conditioned for a minimum of 24 hours at standard laboratory conditions prior to testing.

Barcol Hardness test was performed in accordance with the procedures of ASTM D2583-13. One specimen was tested.

RESULTS:

The following determination was made based upon the above test:

BARCOL HARDNESS

	Hardness
Specimen 1	90

Specimen is being returned with this report for further evaluation.

GHESQUIERE PLASTIC TESTING, INC.

M. W. Ghesquiere
President

MWG/kmi

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Samples, extra and related test materials will be destroyed 30 days after the date of the final report unless the client indicates otherwise in writing.

TOTAL 1 PAGES

GHESQUIERE PLASTIC TESTING, INC.

20460 HARPER AVENUE
HARPER WOODS, MI 48225
PHONE (313) 885-3535
FAX (313) 885-1771

Report Date: February 17, 2014
Test Date: February 14 - 17, 2014

Report #1402-78036
Performed for:
Environmental Geo-Technologies
28470 Citrin Drive
Romulus, MI 48174

Attention: Mr. Don Anderson

WORK REQUESTED:

Perform Barcol Hardness test on sample submitted.

DESCRIPTION OF SAMPLE:

Sample submitted was identified as a fiberglass test coupon.

(P. O. #Credit Card).

WORK PERFORMED:

Test specimen was prepared as necessary and conditioned for a minimum of 24 hours at standard laboratory conditions prior to testing.

Barcol Hardness test was performed in accordance with the procedures of ASTM D2583-13. One specimen was tested.

RESULTS:

The following determination was made based upon the above test:

BARCOL HARDNESS

	Hardness
Specimen 1	90

Specimen was returned to the client on February 17, 2014.

GHESQUIERE PLASTIC TESTING, INC.

M. W. Ghesquiere
President

MWG/dm

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TOTAL 1 PAGES

GHESQUIERE PLASTIC TESTING, INC.

20450 HARPER AVENUE
HARPER WOODS, MI 48225
PHONE (313) 885-3535
FAX (313) 885-1771

Report Date: June 16, 2014
Test Date: June 13 - 16, 2014

Report #1406-78499
Performed for:
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, MI 48174

Attention: Mr. Don Anderson

WORK REQUESTED:

Perform Barcol Hardness test on sample submitted.

DESCRIPTION OF SAMPLE:

Sample submitted was identified as a fiberglass test coupon.

(P. O. #Credit Card).

WORK PERFORMED:

Test specimen was prepared as necessary and conditioned for a minimum of 24 hours at standard laboratory conditions prior to testing.

Barcol Hardness test was performed in accordance with the procedures of ASTM D2583-13. One specimen was tested.

RESULTS:

The following determination was made based upon the above test:

BARCOL HARDNESS

	Hardness
Specimen 1	85

Specimen was returned to the client June 16, 2014.

GHESQUIERE PLASTIC TESTING, INC.

M. W. Ghesquiere
President

MWG/dm

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TOTAL 1 PAGES

October 2, 2014

- TEST REPORT -

PN 118325

PO Attn:John Frost

PLASTICS TESTING DEPARTMENT

Prepared For:

John Frost
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, MI 48174

Prepared By: _____
Melissa Martin
Sr. Project Technician

Approved By: _____
Jim Drummond
Physical & Plastics Testing, Manager

ACCREDITED
A Testing Lab
Certificate Number 2555.01

An A2LA ISO 17025 Accredited Testing Laboratory — Certificate Numbers 255.01 & 255.02
ISO 9001:2008 Registered

ISO 9001:2008
Registered

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www.ardl.com

2887 Gilchrist Rd. | Akron, Ohio 44305 | answers@ardl.com
Toll Free (800) 830-ARDL | Worldwide (330) 794-6600 | Fax (330) 794-6610

October 2, 2014

John Frost
Environmental Geo-Technologies, LLC

SUBJECT: Barcol Hardness on one material.
PO# Attn:John Frost

RECEIVED: One small section identified as; Fiberglass Coupon.

BARCOL HARDNESS ASTM D 2583-13a

	Results
Barcol Hardness, Instant	97

Prepared By: Melissa Martin
Sr. Project Technician

Approved By: Scott W. Yates
Plastics Testing Assistant Manager

st

AKRON RUBBER DEVELOPMENT LABORATORY, INC.

Progress Through Innovation, Technology and Customer Satisfaction

October 22, 2015

• TEST REPORT •

PN 125322

PO 00154

PLASTICS TESTING DEPARTMENT

Prepared For:

John Frost
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, MI 48174

Prepared By: _____
Melissa Martin
Sr. Project Technician

Approved By: _____
Jim Drummond, Sr.
Physical & Plastic Testing, Manager

ACCREDITED
A Testing Lab
Certificate Numbers 255.01 & 255.02

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Fax (330) 794-6610 | Worldwide (330) 794-6600

October 22, 2015

John Frost
Environmental Geo-Technologies, LLC

SUBJECT: Barcol Hardness on one material.

RECEIVED: One small section identified as; Fiberglass Coupon.

BARCOL HARDNESS ASTM D 2583-13a
Instant Reading

	Results
Barcol Hardness, Instant	96

Prepared By: Melissa Martin
Sr. Project Technician

Approved By: Scott W. Yates
Plastics Testing Assistant Manager

tc

December 12, 2016

▪TEST REPORT▪

PN 132662

PO

PLASTICS TESTING DEPARTMENT

Prepared For:

John Frost
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, MI 48174

Prepared By: Melissa Martin
Senior Project Technician

Approved By: Jim Drummond
Physical Testing, Manager

Rev 041916

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A Testing Lab
Certificate Number 255.01 & 255.02

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December 12, 2016

John Frost
Environmental Geo-Technologies, LLC

SUBJECT: Barcol Hardness on one (1) material.

RECEIVED: One (1) small section identified as; Fiberglass Coupon.

BARCOL HARDNESS ASTM D 2583-13a
Instant Reading

	RESULTS
Barcol Hardness, Instant	96

Prepared By: Melissa Martin
Senior Project Technician

Approved By: Scott Yates
Plastics Testing, Assistant Manager

wk

ARDL is ISO 17025 accredited by A2LA for the test methods listed on the certificates referenced on page one. **NOTE: Non-ISO 17025 accredited test methods are designated with the ^ symbol to differentiate from ISO 17025 accredited methods in the body of the test report.**

AKRON RUBBER DEVELOPMENT LABORATORY, INC.

Progress Through Innovation, Technology and Customer Satisfaction

December 13, 2017

▪TEST REPORT▪

PN 139140

PO#

PLASTIC TESTING DEPARTMENT

Prepared For:

John Frost
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, MI 48174

Prepared By: Melissa Martin
Sr Project Technician

Approved By: Jim Drummond
Rubber & Plastic Testing, Manager

Rev 041916

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Fax (330) 794-6610 | Worldwide (330) 794-6600

December 13, 2017

John Frost
Environmental Geo-Technologies, LLC

SUBJECT: Barcol Hardness on one material.

RECEIVED: One small section identified as; Fiberglass Coupon.

BARCOL HARDNESS ASTM D 2583-13a
Instant Reading

	Results
Barcol Hardness, Instant	96

Prepared By: Melissa Martin
Sr Project Technician

Approved By: Scott Yates
Plastics Testing, Assistant Manager

SC

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INJECTION FINGERPRINTS

FINGERPRINT FORM

ENVIRONMENTAL GEO-TECHNOLOGIES, LLC

RECEIVING & APPROVAL FORM

RECEIVING FORM	
Date	7.15.19
Receiving ID#	I07151901
Manifest# Line:	
Land Ban Cert included	Yes No
EGT Approval #	
Generator	
Client	
Transporter	
Time In	
Time out	
Received by	JKF
Sampled by	JKF

LAB INFORMATION (Liquids only)			
Compatible? (RT#)	(Yes) No	Barium	
PCBs (ppm)(Oily Waste Only)?	NA	Calcium	
TOC (ppm)(CC Waste Only)?	NA	Total Iron	
Flash Point (°F)	>140°F	Magnesium	
pH (S.U.)	7.4	Sodium Chloride	
Cyanides? (mg/L)	<30	Bicarbonate	
Sulfides? (ppm)	<200	Carbonate	
Specific Gravity	1.0	TDS	
Physical Description	Liquid	Resistivity	
Stream Consistency	(Yes) No	Sulfate	
Oil In Sample	Yes (No)		
Temperature	67°F		
Conductivity	7.3 mS		
% Solids	0.2		
Turbidity	Yes (No)		
Color (visual)	NONE		
TSS (%)	<0.1		
Radiation Screen (as needed)	NEGATIVE		
Lab Signature			

WASTE STREAMS CHARACTERIZATIONS

ADDITIONAL INFORMATION

EGT NO. 1-12

ROMULUS, MICHIGAN

ENVIRONMENTAL GEO-TECHNOLOGIES, LLC

WORKOVER REPORT

API NO. 21-163-M452
PROJECT NO.: 1920261

WORK PERFORMED: June 25 - July 27, 2019

REPORT SUBMITTED: August 8, 2019

WSP USA

WSP.COM

SIGNATURE

PREPARED BY

Stephen L. Kelly, WSP
Senior Project Manager

TABLE OF CONTENTS

1 WORKOVER DATA 1

2 WELL WORKOVER CHRONOLOGY 2

3 WELL SCHEMATIC 5

4 WELLHEAD 6

5 LOG 7

5.1 WEATHERFORD - BOREHOLE CALIPER LOG (07/01/19) 7

TABLE OF CONTENTS

TABLES

TABLE 1.1 WORKOVER DATA 1
TABLE 1.2 WORKOVER PARTICIPANTS 1

FIGURES

FIGURE 3.1 WELL SCHEMATIC 5
FIGURE 4.1 WELLHEAD DRAWING 6

APPENDIX

A LOG

1 WORKOVER DATA

This report presents a summary of the well workover.

