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Sandia National Laboratories

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By: **Sandia Corporation**

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date: February 23, 2016
to: Records Center
from: Patricia Johnson, SNL Contractor
subject: 2015 Calculated Densities

Johnson

The groundwater densities for the WIPP Culebra monitoring wells were calculated for 2015 as described in the Activity/Project Specific Procedure (SP) 9-11 *Calculation of Densities for Groundwater in WIPP Wells*. The derivation of the data is explained in the following sections and supporting data are attached.

1. Calculation Process:

As stated in SP 9-11, for each calculation the observed water pressure is divided by the height of the water column. Specifically, the measured pressure value minus the closest corresponding barometric pressure was divided by the pressure gauge depth minus the closest corresponding depth to water (from or adjusted to the same measurement point elevation), and that result was then divided by 0.4335 (psi to feet of water conversion at 4°C, at which temperature the density of pure water is 1.000 g/cm³). The individual calculated density results for each well were then averaged for a final density value.

The density data are included in the *2015 Calc Densities.xlsx* spreadsheet file created in Excel. Within that spreadsheet, the worksheet *2015 Calc Dens* summarizes the resulting density values and supporting information for the calculated densities, and the worksheet *2015 Calc Dens Formulas* provides the formulas in the worksheet. In addition, the Excel file contains individual well worksheets that include the data used for the calculations and plots of the pressure gauge pressure data. The columns in the worksheets and their contents are described below:

- A – Monitor Well – Well name
- B – 2015 Avg Calc Dens (g/cm³) – Average calculated density value for 2015
- C – 2015 Specific Gravity (Reference: Freshwater at 70°F) – Average calculated density value for 2015 divided by 0.998 to represent specific gravity in reference to freshwater at 70°F
- D – 2014 Avg Calc Dens (g/cm³) – Average calculated density value for 2014
- E – 2015 - 2014 Diff (g/cm³) – Difference between 2015 and 2014 densities (Column B - Column D)
- F – # of Dens Averaged – number of density values averaged to get the final value
- G – 2015 Timeframe of Data – Time period for pressure data used in calculations
- H – Pressure Gauge File Name (Gauge SN) – File name for pressure data and INW gauge SN
- I – Pressure Gauge Install Depth (ft BTOC/BTEC/BTOT) – Depth below primary measuring point at which the pressure gauge was installed

- J – Pressure Gauge Ideal Install Depth (ft BTOC/BTEC/BTOT) (ERMS 553781) – Mid-Culebra depth below top of referenced casing
- K – Length Off Ideal Depth (ft) – Depth in feet that the pressure gauge is installed below or above the ideal (Column I - Column J)
- L – Date of Install – Date the pressure gauge was installed
- M – Installation Logbook Page – Reference to scientific notebook and page(s) where the pressure gauge installation was documented
- N – Comments/Explanations – Comments and/or explanations regarding data, as needed

The spreadsheet entries were verified by Matt Thomas (6932) and Shelly Nielsen (6930).

2. Identification/Listing of Input, Input sources, and Output:

- Excel spreadsheet including the data – 2015 Calc Densities.xls
 - Worksheet 1 – 2015 Calc Dens
 - Worksheet 2 – 2015 Calc Dens_Formulas
 - Worksheet 3 – Baro Data
 - Worksheet 4 – AEC-7R
 - Worksheet 5 – C-2737
 - Worksheet 6 – ERDA-9
 - Worksheet 7 – H-2b2
 - Worksheet 8 – H-3b2
 - Worksheet 9 – H-4bR
 - Worksheet 10 – H-5b
 - Worksheet 11 – H-6bR
 - Worksheet 12 – H-7b1
 - Worksheet 13 – H-9bR
 - Worksheet 14 – H-10c
 - Worksheet 15 – H-11b4R
 - Worksheet 16 – H-12R
 - Worksheet 17 – H-15R
 - Worksheet 18 – H-16
 - Worksheet 19 – H-17
 - Worksheet 20 – H-19b0
 - Worksheet 21 – IMC-461
 - Worksheet 22 – SNL-1
 - Worksheet 23 – SNL-2
 - Worksheet 24 – SNL-3
 - Worksheet 25 – SNL-5
 - Worksheet 26 – SNL-6
 - Worksheet 27 – SNL-8
 - Worksheet 28 – SNL-9
 - Worksheet 29 – SNL-10
 - Worksheet 30 – SNL-12
 - Worksheet 31 – SNL-13
 - Worksheet 32 – SNL-14
 - Worksheet 33 – SNL-15
 - Worksheet 34 – SNL-16
 - Worksheet 35 – SNL-17A
 - Worksheet 36 – SNL-18
 - Worksheet 37 – SNL-19
 - Worksheet 38 – WIPP-11
 - Worksheet 39 – WIPP-13
 - Worksheet 40 – WIPP-19

