DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 7726 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z Test length: 7.5 Test Section Depth (from Datum): From 63.59 To 71.09

(A) Depth to Water Table From Datum, Ft: 28.75 Test Water Temp: 79 Baro Pressure, psi: 14.47

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 67.34

(C) Distance Water Table to Center of Test Interval Ft. 38.59 Static water pressure at center = (C*62.4/144) + Baro = 31

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.67) [Po = 51] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 17 ; 2/3 Po= 34 ; 1/2 Po= 26 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Sequence No. E Planned Center Pressure: 82

Transducer Readings Before Packers Inflated: Top ~~20.67~~ 18.50 ; Middle ~~44.77~~ 30.40 ; Bottom: ~~48.53~~ 34.25 QA 7-17-13

Transducer Readings After Packers Inflated: Top 19.55 ; Middle 31.72 ; Bottom: 34.11

QA 7-17-13

MP-417Z Z1 SEQUENCE E

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi QA 7-17-13	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
16:54:30	18 444	----	----	---	57.61 54.	13	BEGIN INCREASE FLOW
16:55:00	18444	18 446	2	4	57.78	35	
16:55:30	18446	18 450	4	8	79.07	36	
16:56:00	18450	18 453	3	6	79.87	36	
16:56:30	18453	18 457	4	8	80.08	36	INCREASE FLOW
16:57:00	18457	18 460	3	6	80.52	40	
16:57:30	18460	18 464	4	8	82.84	40	
16:58:00	18464	18 468	4	8	82.93	40	
16:58:30	18468	18 472	4	8	83.12	40	
16:59:00	18472	18 475	3	6	83.45	40	DECREASE FLOW
16 59:30	18475	18 479	4	8	84.93	39	
17:00:00	18479	18 482	3	6	82.35	39	
17:00:30	18482	18 485	3	6	82.29	39	
17:01:00	18485	18 489	4	8	81.98	39	
17:01:30	18489	18 493	4	8	82.03	39	
17:02:00	18493	18 498	5	10	82.24	39	
17:02:30	18498	18501	3	6	81.98	39	
17:03:00	18501	18504	3	6	81.95	39	END (HG)

*From Preliminary Boring Layout Survey

17:03:30 Bottom TRANS = 41.35

17:04:13 Top TRANS = 30.82

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SR 12/17/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET

This Sheet applies to all Zone 1 Tests SJC 12/13/13

BORING: MP-417

DATE: 7-17-13

DATA COLLECTED BY: Tom McGill / Jim Goddard

SHUT-IN TEST PRESSURE: N/A SJC 12/13/13 psi

TIME, minute	SURFACE GAGE PRESSURE, psi	CENTER TRANSDUCER PRESSURE, psi

Not Used

QC. 7-9-13

142142 QC 7-20-13

EQUIPMENT USED

Transducers: Level Troll 700 Serial Numbers: 335896/R24844 (shallow) *6/12/13*; 315381/R24039 (intermediate) *6/20/13*; ~~141142~~/R20367 (deep) *6/20/13*; 315380/R24038 (spare) *6/20/13*

Surface Pressure Gage: (Both Wika 213.53) - MW-3 (at pump); MW-4 (at totalizer) *6/11/13*

Barometric Probe: (Baro Troll) 121315/R22669 *6/12/13*

Flow Meter: (Master Meter 1344) – 8824788 field checked *6/25/13*

Stop Watch: (Sportline 220) – L286/2786 *6/10/13*

Thermometer LTZ8 (5-1-13)

Date of Calibration: Dates in italics after equipment serial number

Calibration due: Post Testing

FILES INCLUDE ALL SEQUENCES:

MP-417 Z1	(B)	2013-07-17	17,06,45	WSL
MP-417 Z1	(B)	2013-07-17	17,06,45	EXCEL
MP-417 Z1	(T)	2013-07-17	17,05,22	WSL
MP-417 Z1	(T)	2013-07-17	17,05,22	EXCEL
MP-417 Z1	(M)	2013-07-17	17,08,05	WSL
MP-417 Z1	(M)	2013-07-17	17,08,05	EXCEL
MP-417 Z1	(L)	2013-07-17	17,09,23	WSL
MP-417 Z1	(L)	2013-07-17	17,09,23	EXCEL

Form Approved for Use on Clinch River SMR Project – J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJC 12/13/13

Packer Test Worksheet

Clinch River SMR Project
AMEC Project No. 6468 13 1072

Test Date	7/17/2013
Prepared By	J. Goddard
Checked By	

Boring Number	MP 417
Zone No.	2
Assigned Interval Top (ft-bgs)	84.00
Assigned Interval Bottom (ft-bgs)	91.50
Center of test interval (ft-bgs)	87.75
Height of Casing (ft ags)	2.09
Depth to water (ft below TOC)	17.56
Depth to Water (Ft- bgs)	15.47
Baro Pressure (psi)	14.50
A= Depth to Water Table (ft)	17.56
B=Surface Gage Height (ft)	0.50
C= Height of water above center of test interval (ft)	72.28
Static Water Pressure @ center of Interval (psi)	46
Max Test Pressure (Po) (psi)	59
1/3 Po (psi)	20
2/3 Po (psi)	39
1/2 Po (psi)	30

	Center Test Pressures (psi)	Inflation Pressure (psi)
Sequence A 1/3	66	116
Sequence B 2/3	85	135
Sequence C 1.0	105	155
Sequence D 1/2	76	126
Sequence E 1.0	105	155

Pipe Check (Estimate Only for Field Guidance))

Length of Packer Assembly	13.29
Average Length of Pipe Section	21.12
Length of pipe to TOC	80.30
Number of Pipe Sections	3.80
length of stickup above TOC (ft)	4.18

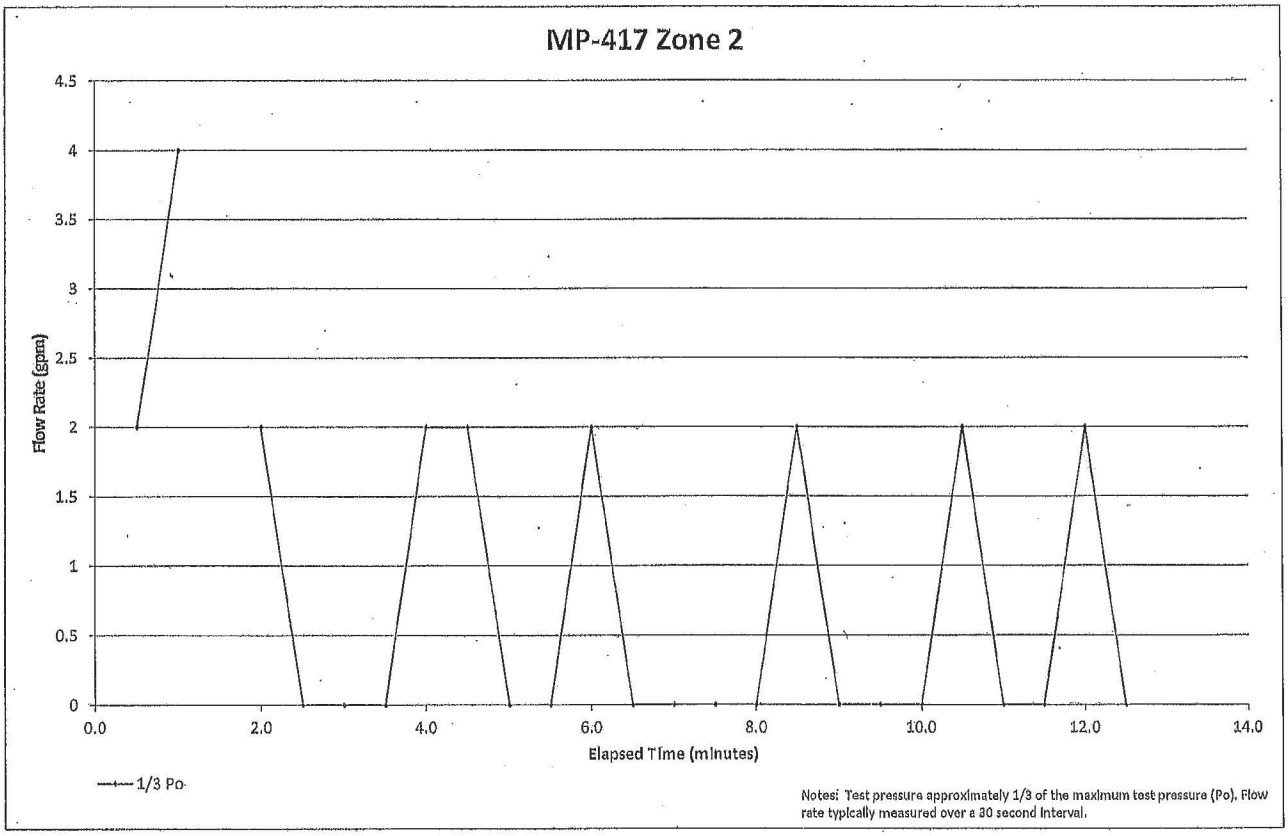
Clinch River SMR Project
Double Packer Borehole Permeability Test Data Sheet
AMEC Environment & Infrastructure, Inc.
AMEC Project # 6468-13-1072

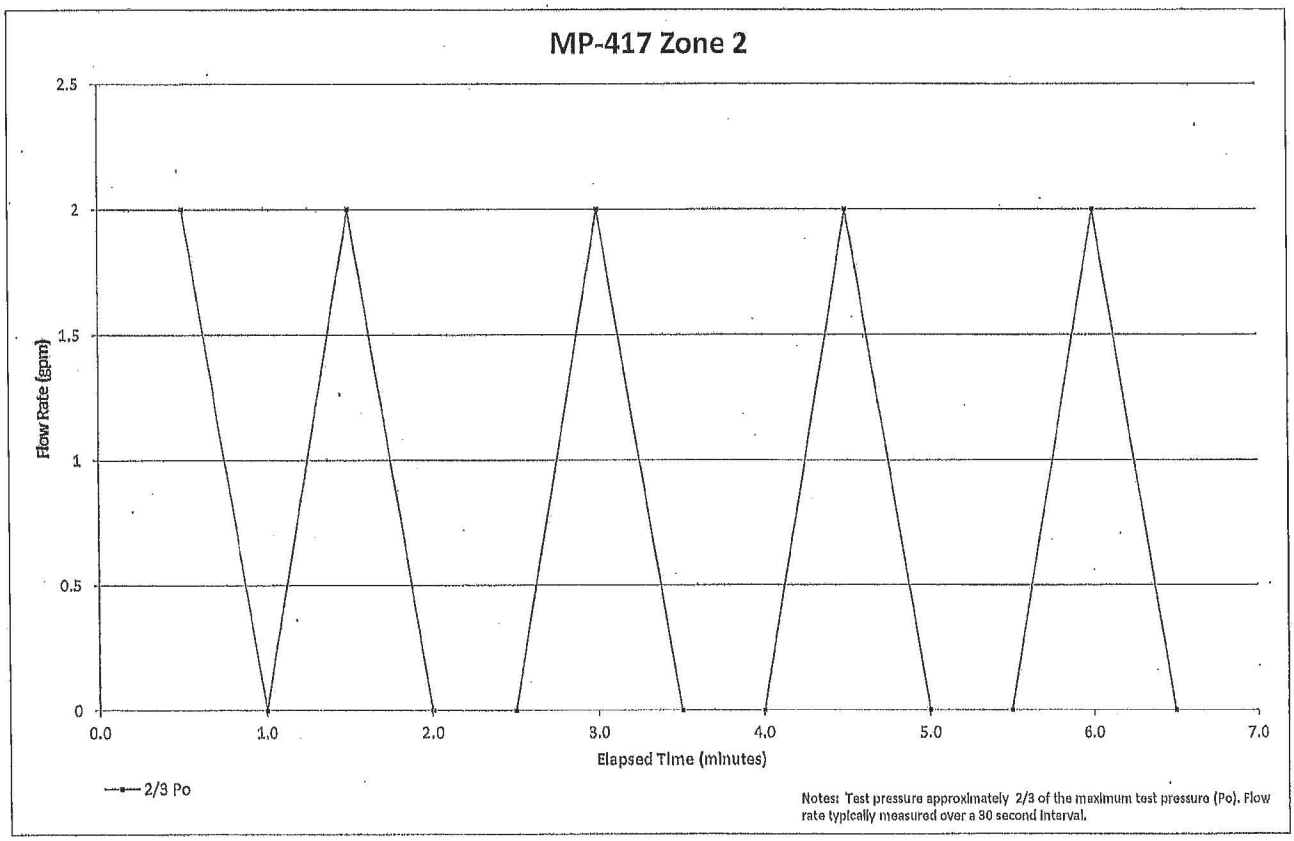
Prepared by: ADT Date: 4-8-14
Checked by: JAA Date: 4-8-14

Boring: MP-417
Zone: 2 ***84.0 feet to 91.5 feet below ground surface***
Transducer Location: Middle

