572937

Sandia National Laboratories

Operated for the U.S. Department of Energy
By: Sandia Corporation
Carlsbad, New Mexico 88220

date: March 6, 2020

to: Records Center

from: Patricia Johnson, SNL Contractor

subject: 2019 Calculated Densities

The groundwater densities for the WIPP Culebra monitoring wells were calculated for 2019 as described in the Activity/Project Specific Procedure (SP) 9-11 *Calculation of Densities for Groundwater in WIPP Wells, Revision 3*. 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 value was divided by the pressure gauge install 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/cm^3). The individual calculated density results for each well were then averaged for a final density value.

The density data are included in the *2019 Calculated Densities.xlsx* workbook file created in Excel. Within that workbook, the worksheet *2019 Calc Dens* summarizes the resulting density values and supporting information for the calculated densities, and the worksheet *2019 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 – 2019 Avg Calc Dens (g/cm^3) – Average calculated density value for 2019
- C – 2019 Specific Gravity (Reference: Freshwater at 70°F) – Average calculated density value for 2018 divided by 0.998 g/cm^3 to represent specific gravity in reference to freshwater at 70°F
- D – 2018 Avg Calc Dens (g/cm^3) – Average calculated density value for 2018
- E – 2019 - 2018 Difference (g/cm^3) – Difference between 2019 and 2018 calculated densities (Column B - Column D)
- F – # of Dens Averaged – number of density values averaged to get the final value
- G – 2019 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 or In-Situ gauge serial number

WIPP:4.4.2.3.1:TD:QA-L Record: 541153

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- 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) – 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(s) the pressure gauge(s) was/were installed
- M – Installation Logbook Page – Reference to scientific notebook(s) and page(s) where the pressure gauge installation(s) is/are documented
- N – Comments/Explanations – Comments and/or explanations regarding data, as needed

The spreadsheet entries were verified by Amelia Hayes (8882) and Shelly Nielsen (8880).

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

- Excel workbook including the data – 2019 Calculated Densities.xls
  - Worksheet 1 – 2019 Calc Dens
  - Worksheet 2 – 2019 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-4bR
  - Worksheet 9 – H-5b
  - Worksheet 10 – H-6bR
  - Worksheet 11 – H-7b1
  - Worksheet 12 – H-9bR
  - Worksheet 13 – H-10cR
  - Worksheet 14 – H-11b4R
  - Worksheet 15 – H-12R
  - Worksheet 16 – H-15R
  - Worksheet 17 – H-16
  - Worksheet 18 – H-17
  - Worksheet 19 – H-19b0
  - Worksheet 20 – IMC-461
  - Worksheet 21 – SNL-1
  - Worksheet 22 – SNL-2
  - Worksheet 23 – SNL-3
  - Worksheet 24 – SNL-5
  - Worksheet 25 – SNL-6
  - Worksheet 26 – SNL-8
  - Worksheet 27 – SNL-9
  - Worksheet 28 – SNL-10
  - Worksheet 29 – SNL-12
  - Worksheet 30 – SNL-13
  - Worksheet 31 – SNL-14
  - Worksheet 32 – SNL-15
  - Worksheet 33 – SNL-16
  - Worksheet 34 – SNL-17
  - Worksheet 35 – SNL-18
  - Worksheet 36 – SNL-19
  - Worksheet 37 – WIPP-11
  - Worksheet 38 – WIPP-13
  - Worksheet 39 – WIPP-19
  - Worksheet 40 – WQSP-1
  - Worksheet 41 – WQSP-2
  - Worksheet 42 – WQSP-3

3. Data Qualification for Compliance Decision Analysis:

Data sources are documented in Column H (Pressure Gauge File Name (Gauge SN)), Column M (Installation Logbook Page), and in the References Section of this memorandum.