3. Data Qualification for Compliance Decision Analysis:

Data sources provided in Column H (Pressure Gauge File Name (Gauge SN)), Column M (Installation Logbook Page), and in the References Section.

4. Software Used:

Intel® Xeon® CPU, Microsoft Windows 7, Microsoft Office Professional Plus 2010 Excel

5. Reviews:

Technical: Matt Thomas, 6932

QA: Shelly Nielsen, 6930

6. References:

- Pressure gauge installation data and SNL water level data from the following scientific notebooks (package ERMS 543277):
Long-Term Monitoring Notebook (LTM)-22
Long-Term Monitoring Notebook (LTM)-23
Long-Term Monitoring Notebook (LTM)-24
- RES Water Level Data submitted to SNL in monthly memoranda (package ERMS 525178)
- Johnson, Patricia B., Culebra Center Depths for Use in Calculating Equivalent Freshwater Heads of the Culebra Dolomite Member of the Rustler Formation near the WIPP Site, Revision 3, June 10, 2010 (ERMS 553781)

7. List of Attachments:

1. Printout of Excel file worksheet 2015 Calc Dens.xls
2. Printout of Excel file worksheet 2015 Calc Dens Formulas.xls
3. CD including the Excel file and memorandum

2015 Calc Dens

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Monitor Well	2015 Avg Calc Dens (g/cm ³)	2015 Specific Gravity (Reference: Freshwater at 70°f)	2014 Avg Calc Dens (g/cm ³)	2015 - 2014 Diff (g/cm ³)	# of Dens Averaged	2015 Timeframe of Data	Pressure Gauge File Name (Gauge SN)	Pressure Gauge Install Depth (ft BTOC/BTEC/BTOT)	Pressure Gauge Ideal Install Depth (ft BTOC/BTEC/BTOT) (ERMS 553781)	Length Off Ideal Depth (ft)	Date of Install	Installation Logbook Page	Comments/Explanations
AEC-7R	1.056	1.058	1.071	-0.015	5	Sept - Nov	AEC-7R C10 082715 (21237086)	866.00	872.98	-6.98	8/27/2015	LTM-23 pg 96	
C-2737	1.023	1.025	1.022	0.001	6	Aug - Oct	C-2737 C27 012715 (21237046)	688.85	689.78	-0.93	1/27/2015	LTM-22 pg 108	
ERDA-9	1.071	1.073	1.070	0.001	6	Aug - Oct	ERDA-9 C20 052715 (21237055)	717.20	717.81	-0.61	5/27/2015	LTM-23 pgs 43-44	
H-2b2	1.009	1.011	1.010	-0.001	6	Aug - Oct	H-2b2 C13 121714 (21237090)	635.50	635.50	0.00	12/17/2014	LTM-22 pg 78	
H-3b2	1.017	1.019	1.025	-0.008	6	Aug - Oct	H-3b2 C21 012715 (21237040)	670.60	687.10	-16.50	1/27/2015	LTM-22 pg 107	
H-4bR	1.027	1.029	1.025	0.002	7	Aug - Nov	H-4bR C11 011415 (21237060)	507.90	507.54	0.36	1/14/2015	LTM-22 pg 96	
H-5b	1.083	1.085	1.087	-0.004	6	Aug - Oct	H-5b C17 022415 (21237033)	909.22	909.22	0.00	2/24/2015	LTM-22 pg 125	
H-6bR	1.036	1.038	1.036	0.000	6	Aug - Oct	H-6bR C09 121014 (21237075)	616.60	616.58	0.02	12/10/2014	LTM-22 pg 75	
H-7b1	1.007	1.009	1.007	0.000	6	Aug - Oct	H-7b1 C20 121714 (21237008)	269.90	269.13	0.77	12/17/2014	LTM-22 pg 79	
H-9bR	1.002	1.004	1.002	0.000	6	Aug - Oct	H-9bR C9 041515 (21237042), H-9bR C10 100615 (2134011)	660.54	660.54	0.00	4/15/15, 10/6/15	LTM-23 pgs 24, 125	
H-10c	1.095	1.097	1.094	0.001	6	Aug - Oct	H-10c C17 012715 (21237016), H-10cR C01 102215 (21237013)	1372.10	1371.90	0.20	1/27/15, 10/22/15	LTM-22 pg 106, LTM-24 pg 6	
H-11b4R	1.076	1.078	1.075	0.001	6	Aug - Oct	H-11b4R C8 120314 (21237070), H-11b4R C9 092915 (21237080)	735.85	735.85	0.00	12/3/14, 9/29/15	LTM-22 pg 66, LTM-23 pg 117	
H-12R	1.106	1.108	1.040	0.066	5	Oct - Dec	H-12R C07 090215 (21237085)	835.80	837.67	-1.87	9/2/2015	LTM-23 pg 99	2014 value was noted as not being representative of formation water