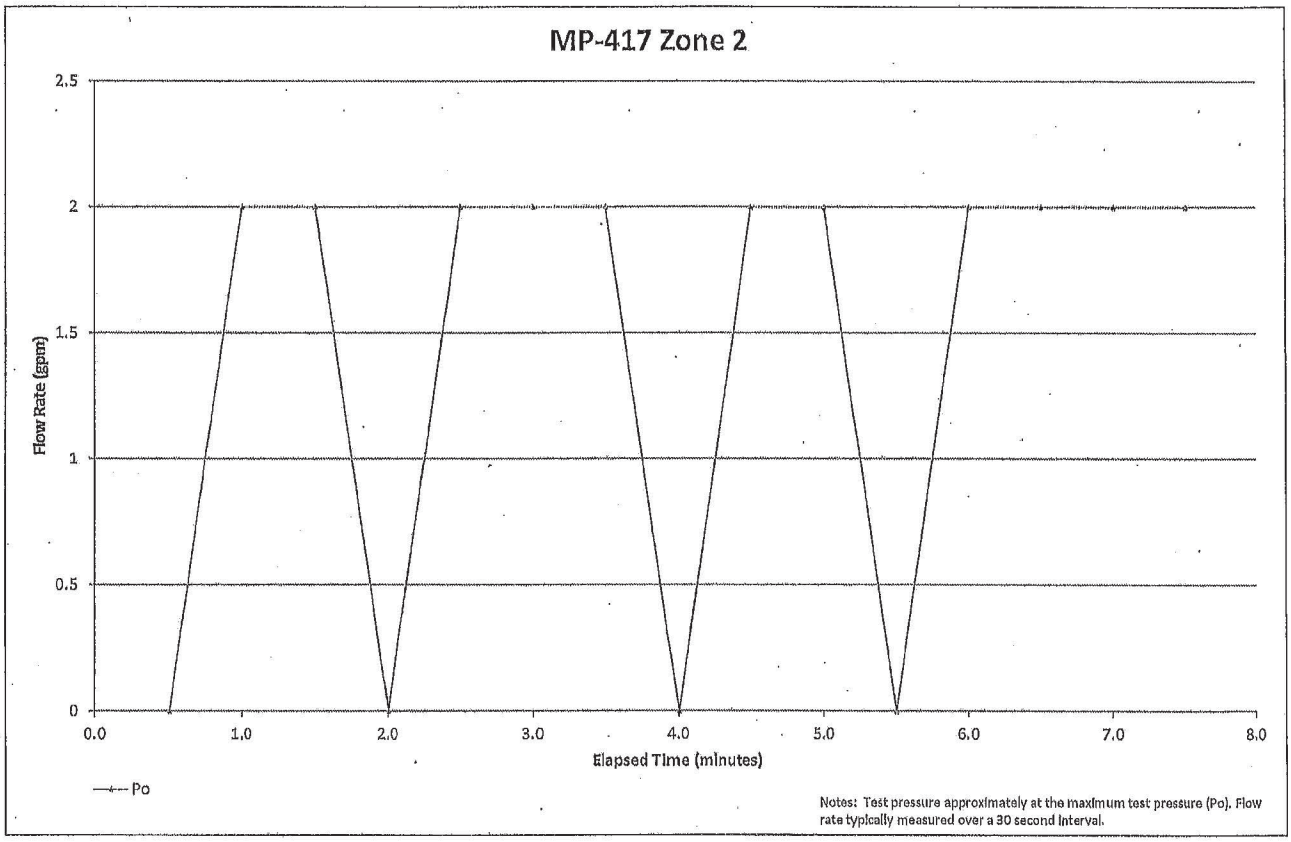
Sequence A (1/3 Po)				Sequence B (2/3 Po)				Sequence C (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
13:56:00	0.0	43.30		14:12:30	0.0	67.88		14:22:30	0.0	84.35	
13:56:30	0.5	43.27	2	14:13:00	0.5	67.46	2	14:23:00	0.5	100.22	0
13:57:00	1.0	57.07	4	14:13:30	1.0	85.77	0	14:23:30	1.0	102.69	2
13:57:30	1.5	no reading		14:14:00	1.5	86.35	2	14:24:00	1.5	102.76	2
13:58:00	2.0	65.11	2	14:14:30	2.0	86.53	0	14:24:30	2.0	104.88	0
13:58:30	2.5	65.02	0	14:15:00	2.5	84.49	0	14:25:00	2.5	105.34	2
13:59:00	3.0	65.45	0	14:15:30	3.0	85.02	2	14:25:30	3.0	105.16	2
13:59:30	3.5	65.33	0	14:16:00	3.5	84.58	0	14:26:00	3.5	105.00	2
14:00:00	4.0	65.18	2	14:16:30	4.0	84.47	0	14:26:30	4.0	105.19	0
14:00:30	4.5	68.68	2	14:17:00	4.5	84.83	2	14:27:00	4.5	105.08	2
14:01:00	5.0	68.88	0	14:17:30	5.0	84.49	0	14:27:30	5.0	105.05	2
14:01:30	5.5	68.73	0	14:18:00	5.5	84.75	0	14:28:00	5.5	103.85	0
14:02:00	6.0	69.02	2	14:18:30	6.0	84.30	2	14:28:30	6.0	104.23	2
14:02:30	6.5	68.04	0	14:19:00	6.5	84.48	0	14:29:00	6.5	103.89	2
14:03:00	7.0	67.28	0					14:29:30	7.0	103.91	2
14:03:30	7.5	67.17	0					14:30:00	7.5	104.08	2
14:04:00	8.0	67.07	0								
14:04:30	8.5	67.00	2								
14:05:00	9.0	67.13	0								
14:05:30	9.5	66.80	0								
14:06:00	10.0	66.80	0								
14:06:30	10.5	67.45	2								
14:07:00	11.0	67.27	0								
14:07:30	11.5	67.20	0								
14:08:00	12.0	67.58	2								
14:08:30	12.5	67.48	0								

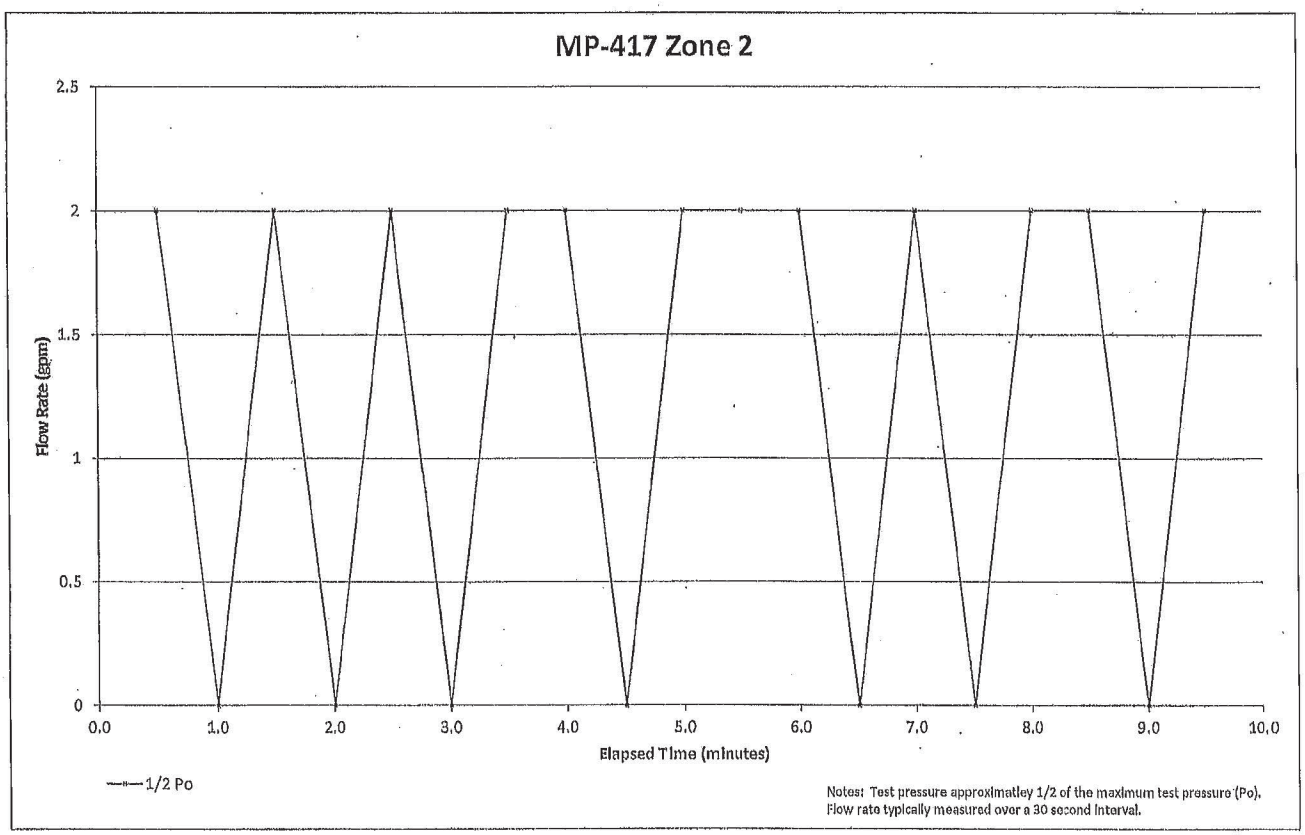
Sequence D (1/2 Po)				Sequence E (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
14:33:30	0.0	104.30		14:47:00	0.0	75.55	
14:34:00	0.5	92.60	2	14:47:30	0.5	92.66	4
14:34:30	1.0	85.78	0	14:48:00	1.0	105.17	2
14:35:00	1.5	85.11	2	14:48:30	1.5	105.32	2
14:35:30	2.0	83.65	0	14:49:00	2.0	105.38	2
14:36:00	2.5	83.56	2	14:49:30	2.5	105.43	2
14:36:30	3.0	81.47	0	14:50:00	3.0	105.56	0
14:37:00	3.5	81.36	2	14:50:30	3.5	105.44	2
14:37:30	4.0	78.89	2	14:51:00	4.0	105.83	2
14:38:00	4.5	78.61	0	14:51:30	4.5	105.36	2
14:38:30	5.0	78.45	2	14:52:00	5.0	105.50	2
14:39:00	5.5	78.62	2	14:52:30	5.5	no additional readings	
14:39:30	6.0	78.69	2				
14:40:00	6.5	78.50	0				
14:40:30	7.0	75.68	2				
14:41:00	7.5	75.86	0				
14:41:30	8.0	75.70	2				
14:42:00	8.5	75.36	2				
14:42:30	9.0	75.61	0				
14:43:00	9.5	75.62	2				



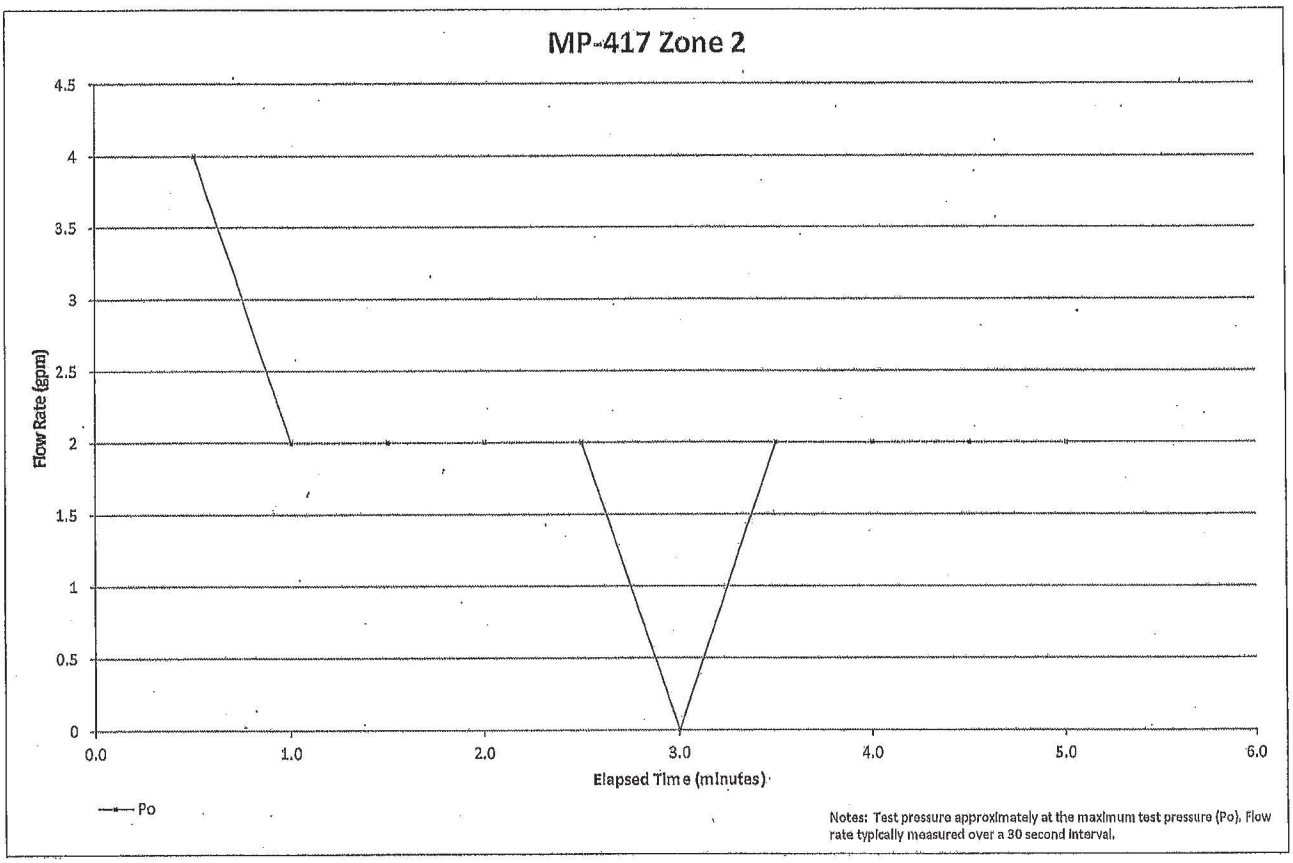


Prepared by/Date: KHL 1/4/14
Checked by/Date: JBS 1/12/14





Prepared by/Date: KAL 1/4/14
Checked by/Date: JDJ 1/22/14



Prepared by/Date: CAL 1/4/14
Checked by/Date: [signature] 1/21/14

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z2 Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.50

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z2 Sequence No. A Planned Center Pressure: 20.66 QA. 7-17-13

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.94

QA. 7-17-13

MP-417 Z2 SEQUENCE A

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
13:56:00	18197	----	----	----	43.30	0	BEGIN INCREASE FLOW
13:56:30	18197	18198	1	2	43.27	0	
13:57:00	18198	18200	2	4	57.07	15	
13:57:30	No Read						
13:58:00	18200	18201	1	2	65.11	15	
13:58:30	18201	18201	0	0	65.02	15	
13:59:00	18201	18201	0	0	65.45	15	
13:59:30	18201	18201	0	0	65.33	15	INCREASE FLOW
14:00:00	18201	18202	1	2	65.18	19	
14:00:30	18202	18203	1	2	68.68	19	
14:01:00	18203	18203	0	0	68.88	20	
14:01:30	18203	18203	0	0	68.73	20	
14:02:00	18203	18204	1	2	69.02	20	DECREASE FLOW
14:02:30	18204	18204	0	0	68.04	17	
14:03:00	18204	18204	0	0	67.28	17	QA. 7-17-13
14:03:30	18204	18204	0	0	67.17	17	
14:04:00	18204	18204	0	0	67.07	17	
14:04:30	18204	18205	1	2	67.00	17	

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SR 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z2 Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.54

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.67) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z Sequence No. A Planned Center Pressure: 66

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.94

QA 7-17-13

MP-417 Z2 SEQUENCE A (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
14:05:00	182405	182405	0	0	67.13	17	
05:30	182405	182405	0	0	66.80	17	
06:00	182405	182405	0	0	66.80	17	
06:30	182405	182406	1	2	67.45	17	
07:00	182406	182406	0	0	67.27	18	
07:30	182406	182406	0	0	67.20	18	
08:00	182406	182407	1	2	67.58	18	
08:30	182407	182407	0	0	67.48	18	END (HG)
				14:09:10	BOTTOM	TRANS #	43.26
				14:09:40	TOP	TRANS #	19.89

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SDR 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z Z Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.50

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Sequence No. B Planned Center Pressure: 85

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.94

QA 7-17-13

MP-417 ZZ SEQUENCE B

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
14:12:30	18209	----	----	----	67.88	18	BEGIN INCREASE FLOW
14:13:00	18209	18 210	1	2	67.46	35	
14:13:30	18210	18 210	0	0	85.77	35	
14:14:00	18210	18 211	1	2	86.35	35	DECREASE FLOW
14:14:30	18211	18 211	0	0	86.53	34	
14:15:00	18211	18 211	0	0	84.49	34	
14:15:30	18211	18 212	1	2	85.06	34	
14:16:00	18212	18 212	0	0	84.58	34	
14:16:30	18212	18 212	0	0	84.47	35	
14:17:00	18212	18 213	1	2	84.83	35	
14:17:30	18213	18 213	0	0	84.49	35	
14:18:00	18213	18 213	0	0	84.75	35	
14:18:30	18213	18 214	1	2	84.30	35	
14:19:00	18214	18 214	0	0	84.48	35	END (HG)
				14:20:00	BOTTOM	TRANS =	42.95
				14:20:30	TOP	TRANS =	19.82

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SR 12/13/17

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z2 Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.50

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z2 Sequence No. C Planned Center Pressure: 105