4. Software Used:

Lenovo, Intel® Core™ i7-4810MQ CPU, Windows 10 Pro, Microsoft Office 2016 Excel

5. Reviews:

Technical: Amelia Hayes, 8882
QA: Shelly Nielsen, 8880

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6. **References:**
   - Pressure gauge installation data and SNL water level data from the following scientific notebooks (package ERMS 543277):
     Long-Term Monitoring Notebook (LTM)-29
     Long-Term Monitoring Notebook (LTM)-30
     Long-Term Monitoring Notebook (LTM)-31
   - 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 2019 Calc Dens.xls
   2. Printout of Excel file worksheet 2019 Calc Dens Formulas.xls
   3. CD including the Excel file and memorandum

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2019 Calculated Densities

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Monitor Well	2019 Avg Calc Dens (g/cm^3)	2019 Specific Gravity (Reference: Freshwater at 70°F)	2018 Avg Calc Dens (g/cm^3)	2019 - 2018 Difference (g/cm^3)	# of Dens Averaged	2019 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)	Length Off Ideal Depth (ft)	Date of Install	Installation Logbook Page	Comments/Explanations
AEC-7R	1.063	1.065	1.075	-0.012	8	Aug - Nov	AEC-7R C17 061219 (21830026)	866.00	867.72	-1.72	6/12/2019	LTM-30 pg 122	
C-2737	1.022	1.024	1.022	0.000	8	Aug - Nov	C-2737 C37 072419 (21237048)	688.85	689.78	-0.93	7/24/2019	LTM-31 pg 12	
ERDA-9	1.071	1.073	1.073	-0.002	8	May - Aug	ERDA-9 C25 042919 (21237089)	717.20	717.81	-0.61	4/29/2019	LTM-30 pg 86	
H-2b2	1.013	1.015	1.011	0.002	6	Sept - Nov	H-2b2 C20 080719 (21237054), H-2b2 C21 082219 (21237059), H-2b2 C22 090519 (21237059)	634.95	635.50	-0.55	8/7/2019, 8/22/19, 9/5/19	LTM-31 pg 19, LTM-31 pg 37, LTM-31 pg 43	
H-3b2	Not Available -- Sandia ceased monitoring in Sept 2017 due to well collapse												
H-4bR	1.018	1.020	1.016	0.002	8	Aug - Nov	H-4bR C19 060619 (21237070)	507.90	507.54	0.36	6/6/2019	LTM-30 pg 118	
H-5b	1.103	1.105	1.100	0.003	8	May - Aug	H-5b C25 051719 (21237066)	889.22	909.22	-20.00	5/17/2019	LTM-30 pg 109	
H-6bR	1.037	1.039	1.033	0.004	8	Aug - Nov	H-6bR C18 070319 (21237081), H-6bR C19 080719 (21237081)	616.60	616.58	0.02	7/3/2019, 8/7/19	LTM-30 pg 145, LTM-31 pg 20	
H-7b1	1.011	1.013	1.009	0.002	8	Mar - Jun	H-7b1 C29 121718 (21237043), H-7b1 C30 053019 (21830040)	269.90	269.13	0.77	12/17/2018, 5/30/19	LTM-29 pg 122, LTM-30 pg 115	
H-9bR	1.003	1.005	1.003	0.000	8	Apr - Jul	H-9bR C17 011719 (21225020), H-9bR C18 050819 (21225020)	660.54	660.54	0.00	1/17/2019, 5/8/19	LTM-29 pg 150, LTM-30 pg 92	
H-10cR	1.085	1.087	1.079	0.006	8	Aug - Nov	H-10cR C11 070219_Append_2019-12-17_12-36-33-708.wsl (452499)	1374.10	1374.10	0.00	7/2/2019	LTM-30 pg 144	
H-11b4R	1.076	1.078	1.076	0.000	8	Aug - Nov	H-114bR C17 030719 (21534011), H-11b4R C18 091019 (21237038)	735.85	736.82	-0.97	3/7/2019, 9/10/19	LTM-30 pg 44, LTM-31 pg 45	
H-12R	1.102	1.104	1.108	-0.006	8	Aug - Nov	H-12R C14 050819 (21741068)	834.69	835.75	-1.06	5/8/2019	LTM-30 pg 92	
H-15R	1.123	1.125	1.119	0.004	8	Aug - Nov	H-15R C22 071219 (21918009)	872.50	872.57	-0.07	7/12/2019	LTM-30 pg 154	
H-16	1.030	1.032	1.031	-0.001	8	Aug - Nov	H-16 C14 030419 (21830022)	715.10	715.10	0.00	3/4/2019	LTM-30 pg 33	
H-17	1.129	1.131	1.130	-0.001	8	Aug - Nov	H-17 C24 022719 (21534014), H-17 C25 090519 (21534014)	719.93	719.93	0.00	2/27/2019, 9/5/19	LTM-30 pg 29, LTM-31 pg 43	