H-15R	1.117	1.119	1.116	0.001	6	Aug - Oct	H-15R C16 033115 (21237072)	872.50	872.57	-0.07	3/31/2015	LTM-23 pg 8	
H-16	1.052	1.034	1.033	-0.001	6	Aug - Oct	H-16 C09 070115 (21237087), H-16 C10 091115 (21237087)	715.10	715.10	0.00	7/1/15, 9/11/15	LTM-23 pgs 60, 115	
H-17	1.131	1.133	1.132	-0.001	6	Aug - Oct	H-17 C15 041515 (2125021)	719.93	719.93	0.00	1/14/2015	LTM-22 pg 97, LTM-23 pg 25	
H-19b0	1.064	1.066	1.065	-0.001	6	Aug - Oct	H-19b0 C20 022515 (21237044)	754.00	753.49	0.51	2/25/2015	LTM-22 pg 129	
IMC-461	1.002	1.004	0.994	0.008	6	Sept - Nov	IMC-461 C28 121014 (21237064), IMC-461 C29 090415 (21237076)	376.50	376.10	0.40	12/10/14, 9/4/15	LTM-22 pg 74, LTM-23 pg 100	
SNL-1	1.028	1.030	1.028	0.000	6	Aug - Oct	SNL-1 C27 011315 (21237030)	612.90	612.23	0.67	1/13/2015	LTM-22 pg 91	
SNL-2	1.006	1.008	1.008	-0.002	6	Aug - Oct	SNL-2 C32 011315 (21237056)	470.70	470.69	0.01	1/13/2015	LTM-22 pg 93	
SNL-3	1.026	1.028	1.025	0.001	6	Aug - Oct	SNL-3 C18 011315 (21237032)	766.50	766.19	0.31	1/13/2015	LTM-22 pg 92	
SNL-5	1.007	1.009	1.006	0.001	6	Aug - Oct	SNL-5 C27 011415 (21237089), SNL-5 C28 052715 (21237039)	649.00	648.84	0.16	1/14/15, 5/27/15	LTM-22 pg 100, LTM-23 pgs 42-43	
SNL-6	1.244	1.246	1.244	0.000	6	Aug - Oct	SNL-6 C18 011315 (21237012)	1338.20	1338.03	0.17	1/13/2015	LTM-22 pg 90	
SNL-8	1.093	1.095	1.093	0.000	6	Aug - Oct	SNL-8 C37 121714 (21225019)	969.70	969.70	0.00	12/17/2014	LTM-22 pg 76	
SNL-9	1.016	1.018	1.016	0.000	4	Nov - Dec	SNL-9 C29 110215 (21237067)	567.20	567.20	0.00	11/2/2015	LTM-24 pg 8	
SNL-10	1.008	1.010	1.008	0.000	6	Aug - Nov	SNL-10 C21 100814 (21237067), SNL-10 C22 092915 (21237083)	613.50	613.46	0.04	10/8/14, 9/29/15	LTM-22 pg 27, LTM-23 pg 119	
SNL-12	1.005	1.007	1.005	0.000	6	Aug - Oct	SNL-12 C20 012715 (21237034)	570.90	570.68	0.22	1/27/2015	LTM-22 pg 104	
SNL-13	1.023	1.025	1.02	0.003	6	Aug - Oct	SNL-13 C29 021215 (21237083), SNL-13 C24 052715 (21237048)	401.00	400.62	0.38	2/12/15, 5/27/15	LTM-22 pg 122, LTM-23 pg 44	
SNL-14	1.042	1.044	1.044	-0.002	6	Aug - Oct	SNL-14 C30 011415 (21237082)	668.95	668.95	0.00	1/14/2015	LTM-22 pg 98	
SNL-15	1.229	1.231	1.228	0.001	6	Aug - Oct	SNL-15 C26 012715 (21237037)	922.18	922.18	0.00	1/27/2015	LTM-22 pg 106	
SNL-16	1.012	1.014	1.01	0.002	6	Oct - Dec	SNL-16 C23 090215 (21237005), SNL-16 C24 110915 (21237005)	207.86	207.86	0.00	9/2/15, 11/9/15	LTM-23 pg 99, LTM-24 pg 22	
SNL-17A	1.007	1.009	1.005	0.002	6	Aug - Oct	SNL-17 C21 120414 (21237007), SNL-17 C22 092915 (21225017)	349.60	349.93	-0.33	12/4/14, 9/29/15	LTM-22 pg 72, LTM-23 pg 116-117	
SNL-18	1.007	1.009	1.007	0.000	6	Aug - Oct	SNL-18 C26 052715 (21237027)	549.30	549.30	0.00	5/27/2015	LTM-23 pg 42	
SNL-19	1.003	1.005	1.004	-0.001	6	Aug - Oct	SNL-19 C18 011315 (21225020)	355.10	354.19	0.91	1/13/2015	LTM-22 pg 94	
WIPP-11	1.036	1.038	1.036	0.000	6	Aug - Oct	WIPP-11 C27 012815 (21237057)	857.80	857.41	0.39	1/28/2015	LTM-22 pg 108	
WIPP-13	1.034	1.036	1.035	-0.001	6	Aug - Oct	WIPP-13 C21 033115 (21237081)	715.30	714.88	0.42	3/31/2015	LTM-23 pg 7	
WIPP-19	1.048	1.050	1.051	-0.003	6	Aug - Oct	WIPP-19 C13 060315 (21237083), WIPP-19 C14 081315 (21237064)	770.20	769.50	0.70	6/3/15, 8/13/15	LTM-23 pgs 51, 91	