Workover Data	
Client	Environmental Geo-Technologies, LLC
Location	Romulus, MI
Well No.	EGT No. 1-12
Start Date	June 25, 2019
Completion Date	July 27, 2019

Table 1.1 Workover Data

The following personnel participated in the well workover.

Workover Participants	Company
John Frost	Environmental Geo-Technologies, LLC
Rick Powals	Environmental Geo-Technologies, LLC
Jason Rubin	Republic Services
Steve Kelly	WSP Project Manager
Rusty Clark	WSP Field Supervisor
Clay Chauviere	WSP Field Supervisor

Table 1.2 Workover Participants

2 WELL WORKOVER CHRONOLOGY

The following is a chronology of the well workover taken from WSP Field Supervisor's daily reports and the Project Manager's notes.

Coil Tubing – Nitrogen Backwash

Tuesday June 25, 2019
Spotted 1½-inch coil tubing unit on EGT No. 1-12. Removed the 4-1/16-inch, 2,000 psi flange from the top of the flow cross on the wellhead. Installed adapter flange and rigged up 1½-inch coil tubing BOP. Spotted the coil tubing unit and one (1) 400-bbl open-top tank and one (1) 500-bbl frac tank. Filled frac tank with fresh water. Shut down for night and secured well.

Wednesday June 26, 2019
Picked up injector head and rigged up to wellhead. Picked up 2⅛-inch mud motor with 3¼-inch junk bladed mill and started in hole with 180 psi on annulus and 150 psi on tubing. Started pumping nitrogen at 350 SCFM. Tagged at 4,394 feet with coil. Broke free and worked bit to 4655 feet. Worked motor with bit up and down open hole section. Shut off nitrogen after pumping 200 bbl of fluid through coil. Pulled out of hole with coil tubing and secured the well for the night.

Thursday, June 27, 2019
Ran in the hole with 1½ inch-coil tubing and a 5-port flow nozzle, pumping nitrogen at 350 SCFM and water at ½ bpm. Tagged bottom at 4649 feet. Worked nozzle in open hole. Recovered milky returns with strong odor. Returns cleaned up. Started out of hole at 11:00 AM. Bled off nitrogen and filled well with 9.2 lb/gal brine water. Rigged down and moved out coil tubing unit and associated equipment. Re-installed wellhead. Tubing on a vacuum and annulus pressure at 280 psi.

Open Hole Caliper Log and Short-Term Injection Test

Monday, July 1, 2019
Moved in and rigged up Weatherford Wireline Unit and crane truck. Rigged up B&B Oilfield pump skid unit. Shut-in pressure = 0 psi. Pressure tested pump lines to 1500 psi. Made up caliper tool (22.75 feet) and started in hole. Tagged bottom at 4400 feet. Worked tool down to 4452 feet. Logged from 4452 to base of casing at approximately 4073 feet. Rigged down and moved out wireline unit and associated equipment.

Tuesday, July 2, 2019
Pressure tested pump lines to 1500 psi. EGT pressurized annulus from 151 psi to 850 psi. Performed the following injection test into the well with storm water (8.34 lb/gal):

Volume (bbl)	Rate (bpm)	Tubing (psi)	Annulus (psi)	Injectivity Index (gpm/psi)
10	1.00	750	1229	0.056
16	0.78	830	1241	0.039
30	0.69	870	1243	0.033
44	0.59	900	1245	0.028
52	0.56	940	1174	0.025
65	0.44	936	1255	0.020
76	0.39	914	1240	0.018
89	0.41	920	1238	0.019
100	0.47	920	1240	0.021
112	0.47	920	1252	0.021
119	0.46	920	1255	0.021
121	0.47	920	1252	0.021

134	0.47	920	1255	0.021
141	0.47	930	1255	0.021
146	0.41	890	1226	0.019
153	0.42	890	1230	0.020

Shut down pump. Switched from fresh water to 8.8 lb/gal brine water and restarted injection test.

Volume (bbl)	Rate (bpm)	Tubing (psi)	Annulus (psi)	Injectivity Index (gpm/psi)
10	0.47	900	1248	0.022
15	0.47	900	1221	0.022
30	0.52	920	1278	0.024
39	0.46	900	1264	0.021
50	0.53	930	1295	0.024
60	0.51	925	1306	0.023
64	0.52	930	1311	0.023
71	0.53	930	1314	0.024

Coil Tubing – Acid Stimulation

Monday, July 8, 2019
Laid mats for crane unit.

Tuesday, July 9, 2019
Moved in mats for crane unit and rigged up crane. Spotted and rigged up 2-inch coil tubing unit. Rigged up BOP stack. Moved in and rigged up pump truck and first acid transport truck. Filled coil with 51 bbl of fresh water. Ran in hole with coil and tagged at 4444 feet. Started pumping 5000 gallons of 15% HCl acid with backside open to open-top tank until acid was within 10 bbl of end of coil tubing. Shut in backside and pumped acid at 0.5 bpm at 738 psi on wellhead. After pumping 60 bbl of HCl acid, started flushing coil with fresh water. Pulled out of hole with coil and rigged down injector head from wellhead. Secured well and shut down for the night with 140 psi on the tubing.

Wednesday, July 10, 2019
Rigged up injector head to wellhead and opened well with 235 psi on the annulus and 295 psi on the tubing. Ran in hole with 2 inch coil and tagged bottom at 4466 feet. Pumped 45 bbl of 12% HCl/3% HF with backside open, circulating returns to open-top tank. Shut-in backside after pumping 45 bbl of fresh water. Continued pumping acid into formation at 0.5 bpm at 500 psi at 1:00 PM. Increased rate to 1.4 bpm at 880 psi at 13:30 PM. Rate at 1.4 bpm at 780 psi at 2:00 PM and pressure was at 895 psi at 2:30 PM. Displaced acid with fresh water and pulled out of hole. Removed injector head and secured well. Tubing pressure at 346 psi and annulus at 341 psi. Pumped a total of 120 bbl of 12% HCl/3% HF and 50 bbl of 15% HCl acid.

Thursday, July 11, 2019
Rigged up injector head to well. Opened well with 149 psi on annulus and 210 psi on tubing. Ran in the hole with the 2-inch coil and tagged bottom at 4475 feet. Pulled up to 4100 feet and open the backside and circulated 12% HCl/3% HF to the bottom of the coil. Closed the backside after pumping 40 bbl and started injecting into the formation at 3:10 PM. Continued pumping acid at 1.6 bpm at 833 psi. Started out of hole at 3:30 PM while pumping fresh water and was out by 4:00 PM. Pumped a sweep of soda ash through coil to remove any residual acid in the coil. Blew water out of coil with nitrogen. Rigged down coil tubing unit and associated equipment and moved out.

Friday, July 12, 2019
Rigged up a pump truck to Well 1-12 with an annulus pressure at 251 psi and a tubing pressure at 166 psi. Started pumping into well at 2.75 bpm and tubing pressure was 872 psi (Injectivity Index = 0.132 gpm/psi) after pumping 172 bbl. Reduced rate to 2 bpm and pressure dropped to 680 psi (Injectivity Index = 0.124 gpm/psi). Pumped another 332 bbl of fresh water. Stopped pumping and rigged down pump truck. A total of 5000 gallons of 15% HCl and 10,000 gallons of 12% HCl/3% HF acid were pumped into the well over a three day period. Returned well to EGT. The pre-

acid fresh water Injectivity Index averaged 0.020 gpm/psi and the post-acid fresh water index increased by a factor of 6.2 to 0.124 gpm/psi.

10-Hour Injection Test and Surface Gauge Pressure Falloff Test

Friday, July 26, 2019
Rigged up pump truck to well EGT No. 1-12 with annulus pressure at 899 psi and tubing pressure at 110 psi. Connected tandem WSP digital pressure gauges to wellhead with EGT pressure transmitter. Connected injection line to EGT flowmeter in pump house. Started pumping freshwater at approximately 2 bpm. After pumping 1165 bbl of freshwater over 10 hours at an average rate of 81.3 gpm (1.935 bpm), shut in well at 5:00 PM at a final injection pressure of 756.7 psi (Injectivity Index = 0.107 gpm/psi). Rigged down and moved out pump truck. (After 18 hours of falloff, the surface pressure had dropped to 131.0 psi. The digital pressure gauge was removed from the well at approximately 7 AM on Monday, July 29, 2019 and returned to Baton Rouge for downloading and analysis.