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.94

QA 7-17-13

MP-417 Z2 SEQUENCE C

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
14:22:30	18217	----	----	----	84.35	35	BEGIN INCREASE FLOW
14:23:00	18217	18 217	0	0	100.22	52	
23:30	18217	18 218	1	2	102.69	52	INCREASE FLOW
14:24:00	18 218	18 219	1	2	102.76	52	
14 24:30	18 219	18 219	0	0	104.88	54	
14:25:00	18219	18 220	1	2	105.34	54	
14 25:30	18220	18 221	1	2	105.16	54	
14:26:00	18221	18 222	1	2	105.00	54	
14:26:30	18222	18 222	0	0	105.19	54	
14:27:00	18222	18 223	1	2	105.08	54	
14:27:30	18223	18 224	1	2	105.05	54	
14:28:00	18224	18 224	0	0	103.85	54	
14:28:30	18228	18 225	1	2	104.23	54	
14:29:00	18226	18 226	1	2	103.89	54	
14:29:30	18226	18 227	1	2	103.91	54	
14:30:00	18 227	18228	1	2	104.08	54	END (HG)
				14:30:45	BOTTOM	TRANS =	42.69
				14:31:15	TOP	TRANS =	19.78

QA 7-17-13

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJC 12/13/17

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z2 Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.54

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z2 Sequence No. D Planned Center Pressure: 76

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.94

QA 7-17-13

MP-417 Z2 SEQUENCE D

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
14:33:30	18233	----	----	----	104.30	54	BEGIN DECREASE FLOW
14:34:00	18233	18 234	1	2	92.60	35	
14:34:30	18234	18 234	0	0	85.78	35	DECREASE FLOW
14:35:00	18234	18 235	1	2	85.11	32	
14:35:30	18235	18 235	0	0	83.65	32	DECREASE FLOW
14:36:00	18235	18 236	1	2	83.56	32	
14:36:30	18236	18 236	0	0	81.47	30	DECREASE
14:37:00	18236	18 237	1	2	81.36	30	
14:37:30	18237	18 238	1	2	78.89	28	
14:38:00	18238	18 238	0	0	78.61	28	
14:38:30	18238	18 239	1	2	78.45	28	
14:39:00	18239	18 240	1	2	78.62	28	
14:39:30	18240	18 241	1	2	78.69	28	DECREASE FLOW
14:40:00	18241	18 241	0	0	78.54	28	
14:40:30	18241	18 242	1	2	75.68	25	
14:41:00	18242	18 242	0	0	75.86	25	
14:41:30	18242	18 243	1	2	75.70	25	
14:42:00	18243	18 244	1	2	75.36	25	

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJR 12/12/17

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z2 Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.50

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po; 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z2 Sequence No. D Planned Center Pressure: 76

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.94

QA 7-17-13

MP-417 Z2 SEQUENCE D (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
14:42:30	18244	18244	0	0	75.61	25	
14:43:00	18244	18245	1	2	75.62	25	END (HG)
				14:43:40	BOTTOM	TRANS =	42.50
				14:44:15	TOP	TRANS =	19.72

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJR 12/13/17

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 7726 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z2 Test length: 7.5 Test Section Depth (from Datum): From 86.09 To 93.59

(A) Depth to Water Table From Datum, Ft: 17.56 Test Water Temp: 79 Baro Pressure, psi: 14.54

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 89.84

(C) Distance Water Table to Center of Test Interval Ft. 72.28 Static water pressure at center = (C*62.4/144) + Baro = 46

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.67) [Po = 59] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 20 ; 2/3 Po= 39 ; 1/2 Po= 30 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z2 Sequence No. E Planned Center Pressure: 105

Transducer Readings Before Packers Inflated: Top 20.67 ; Middle 44.77 ; Bottom: 48.53

Transducer Readings After Packers Inflated: Top 19.99 ; Middle 43.41 ; Bottom: 43.91

7-17-13
MP-417 Z2 SEQUENCE E

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
14:47:00	18250	----	----	----	75.55	25	BEGIN INCREASE FLOW
14:47:30	18250	18252	2	4	92.66	54	
14:48:00	18252	18253	1	2	105.17	54	
14:48:30	18253	18254	1	2	105.32	54	
14:49:00	18254	18255	1	2	105.38	54	
14:49:30	18255	18256	1	2	105.43	54	
14:50:00	18256	18256	0	0	105.56	54	
14:50:30	18256	18257	1	2	105.44	54	
14:51:00	18257	18258	1	2	105.83	54	
14:51:30	18258	18259	1	2	105.36	54	
14:52:00	18259	18260	1	2	105.50	54	END (HG)
14:52:30	No Additional Readings						
53:00				14:52:40	Bottom	Trans =	42.40
				14:53:10	Top	Trans =	19.69

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SSL 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET

This Sheet Applies to all Zone 2 Tests SJC 12/13/13

BORING: MP-417

DATE: 7-17-13

DATA COLLECTED BY: Tom McGill / Jim Goddard

SHUT-IN TEST PRESSURE: N/A SJC 12/13/13 psi

TIME, minute	SURFACE GAGE PRESSURE, psi	CENTER TRANSDUCER PRESSURE, psi

Not Used

QA. 7-9-13

142142 QA 7-20-13

EQUIPMENT USED

Transducers: Level Troll 700 Serial Numbers: 335896/R24844 (shallow) *6/12/13*; 315381/R24039 (intermediate) *6/20/13*; ~~141142~~/R20367 (deep) *6/20/13*; 315380/R24038 (spare) *6/20/13*

Surface Pressure Gage: (Both Wika 213.53) - MW-3 (at pump); MW-4 (at totalizer) *6/11/13*

Barometric Probe: (Baro Troll) 121315/R22669 *6/12/13*

Flow Meter: (Master Meter 1344) – 8824788 field checked *6/25/13*

Stop Watch: (Sportline 220) – L286/2786 *6/10/13*

Thermometer LT28 (5-1-13)

Date of Calibration: Dates in italics after equipment serial number

Calibration due: Post Testing

FILES INCLUDE ALL SEQUENCES:

MP-417 Z2	(B)	2013-07-17	14,55,08	WSL
MP-417 Z2	(B)	2013-07-17	14,55,08	EXCEL
MP-417 Z2	(T)	2013-07-17	14,54,06	WSL
MP-417 Z2	(T)	2013-07-17	14,54,06	EXCEL
MP-417 Z2	(M)	2013-07-17	14,56,50	WSL
MP-417 Z2	(M)	2013-07-17	14,56,50	EXCEL
MP-417 Z2	(L)	2013-07-17	14,58,41	WSL
MP-417 Z2	(L)	2013-07-17	14,58,41	EXCEL

Form Approved for Use on Clinch River SMR Project – J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJC 12/13/13

Packer Test Worksheet

Clinch River SMR Project
AMEC Project No. 6468 13 1072

Test Date	7/17/2013
Prepared By	J. Goddard
Checked By	

Boring Number	MP 417
Zone No.	3
Assigned Interval Top (ft-bgs)	210.50
Assigned Interval Bottom (ft-bgs)	218.00
Center of test interval (ft-bgs)	214.25
Height of Casing (ft ags)	2.09
Depth to water (ft below TOC)	19.15
Depth to Water (Ft- bgs)	17.06
Baro Pressure (psi)	14.52
A= Depth to Water Table (ft)	19.15
B=Surface Gage Height (ft)	0.50
C= Height of water above center of test interval (ft)	197.19
Static Water Pressure @ center of Interval (psi)	100
Max Test Pressure (Po) (psi)	132
1/3 Po (psi)	44
2/3 Po (psi)	88
1/2 Po (psi)	66

	Center Test Pressures (psi)	Inflation Pressure (psi)
Sequence A 1/3	144	194
Sequence B 2/3	188	238
Sequence C 1.0	232	282
Sequence D 1/2	166	216
Sequence E 1.0	232	282

Pipe Check (Estimate Only for Field Guidance))

Length of Packer Assembly	13.29
Average Length of Pipe Section	21.12
Length of pipe to TOC	206.80
Number of Pipe Sections	9.79
length of stickup above TOC (ft)	4.40

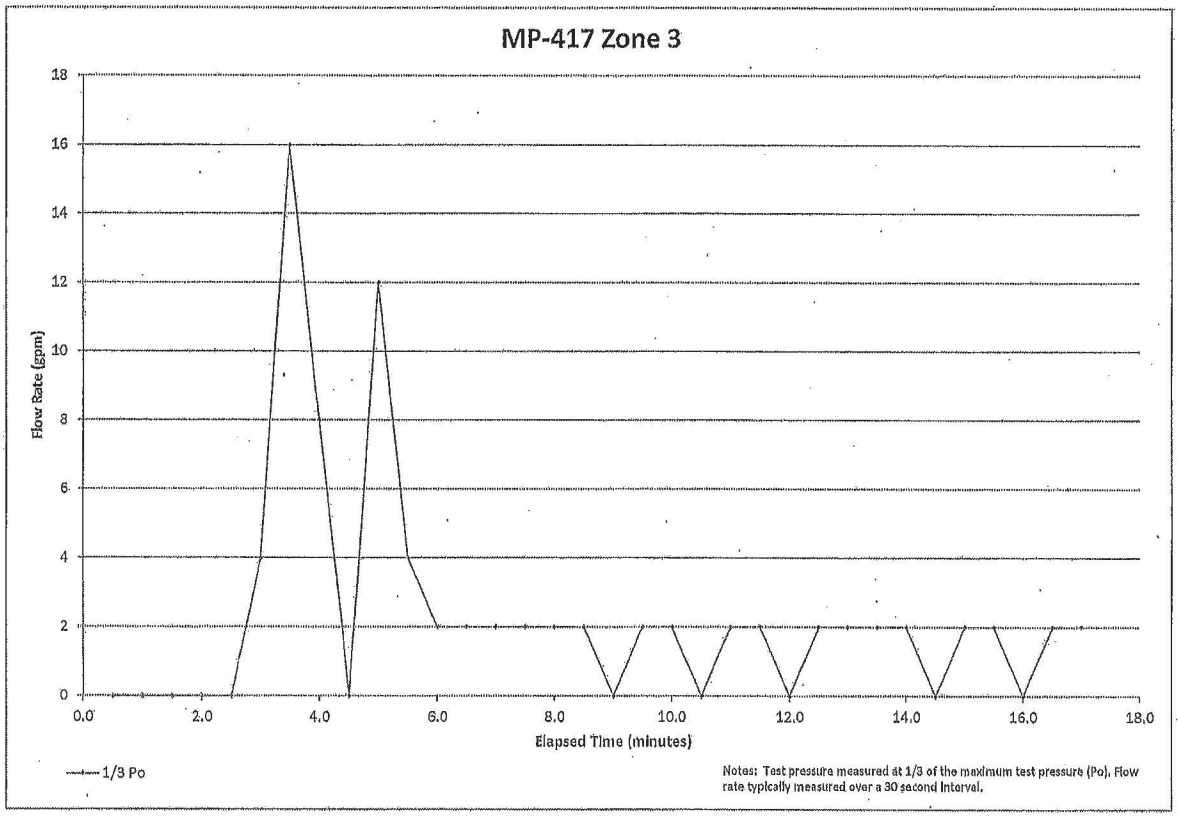
Clinch River SMR Project
Double Packer Borehole Permeability Test Data Sheet
AMEC Environment & Infrastructure, Inc.
AMEC Project # 6468-13-1072

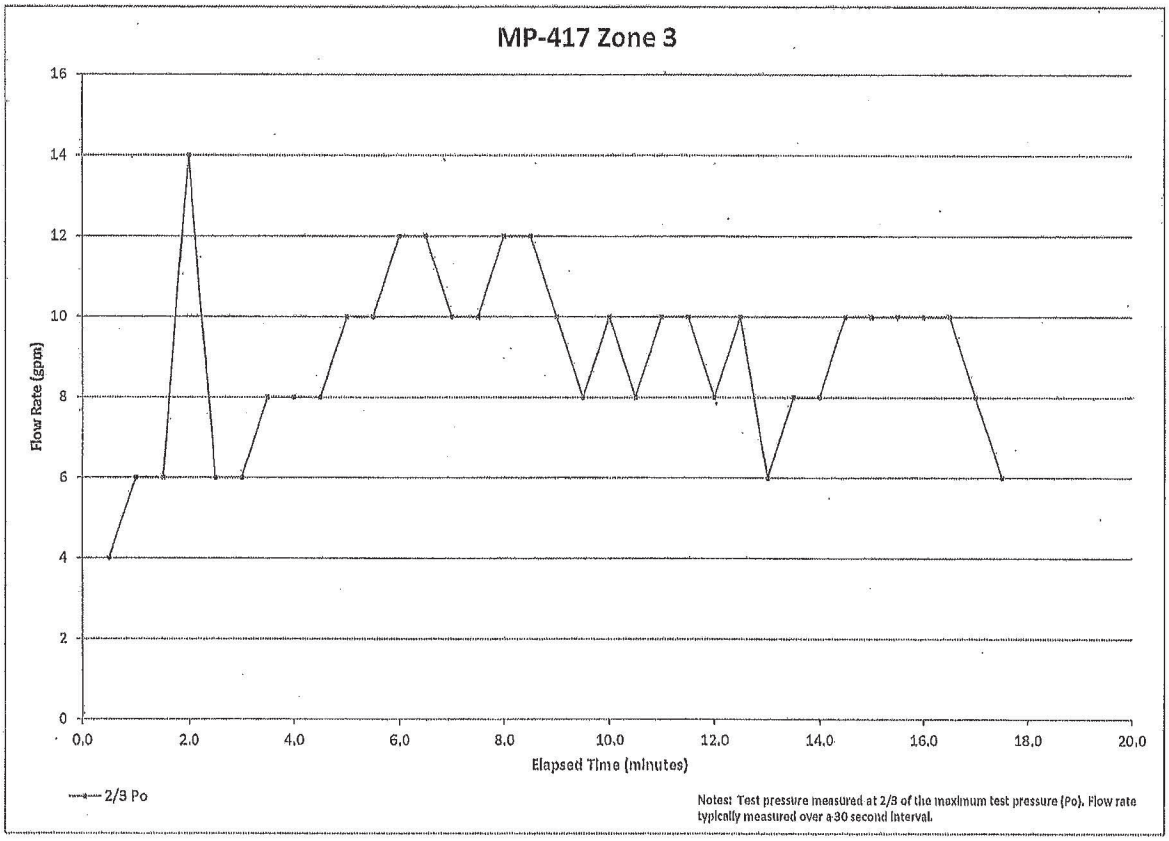
Prepared by: CDT Date: 4-8-14
Checked by: JDZ Date: 4-8-14

Boring: MP-417
Zone: Z3 ***210.5 feet to 218.0 feet below ground surface***
Transducer Location: Middle