H-19b0	1.064	1.066	1.065	-0.001	8	Aug - Nov	H-19b0 C27 050819 (21237068)	754.00	753.49	0.51	5/8/2019	LTM-30 pg 91	
IMC-461	0.998	1.000	1.000	-0.002	8	Aug - Nov	IMC-461 C36 042919 (21830024)	376.50	376.10	0.40	4/29/2019	LTM-30 pg 83	
SNL-1	1.031	1.033	1.029	0.002	8	Aug - Nov	SNL-1 C36 062619 (21830039), SNL-1 C37 080719 (21830039)	612.90	612.23	0.67	6/26/2019, 8/7/19	LTM-30 pg 140, LTM-31 pg 20	
SNL-2	1.008	1.010	1.006	0.002	8	Aug - Nov	SNL-2 C39 052819 (21830038), SNL-2 C40 071119 (21830038)	470.70	470.69	0.01	5/28/2019, 7/11/19	LTM-30 pg 111, LTM-30 pg 150	
SNL-3	1.027	1.029	1.026	0.001	6	Aug - Nov	SNL-3 C25 080719 (21237050), SNL-3 C26 092519 (21237050)	766.50	766.19	0.31	8/7/2019, 9/24/19	LTM-31 pg 20, LTM-31 pg 64	
SNL-5	1.005	1.007	1.005	0.000	8	Aug - Nov	SNL-5 C38 042419 (21237032)	649.00	648.84	0.16	4/24/2019	LTM-30 pg 81	
SNL-6	1.243	1.245	1.246	-0.003	8	Aug - Nov	SNL-6 C25 051519_Append_2019-11-13_11-39-12-430.wsl (452208)	1328.20	1338.03	-9.83	5/15/2019	LTM-30 pg 104	
SNL-8	1.089	1.091	1.104	-0.015	8	Aug - Nov	SNL-8 C50 072319 (21918010), SNL-8 C51 090419 (21918010)	968.70	969.70	-1.00	7/23/2019, 9/4/19	LTM-31 pg 7, LTM-31 pg 42	
SNL-9	1.016	1.018	1.015	0.001	8	Jul - Nov	SNL-9 C37 061219 (21741069)	567.20	567.20	0.00	6/12/2019	LTM-30 pg 123	
SNL-10	1.009	1.011	1.009	0.000	8	Aug - Nov	SNL-10 C30 061219 (21237078)	613.50	613.46	0.04	6/12/2019	LTM-30 pg 123	
SNL-12	1.008	1.010	1.013	-0.005	8	Aug - Nov	SNL-12 C30 042419 (21237079)	570.90	570.68	0.22	4/24/2019	LTM-30 pg 81	
SNL-13	1.022	1.024	1.020	0.002	7	Aug - Nov	SNL-13 C32 080719 (21237080)	401.00	400.62	0.38	8/7/2019	LTM-31 pg 18	
SNL-14	1.045	1.047	1.045	0.000	8	Jul - Nov	SNL-14 C37 071219 (21918012), SNL-14 C38 080719 (21918012), SNL-14 C39 092519 (21918012)	668.95	668.95	0.00	7/12/2019, 8/7/19, 9/25/19	LTM-30 pg 153, LTM-31 pg 21, LTM-31 pg 64	
SNL-15	1.229	1.231	1.225	0.004	8	Aug - Nov	SNL-15 C32 111518 (21237027), SNL-15 C33 091019 (21225018)	922.18	922.18	0.00	11/15/18, 9/10/19	LTM-29 pg 110, LTM-31 pg 46	
SNL-16	1.015	1.017	1.014	0.001	8	Aug - Nov	SNL-16 C32 053019 (21237009), SNL-16 C33 080719 (21237009), SNL-16 C34 082219 (21237049)	207.86	207.86	0.00	5/30/19, 8/7/19, 8/22/19	LTM-30 pg 114, LTM-31 pg 21, LTM-31 pg 38	
SNL-17	1.012	1.014	1.007	0.005	8	Jul - Nov	SNL-17 C32 030719 (21237004), SNL-17 C33 091019 (21830040), SNL-17 C34 092419 (21225017)	349.60	349.93	-0.33	3/7/19, 9/10/19, 9/24/19	LTM-30 pg 43, LTM-31 pg 44, LTM-31 pg 64	
SNL-18	1.009	1.011	1.011	-0.002	8	Aug - Nov	SNL-18 C39 071119 (21534015)	549.30	549.30	0.00	7/11/2019	LTM-30 pg 150	
SNL-19	1.004	1.006	1.004	0.000	8	Aug - Nov	SNL-19 C27 071119 (21918008)	355.10	354.19	0.91	7/11/2019	LTM-30 pg 149	
WIPP-11	1.034	1.036	1.037	-0.003	8	May - Aug	WIPP-11 C35 042419 (21830025)	857.49	857.41	0.08	4/24/2019	LTM-30 pg 82	
WIPP-13	1.033	1.035	1.032	0.001	8	Aug - Nov	WIPP-13 C28 050819 (21237072)	715.30	714.88	0.42	5/8/2019	LTM-30 pg 91	
WIPP-19	1.059	1.061	1.057	0.002	8	Aug - Nov	WIPP-19 C24 061219 (21918011)	770.96	770.96	0.00	6/12/2019	LTM-30 pg 123	
WQSP-1	1.039	1.041			8	Apr - Nov	WQSP-1 C1 021419 (21237063)	707.00	710.50	-3.50	2/14/2019	LTM-30 pg 26	no prior calculated density values available, wells were added to monitoring network in 2019
WQSP-2	1.031	1.033			8	Apr - Nov	WQSP-2 C1 021419 (21741067)	814.00	822.00	-8.00	2/14/2019	LTM-30 pg 26	
WQSP-3	1.139	1.141			8	Apr - Nov	WQSP-3 C1 021419 (21534010)	849.00	857.00	-8.00	2/14/2019	LTM-30 pg 27	