3 WELL SCHEMATIC

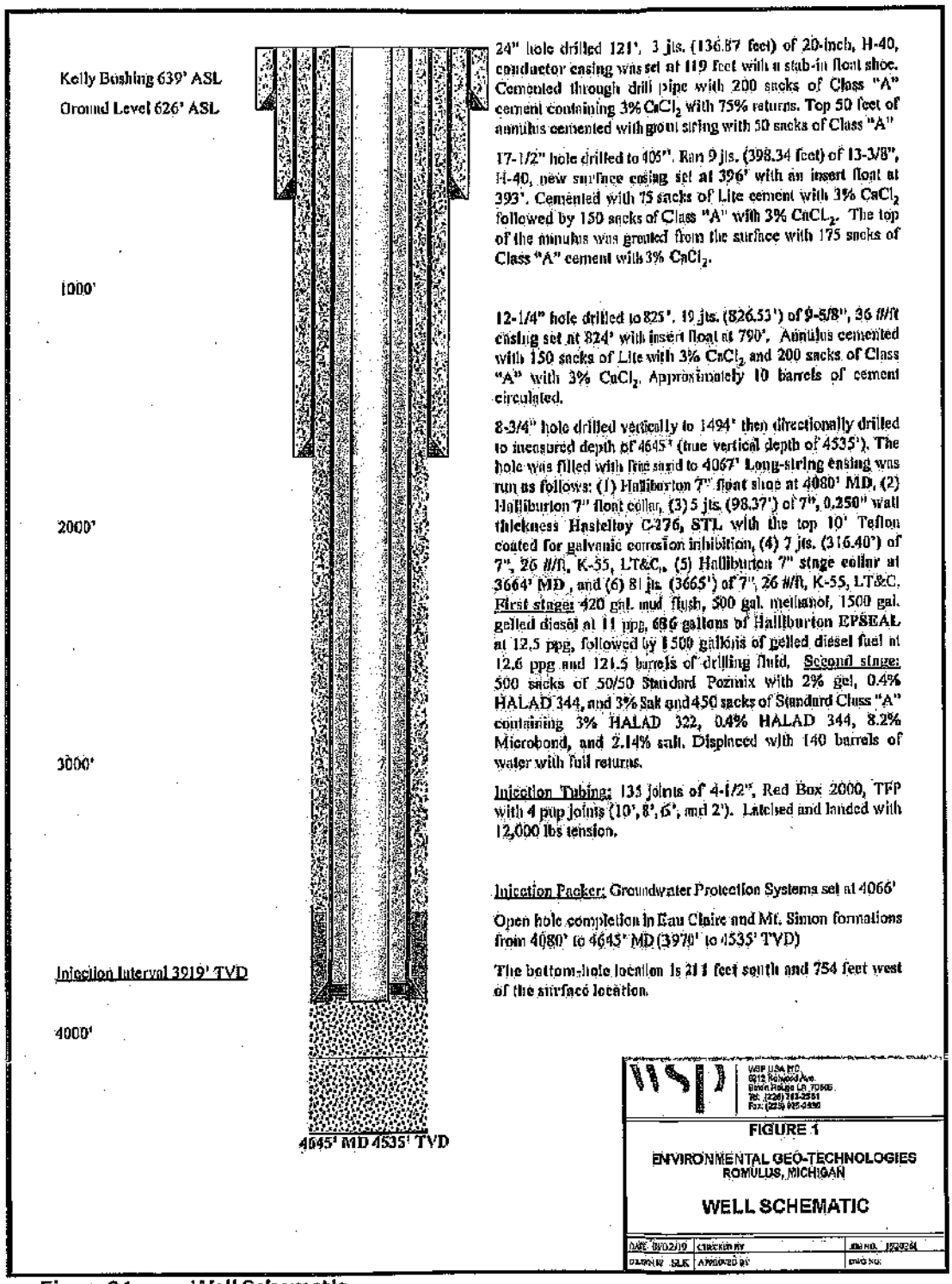
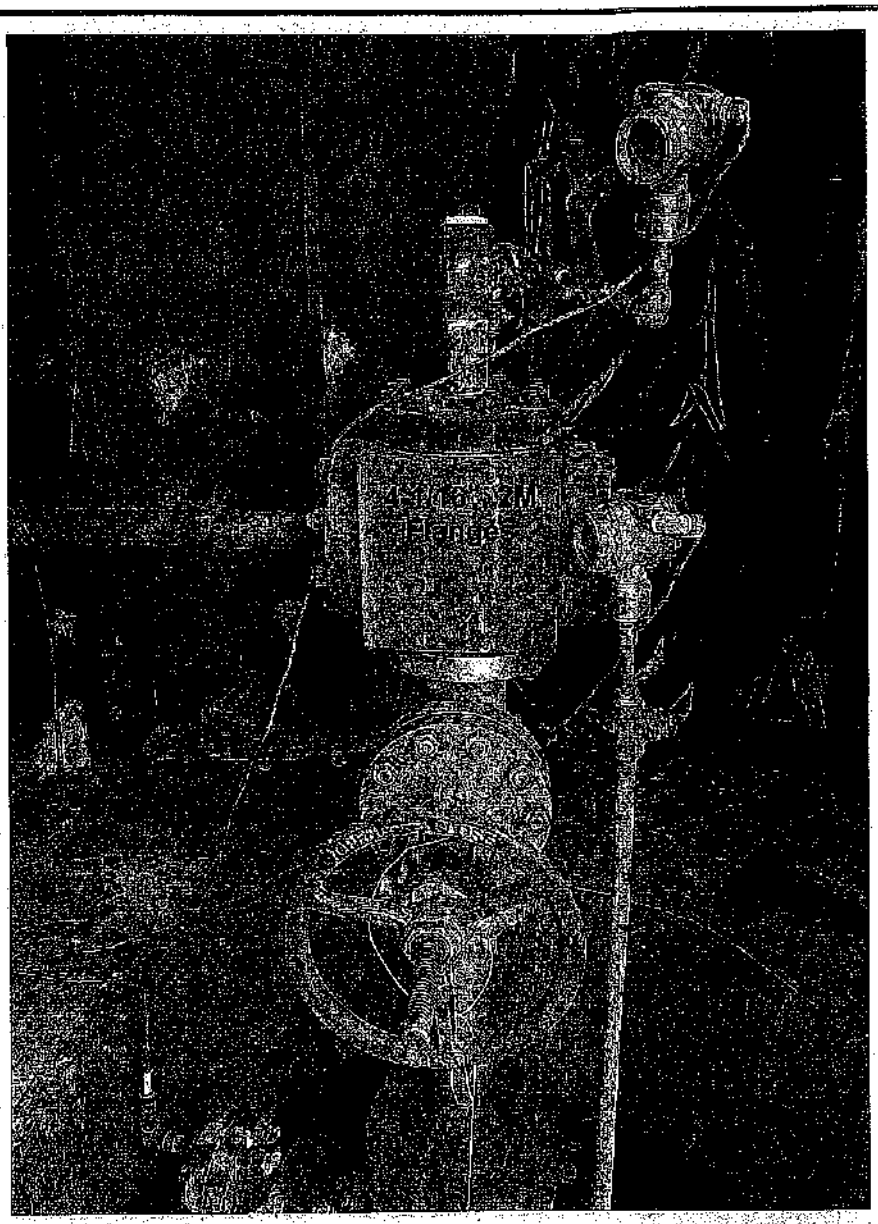


Figure 3.1 Well Schematic

4 WELLHEAD



WSP USA INC.
8212 Nelson Ave.
Baton Rouge LA 70809
Tel: (225) 923-2351
Fax: (225) 923-2359

FIGURE 2

ENVIRONMENTAL GEO-TECHNOLOGIES
ROMULUS, MICHIGAN

WELLHEAD PICTURE

DATE 08/02/19	DRAWN BY	JOB NO. 1920261
SCALE NTS	APPROVED BY	DWG NO.

Figure 4.1 Wellhead Drawing

5 LOG

This section presents a synopsis of all logs run.

5.1 WEATHERFORD - BOREHOLE CALIPER LOG (07/01/19)

This log was run to evaluate the current borehole geometry of the open hole completion interval.

A LOG

WEATHERFORD - BOREHOLE CALIPER LOG (07/01/19)

Weatherford®

Borehole Caliper Log
Gamma Ray

COMPANY	Republic Services
WELL	EGT Well #1-12
FIELD	Romulus Storage
PROVINCE/COUNTY	Wayne
COUNTRY/STATE	U.S.A. / Michigan
LOCATION	1603' FSL 2351' FEL SW NW SE

SEC 12	TWP 35	RGE 9E	Other Services
Latitude			None
Longitude			
API Number	21-163-M452		

Permanent Datum Ground Level, Elevation 626 feet
Log Measured From KB, 13.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	639.00
DF	638.00
GL	626.00

Date	01-July-2019			
Run Number	One			
Service Order	2428-249171021			
Depth Driller	4645.00	feet		
Depth Logger	4452.00	feet		
First Reading	4452.00	feet		
Last Reading	0.00	feet		
Casing Driller	4070.00	feet		
Casing Logger	4073.00	feet		
Bit Size	8.750	inches		
Hole Fluid Type	Brine			
Density / Viscosity	1.00 g/c3	---		
PH / Fluid Loss	---	---		
Sample Source	---			
Rm @ Measured Temp	---			
Rmf @ Measured Temp	---			
Rmc @ Measured Temp	---			
Source Rmf / Rmc	Calc	Calc		
Rm @ BHT	---			
Time Since Circulation	24 Hours			
Max Recorded Temp	85.00	deg F		
Equipment / Base	13268	Flora		
Recorded By	Chad Skinner			
Witnessed By	Clay Chauviere			

Last Edited: 01-JUL-2019 18:21

BOREHOLE RECORD

Bit Size inches	Depth From feet	Depth To feet
17.500	121.00	405.00
12.250	405.00	825.00
8.750	825.00	4452.00

CASING RECORD

Type	Size Inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
Tubing	4.500	0.00	4073.00	8.50

REMARKS

Software Version 19.01.8874
Crew: Justin Potts, Sam Oliger

Tool String 1: MCG, MTC, MIE

According to paper survey, hole is 15 degrees deviated.