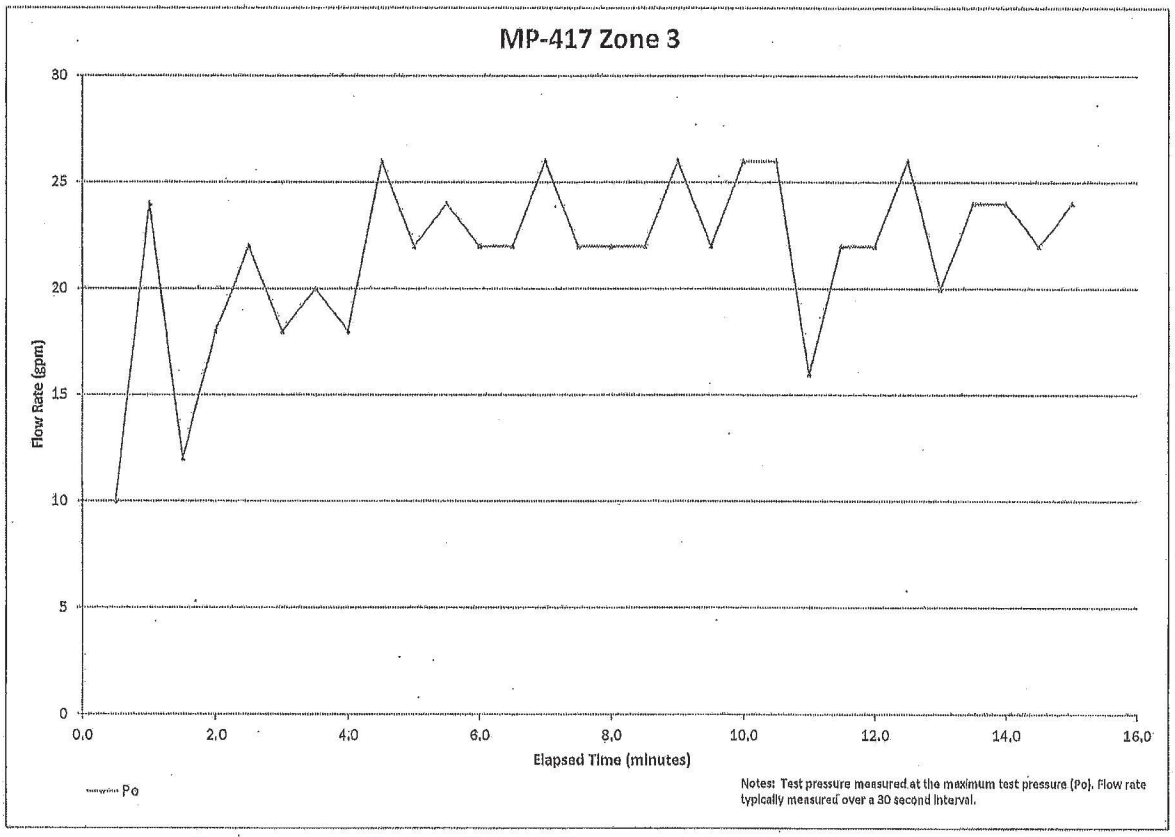
Sequence A (1/3 Po)				Sequence B (2/3 Po)				Sequence C (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
10:20:00	0.0	97.03		10:40:30	0.0	144.70		11:04:00	0.0	192.53	
10:20:30	0.5	97.02	0	10:41:00	0.5	144.67	4	11:04:30	0.5	192.62	10
10:21:00	1.0	96.99	0	10:41:30	1.0	154.25	6	11:05:00	1.0	192.71	24
10:21:30	1.5	96.94	0	10:42:00	1.5	156.47	6	11:05:30	1.5	204.10	12
10:22:00	2.0	96.91	0	10:42:30	2.0	168.94	14	11:06:00	2.0	210.23	18
10:22:30	2.5	96.89	0	10:43:00	2.5	171.03	6	11:06:30	2.5	213.27	22
10:23:00	3.0	96.86	4	10:43:30	3.0	173.33	6	11:07:00	3.0	215.61	18
10:23:30	3.5	111.32	16	10:44:00	3.5	174.81	8	11:07:30	3.5	217.55	20
10:24:00	4.0	148.75	8	10:44:30	4.0	176.73	8	11:08:00	4.0	219.13	18
10:24:30	4.5	154.91	0	10:45:00	4.5	177.25	8	11:08:30	4.5	222.48	26
10:25:00	5.0	151.55	12	10:45:30	5.0	180.50	10	11:09:00	5.0	225.41	22
10:25:30	5.5	150.84	4	10:46:00	5.5	180.30	10	11:09:30	5.5	227.17	24
10:26:00	6.0	151.87	2	10:46:30	6.0	181.08	12	11:10:00	6.0	228.37	22
10:26:30	6.5	148.88	2	10:47:00	6.5	185.89	12	11:10:30	6.5	228.87	22
10:27:00	7.0	148.80	2	10:47:30	7.0	187.73	10	11:11:00	7.0	229.14	26
10:27:30	7.5	145.78	2	10:48:00	7.5	189.09	10	11:11:30	7.5	229.55	22
10:28:00	8.0	145.76	2	10:48:30	8.0	189.78	12	11:12:00	8.0	229.54	22
10:28:30	8.5	145.74	2	10:49:00	8.5	190.46	12	11:12:30	8.5	229.59	22
10:29:00	9.0	145.85	0	10:49:30	9.0	189.93	10	11:13:00	9.0	229.72	26
10:29:30	9.5	145.77	2	10:50:00	9.5	189.67	8	11:13:30	9.5	229.86	22
10:30:00	10.0	143.12	2	10:50:30	10.0	189.68	10	11:14:00	10.0	230.01	26
10:30:30	10.5	142.69	0	10:51:00	10.5	189.60	8	11:14:30	10.5	230.84	26
10:31:00	11.0	142.43	2	10:51:30	11.0	189.58	10	11:15:00	11.0	231.16	16
10:31:30	11.5	142.37	2	10:52:00	11.5	189.37	10	11:15:30	11.5	231.74	22
10:32:00	12.0	143.12	0	10:52:30	12.0	189.63	8	11:16:00	12.0	231.96	22
10:32:30	12.5	144.58	2	10:53:00	12.5	189.72	10	11:16:30	12.5	232.22	26
10:33:00	13.0	144.79	2	10:53:30	13.0	187.51	6	11:17:00	13.0	232.03	20
10:33:30	13.5	144.71	2	10:54:00	13.5	***186.67***	8	11:17:30	13.5	232.11	24
10:34:00	14.0	144.82	2	10:54:30	14.0	187.51	8	11:18:00	14.0	232.12	24
10:34:30	14.5	144.92	0	10:55:00	14.5	188.95	10	11:18:30	14.5	232.04	22
10:35:00	15.0	144.77	2	10:55:30	15.0	189.92	10	11:19:00	15.0	232.30	24
10:35:30	15.5	144.81	2	10:56:00	15.5	190.15	10				
10:36:00	16.0	144.85	0	10:56:30	16.0	190.32	10				
10:36:30	16.5	144.87	2	10:57:00	16.5	190.79	10				
10:37:00	17.0	144.86	2	10:57:30	17.0	191.00	8				
				10:58:00	17.5	191.17	6				

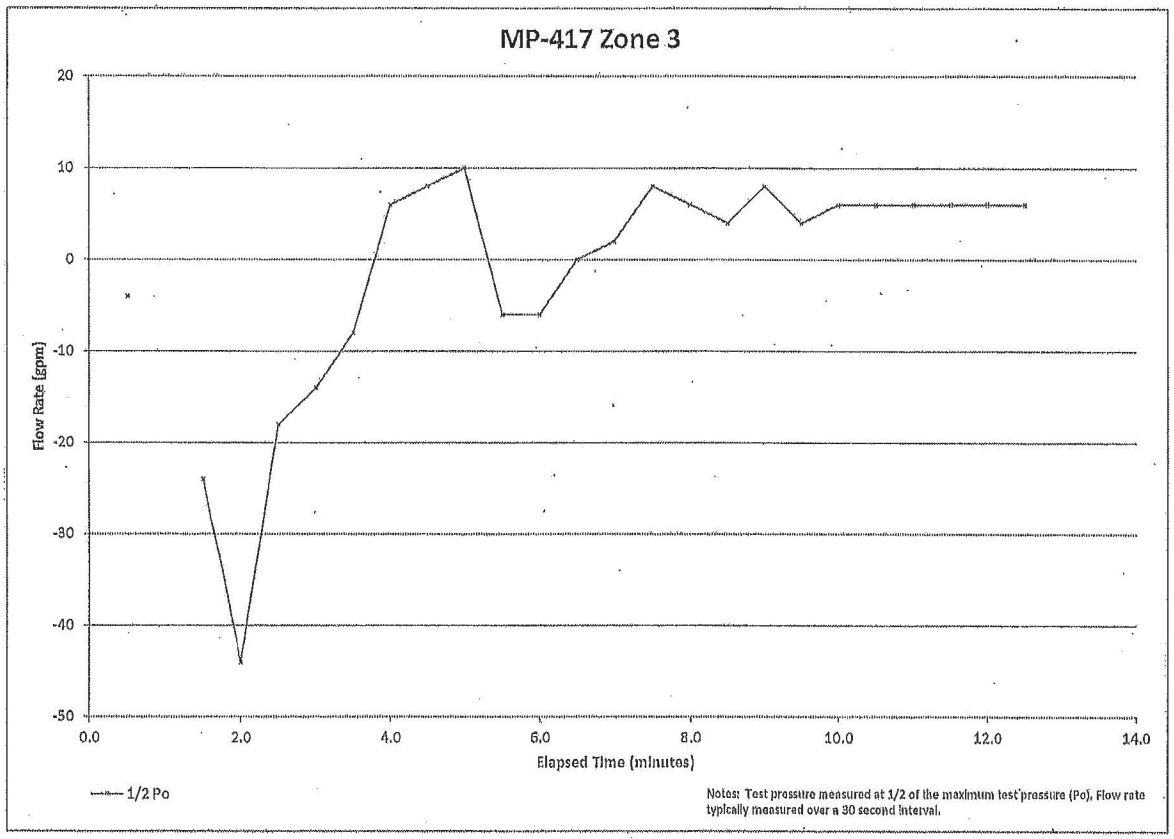
Sequence D (1/2 Po)				Sequence E (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
11:24:00	0.0	233.20		11:39:30	0.0	166.58	
11:24:30	0.5	228.53	-4	11:40:00	0.5	166.40	20
11:25:00	1.0	no reading		11:40:30	1.0	170.35	22
11:25:30	1.5	189.62	-24	11:41:00	1.5	192.77	36
11:26:00	2.0	168.28	-44	11:41:30	2.0	208.66	40
11:26:30	2.5	158.84	-18	11:42:00	2.5	218.36	38
11:27:00	3.0	155.24	-14	11:42:30	3.0	225.26	44
11:27:30	3.5	152.70	-8	11:43:00	3.5	230.71	42
11:28:00	4.0	156.35	6	11:43:30	4.0	234.17	42
11:28:30	4.5	167.67	8	11:44:00	4.5	237.32	46
11:29:00	5.0	173.81	10	11:44:30	5.0	238.56	32
11:29:30	5.5	170.03	-6	11:45:00	5.5	239.39	32
11:30:00	6.0	160.38	-6	11:45:30	6.0	239.43	34
11:30:30	6.5	157.57	0	11:46:00	6.5	238.92	30
11:31:00	7.0	158.41	2	11:46:30	7.0	239.16	30
11:31:30	7.5	162.22	8	11:47:00	7.5	239.11	24
11:32:00	8.0	164.56	6	11:47:30	8.0	238.62	30
11:32:30	8.5	165.88	4	11:48:00	8.5	238.23	24
11:33:00	9.0	166.37	8	11:48:30	9.0	237.74	22
11:33:30	9.5	166.56	4	11:49:00	9.5	234.82	22
11:34:00	10.0	166.07	6	11:49:30	10.0	233.40	22
11:34:30	10.5	166.41	6	11:50:00	10.5	232.85	20
11:35:00	11.0	166.63	6	11:50:30	11.0	232.31	22
11:35:30	11.5	166.86	6	11:51:00	11.5	232.01	22
11:36:00	12.0	166.89	6	11:51:30	12.0	231.90	22
11:36:30	12.5	166.82	6	11:52:00	12.5	231.85	20
				11:52:30	13.0	231.76	28
				11:53:00	13.5	231.87	16



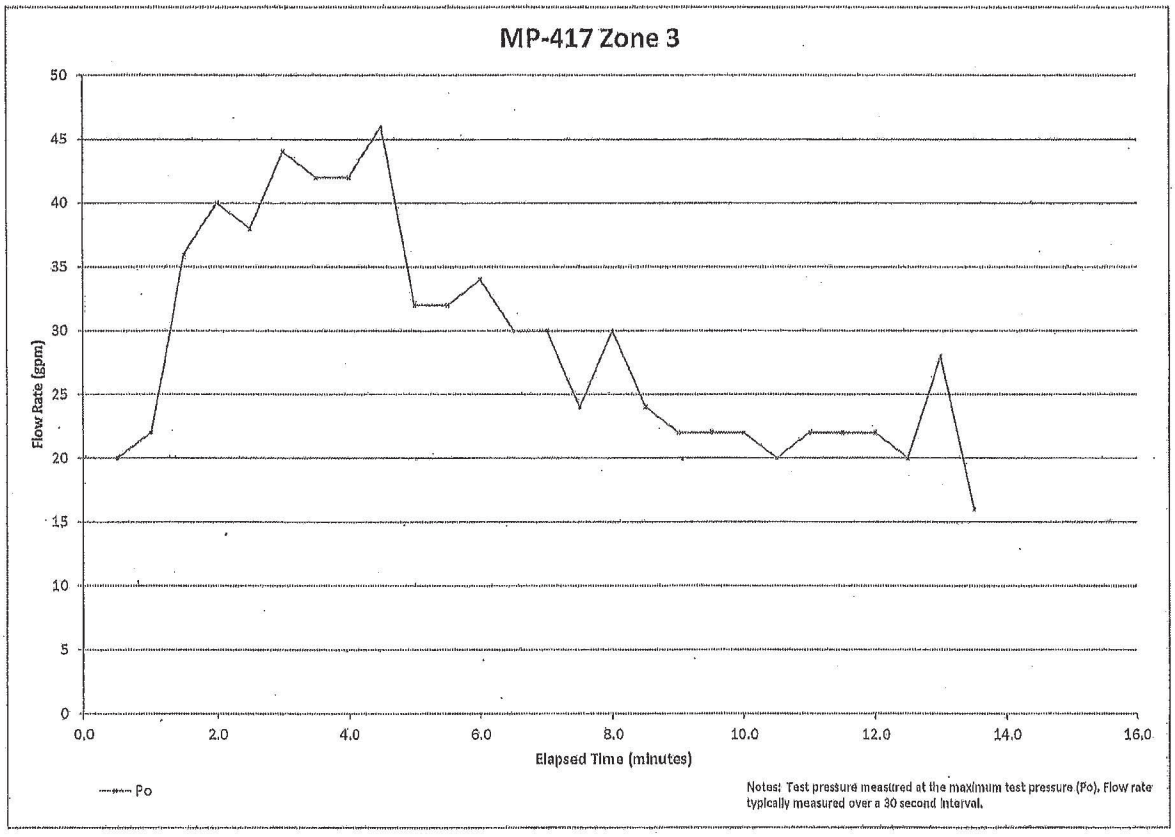


Prepared by/Date: KNL 1/4/14
Checked by/Date: GDS 1/4/14





Prepared by/Date: KHL 1/4/14
Checked by/Date: JDJ 1/12/14



Prepared by/Date: KHL 1/4/14
Checked by/Date: [signature] 1/21/14

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Bldg No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 812.6 To 820.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 816.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Sequence ID: A B C D E Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z3 Sequence No. A Planned Center Pressure: 144

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE A

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
10:20:00	17020	----	----	----	97.03	0	BEGIN
10:20:30	17020	17020	0	0	97.02	0	
10:21:00	17020	17020	0	0	96.99	0	
10:21:30	17020	17020	0	0	96.94	0+0	
10:22:00	17020	17020	0	0	96.91	0	
10:22:30	17020	17020	0	0	96.89	0	INCREASE
10:23:00	17020	17022	2	4	96.86	5	
10:23:30	17022	17030	8	16	111.32	45	
10:24:00	17030	17034	4	8	148.75	50	
10:24:30	17034	17034	0	0	154.91	50	DECREASE FLOW
10:25:00	17034	17040	6	12	151.55	45	
10:25:30	17040	17042	2	4	150.84	45	
10:26:00	17042	17043	1	2	151.87	42	
10:26:30	17043	17044	1	2	148.88	42	
10:27:00	17044	17045	1	2	148.80	40	
10:27:30	17045	17046	1	2	145.78	39	
10:28:00	17046	17047	1	2	145.76	39	
10:28:30	17047	17048	1	2	145.74	39	

QC 7-17-13

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SSC 12/17/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 3-13-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval.