Notes:

All pressure gauges except H-10cR and SNL-6 are INW brand and cables are all non-vented

H-10cR and SNL-6 pressure gauges are InSitu brand

Barometric data are from INW gauges - SN 21237001 and SN 21237003

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

PT = Pressure Transducer

NA = Not available

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, and WQSP wells which are from DOE-WIPP-95-2154

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2019 Calculated Densities Formulas

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Monitor Well	2019 Avg Calc Dens (g/cm^3)	2019 Specific Gravity (Reference: Freshwater at 70°F)	2018 Avg Calc Dens (g/cm^3)	2019 - 2018 Difference (g/cm^3)	# of Dens Averaged	2019 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)	Length Off Ideal Depth (ft)	Date of Install	Installation Logbook Page	Comments/Explanations
AEC-7R	1.063	=B4/0.998	1.075	=B4-D4	8	Aug - Nov	AEC-7R C17 061219 (21830026)	866	867.72	=I4-J4	43628	LTM-30 pg 122	
C-2737	1.022	=B5/0.998	1.022	=B5-D5	8	Aug - Nov	C-2737 C37 072419 (21237048)	688.85	689.78	=I5-J5	43670	LTM-31 pg 12	
ERDA-9	1.071	=B6/0.998	1.073	=B6-D6	8	May - Aug	ERDA-9 C25 042919 (21237089)	717.2	717.81	=I6-J6	43584	LTM-30 pg 86	
H-2b2	1.013	=B7/0.998	1.011	=B7-D7	6	Sept - Nov	H-2b2 C20 080719 (21237054), H-2b2 C21 082219 (21237059), H-2b2 C22 090519 (21237059)	634.95	635.5	=I7-J7	8/7/2017, 8/22/19, 9/5/19	LTM-31 pg 19, LTM-31 pg 37, LTM-31 pg 43	
H-3b2	Not Available -- Sandia ceased monitoring in Sept 2017 due to well collapse												
H-4bR	1.018	=B9/0.998	1.016	=B9-D9	8	Aug - Nov	H-4bR C19 060619 (21237070)	507.9	507.54	=I9-J9	43622	LTM-30 pg 118	
H-5b	1.103	=B10/0.998	1.1	=B10-D10	8	May - Aug	H-5b C25 051719 (21237066)	889.22	909.22	=I10-J10	43602	LTM-30 pg 109	
H-6bR	1.037	=B11/0.998	1.033	=B11-D11	8	Aug - Nov	H-6bR C18 070319 (21237081), H-6bR C19 080719 (21237081)	616.6	616.58	=I11-J11	7/3/2019, 8/7/19	LTM-30 pg 145, LTM-31 pg 20	
H-7b1	1.011	=B12/0.998	1.009	=B12-D12	8	Mar - Jun	H-7b1 C29 121718 (21237043), H-7b1 C30 053019 (21830040)	269.9	269.13	=I12-J12	12/17/2018, 5/30/19	LTM-29 pg 122, LTM-30 pg 115	
H-9bR	1.003	=B13/0.998	1.003	=B13-D13	8	Apr - Jul	H-9bR C17 011719 (21225020), H-9bR C18 050819 (21225020)	660.54	660.54	=I13-J13	1/17/2019, 5/8/19	LTM-29 pg 150, LTM-30 pg 92	