Notes:

All pressure gauges are INW brand and cables are all non-vented
 Barometric data are from INW gauge - gauge - 21237000 (file - PAC-A BAR03 011415)

ft BTOC = feet below top of casing
 ft BTEC = feet below top of environmental casing
 ft BTOT = feet below top of tubing

LTM = Long-Term Monitoring

NA = Not available

The "SNL-17A" and "SNL-17" names are used interchangeably

Mid Depths are from ERMS 553781, except for AEC-7R, H-9bR, H-11b4R, and H-12R, which are from RES BDRs and/or construction diagrams

Information Only

2015 Calc Dens_Formulas

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Monitor Well	2015 Avg Calc Dens (g/cm ³)	2015 Specific Gravity (Reference: Freshwater at 70°F)	2014 Avg Calc Dens (g/cm ³)	2015 - 2014 Diff (g/cm ³)	# of Dens Averaged	2015 Timeframe of Data	Pressure Gauge File Name (Gauge SN)	Pressure Gauge Install Depth (ft BTOC/BTEC/BTOT)	Pressure Gauge Ideal Install Depth (ft BTOC/BTEC/BTOT) [ERMS 553784]	Length Off Ideal Depth (ft)	Date of Install	Installation Logbook Page	Comments/Explanations
AEC-7R	1.056	=B4/0.998	1.071	=B4-D4	5	Sept - Nov	AEC-7R C10 082715 (21237086)	86	872.98	=14-J4	4/22/15	LTM-23 pg 95	
C-2737	1.023	=B5/0.998	1.022	=B5-D5	6	Aug - Oct	C-2737 C27 012715 (21237046)	688.85	689.78	=15-J5	4/20/15	LTM-22 pg 108	
ERDA-9	1.071	=B6/0.998	1.07	=B6-D6	6	Aug - Oct	ERDA-9 C20 052715 (21237053)	717.2	717.81	=16-J6	4/21/15	LTM-23 pgs 43-44	
H-2B2	1.009	=B7/0.998	1.01	=B7-D7	6	Aug - Oct	H-2B2 C13 121714 (21237090)	635.5	635.5	=17-J7	4/19/10	LTM-22 pg 78	
H-3B2	1.017	=B8/0.998	1.025	=B8-D8	6	Aug - Oct	H-3B2 C11 012715 (21237040)	670.6	687.1	=18-J8	4/20/15	LTM-22 pg 107	
H-4R	1.027	=B9/0.998	1.025	=B9-D9	7	Aug - Nov	H-4R C11 011415 (21237090)	507.9	507.54	=19-J9	4/20/18	LTM-22 pg 96	
H-5b	1.083	=B10/0.998	1.087	=B10-D10	6	Aug - Oct	H-5b C17 022415 (21237033)	909.22	909.22	=10-110	4/20/15	LTM-22 pg 125	
H-6R	1.036	=B11/0.998	1.036	=B11-D11	6	Aug - Oct	H-6R C09 121004 (21237075)	616.6	616.58	=11-111	4/19/13	LTM-22 pg 75	
H-7b1	1.007	=B12/0.998	1.007	=B12-D12	6	Aug - Oct	H-7b1 C10 121714 (21237008)	269.9	269.13	=12-112	4/19/10	LTM-22 pg 79	