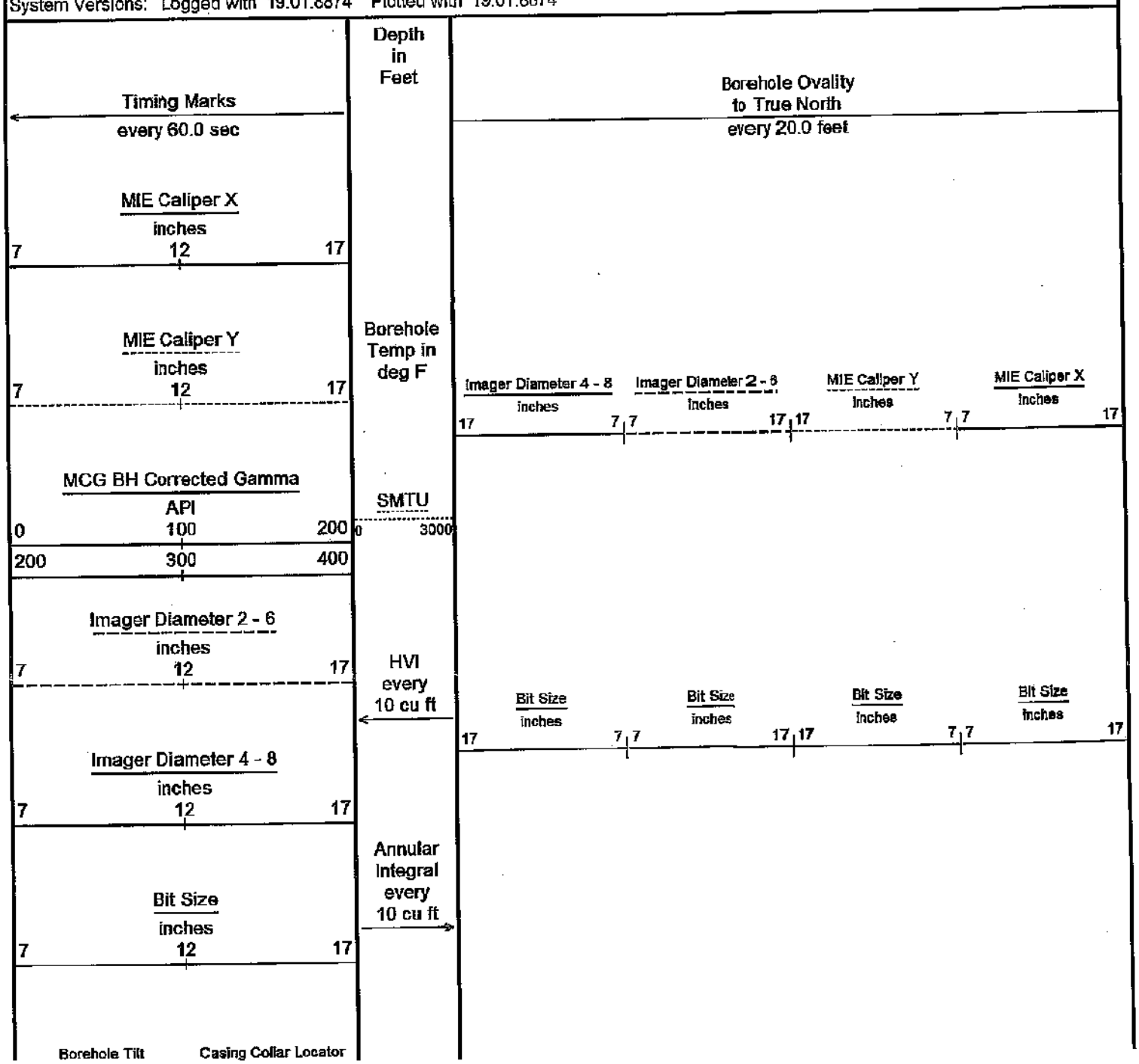
The log was measured from K.B.
Logging speed ran as per client request.

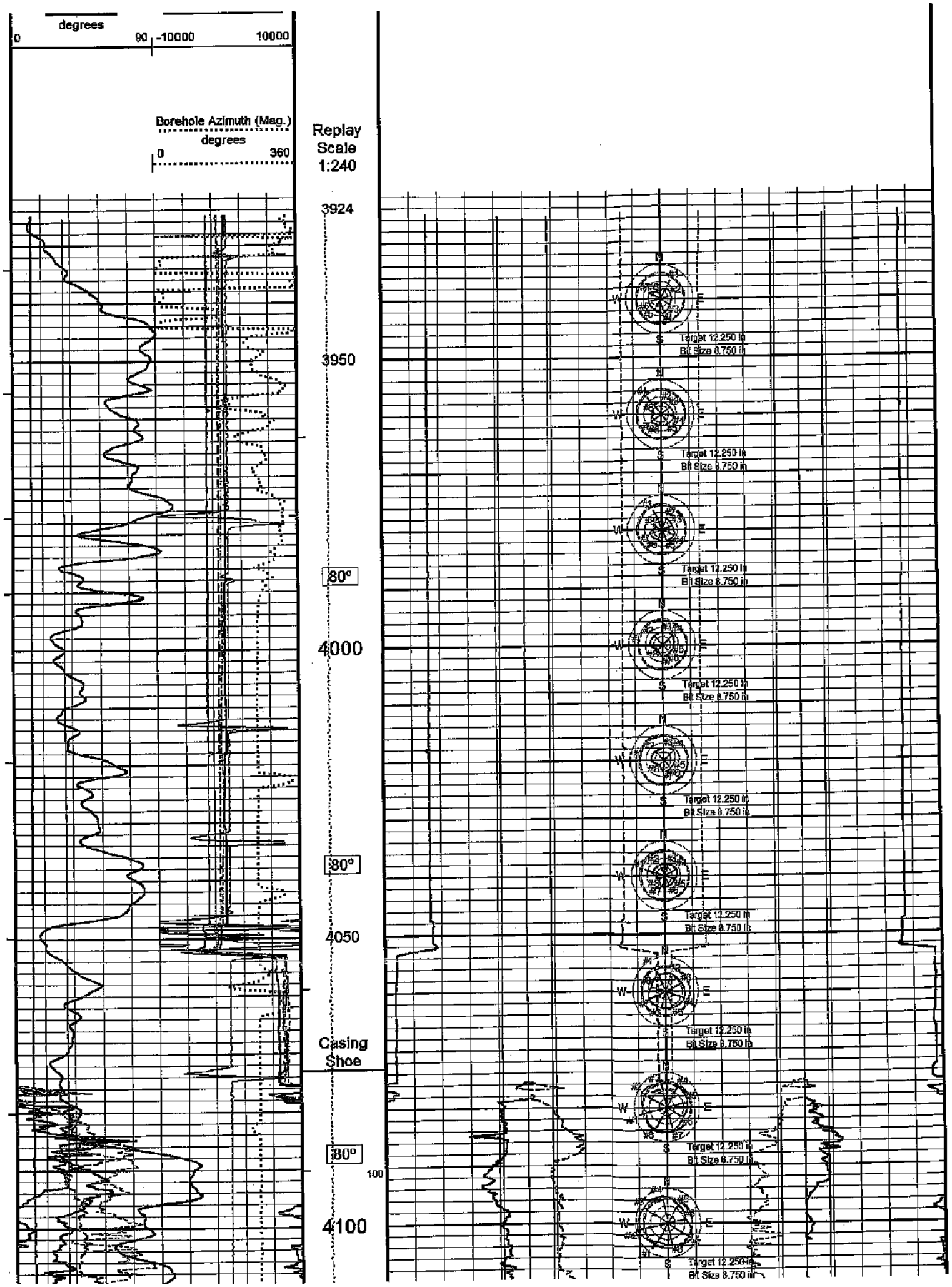
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