TEST NO. MP-417 Z3 Sequence No. A Planned Center Pressure: 144

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE A (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
10:29:00	170 48	170 48	0	0	145.85	39	DECREASE FLOW
10:29:	170 48	170 49	1	2	145.77	36	
10:30:00	170 49	170 50	1	2	143.12	35	
10:30:30	170 50	170 50	0	0	142.69	35	
10:31:00	170 50	170 51	1	2	142.43	35	INCREASE FLOW
10:31:30	170 51	170 52	1	2	142.37	36	
10:32:00	170 52	170 52	0	0	143.12	36	
10:32:30	170 52	170 53	1	2	144.58	36	
10:33:00	170 53	170 54	1	2	144.79	36	
10:33:30	170 54	170 55	1	2	144.71	36	
10:34:00	170 55	170 56	1	2	144.82	36	
10:34:30	170 56	170 56	0	0	144.92	36	
10:35:00	170 56	170 57	1	2	144.77	36	
10:35:30	170 57	170 58	1	2	144.81	36	
10:36:00	170 58	170 58	0	0	144.85	36	
10:36:30	170 58	170 59	1	2	144.87	36	
10:37:00	170 59	170 60	1	2	144.86	36	END (HG/HA)

*From Preliminary Boring Layout Survey

10:37:40 BOTTOM TRANS = 99.62
38:20 TOP TRANS 28.77

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SSC 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z3 Sequence No. B Planned Center Pressure: 188

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE B

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
10:40:30	17065	----	----	----	144.70	36	BEGIN INCREASE FLOW
10:41:00	17065	17067	2	4	144.67	46	
10:41:30	17067	17070	3	6	154.25	50	INCREASE FLOW
10:42:00	17070	17073	3	6	156.47	60	
10:42:30	17073	17080	7	14	168.94	65	
10:43:00	17080	17083	3	6	171.03	66	
10:43:30	17083	17086	3	6	173.33	69	INCREASE FLOW
10:44:00	17086	17090	4	8	174.81	70	
10:44:30	17090	17094	4	8	176.73	70	INCREASE FLOW
10:45:00	17094	17098	4	8	177.25	75	
10:45:30	17098	17103	5	10	180.50	75	
10:46:00	17103	17108	5	10	180.30	75	INCREASE FLOW
10:46:30	17108	17114	6	12	181.08	80	
10:47:00	17114	17120	6	12	185.89	82	
10:47:30	17120	17125	5	10	187.73	82	
10:48:00	17125	17130	5	10	189.09	85	
10:48:30	17130	17136	6	12	189.78	85	DECREASE FLOW
10:49:00	17136	17142	6	12	190.46	84	

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJR 12/13/13.

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z3 Sequence No. B Planned Center Pressure: 188

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE B (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
10:49:30	17 142	17 147	5	10	189 93	84	
10:50:00	17 147	17 151	4	8	189.67	84	
10:50:30	17 151	17 156	5	10	189.68	84	
10:51:00	17 156	17 160	4	8	189.60	84	
10:51:30	17 160	17 165	5	10	189.58	84	
10:52:00	17165	17 170	5	10	189.37	84	
10:52:30	17170	17 174	4	8	189.63	84	DECREASE FLOW
10:53:00	17174	17 179	5	10	189.72	83	
10:53:30	17179	17 182	3	6	187.51	80	
10:54:00	17182	17 186	4	8	186.67	80	INCREASE FLOW
10:54:30	17186	17 190	4	8	187.51	83	
10:55:00	17190	17 195	5	10	188.95	84	
10:55:30	17195	17200	5	10	189.92	84	
10:56:00	17200	17 205	5	10	190.15	84	
10:56:30	17205	17 210	5	10	190.32	84	
10:57:00	17210	17 215	5	10	190.79	85	
10:57:30	17215	17 219	4	8	191.00	85	
10:58:00	17219	17 222	3	6	191.17	85	END (H.G.)

*From Preliminary Boring Layout Survey

10:58:30 BOTTOM TRANS = 109.01

10:59:00 TOP TRANS = 29.57

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJ 12/17/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z 3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po; 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z3 Sequence No. C Planned Center Pressure: 232

Qss, 7-17-13

Transducer Readings Before Packers Inflated: Top 29.07 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z 3 SEQUENCE C

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:04:00	17272	-----	----	----	192.53	85	BEGIN INCREASE FLOW
11:04:30	17272	17 277	5	10	192.62	86	INCREASE
11:05:00	17277	17* 289	12	24	192.71	100	LATE FLOW READING
11:05:30	17289	17 295	6	12	204.10	105	
11:06:00	17295	17 304	9	18	210.23	107	
11:06:30	17304	17 315	11	22	213.27	115	
11:07:00	17315	17 324	9	18	215.61	115	
11:07:30	17324	17 334	10	20	217.55	116	INCREASE FLOW
11:08:00	17334	17 343	9	18	219.13	120	
11:08:30	17343	17 356	13	26	222.48	125	
11:09:00	17356	17 367	11	22	225.41	126	
11:09:30	17367	17 379	12	24	227.17	128	
11:10:00	17379	17 390	11	22	228.37	130	
11:10:30	17390	17 401	11	22	228.87	130	
11:11:00	17401	17414	13	26	229.14	130	
11:11:30	17414	17 425	11	22	229.55	130	
11:12:00	17425	17 436	11	22	229.54	130	
11:12:30	17436	17 447	11	22	229.55	130	
11:13:00	17447	17 460	13	26	229.72	130	

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJZ 12/17/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po = 88 ; 1/2 Po = 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417-Z3 Sequence No. C Planned Center Pressure: 232

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQ C (Cont'd)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:13:30	17460	17 471	11	22	229.86	130	INCREASE
11:14:00	17471	17 484	13	26	230.01	132	SS. 7-17-13
11:14:30	17484	17 497	13	26	230.84	132	
11:15:00	17497	17 505	8	16	231.16	132	
11:15:30	17505	17 516	11	22	231.74	132	
11:16:00	17516	17 527	11	22	231.96	133	
11:16:30	17 527	17 540	13	26	232.22	134	
11:17:00	17540	17 550	10	20	232.03	134	
11:17:30	17550	17 562	12	24	232.11	134	
11:18:00	17562	17 574	12	24	232.12	134	
11:18:30	17 574	17 585	11	22	232.04	134	
11:19:00	17585	17 597	12	24	232.30	137	END (H.G.)
				11:19:40	Bottom	Trans #	125.74
				11:20:30	Top	Trans #	31.18

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJZ 12/10/17

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.67) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval

SJR 12/13/13

TEST NO: MP-417 Z3 Sequence No. D Planned Center Pressure: 166

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 Sequence D

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:24:00	17714	----	----	----	233.20	134	Begin Decrease Flow
11:24:30	17714	17712	-2	-4	228.53	72	Back Flow
11:25:00	No Readings						
11:25:30	17712	17688	-24	-24	189.62	68	
11:26:00	17688	17666	-22	-44	168.28	90	
11:26:30	17666	17657	-9	-18	158.84	45	
11:27:00	17657	17650	-7	-14	155.24	45	
11:27:30	17650	17646	-4	-8	152.70	40	Increase Flow
11:28:00	17646	17649	3	6	156.35	63	Adjust
11:28:30	17649	17653	4	8	167.67	65	Flow
11:29:00	17653	17658	5	10	173.81	63	
11:29:30	17658	17655	-3	-6	170.03	50	
11:30:00	17655	17652	-3	-6	160.38	50	Adjust Flow
11:30:30	17652	17652	0	0	157.57	50	
11:31:00	17652	17653	1	2	158.41	50	Adjust Flow
11:31:30	17653	17657	4	8	162.22	55	
11:32:00	17657	17660	3	6	164.50	57	
11:32:30	17660	17662	2	4	165.88	60	

QA 7-17-13

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJR 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No. MP417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6*

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z3 Sequence No. D Planned Center Pressure: 166

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE D (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:33:00	17 662	17 666	4	8	166.37	60	
11:33:30	17 666	17 668	2	4	166.56	58	
11:34:00	17 668	17 671	3	6	166.09	58	
11:34:30	17 671	17 674	3	6	166.41	58	
11:35:00	17 674	17 677	3	6	166.63	58	
11:35:30	17 677	17 680	3	6	166.86	60	
11:36	17680	17 683	3	6	166.89	60	
11:36:30	17 683	17 686	3	6	166.82	60	
				11:37:00	Bottom	TRANS =	126.85
				11:37:45	Top	TRANS =	32.66

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJC 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 19.15 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 197.20 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po= 88 ; 1/2 Po= 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417Z3 Sequence No. E Planned Center Pressure: 232

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE E

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11139 30	177 06	---	---	---	166,58	60	BEGIN INCREASE FLOW
11:40:00	177 06	17 716	10	20	166 40	65	
11:40:30	17716	17 727	11	22	170,35	120	
11:41:00	17727	17 745	18	36	192,77	130	
11:41:30	17745	17 765	20	40	208,66	130	
11:42:00	17765	17 784	19	38	218.36	145	
11:42:30	17784	17 806	22	44	225,26	149	
11:43:00	17 806	17 827	21	42	230,71	151	
11:43:30	17827	17 848	21	42	234,17	155	DECREASE FLOW
11:44:00	17 848	17 871	23	46	237,32	150	
11:44:30	17 871	17 887	16	32	238,56	150	DECREASE FLOW
11:45:00	17887	17 903	16	32	239,39	149	DECREASE FLOW
11:45:30	17 903	17 920	17	34	239,43	145	
11:46:00	17 920	17 935	15	30	238,92	145	DECREASE FLOW
11:46:30	17 935	17 950	15	30	239,16	144	DECREASE FLOW
11:47:00	17 950	17 962	12	24	239,11	140	
11:47:30	17 962	17 977	15	30	238,62	140	
11:48:00	17977	17 989	12	24	238,23	140	DECREASE FLOW

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SSC 12/13/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-17-13

Boring No MP-417 Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 772.6 *

Casing Height above ground, Ft: 2.09 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 774.7 = Datum

TEST ID: MP-417 Z3 Test length: 7.5 Test Section Depth (from Datum): From 212.6 To 220.1

(A) Depth to Water Table From Datum, Ft: 191.5 Test Water Temp: 80°F Baro Pressure, psi: 14.52

(B) Surface Gage Height Above Datum, Ft. 0.50 Depth to Center of Test Interval From Datum, Ft: 216.35

(C) Distance Water Table to Center of Test Interval Ft. 19.72 Static water pressure at center = (C*62.4/144) + Baro = 100

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 132] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 44 ; 2/3 Po = 88 ; 1/2 Po = 66 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-417 Z3 Sequence No. E Planned Center Pressure: 232

Transducer Readings Before Packers Inflated: Top 29.04 ; Middle 98.61 ; Bottom: 102.39

Transducer Readings After Packers Inflated: Top 28.62 ; Middle 97.29 ; Bottom: 96.65

MP-417 Z3 SEQUENCE E (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:48:30	17989	18000	11	22	237.74	135	
11:49:00	18000	18011	11	22	234.82	135	
11:49:30	18011	18022	11	22	233.40	134	
11:50:00	18022	18032	10	20	232.85	134	
11:50:30	18032	18043	11	22	232.31	132	
11:51:00	18043	18054	11	22	232.01	132	
11:51:30	18054	18065	11	22	231.90	132	
11:52:00	18065	18075	10	20	231.85	132	
11:52:30	18075	18089	14	28	231.76	130	
11:53:00	18089	18097	8	16	231.87	130	END (HG)
54:00				11:53:40	Bottom Trans =		139.55
				11:54:30	Top Trans =		35.72

*From Preliminary Boring Layout Survey

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET

This Sheet Applies to all Zone 3 Tests SDR 12/17/13

BORING: MP-417

DATE: 7-17-13

DATA COLLECTED BY: Tom McGill / Jim Goddard

SHUT-IN TEST PRESSURE: N/A psi SDR 12/17/13

TIME, minute	SURFACE GAGE PRESSURE, psi	CENTER TRANSDUCER PRESSURE, psi
	Not Used	

QA. 7-9-13

142142 QA 7-20-13

EQUIPMENT USED

Transducers: Level Troll 700 Serial Numbers: 335896/R24844 (shallow) *6/12/13*; 315381/R24039 (intermediate) *6/20/13*; ~~141142~~/R20367 (deep) *6/20/13*; 315380/R24038 (spare) *6/20/13*

Surface Pressure Gage: (Both Wika 213.53) - MW-3 (at pump); MW-4 (at totalizer) *6/11/13*

CHECK BARO TOMORROW 7-18-13

Barometric Probe: (Baro Troll) 121315/R22669 *6/12/13*

CHECKED BY QA. 7-17-13 FIELD BOOK Pg 85

Flow Meter: (Master Meter 1344) – 8824788 field checked *6/25/13*

Stop Watch: (Sportline 220) – L286/2786 *6/10/13*

THERMOMETER LT28 (5-1-13)

Date of Calibration: Dates in italics after equipment serial number

Calibration due: Post Testing

FILES INCLUDE ALL SEQUENCES:

MP-417 Z3	(B)	2013-07-17	12.03.16	WSL
MP-417 Z3	(B)	2013-07-17	12.03.16	EXCEL
MP-417 Z3	(T)	2013-07-17	11.56.47	WSL
MP-417 Z3	(T)	2013-07-17	11.56.47	EXCEL
MP-417 Z3	(M)	2013-07-17	11.58.08	WSL
MP-417 Z3	(M)	2013-07-17	11.58.08	EXCEL
MP-417 Z3	(L)	2013-07-17	12.01.03	WSL
MP-417 Z3	(L)	2013-07-17	12.01.03	EXCEL

Form Approved for Use on Clinch River SMR Project – J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by _____

PACKER TEST FLOW RATE GRAPHS

Boring MP-418A

Packer Test Intervals: ***(below ground surface) (below top of casing)***

MP-418A Zone 1:	***86.0*** feet to ***93.5*** feet:	***87.27*** feet to ***94.77*** feet
MP-418A Zone 2:	***139.0*** feet to ***148.5*** feet:	***140.27*** feet to ***147.77*** feet
MP-418A Zone 3:	***240.0*** feet to ***247.5*** feet:	***241.27*** feet to ***248.77*** feet

Graphs of flow rate (gpm) vs time (minutes) have been created from Excel sheets containing data from field data sheets. For clarity, individual plots for each sequence within a tested interval are presented. Generally, plots are not provided if the field data sheets indicate no flow during a test sequence. ***Bechtel Field Instruction forms are provided. AMEC field data sheets are provided following the graphs for each zone. The AMEC field data sheets use top of casing as a field measurement reference. Assigned test interval depths below ground surface were converted to depths below top of casing by adding the casing height to the assigned test interval depths.*** Transducer data file names are listed on the last field data sheet of each test interval. Transducer data files are furnished as electronic files ***in a data supplement submittal***.