H-9BR	1.002	=B13/0.998	1.002	=B13-D13	6	Aug - Oct	H-9BR C9 041515 (21237042), H-9BR C10 100615 (21534011)	660.54	660.54	=13-113	4/15/15, 10/6/15	LTM-23 pgs 24, 125	
H-10c	1.095	=B14/0.998	1.094	=B14-D14	6	Aug - Oct	H-10c C17 012715 (21237016), H-10cR C01 102215 (21237013)	1372.1	1371.9	=14-114	1/27/15, 10/22/15	LTM-22 pg 106, LTM-24 pg 6	
H-11b4R	1.076	=B15/0.998	1.075	=B15-D15	6	Aug - Oct	H-11b4R C8 120314 (21237070), H-11b4R C9 092915 (21237080)	735.85	735.85	=15-115	12/3/14, 9/29/15	LTM-22 pg 66, LTM-23 pg 117	
H-12R	1.106	=B16/0.998	1.04	=B16-D16	5	Oct - Dec	H-12R C07 090215 (21237085)	835.8	837.67	=16-116	4/22/15	LTM-23 pg 99	2014 value was noted as not being representative of formation water
H-15R	1.117	=B17/0.998	1.116	=B17-D17	6	Aug - Oct	H-15R C16 033115 (21237072)	872.5	872.57	=17-117	4/20/14	LTM-23 pg 8	
H-16	1.032	=B18/0.998	1.033	=B18-D18	6	Aug - Oct	H-16 C09 070115 (21237087), H-16 C10 091115 (21237087)	715.1	715.1	=18-118	7/1/15, 9/11/15	LTM-23 pgs 60, 115	
H-17	1.131	=B19/0.998	1.132	=B19-D19	6	Aug - Oct	H-17 C15 041515 (21225021)	719.93	719.93	=19-119	4/20/18	LTM-22 pg 97, LTM-23 pg 25	
H-19B0	1.064	=B20/0.998	1.065	=B20-D20	6	Aug - Oct	H-19B0 C20 022515 (21237044)	54	753.49	=20-120	4/20/16	LTM-22 pg 129	
IMC-461	1.002	=B21/0.998	0.994	=B21-D21	6	Sept - Nov	IMC-461 C28 121014 (21237064), IMC-461 C29 090415 (21237076)	176.5	376.1	=21-121	12/10/14, 9/4/15	LTM-22 pg 74, LTM-23 pg 100	
SNL-1	1.028	=B22/0.998	1.028	=B22-D22	6	Aug - Oct	SNL-1 C27 011815 (21237030)	612.9	612.23	=22-122	4/20/17	LTM-22 pg 91	
SNL-2	1.006	=B23/0.998	1.008	=B23-D23	6	Aug - Oct	SNL-2 C32 011815 (21237056)	470.7	470.69	=23-123	4/20/17	LTM-22 pg 93	
SNL-3	1.026	=B24/0.998	1.025	=B24-D24	6	Aug - Oct	SNL-3 C18 011815 (21237032)	766.5	766.19	=24-124	4/20/17	LTM-22 pg 92	
SNL-5	1.007	=B25/0.998	1.006	=B25-D25	6	Aug - Oct	SNL-5 C27 011415 (21237089), SNL-5 C28 052715 (21237039)	649	648.84	=25-125	1/14/15, 5/27/15	LTM-22 pg 100, LTM-23 pgs 42-43	
SNL-6	1.244	=B26/0.998	1.244	=B26-D26	6	Aug - Oct	SNL-6 C18 011815 (21237012)	1338.2	1338.03	=26-126	4/20/17	LTM-22 pg 90	