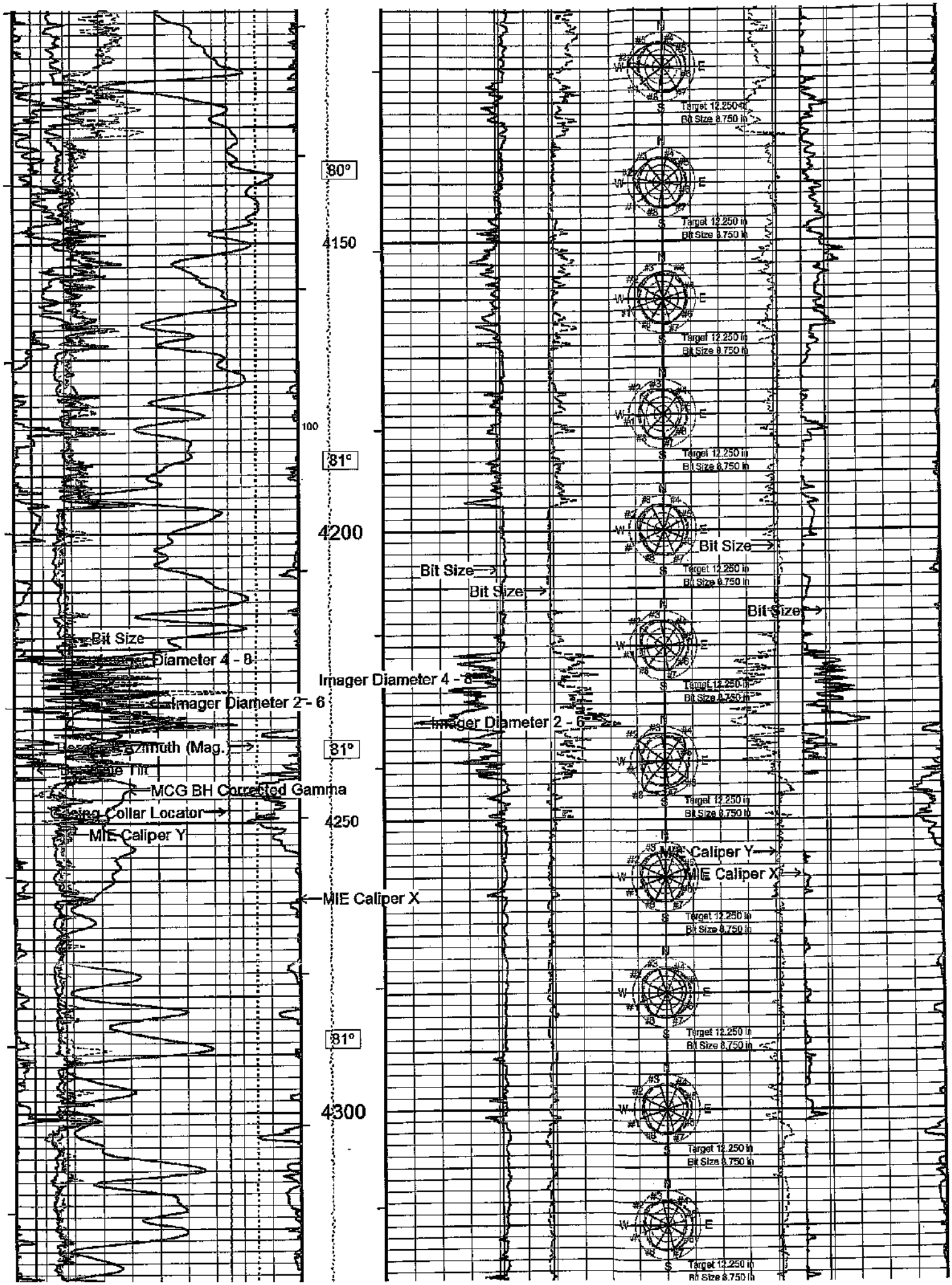
5 Inch Main Pass

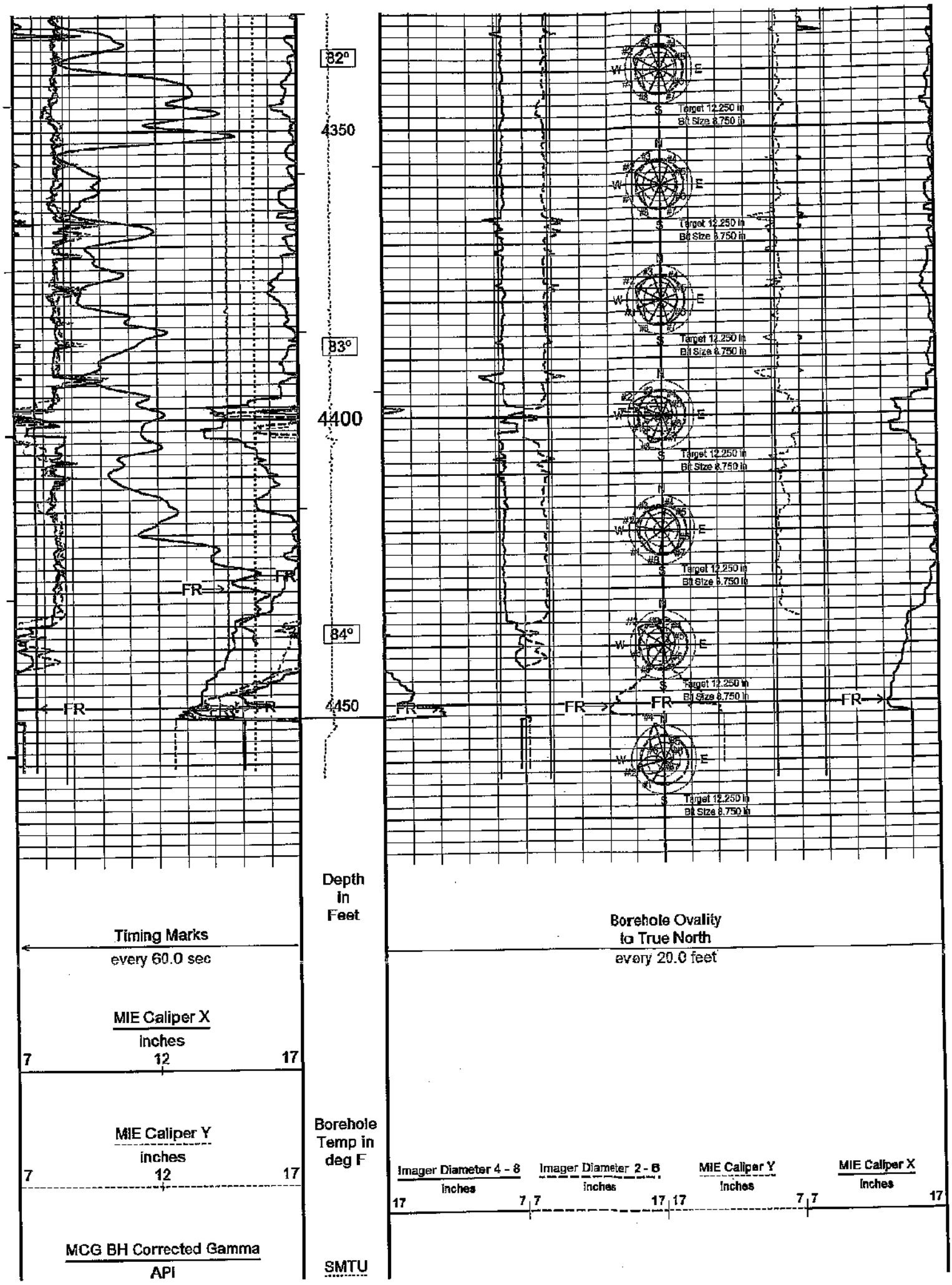
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Logs\WSP USA Inc\EGT Well 1-12\Main.dta
System Versions: Logged with 19.01.8874 Plotted with 19.01.8874

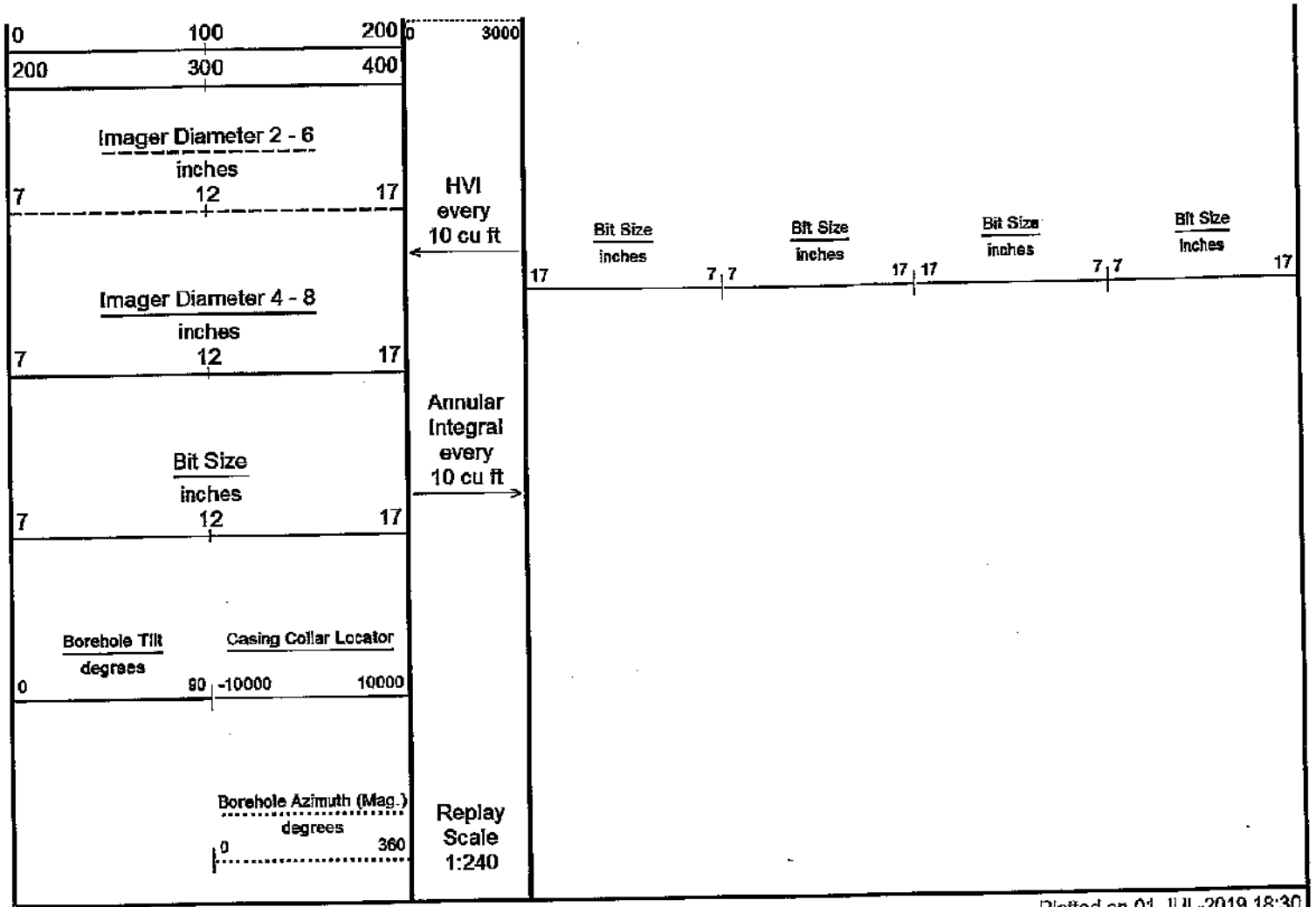
Plotted on 01-JUL-2019 18:30
Recorded on 01-JUL-2019 17:38