FIF No. 25847-601-K0I-CY00-00016

BECHTEL POWER CORPORATION
Project No. 25847
Clinch River CPA Project- Site Subsurface Investigation
FIELD INSTRUCTION FORM

Specification Section: 5.3.7.2

Packer Testing in MP 418A

Field Instruction: The following are the three (3) depth zones in which packer testing will be conducted in borehole MP 418A:

Zone 1: 86.0 to 93.5 feet below land surface. (Tolerance +/- 0.5 feet)
Zone 2: 139.0 to 146.5 feet below land surface. (Tolerance +/- 0.5 feet)
COMPLETED 7-20-13 { Zone 3: 240.0 to 247.5 feet below land surface. (Tolerance +/- 0.5 feet)

The desired pressure ranges that will be tested in each of the ~~four~~ three zones are based on the calculation of the test pressures as provided in AMEC Project Procedure CRP-3 – Packer Pressure Testing in Boreholes, Attachment B (Bechtel Power InfoWorks 25847-601-V14-CY00-00018-006) or latest revision at time of testing. The test pressures will be determined just before the commencement of the tests by measuring the water level at the start of test.

Basis/Justification for Instruction:

The depths of the above zones were selected based on fracture zones identified from DRAFT geologic core logs, RQD analysis and from the acoustic televiewer logs. The bottom depth for packer testing is limited to approximately 250 feet due to the packer test assembly and maximum transducer cable length of approximately 285 feet. The justification of the pressure ranges that will be tested will be based on AMEC Project Procedure CRP-3 – Packer Pressure Testing in Boreholes, Attachment B (Bechtel Power InfoWorks 25847-601-V14-CY00-00018-006) or latest revision at time of testing.

	Name	Signature	Date
Prepared By:	Hillol Guha	[signature]	7/20/13
Reviewed By:	GERALD McLANE	[signature]	7/20/13
Approved By:	Yehu ... for Mark Reimnitz (see attached)	[signature]	7/20/13
(see Section 1.2 for further instructions) Received By AMEC Site Mgr or Proj Mgr:	S Criscenzo	[signature]	7/20/13

Packer Test Worksheet

Clinch River SMR Project
AMEC Project No. 6468 13 1072

Test Date	7/21/2013
Prepared By	J. Goddard
Checked By	

Boring Number	418A
Zone No.	1
Assigned Interval Top (ft-bgs)	86.00
Assigned Interval Bottom (ft-bgs)	93.50
Center of test interval (ft-bgs)	89.75
Height of Casing (ft ags)	1.27
Depth to water (ft below TOC)	50.08
Depth to Water (Ft- bgs)	48.81
Baro Pressure (psi)	14.36
A= Depth to Water Table (ft)	50.08
B=Surface Gage Height (ft)	1.50
C= Height of water above center of test interval (ft)	40.94
Static Water Pressure @ center of Interval (psi)	32
Max Test Pressure (Po) (psi)	75
1/3 Po (psi)	25
2/3 Po (psi)	50
1/2 Po (psi)	38

	Center Test Pressures (psi)	Inflation Pressure (psi)
Sequence A 1/3	57	107
Sequence B 2/3	82	132
Sequence C 1.0	107	157
Sequence D 1/2	70	120
Sequence E 1.0	107	157

Pipe Check (Estimate Only for Field Guidance))

Length of Packer Assembly	13.29
Average Length of Pipe Section	21.12
Length of pipe to TOC	81.48
Number of Pipe Sections	3.86
length of stickup above TOC (ft)	3.00

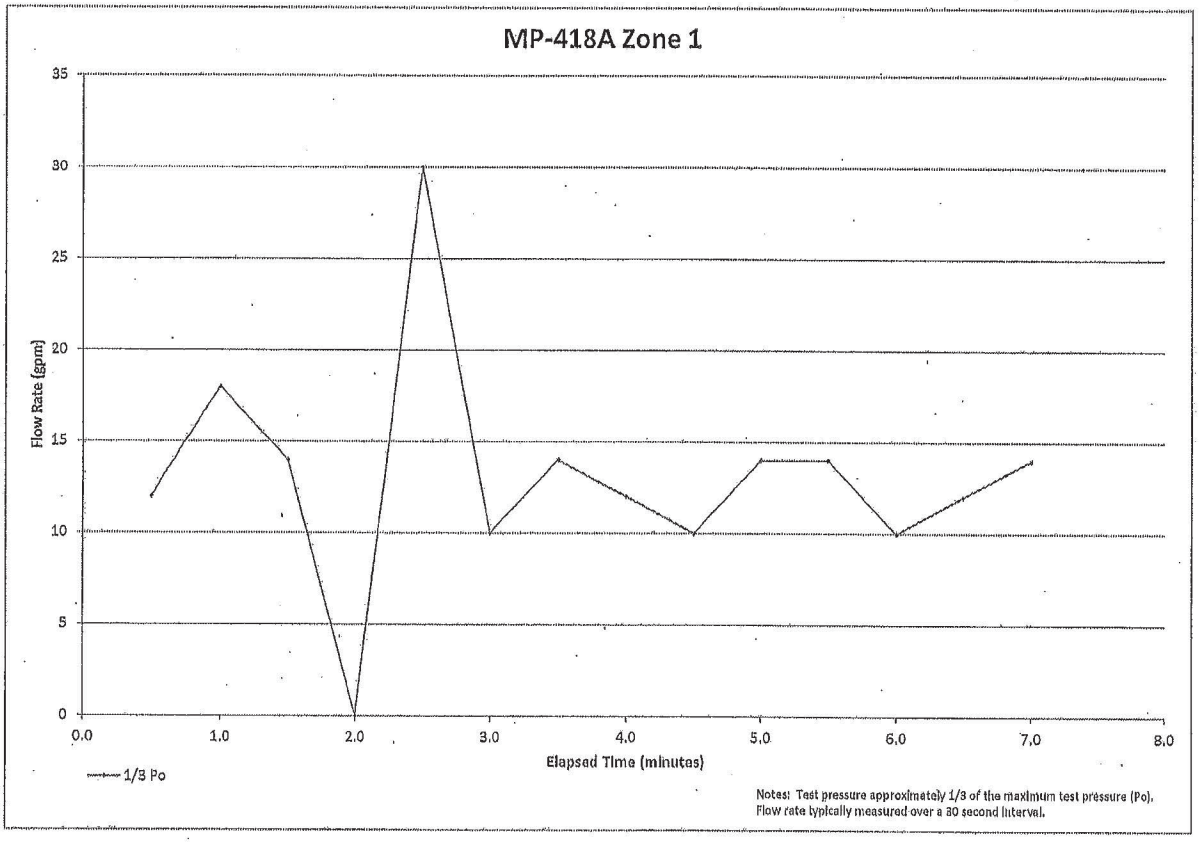
Clinch River SMR Project
Double Packer Borehole Permeability Test Data Sheet
AMEC Environment & Infrastructure, Inc.
AMEC Project # 6468-13-1072

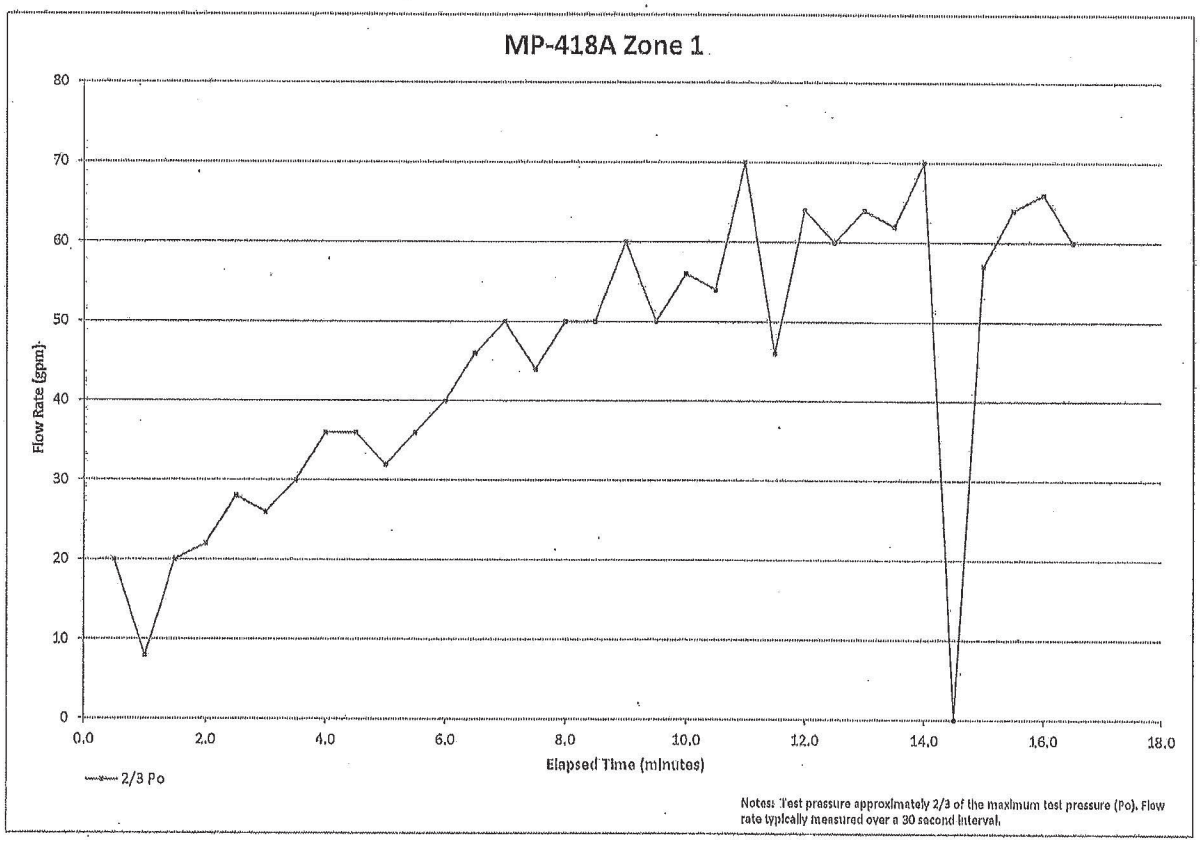
Prepared by: CDT Date: 4-8-14
Checked by: JAJ Date: 4-18-14

Boring: MP-418A
Zone: Z1 ***86.0 feet to 93.5 feet below ground surface***
Transducer Location: Middle

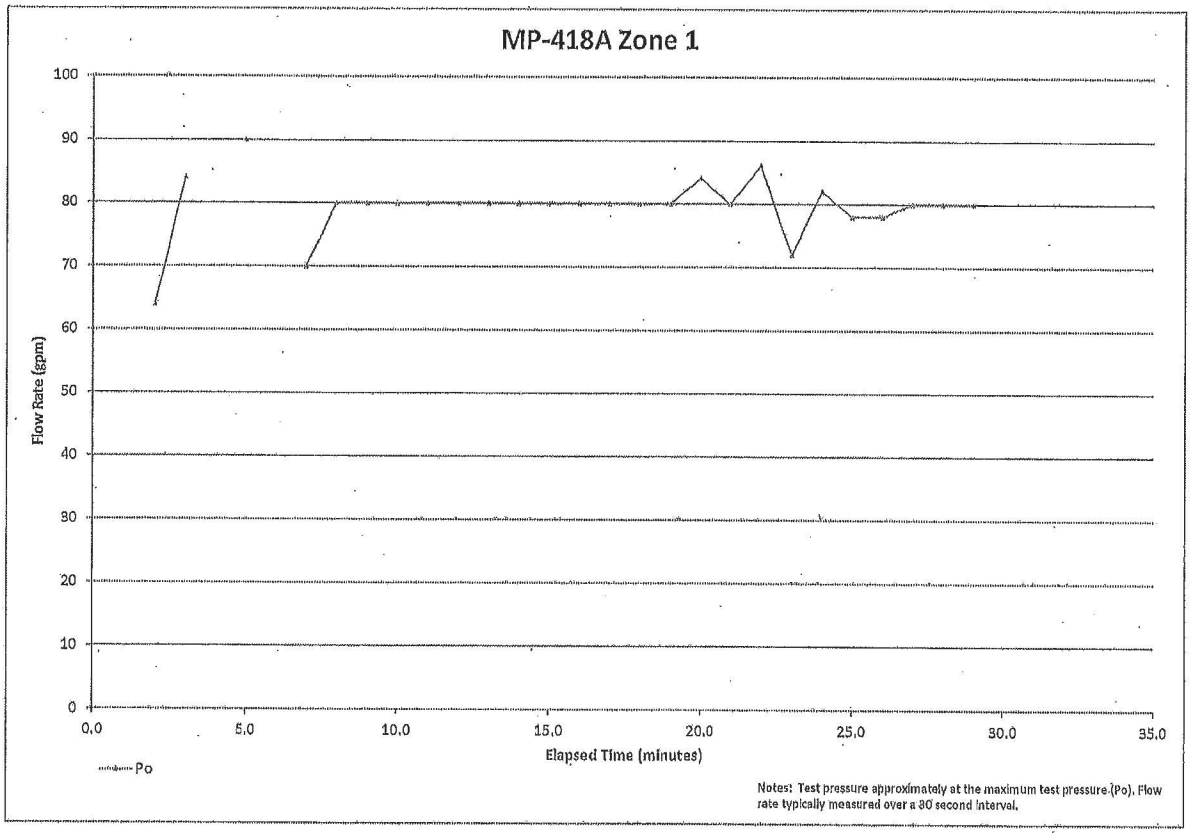
Sequence A (1/3 Po)				Sequence B (2/3 Po)				Sequence C (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
10:58:30	0.0	30.82		11:08:00	0.0	61.41		11:36:30	0.0	32.36	
10:59:00	0.5	37.61	12	11:08:30	0.5	67.92	20	11:37:00	0.5	65.60	64
10:59:30	1.0	64.46	18	11:09:00	1.0	67.97	8	11:37:30	1.0	87.30	84
11:00:00	1.5	67.45	14	11:09:30	1.5	72.54	20	11:38:00	1.5	no reading	
11:00:30	2.0	63.12	0	11:10:00	2.0	72.93	22	11:38:30	2.0	87.98	90
11:01:00	2.5	64.15	30	11:10:30	2.5	***77.10***	28	11:39:00	2.5	no reading	
11:01:30	3.0	62.91	10	11:11:00	3.0	***75.17***	26	11:39:30	3.0	88.27	70
11:02:00	3.5	***60.99***	14	11:11:30	3.5	***75.18***	30	11:40:00	3.5	86.96	80
11:02:30	4.0	60.70	12	11:12:00	4.0	***75.64***	36	11:40:30	4.0	87.25	80
11:03:00	4.5	60.69	10	11:12:30	4.5	***76.53***	36	11:41:00	4.5	85.78	80
11:03:30	5.0	60.87	14	11:13:00	5.0	***78.87***	32	11:41:30	5.0	86.16	80
11:04:00	5.5	60.59	14	11:13:30	5.5	***79.78***	36	11:42:00	5.5	84.51	80
11:04:30	6.0	60.97	10	11:14:00	6.0	***76.06***	40	11:42:30	6.0	84.33	80
11:05:00	6.5	60.58	12	11:14:30	6.5	***78.27***	46	11:43:00	6.5	84.66	80
11:05:30	7.0	60.49	14	11:15:00	7.0	***76.35***	50	11:43:30	7.0	83.63	80
				11:15:30	7.5	***76.32***	44	11:44:00	7.5	83.44	80
				11:16:00	8.0	79.68	50	11:44:30	8.0	83.28	80
				11:16:30	8.5	81.29	50	11:45:00	8.5	83.28	80
				11:17:00	9.0	80.50	60	11:45:30	9.0	83.33	80
				11:17:30	9.5	79.84	50	11:46:00	9.5	82.90	84
				11:18:00	10.0	79.98	56	11:46:30	10.0	82.31	80
				11:18:30	10.5	***79.59***	54	11:47:00	10.5	81.67	86
				11:19:00	11.0	79.00	70	11:47:30	11.0	81.36	72
				11:19:30	11.5	86.40	46	11:48:00	11.5	82.91	82
				11:20:00	12.0	85.03	64	11:48:30	12.0	82.61	78
				11:20:30	12.5	83.34	60	11:49:00	12.5	81.93	78
				11:21:00	13.0	82.38	64	11:49:30	13.0	81.78	80
				11:21:30	13.5	82.32	62	11:50:00	13.5	81.43	80
				11:22:00	14.0	82.06	70	11:50:30	14.0	80.87	80
				11:22:30	14.5	80.73	no reading				
				11:23:00	15.0	80.48	57				
				11:23:30	15.5	79.94	64				
				11:24:00	16.0	80.15	66				
				11:24:30	16.5	79.61	60				