SNL-8	1.093	=B27/0.998	1.093	=B27-D27	6	Aug - Oct	SNL-8 C37 121714 (21225019)	869.7	869.7	=27-127	4/19/10	LTM-22 pg 76	
SNL-9	1.016	=B28/0.998	1.016	=B28-D28	6	Nov - Dec	SNL-9 C29 110215 (21237067)	567.2	567.2	=28-128	4/23/10	LTM-24 pg 8	
SNL-10	1.008	=B29/0.998	1.008	=B29-D29	6	Aug - Nov	SNL-10 C21 100814 (21237067), SNL-10 C22 092915 (21237083)	613.5	613.46	=29-129	10/8/14, 9/29/15	LTM-22 pg 27, LTM-23 pg 119	
SNL-12	1.005	=B30/0.998	1.005	=B30-D30	6	Aug - Oct	SNL-12 C20 012715 (21237034)	570.9	570.68	=30-130	4/20/11	LTM-22 pg 104	
SNL-13	1.023	=B31/0.998	1.02	=B31-D31	6	Aug - Oct	SNL-13 C23 021215 (21237083), SNL-13 C24 052715 (21237048)	411	400.62	=31-131	2/12/15, 5/27/15	LTM-22 pg 122, LTM-23 pg 44	
SNL-14	1.042	=B32/0.998	1.044	=B32-D32	6	Aug - Oct	SNL-14 C30 011415 (21237082)	668.95	668.95	=32-132	4/20/18	LTM-22 pg 98	
SNL-15	1.229	=B33/0.998	1.228	=B33-D33	6	Aug - Oct	SNL-15 C26 012715 (21237037)	822.18	822.18	=33-133	4/20/11	LTM-22 pg 106	
SNL-16	1.012	=B34/0.998	1.01	=B34-D34	6	Oct - Dec	SNL-16 C23 080215 (21237005), SNL-16 C24 110915 (21237005)	207.86	207.86	=34-134	9/2/15, 11/9/15	LTM-23 pg 99, LTM-24 pg 22	
SNL-17A	1.007	=B35/0.998	1.005	=B35-D35	6	Aug - Oct	SNL-17 C21 120414 (21237007), SNL-17 C22 092915 (21225017)	349.6	349.93	=35-135	12/4/14, 9/29/15	LTM-22 pg 72, LTM-23 pg 116-117	
SNL-18	1.007	=B36/0.998	1.007	=B36-D36	6	Aug - Oct	SNL-18 C26 052715 (21237027)	549.3	549.3	=36-136	4/21/15	LTM-22 pg 42	
SNL-19	1.003	=B37/0.998	1.004	=B37-D37	6	Aug - Oct	SNL-19 C18 011815 (21225020)	355.1	354.19	=37-137	4/20/17	LTM-22 pg 94	
WIPP-11	1.036	=B38/0.998	1.036	=B38-D38	6	Aug - Oct	WIPP-11 C27 012815 (21237057)	857.8	857.41	=38-138	4/20/13	LTM-22 pg 108	
WIPP-13	1.034	=B39/0.998	1.035	=B39-D39	6	Aug - Oct	WIPP-13 C21 033115 (21237081)	715.3	714.88	=39-139	4/20/14	LTM-23 pg 7	
WIPP-19	1.048	=B40/0.998	1.051	=B40-D40	6	Aug - Oct	WIPP-19 C3 060315 (21237083), WIPP-19 C14 081315 (21237064)	770.2	769.5	=40-140	6/3/15, 8/13/15	LTM-23 pgs 51, 91	

Notes:
 All pressure gauges
 Barometric data in
 ft BTOC = feet below
 ft BTEC = feet below
 ft BTOT = feet below
 LTM = Long-Term
 NA = Not available
 The "SNL-17A" and
 Mid Depths are from

Information Only