degrees
0
90
-10000
10000
Borehole Azimuth (Mag.)
degrees
0
360
Replay
Scale
1:240
3924
3950
80°
4000
80°
4050
Casing
Shoe
80°
100
4100
Target 12.250 in
Bit Size 8.750 in


80°
4150
100
81°
4200
Bit Size
Imager Diameter 4 - 8
Imager Diameter 2 - 6
Azimuth (Mag.)
Tilt
MCG BH Corrected Gamma
Casing Collar Locator
MIE Caliper Y
81°
4250
MIE Caliper X
81°
4300
Target 12.250 in
Bit Size 8.750 in


82°
4350
83°
4400
84°
4450
FR
Depth in Feet
Timing Marks
every 60.0 sec
MIE Caliper X
inches
7
12
17
MIE Caliper Y
inches
7
12
17
Borehole Temp in deg F
MCG BH Corrected Gamma
API
SMTU
Target 12.250 in
Bit Size 8.750 in
Borehole Ovality to True North
every 20.0 feet
Imager Diameter 4 - 8
inches
Imager Diameter 2 - 6
inches
MIE Caliper Y
inches
MIE Caliper X
inches
17
7
7
17
17
7
7
17



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Logs\WSP USA Inc\EGT Well 1-12\Main.dta
System Versions: Logged with 19.01.8874 Plotted with 19.01.8874

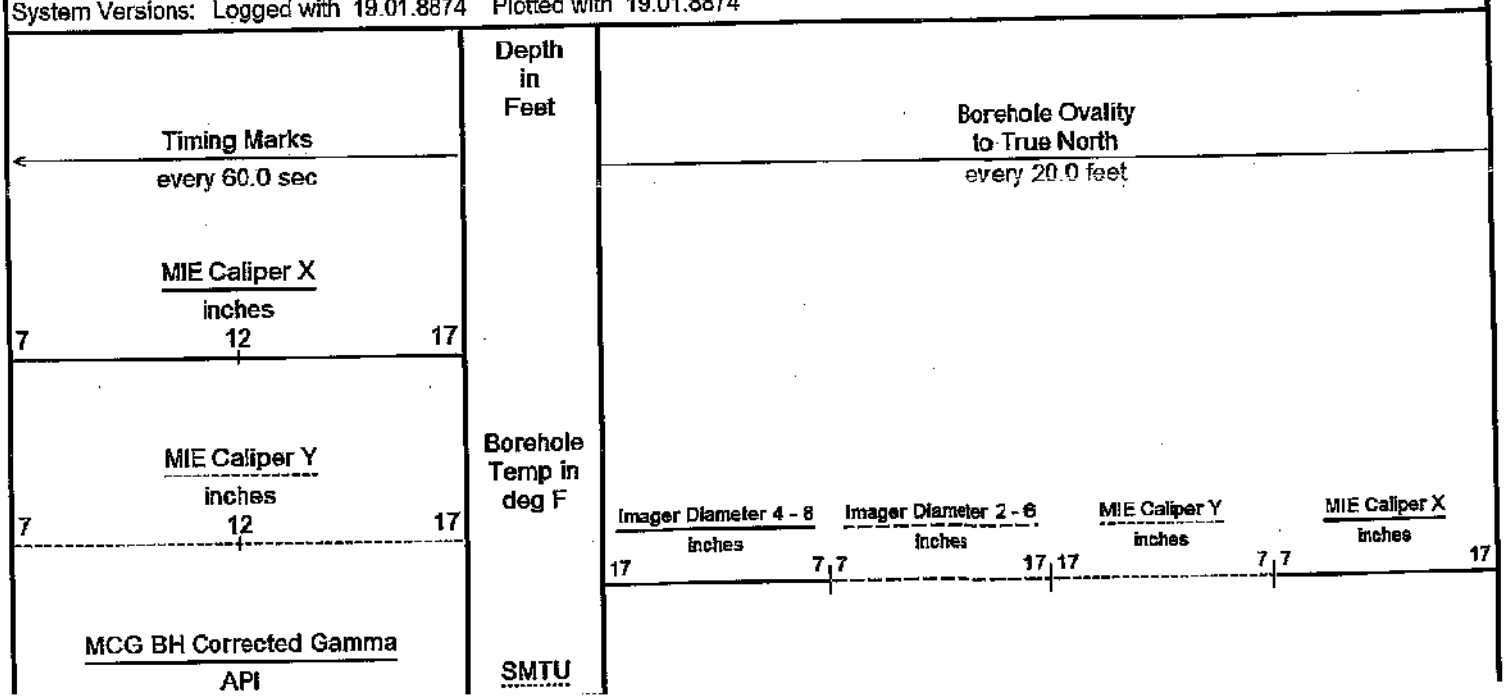
Plotted on 01-JUL-2019 18:30
Recorded on 01-JUL-2019 17:38