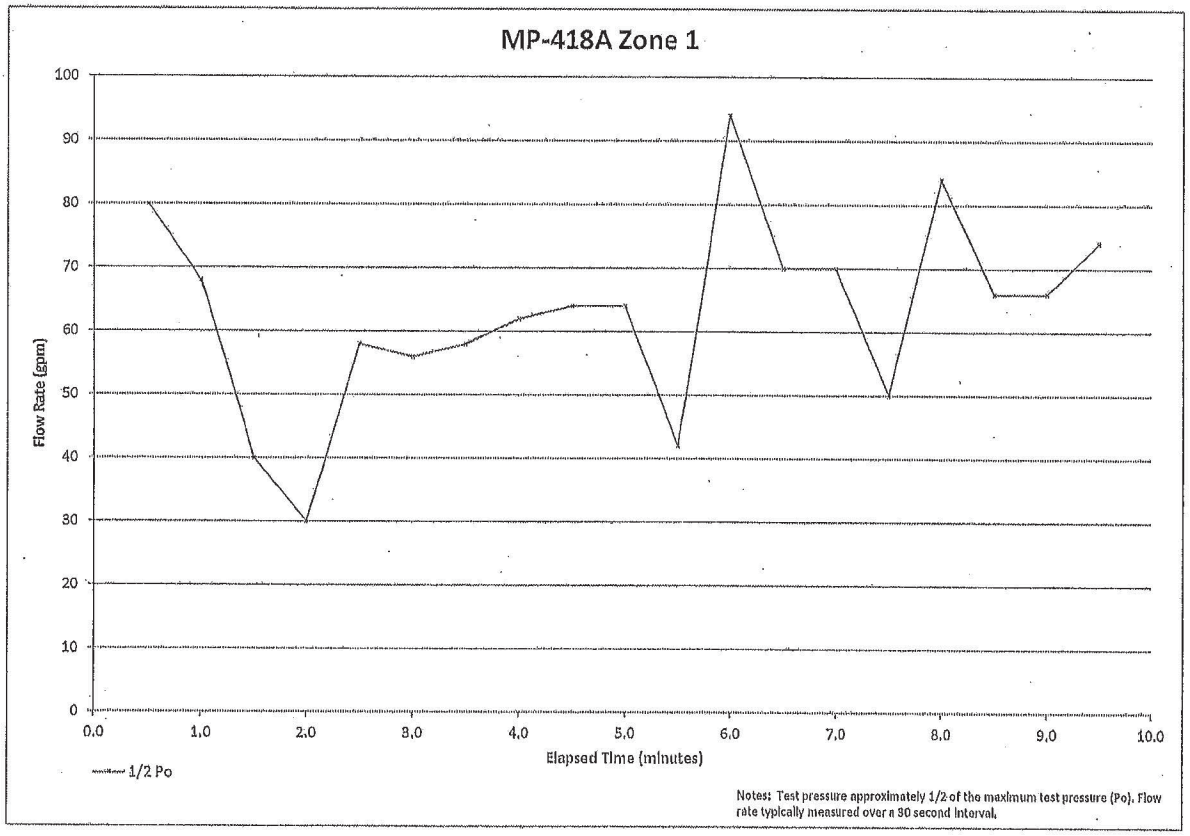
Sequence D (1/2 Po)				Sequence E (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
12:15:30	0.0	33.31		12:43:30	0.0	32.75	
12:16:00	0.5	46.90	80	12:44:00	0.5	69.21	120
12:16:30	1.0	54.75	68	12:44:30	1.0	74.96	60
12:17:00	1.5	55.25	40	12:45:00	1.5	74.90	80
12:17:30	2.0	57.08	30	12:45:30	2.0	76.01	80
12:18:00	2.5	58.32	58	12:46:00	2.5	76.60	80
12:18:30	3.0	58.75	56	12:46:30	3.0	76.64	80
12:19:00	3.5	62.06	58	12:47:00	3.5	77.04	80
12:19:30	4.0	63.92	62	12:47:30	4.0	76.85	82
12:20:00	4.5	64.63	64	12:48:00	4.5	77.41	76
12:20:30	5.0	66.24	64	12:48:30	5.0	77.84	60
12:21:00	5.5	67.50	42	12:49:00	5.5	77.72	76
12:21:30	6.0	69.36	94	12:49:30	6.0	78.22	104
12:22:00	6.5	69.39	70	12:50:00	6.5	77.86	80
12:22:30	7.0	70.13	70	12:50:30	7.0	77.60	80
12:23:00	7.5	69.98	50	12:51:00	7.5	77.60	86
12:23:30	8.0	70.12	84	12:51:30	8.0	77.38	74
12:24:00	8.5	70.22	66	12:52:00	8.5	77.61	84
12:24:30	9.0	70.13	66	12:52:30	9.0	77.36	76
12:25:00	9.5	70.10	74	12:53:00	9.5	75.33	80
				12:53:30	10.0	77.26	80
				12:54:00	10.5	77.46	70
				12:54:30	11.0	77.32	70
				12:55:00	11.5	77.25	80
				12:55:30	12.0	77.22	80
				12:56:00	12.5	77.33	80
				12:56:30	13.0	77.30	74
				12:57:00	13.5	77.80	86
				12:57:30	14.0	77.80	80
				12:58:00	14.5	77.47	74



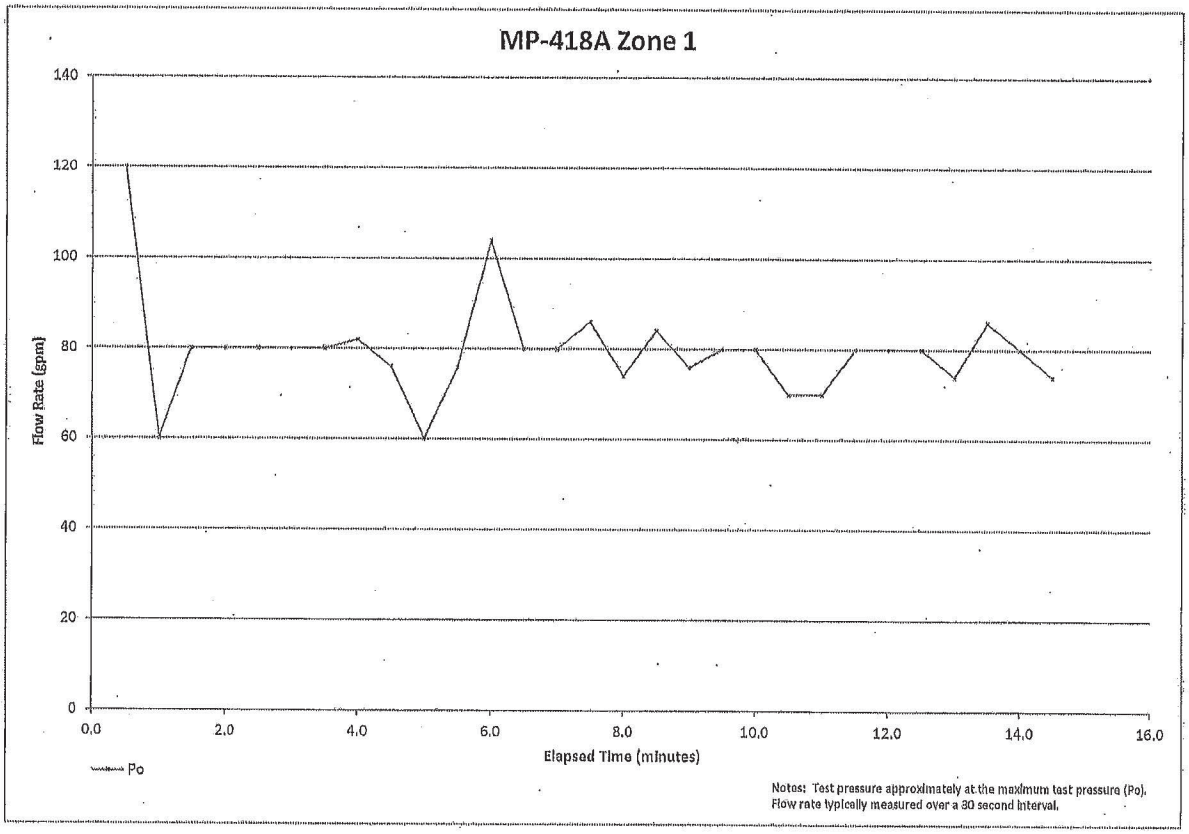


Prepared by/Date: KHL 1/4/14
Checked by/Date: JDJ 1/12/14





Prepared by/Date: KAL 1/4/14
Checked by/Date: JCS 1/12/14



Prepared by/Date: KHL 1/4/14
Checked by/Date: JBS 1/12/14

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC. Page 1 of 2

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08 Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.89°C)

(B) Surface Gage Height Above Datum, Ft. 1.50 Depth to Center of Test Interval From Datum, Ft: 91.02

(C) Distance Water Table to Center of Test Interval Ft. 40.94 Static water pressure at center = (C*62.4/144) + Baro = 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. 4 Planned Center Pressure: 57

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: ~~8~~ 35.46

7-21-13

MP-418A Z1 SEQUENCE A

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
10: 58:30	18898	----	----		30.82	0	BEGIN INCREASE FLOW
10: 59:00	18898	18904	6	12	37.61	21	
10: 59:30	18904	18913	9	18	64.46	13	
11 10: 00:00	18913	18920	7	14	67.45	13	DECREASE FLOW
11 10: 00:30	18920	18920	0	0	63.12	8	
11 10: 01:00	18920	18935	15	30	64.15	7	
11 10: 01:30	18935	18940	5	10	62.91	7	DF (DECREASE FLOW)
11: 02:00	18940	18947	7	14	60.99	5	
11: 02:30	18947	18953	6	12	60.70	5	
11: 03:00	18953	18958	5	10	60.69	5	
11: 03:30	18958	18965	7	14	60.87	5	
11: 04:00	18965	18972	7	14	60.59	5	
11: 04:30	18972	18977	5	10	60.97	5	
11: 05:00	18977	18983	6	12	60.58	5	
11: 05:30	18983	18990	7	14	60.49	5	END
				11:06:09	BOTTOM TRANS *		35.50
				11:06:42	TOP TRANS *		20.80

*From Preliminary Boring Layout Survey

APPROXIMATELY 100 GALS FROM TEST WATER TANK

7-21-13

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SDR 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No. MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08

(B) Surface Gage Height Above Datum, Ft. 1.50

Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.85C)
Depth to Center of Test Interval From Datum, Ft: 91.07 7-21-13

(C) Distance Water Table to Center of Test Interval Ft. 40.94 Static water pressure at center = (C*62.4/144) + Baro = 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. 13 Planned Center Pressure: 82

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 35.46 7-21-13

MP-418A Z1 SEQUENCE B

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11 08 00	19023	---	---	---	61.41	5	BEGIN INCREASE FLOW
11 08 30	19023	19033	10	20	67.92	15	
11 09 00	19033	19037	4	8	67.97	14	IF (INCREASE FLOW)
11 09 30	19037	19047	10	20	72.54	21	
11 10 00	19047	19058	11	22	72.93	21	IF
11 10 30	19058	19072	14	28	77.10	26	
11 11 00	19072	19085	13	26	75.17	26	IF
11 11 30	19085	19100	15	30	75.18	32	
11 12 00	19100	19118	18	36	75.64	29	IF
11 12 30	19118	19136	18	36	76.53	36	
11 13 00	19136	19152	16	32	78.87	35	IF
11 13 30	19152	19170	18	36	79.78	38	
11 14 00	19170	19190	20	40	76.06	35	IF
11 14 30	19190	19213	23	46	78.22	40	
11 15 00	19213	19238	25	50	76.35	39	IF
11 15 30	19238	19260	22	44	76.32	45	IF
11 16 00	19260	19285	25	50	79.68	55	
11 16 30	19285	19310	25	50	81.29	50	

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJT 12/18/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08 Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (21.11°C)

(B) Surface Gage Height Above Datum, Ft. 1.50 Depth to Center of Test Interval From Datum, Ft: 91.02 QJS 7-21-13

(C) Distance Water Table to Center of Test Interval Ft. 40.94 Static water pressure at center = (C*62.4/144) + Baro = 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. 13 Planned Center Pressure: 82

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 35.46 QJS 7-21-13

MP-418A Z1 SEQUENCE B (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:17:00	19310	19340	30	60	80.50	50	BEGIN QJS 7-21-13
11:17:30	19340	19365	25	50	79.84	50	
11:18:00	19365	19393	28	56	79.98	50	
11:18:30	19393	19420	27	54	79.59	50	
11:19:00	19420	19455	35	70	79.00	50	IE
11:19:30	19455	19478	23	46	86.40	64	
11:20:00	19478	19510	32	64	85.03	65	
11:20:30	19510	19540	30	60	83.34	60	
11:21:00	19540	19572	32	64	82.38	60	
11:21:30	19572	19603	31	62	82.32	60	
11:22:00	19603	19638	35	70	82.06	58	
* 11:22:30	19638	No * Reading			80.73	58	
* 11:23:00	No * Reading	19695	57	* 57	80.48	56	
11:23:30	19695	19727	32	64	79.91	56	
11:24:00	19727	19760	33	66	80.15	56	
11:24:30	19760	19790	30	60	79.61	56	END
			QJS 7-21-13	25 22 11:35:-	BOTTOM	TRANS =	35.52
				11:26:01	TOP	TRANS =	25.26

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by JC 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08 Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (21.11°C)

(B) Surface Gage Height Above Datum, Ft. 1.50 Depth to Center of Test Interval From Datum, Ft: 91.02 QA 7-21-13

(C) Distance Water Table to Center of Test Interval, Ft. 40.94 ~~Static water pressure at center = (C*62.4/144) + Baro =~~ 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. C Planned Center Pressure: 107