H-10cR	1.085	=B14/0.998	1.079	=B14-D14	8	Aug - Nov	H-10cR C11 070219_Append_2019-12-17_12-36-33-708.wsl (452499)	1374.1	1374.1	=I14-J14	43648	LTM-30 pg 144	
H-11b4R	1.076	=B15/0.998	1.076	=B15-D15	8	Aug - Nov	H-114bR C17 030719 (21534011), H-11b4R C18 091019 (21237038)	735.85	736.82	=I15-J15	3/7/2019, 9/10/19	LTM-30 pg 44, LTM-31 pg 45	
H-12R	1.102	=B16/0.998	1.108	=B16-D16	8	Aug - Nov	H-12R C14 050819 (21741068)	834.69	835.75	=I16-J16	43593	LTM-30 pg 92	
H-15R	1.123	=B17/0.998	1.119	=B17-D17	8	Aug - Nov	H-15R C22 071219 (21918009)	872.5	872.57	=I17-J17	43658	LTM-30 pg 154	
H-16	1.03	=B18/0.998	1.031	=B18-D18	8	Aug - Nov	H-16 C14 030419 (21830022)	715.1	715.1	=I18-J18	43528	LTM-30 pg 33	
H-17	1.129	=B19/0.998	1.13	=B19-D19	8	Aug - Nov	H-17 C24 022719 (21534014), H-17 C25 090519 (21534014)	719.93	719.93	=I19-J19	2/27/2019, 9/5/19	LTM-30 pg 29, LTM-31 pg 43	
H-19b0	1.064	=B20/0.998	1.065	=B20-D20	8	Aug - Nov	H-19b0 C27 050819 (21237068)	754	753.49	=I20-J20	43593	LTM-30 pg 91	
IMC-461	0.998	=B21/0.998	1	=B21-D21	8	Aug - Nov	IMC-461 C36 042919 (21830024)	376.5	376.1	=I21-J21	43584	LTM-30 pg 83	
SNL-1	1.031	=B22/0.998	1.029	=B22-D22	8	Aug - Nov	SNL-1 C36 062619 (21830039), SNL-1 C37 080719 (21830039)	612.9	612.23	=I22-J22	6/26/2019, 8/7/19	LTM-30 pg 140, LTM-31 pg 20	
SNL-2	1.008	=B23/0.998	1.006	=B23-D23	8	Aug - Nov	SNL-2 C39 052819 (21830038), SNL-2 C40 071119 (21830038)	470.7	470.69	=I23-J23	5/28/2019, 7/11/19	LTM-30 pg 111, LTM-30 pg 150	
SNL-3	1.027	=B24/0.998	1.026	=B24-D24	6	Aug - Nov	SNL-3 C25 080719 (21237050), SNL-3 C26 092519 (21237050)	766.5	766.19	=I24-J24	8/7/2019, 9/24/19	LTM-31 pg 20, LTM-31 pg 64	
SNL-5	1.005	=B25/0.998	1.005	=B25-D25	8	Aug - Nov	SNL-5 C38 042419 (21237032)	649	648.84	=I25-J25	43579	LTM-30 pg 81	
SNL-6	1.243	=B26/0.998	1.246	=B26-D26	8	Aug - Nov	SNL-6 C25 051519_Append_2019-11-13_11-39-12-430.wsl (452208)	1328.2	1338.03	=I26-J26	43600	LTM-30 pg 104	
SNL-8	1.089	=B27/0.998	1.104	=B27-D27	8	Aug - Nov	SNL-8 C50 072319 (21918010), SNL-8 C51 090419 (21918010)	968.7	969.7	=I27-J27	7/23/2019, 9/4/19	LTM-31 pg 7, LTM-31 pg 42	
SNL-9	1.016	=B28/0.998	1.015	=B28-D28	8	Jul - Nov	SNL-9 C37 061219 (21741069)	567.2	567.2	=I28-J28	43628	LTM-30 pg 123	
SNL-10	1.009	=B29/0.998	1.009	=B29-D29	8	Aug - Nov	SNL-10 C30 061219 (21237078)	613.5	613.46	=I29-J29	43628	LTM-30 pg 123	
SNL-12	1.008	=B30/0.998	1.013	=B30-D30	8	Aug - Nov	SNL-12 C30 042419 (21237079)	570.9	570.68	=I30-J30	43579	LTM-30 pg 81	