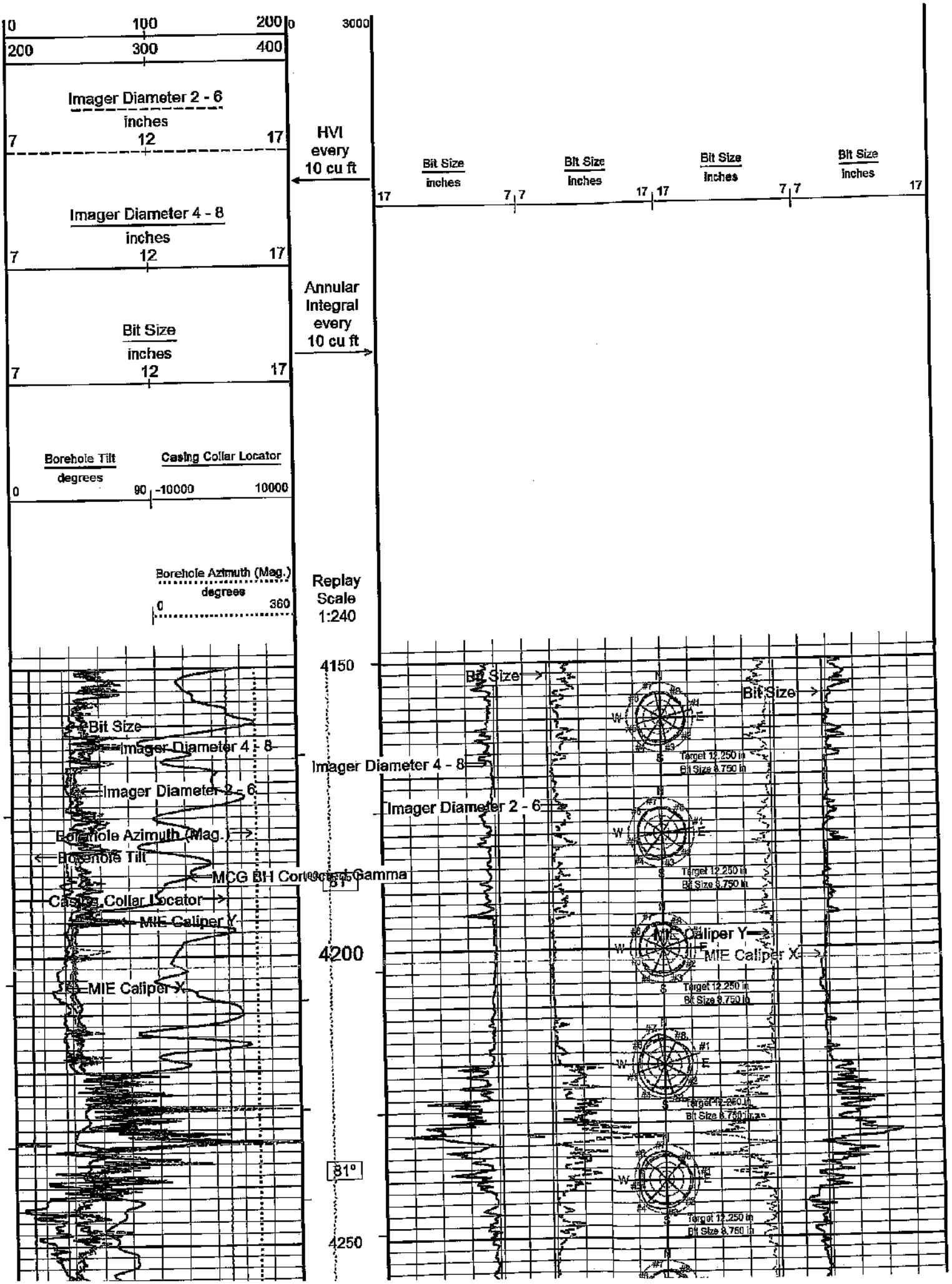
5 Inch Main Pass

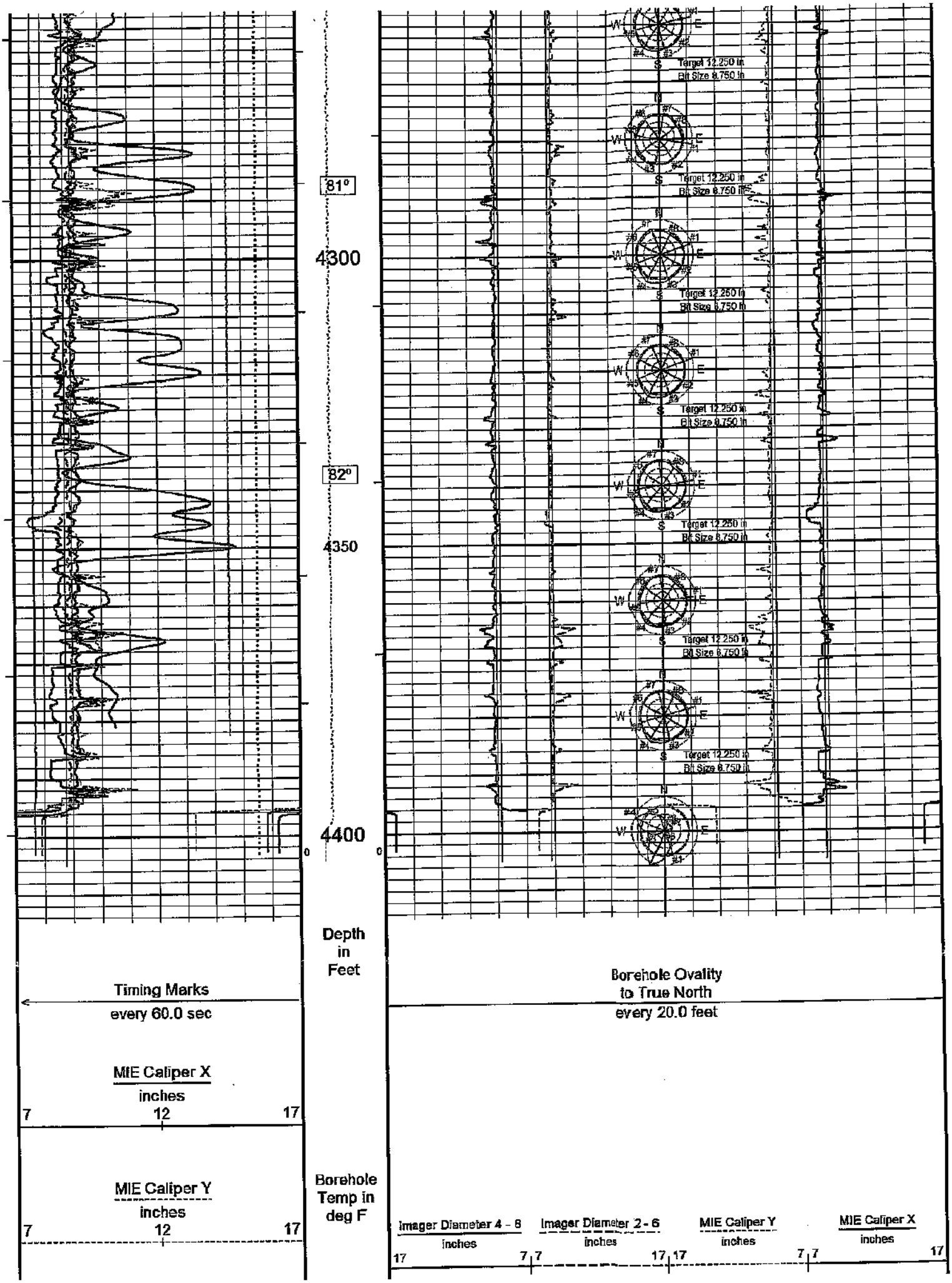
5 Inch Repeat Section

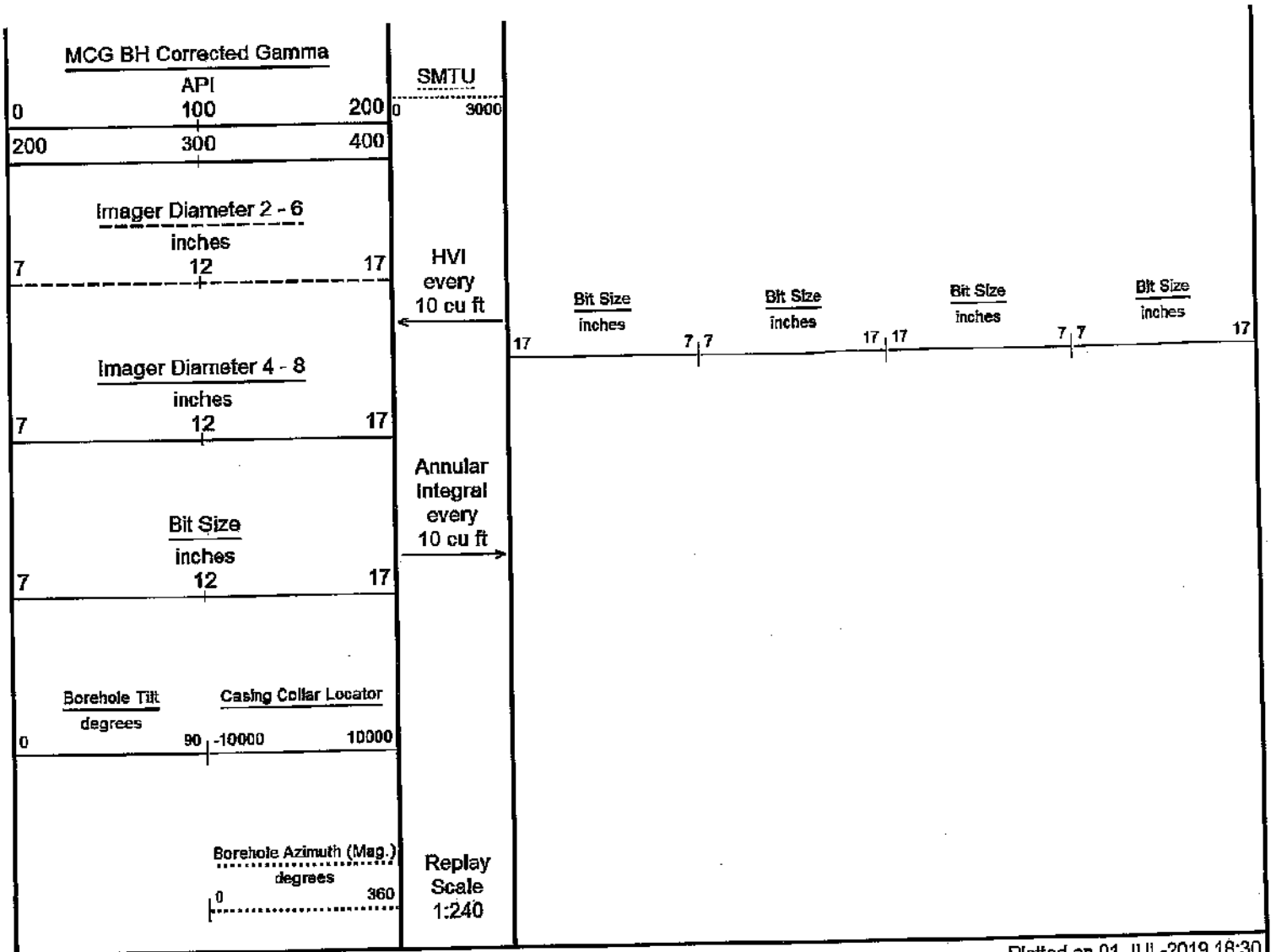
Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Logs\WSP USA Inc\EGT Well 1-12\Caliper Repeat.dta
System Versions: Logged with 19.01.8874 Plotted with 19.01.8874

Plotted on 01-JUL-2019 18:30
Recorded on 01-JUL-2019 17:17




0 100 200
200 300 400
Imager Diameter 2 - 6
inches
7 12 17
Imager Diameter 4 - 8
inches
7 12 17
Bit Size
inches
7 12 17
Borehole Tilt
degrees
0 90
Casing Collar Locator
-10000 10000
Borehole Azimuth (Mag.)
degrees
0 360
HVI
every
10 cu ft
Annular
Integral
every
10 cu ft
Replay
Scale
1:240
0 3000
Bit Size
inches
17 7
Bit Size
inches
7 17
Bit Size
inches
17 7
Bit Size
inches
7 17
4150
4200
4250
Bit Size
Imager Diameter 4 - 8
Imager Diameter 2 - 6
Borehole Azimuth (Mag.)
Borehole Tilt
MCG BH Corrected Gamma
Casing Collar Locator
MIE Caliper Y
MIE Caliper X
81°
Target 12.250 in
Bit Size 8.750 in