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 35.46 QA 7-21-13

MP-418A. Z1 SEQUENCE C

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:36:30	19936	----	----	----	32.36	0	BEGIN INCREASE FLOW
11:37:00	19936	19968	32	64 ~~67~~	65.60	89	(MAXIMUM)
11:37:30	19968	20010	42	84	87.30	89	
11:37:00		No Reading					
11:37:30	20010	20055	45	~~90~~ 45	87.98	88	
11:38:00		No Reading					
11:38:30	20055	20090	35	70	88.27	88	
11:39:00	20090	20130	40	80	86.96	86	
11:39:30	20130	20170	40	80	87.25	86	
11:40:00	20170	20210	40	80	85.78	85	
11:40:30	20210	20250	40	80	86.16	84	
11:41:00	20250	20290	40	80	84.51	84	
11:41:30	20290	20330	40	80	84.33	83	
11:42:00	20330	20370	40	80	84.66	82	
11:42:30	20370	20410	40	80	83.63	81	
11:43:00	20410	20450	40	80	83.44	81	
11:43:30	20450	20490	40	80	83.28	80	
11:44:00	20490	20530	40	80	83.33	80	

QA 7-21-13

QA 7-21-13

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SR 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC. Page 1 of 2

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08 Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.89C)

(B) Surface Gage Height Above Datum, Ft. 1.50 Depth to Center of Test Interval From Datum, Ft: 91.02 7-21-13

(C) Distance Water Table to Center of Test Interval Ft 40.94 Static water pressure at center = (C*62.4/144) + Baro = 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. C Planned Center Pressure: 107

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 35.46 7-21-13

MP-418A Z1 SEQUENCE C (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
11:44:30	20530	20 572	42	84	82.90	80	BEGIN 7-21-13
11:45:00	20572	20 612	40	80	82.31	79	
11:49:30	20612	20 655	43	86	81.67	79	
11:46:00	20655	20 691	36	72	81.36	79	
11:46:30	20691	20 732	41	82	82.91	79	
11:47:00	20732	20 771	39	78	82.61	79	
11:47:30	20771	20 810	39	78	81.93	78	
11:48:00	20810	20 850	40	80	81.78	78	
11:48:30	20850	20 890	40	80	81.43	74 84	END - OUT OF WATER
11:49:00	20890	20 930	40	80	80.87	75	END - OUT OF WATER
				11:51:05	BOTTOM	TRANS #	35.58
				11:51:45	TOP	TRANS #	22.93

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SR 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC. Page 1 of 2

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08 Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.83C)

(B) Surface Gage Height Above Datum, Ft. 1.50 Depth to Center of Test Interval From Datum, Ft: 91.02 7-21-13

(C) Distance Water Table to Center of Test Interval Ft. 40.94 Static water pressure at center = (C*62.4/144) + Baro = 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. D Planned Center Pressure: 70

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 35.46 7-21-13

MP-418A Z1 SEQUENCE D

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
12|15|30	20952	----	----		33.31	Ø	BEGIN INCREASE FLOW
12|16|00	20952	992	40	80	46.90	19	IF (INCREASE FLOW)
12|16|30	20992	21026	34	68	54.75	22 20	IF
12|17|00	21026	21046	20	40	55.25	27	
12|17|30	21046	21061	15	30	57.08	28	IF
12|18|00	21061	21090	29	58	58.32	30	IF
12|18|30	21090	21119	28	56	58.75	30	
12|19|00	21119	21147	29	58	62.06	38	IF
12|19|30	21147	21178	31	62	63.92	42	
12|20|00	21178	21210	32	64	64.63	42	IF
12|20|30	21210	21242	32	64	66.24	50	
12|21|00	21242	21263	21	42	67.50	50	IF
12|21|30	21263	21310	47	94	69.36	52	
12|22|00	21310	21345	35	70	69.39	52	
12|22|30	21345	21380	35	70	70.13	54	
12|23|00	21380	21405	25	50	69.98	54	
12|23|30	21405	21447	42	84	70.12	54	
12|24|00	21447	21480	33	66	70.22	54	

7-21-13

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08

(B) Surface Gage Height Above Datum, Ft. 1.50

Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.89°C)
Depth to Center of Test Interval From Datum, Ft: 91.02 SS 7-21-13

(C) Distance Water Table to Center of Test Interval Ft. 40.94 ~~Static water pressure at center = (C*62.4/144) + Baro =~~ 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. D Planned Center Pressure: 70

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 2 35.46
SS 7-21-13

MP-418A Z1 SEQUENCE D

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
12:24:30	21480	21 513	33	66	70.13	54	BEGIN SS 7-21-13
12:25:00	21 513	21 550	37	74	70.10	54	END LOW WATER
				12:25:45	BOTTOM	TRANS	35.58
				12:26:20	TOP	TRANS	25.27

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SSL 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Gnd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Gnd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08

(B) Surface Gage Height Above Datum, Ft. 1.50

Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.89°C)
Depth to Center of Test Interval From Datum, Ft: 91.02

(C) Distance Water Table to Center of Test Interval, Ft. 40.94 Static water pressure at center = (C*62.4/144) + Baro = 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.57) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po

Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. E Planned Center Pressure: 107

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60 ; Middle 30.89 ; Bottom: 35.46

QA 7-21-13

MP-418A Z1 SEQUENCE E

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
12:43:30	21620	----	----	----	32.75	0	BEGIN INCREASE FLOW
12:44:00	21620	21680	60	120	69.21	72	IF (INCREASE FLOW)
12:44:30	21680	21710	30	60	74.96	75	(MAXIMUM)
12:45:00	21710	21750	40	80	74.90	75	
12:44:30	21750	21790	40	80	76.01	72	
12:46:00	21790	21830	40	80	76.50	73	
12:46:30	21830	21870	40	80	76.64	74	
12:47:00	21870	21910	40	80	77.04	74	
12:47:30	21910	21952	42	82	76.85	74	
12:48:00	21952	21990	38	76	77.41	74	
12:48:30	21990	22020	30	60	77.84	74	
12:49:00	22020	22058	38	76	77.72	74	
12:49:30	22058	22110	52	104	78.22	74	
12:50:00	22110	22150	40	80	77.86	73	
12:50:30	22150	22190	40	80	77.60	72	
12:51:00	22190	22233	43	86	77.60	72	
12:51:30	22233	22270	37	74	77.38	72	
12:52:00	22270	22312	42	84	77.61	72	

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET
AMEC ENVIRONMENTAL & INFRASTRUCTURE, INC.

PROJECT NAME: Clinch River SMR Project JOB NO. 6468-13-1072 DATE: 7-21-13

Boring No MP-418A Borehole Diameter, In.: 3.8 Total Boring Depth, Ft. 320 Grd Elev, Ft: 811.6 *

Casing Height above ground, Ft: 1.27 Elev. Top of Casing, Ft. (Grd Elev + Casing Height): 812.87 = Datum

TEST ID: MP-418A Z1 Test length: 7.5 Test Section Depth (from Datum): From 87.27 To 94.77

(A) Depth to Water Table From Datum, Ft: 50.08 Test Water Temp: 80°F Baro Pressure, psi: 14.36 (20.89°C)
WELL WATER TEMP 70°F (20.89C)

(B) Surface Gage Height Above Datum, Ft. 1.50 Depth to Center of Test Interval From Datum, Ft: 91.02 QS. 7-21-13

(C) Distance Water Table to Center of Test Interval Ft. 40.94 ~~Static water pressure at center = (C*62.4/144) + Baro =~~ 32

MAXIMUM TEST PRESSURE, Po = ([A+B*1] + C*0.67) [Po = 75] Test Pressure sequence = 1/3 Po, 2/3 Po, Po, 1/2 Po, Po
Sequence ID: A B C D E

Po Values: 1/3 Po = 25 ; 2/3 Po= 50 ; 1/2 Po= 38 Add Appropriate Po value to static pressure at center of test interval

TEST NO. MP-418A Z1 Sequence No. E Planned Center Pressure: 107

Transducer Readings Before Packers Inflated: Top 20.60 ; Middle 31.32 ; Bottom: 35.19

Transducer Readings After Packers Inflated: Top 20.60; Middle 30.89; Bottom: 35.46 QS. 7-21-13

MP-418A Z1 SEQUENCE E (CONT'D)

Time, Minutes	FLOW METER READING, Gallons			FLOW, gpm	Middle Transducer Reading, psi	Surface Gage Pressure, psi	REMARKS
	Initial	Final	Difference				
12:52:30	22312	22 350	38	76	77.30	71	BEGIN QS.
12:53:00	22350	22 390	40	80	75.33	65	
12:53:30	22390	22 430	40	80	77.26	60	
12:54:00	22430	22 465	35	70	77.46	70	
12:54:30	22465	22 500	35	70	77.32	70	
12:55:00	22500	22 540	40	80	77.25	70	
12:55:30	22540	22 580	40	80	77.22	70	
12:56:00	22580	22 620	40	80	77.33	70	
12:56:30	22620	22 657	37	74	77.30	70	
12:57:00	22657	22 700	43	86	77.30	70	
12:57:30	22700	22 740	40	80	77.30	70	
12:58:00	22740	22 777	37	74	77.47	70	END
				12:58:45	Bottom	Trans =	35.57
				12:59:51	Top	Trans =	26.69

*From Preliminary Boring Layout Survey

Form Approved for Use on Clinch River SMR Project - J. A. Tice, Technical Lead

Form Rev 0 - Reviewed by SJC 12/16/13

DOUBLE PACKER BOREHOLE PERMEABILITY TEST DATA SHEET

This Sheet Applies to all Zone 1 Tests SJR 12/16/13

BORING: MP-418A

DATE: 7-21-13

DATA COLLECTED BY: TOM McGILL / JIM GODDARD

SHUT-IN TEST PRESSURE: N/A SJR 12/16/13 psi

TIME, minute	SURFACE GAGE PRESSURE, psi	CENTER TRANSDUCER PRESSURE, psi
	NOT USED SEE PAGE 1 QA 7-21-13	

EQUIPMENT USED

Transducers: Mini Trol Serial Numbers: 335896 (6-12-13) 142142 (6-20-13)

BACKFLOW GAUGE: MW-3 (6-11-13) 315381 (6-20-13)

Surface Pressure Gage: MW-4 / MW-5 (6-11-13) THERMOMETER: LT28 (5-1-13)

NITROGEN GAUGE: MW-1 & MW-2 (6-11-13)

Barometric Probe: 121315 (6-12-13)

Flow Meter: 88247 88 (FIELD 7-8-13)

Stop Watch: L886 (6-10-13)

Date of Calibration: PARENTHESIS

Calibration due: POST-TESTING

MP-418A	Z1	(B)	2013-07-21	13,07.55	WSL
MP-418A	Z1	(B)	2013-07-21	13,07.55	EXCEL
MP-418A	Z1	(T)	2013-07-21	~~13,06.26~~ 13,06.29 QA 7-21-13	WSL
MP-418A	Z1	(T)	2013-07-21	13,06,29	EXCEL
MP-418A	Z1	(M)	2013-07-21	13,03,25	WSL
MP-418A	Z1	(M)	2013-07-21	13,03,25	EXCEL
MP-418A	Z1	(L)	2013-07-21	13,09.17	WSL
MP-418A	Z1	(L)	2013-07-21	13,09.17	EXCEL

Form Rev 0 - Reviewed by SJR 12/16/13

Packer Test Worksheet

Clinch River SMR Project
AMEC Project No. 6468 13 1072

Test Date	7/21/2013
Prepared By	J. Goddard
Checked By	TM

Boring Number	418A
Zone No.	2
Assigned Interval Top (ft-bgs)	139.00
Assigned Interval Bottom (ft-bgs)	146.50
Center of test interval (ft-bgs)	142.75
Height of Casing (ft ags)	1.27
Depth to water (ft below TOC)	50.18
Depth to Water (Ft- bgs)	48.91
Baro Pressure (psi)	14.36
A= Depth to Water Table (ft)	50.18
B=Surface Gage Height (ft)	1.50
C= Height of water above center of test interval (ft)	93.84
Static Water Pressure @ center of Interval (psi)	55
Max Test Pressure (Po) (psi)	105
1/3 Po (psi)	35
2/3 Po (psi)	70
1/2 Po (psi)	53

	Center Test Pressures (psi)	Inflation Pressure (psi)
Sequence A 1/3	90	140
Sequence B 2/3	125	175
Sequence C 1.0	160	210
Sequence D 1/2	108	158
Sequence E 1.0	160	210

Pipe Check (Estimate Only for Field Guidance))

Length of Packer Assembly	13.29
Average Length of Pipe Section	21.12
Length of pipe to TOC	134.48
Number of Pipe Sections	6.37
length of stickup above TOC (ft)	13.36

Clinch River SMR Project
Double Packer Borehole Permeability Test Data Sheet
AMEC Environment & Infrastructure, Inc.
AMEC Project # 6468-13-1072

Prepared by: CDT Date: 4-8-14
Checked by: JA2 Date: 4-8-14

Boring: MP-418A
Zone: 2 ***139.0 feet to 146.5 feet below ground surface***
Transducer Location: Middle

Sequence A (1/3 Po)				Sequence B (2/3 Po)				Sequence C (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
8:43:00	0.0	53.90		8:51:30	0.0	91.05		9:01:00	0.0	127.13	
8:43:30	0.5	53.90	0	8:52:00	0.5	105.18	0	9:01:30	0.5	143.14	2
8:44:00	1.0	53.90	6	8:52:30	1.0	103.57	2	9:02:00	1.0	140.75	0
8:44:30	1.5	59.66	0	8:53:00	1.5	***112.10***	0	9:02:30	1.5	155.30	2
8:45:00	2.0	91.72	0	8:53:30	2.0	113.87	2	9:03:00	2.0	152.00	2
8:45:30	2.5	90.22	0	8:54:00	2.5	120.27	2	9:03:30	2.5	152.50	0
8:46:00	3.0	90.14	0	8:54:30	3.0	122.52	0	9:04:00	3.0	158.11	2
8:46:30	3.5	90.27	2	8:55:00	3.5	122.91	2	9:04:30	3.5	158.37	2
8:47:00	4.0	90.47	0	8:55:30	4.0	126.52	0	9:05:00	4.0	162.33	2
8:47:30	4.5	90.49	0	8:56:00	4.5	126.50	2	9:05:30	4.5	160.76	0
8:48:00	5.0	90.62	2	8:56:30	5.0	126.40	0	9:06:00	5.0	160.63	2
8:48:30	5.5	90.73	0	8:57:00	5.5	126.61	2	9:06:30	5.5	160.11	2
				8:57:30	6.0	126.55	0	9:07:00	6.0	160.71	0
				8:58:00	6.5	126.95	2	9:07:30	6.5	160.72	2
				8:58:30	7.0	126.95	0	9:08:00	7.0	160.68	2
								9:08:30	7.5	160.21	0

Sequence D (1/2 Po)				Sequence E (Po)			
Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)	Time	Elapsed Time (minutes)	Pressure (psi)	Flow Rate (gpm)
9:12:00	0.0	161.24		9:22:00	0.0	107.15	
9:12:30	0.5	145.60	0	9:22:30	0.5	138.45	4
9:13:00	1.0	143.00	0	9:23:00	1.0	142.81	0
9:13:30	1.5	124.18	0	9:23:30	1.5	155.98	2
9:14:00	2.0	121.88	0	9:24:00	2.0	160.53	2
9:14:30	2.5	108.31	0	9:24:30	2.5	160.47	0
9:15:00	3.0	108.80	0	9:25:00	3.0	160.50	2
9:15:30	3.5	107.45	2	9:25:30	3.5	160.53	2
9:16:00	4.0	107.42	0	9:26:00	4.0	160.14	0
9:16:30	4.5	107.34	2	9:26:30	4.5	160.68	2
9:17:00	5.0	107.38	0	9:27:00	5.0	160.62	2
9:17:30	5.5	107.33	2				
9:18:00	6.0	107.37	0				
9:18:30	6.5	107.24	0				
9:19:00	7.0	107.45	2				