SNL-13	1.022	=B31/0.998	1.02	=B31-D31	7	Aug - Nov	SNL-13 C32 080719 (21237080)	401	400.62	=I31-J31	43684	LTM-31 pg 18	
SNL-14	1.045	=B32/0.998	1.045	=B32-D32	8	Jul - Nov	SNL-14 C37 071219 (21918012), SNL-14 C38 080719 (21918012), SNL-14 C39 092519 (21918012)	668.95	668.95	=I32-J32	7/12/2019, 8/7/19, 9/25/19	LTM-30 pg 153, LTM-31 pg 21, LTM-31 pg 64	
SNL-15	1.229	=B33/0.998	1.225	=B33-D33	8	Aug - Nov	SNL-15 C32 111518 (21237027), SNL-15 C33 091019 (21225018)	922.18	922.18	=I33-J33	11/15/18, 9/10/19	LTM-29 pg 110, LTM-31 pg 46	
SNL-16	1.015	=B34/0.998	1.014	=B34-D34	8	Aug - Nov	SNL-16 C32 053019 (21237009), SNL-16 C33 080719 (21237009), SNL-16 C34 082219 (21237049)	207.86	207.86	=I34-J34	5/30/19, 8/7/19, 8/22/19	LTM-30 pg 114, LTM-31 pg 21, LTM-31 pg 38	
SNL-17	1.012	=B35/0.998	1.007	=B35-D35	8	Jul - Nov	SNL-17 C32 030719 (21237004), SNL-17 C33 091019 (21830040), SNL-17 C34 092419 (21225017)	349.6	349.93	=I35-J35	3/7/19, 9/10/19, 9/24/19	LTM-30 pg 43, LTM-31 pg 44, LTM-31 pg 64	
SNL-18	1.009	=B36/0.998	1.011	=B36-D36	8	Aug - Nov	SNL-18 C39 071119 (21534015)	549.3	549.3	=I36-J36	43657	LTM-30 pg 150	
SNL-19	1.004	=B37/0.998	1.004	=B37-D37	8	Aug - Nov	SNL-19 C27 071119 (21918008)	355.1	354.19	=I37-J37	43657	LTM-30 pg 149	
WIPP-11	1.034	=B38/0.998	1.037	=B38-D38	8	May - Aug	WIPP-11 C35 042419 (21830025)	857.49	857.41	=I38-J38	43579	LTM-30 pg 82	
WIPP-13	1.033	=B39/0.998	1.032	=B39-D39	8	Aug - Nov	WIPP-13 C28 050819 (21237072)	715.3	714.88	=I39-J39	43593	LTM-30 pg 91	
WIPP-19	1.059	=B40/0.998	1.057	=B40-D40	8	Aug - Nov	WIPP-19 C24 061219 (21918011)	770.96	=769.5+1.46	=I40-J40	43628	LTM-30 pg 123	
WQSP-1	1.039	=B41/0.998			8	Apr - Nov	WQSP-1 C1 021419 (21237063)	707			43510	LTM-30 pg 26	no prior calculated density values available, wells were added to monitoring network in 2019
WQSP-2	1.031	=B42/0.998			8	Apr - Nov	WQSP-2 C1 021419 (21741067)	814			43510	LTM-30 pg 26	
WQSP-3	1.139	=B43/0.998			8	Apr - Nov	WQSP-3 C1 021419 (21534010)	849			43510	LTM-30 pg 27	

Notes:
All pressure gauges except H-10cR and SNL-6 are INW brand and cables are all non-vented
H-10cR and SNL-6 pressure gauges are InSitu brand
Barometric data are from INW gauges - SN 21237001 and SN 21237003
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
PT = Pressure Transducer
NA = Not available
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, and WQSP wells which are from DOE-WIPP-95-2154

Information Only