81°
4300
82°
4350
4400
Depth in Feet
Timing Marks
every 60.0 sec
MIE Caliper X
inches
7
12
17
MIE Caliper Y
inches
7
12
17
Borehole Temp in deg F
Target 12.250 in
Bit Size 8.750 in
Borehole Ovality to True North
every 20.0 feet
Imager Diameter 4 - 8
inches
17
7
Imager Diameter 2 - 6
inches
7
17
MIE Caliper Y
inches
17
7
MIE Caliper X
inches
7
17



Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Logs\WSP USA Inc\EGT Well 1-12\Caliper Repeat.dta
System Versions: Logged with 19.01.8874 Plotted with 19.01.8874

Plotted on 01-JUL-2019 18:30
Recorded on 01-JUL-2019 17:17

5 Inch Repeat Section

BEFORE SURVEY CALIBRATION

C:\Logs\WSP USA Inc\EGT Well 1-12\Main.dta

Last Edited on 01-JUL-2019,14:37

General Constants All 000

General Parameters		
Mud Resistivity	1.000	ohm-metres
Mud Resistivity Temperature	70.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	8 Arm CMI	
HVOL Caliper 1	N/A	
HVOL Caliper 2	N/A	
Annular Volume Diameter	4.500	inches
Caliper for Differential Caliper	Y Two Arm Caliper	
Rwa Parameters		
Porosity used	N/A	
Resistivity used	N/A	
RWA Constant A	N/A	
RWA Constant M	N/A	
SW/APOR Tool Source		

Down-hole Tension Calibration SMS 0

Field Calibration on 23-MAY-2019 06:41

Reading No	Measured	
1	16998.47	20.00
2	17536.39	380.00

Gamma Calibration MCG-D.K 475

Field Calibration on 26-JUN-2019 15:12

	Measured	Calibrated (API)
Background	37	24
Calibrator (Gross)	709	465
Calibrator (Net)	672	441

Gamma Calibration Tolerances MCG-D.K 475

Ratio 1.524 (1.40 – 1.475 – 1.55) Counts/API

Gamma Constants MCG-D.K 475

Last Edited on 01-JUL-2019,14:37

Gamma Calibrator Number	GRCC149	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.00	gm/cc
Caliper Source for Processing	MIE Diam. Y Armswing	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

SP Calibration MCG-D.K 475

Field Calibration on 26-JUN-2019,15:00

	Measured	Calibrated (mV)
Reference 1	100.0	100.0
Reference 2	-100.0	-100.0

High Resolution Temperature Calibration MCG-D.K 475

Field Calibration on 26-JUN-2019,14:59

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MCG-D.K 475

Last Edited on 09-MAR-2019,20:02

Pre-filter Length 11

Caliper Calibration MTC-A 42

Base Calibration on 05-MAY-2019 15:54
Field Calibration on 05-MAY-2019 15:56

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	15388	8.00
2	16609	9.86
3	17979	11.92
4	19362	13.93
5	20752	15.96
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
11.90	11.92

Caliper Calibration Tolerances MTC-A 42

Long Arm Field Cal. 11.90 (11.52 – 11.92 – 12.32) in

Accelerometer Parameters MIE-A.A 205

Date Of Last Accelerometer Calibration 28-MAR-2017,14:11

	X Accelerometer	Y Accelerometer	Z Accelerometer
Slope	-1.096695	-1.102958	-1.099753
Offset	0.001167	0.003738	-0.006040

Accelerometer Constants MIE-A.A 205

Last Edited on 25-MAY-2017,14:16

Accelerometer Calibrator Number MNKA099

Accelerometer Temperature Characterisation

X Accelerometer

Serial Number	829			
Calibration Date	18-Mar-2009			
	B0	B1	B2	B3
Bias(g)	0.00000e+00	3.85446e-05	-3.97712e-08	1.22710e-10
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+00	2.75555e-04	4.16325e-07	4.80125e-10

Y Accelerometer

Serial Number	890			
Calibration Date	10-Apr-2010			
	B0	B1	B2	B3
Bias(g)	0.00000e+00	9.15265e-06	-6.81619e-09	1.46787e-10
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+00	2.78599e-04	2.72844e-07	9.01795e-10

Z Accelerometer

Serial Number	901			
Calibration Date	12-Apr-2010			
	B0	B1	B2	B3
Bias(g)	0.00000e+00	1.24151e-05	-6.79414e-09	7.96660e-11
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+00	2.38432e-04	6.40058e-07	-1.92725e-10

Imager Pad Check MIE-A.A 205

Pad 1	Pad Not Tested	Pad 5	Pad Not Tested
Pad 2	Pad Not Tested	Pad 6	Pad Not Tested
Pad 3	Pad Not Tested	Pad 7	Pad Not Tested
Pad 4	Pad Not Tested	Pad 8	Pad Not Tested

Compact Micro Imager Constants MIE-A.A 205

Last Edited on 14-AUG-2017,14:44

Sonde Configuration	Caliper Mode	
Arm-Pad Kit	KIA-BA (19 in)	
Arm-Pad Kit Serial Number		
Centre Pad 1 Rotational Offset	0.00	degrees
Image/Borehole Ovality Reference	Azimuth of Pad 1	
Non Active Buttons	N/A	
Search Angle	N/A	degrees
Correlation Interval	N/A	feet
Correlation Step	N/A	feet
Current Offset	N/A	mAmp
Image Processing	Disabled	mAmp

Caliper Calibration MIE-A.A 205

Base Calibration on 06-MAY-2019 18:22
Field Calibration on 06-MAY-2019 18:26

Base Calibration

Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)
1	28110	27338	5.97
2	33846	32780	8.00
3	38794	37811	9.86
4	44241	43359	11.92
5	49715	49116	13.93

Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	24833	25717	27725	26570	5.97
2	29247	31115	32406	30135	8.00
3	33820	33780	36104	36095	9.86
4	37866	40213	42214	39522	11.92
5	44618	43263	45086	46165	13.93

Field Calibration

Measured Pads 1-5 Caliper(in)	Measured Pads 3-7 Caliper(in)	Actual Caliper(in)
7.66	7.76	8.00

Measured Pad 2 Caliper(in)	Measured Pad 4 Caliper(in)	Measured Pad 6 Caliper(in)	Measured Pad 8 Caliper(in)	Actual Caliper(in)
3.79	3.74	3.94	4.07	8.00

Caliper Calibration Tolerances MIE-A.A 205

Upper

Long Arm X Field Cal.	7.66	in	Long Arm Y Field Cal.	7.76	in

Lower

Long Arm X Field Cal.	7.72	in	Long Arm Y Field Cal.	7.80	in

Caliper Constants MIE-A.A 205

Caliper Difference for BRKT 0.120 inches

Magnetometer Parameters MIE-A.A 205

Date Of Last Magnetometer Calibration 19-JUN-2014,09:48

	X Magnetometer	Y Magnetometer	Z Magnetometer
Slope	-1.000000	-1.011337	-0.992546
Offset	-0.000862	-0.024777	0.017179

Magnetometer Constants MIE-A.A 205

Last Edited on 30-APR-2017,13:50

Magnetometer Calibrator Number MNK099

Navigation Constants MIE-A.A 205

Last Edited on 10-DEC-2018,11:35

Magnetic Declination 4.78 degrees West

DOWNHOLE EQUIPMENT

C:\Logs\WSP USA Inc\EGT Well 1-12\Main.dta

Cablehead, 11 pin
CBH-CB 258 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor
SHA-J.A 397 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.K 475 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Two Arm Caliper
MTC-A 42 LG: 7.11 ft WT: 61.7 lb OD: 2.244 in

Compact MMI Electrode Section
MIE-A.A 205 LG: 13.96 ft WT: 99.2 lb OD: 2.402 in

Compact Pressure Bung
HFS 2 LG: 0.13 ft WT: 4.4 lb OD: 2.244 in

Total Length: 34.59 ft Weight: 275.6 lb

22.75 ft	GGCE - MCG BH Corrected Gamma
20.57 ft	CCLG - Casing Collar Locator
19.85 ft	CGXT - MCG External Temperature
14.88 ft	AVOL - Annular Volume
14.88 ft	HVOL - Hole Volume
0.04 ft	IECY - MIE Caliper Y
0.04 ft	IECX - MIE Caliper X
0.00 ft	ITLT - Borehole Tilt
-0.57 ft	DI26 - Imager Diameter 2 - 6
0.00 ft	IAZI - Borehole Azimuth (Mag.)
-0.57 ft	DI48 - Imager Diameter 4 - 8
Tool Zero	(1.99ft from bottom)
-1.99 ft	SMTU - DST Uphole Tension

All measurements relative to tool zero.

COMPANY	Republic Services
WELL	EGT Well #1-12
FIELD	Romulus Storage
PROVINCE/COUNTY	Wayne

COUNTRY/STATE	U.S.A. / Michigan				
Elevation Kelly Bushing	639	feet	First Reading	4452.00	feet
Elevation Drill Floor	638	feet	Depth Driller	4645.00	feet
Elevation Ground Level	626	feet	Depth Logger	4452.00	feet

Weatherford®

Borehole Caliper Log

Gamma Ray