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Sandia National Laboratories
Operated for the U.S. Department of Energy
by
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Carlsbad, New Mexico 88220

date: January 13, 2012

to: Records Center

from: Patricia Johnson, SNL Contractor

subject: 2011 Calculated Densities

The groundwater densities for the WIPP Culebra monitoring wells were calculated for 2011 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 the 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 Troll 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 *2011 Calc Densities.xlsx* spreadsheet file created in Excel. Within that spreadsheet, the worksheet *2011 Calc Dens* summarizes the resulting density values and supporting information for the calculated densities, and the worksheet *2011 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 Troll pressure data. The columns in the worksheets and their contents are described below:

- A – Monitor Well – Well name
- B – 2011 Avg Calc Dens (g/cm^3) – Average Calculated Density Value for 2011
- C – 2010 Avg Calc Dens (g/cm^3) – Average Calculated Density Value for 2010
- D – 2011 - 2010 Diff – Difference between 2011 and 2010 densities (Column B - Column C)
- E – # of Dens Averaged – number of density values averaged to get the final value

- F – Troll and Cable Type – the type of Troll and cable used to collect pressure measurements
- G – 2011 Timeframe of Data – Time period for pressure data used in calculations
- H – Troll File Name(s) – File names for pressure data
- I – Troll Install Depth (ft BTOC/BTEC) – Depth below primary measuring point at which the Troll was installed
- J – Troll Ideal Install Depth (ft BTOC/BTEC) (ERMS 549564) – Mid-Culebra depth below top of casing
- K – Length Off Ideal Depth (ft) – Depth in feet that the Troll is installed below/above ideal (Column J - Column I)
- L – Date of Install – Date the Troll was installed into the well
- M – Installation Logbook Page – Reference to the logbook and page where the Troll installation was documented
- N – Comments/Explanations – Comments and/or explanations regarding data

The spreadsheet entries were verified by Dale O. Bowman II, Organization 6212.

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

- Excel spreadsheet including the data – 2011 Calc Densities.xls
  - Worksheet 1 – 2011 Calc Dens (printed copy attached)
  - Worksheet 2 – 2011 Calc Dens Formulas (printed copy attached)
  - Worksheet 3 – Baro Data
  - Worksheet 4 – AEC-7
  - 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-11b4
  - Worksheet 16 – H-12
  - 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 (Troll File Name(s)), 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: Dale O. Bowman II, 6212
QA: Shelly Nielsen, 6210

6. References:

- Troll installation data and SNL water level data from the following logbooks (package ERMS 543277):
  Long-Term Monitoring Notebook (LTM)-15
  Long-Term Monitoring Notebook (LTM)-16
- WRES 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 2011 Calc Dens.xls
2. Printout of Excel file worksheet 2011 Calc Dens Formulas.xls
3. CD including the Excel file and memorandum

2011 Calc Dens

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Monitor Well	2011 Avg Calc Dens (g/cm^3)	2010 Avg Calc Dens (g/cm^3)	2011 - 2010 Diff (g/cm^3)	# of Dens Averaged	Troll and Cable Type	2011 Timeframe of Data	Troll File Name(s)	Troll Install Depth (ft BTOC/BTEC)	Troll Ideal Install Depth (ft BTOC/BTEC) (ERMS 549564)	Length Off Ideal Depth (ft)	Date of Install	Installation Logbook Page	Comments/Explanations
AEC-7	1.069	1.076	-0.007	6	Level - non-vented	June - August	SN149041 120810 AEC-7 (C12) 2011-06-29 08.48.25.wsl, SN126697 062911 AEC-7 (C13) 2011-11-03 09.05.47.wsl	872.4	872.4	0.00	SN149041 11/10/10 SN126697 06/29/11	LTM#15 pg 36-37 LTM#16 PG 74	
C-2737	1.025	1.025	0.000	7	Level - non-vented	June - August	SN123384 111710 C-2737 (C22) 2011-06-30 08.54.55.wsl, SN146411 063011 C-2737 (C23) 2011-12-07 10.07.31.wsl	688.9	691.0	2.15	SN123384 11/17/10 SN146411 06/30/11	LTM#15 PG 41-42 LTM#16 PG 78	
ERDA-9	1.071	1.070	0.001	7	Level - non-vented	June - August	SN116299 113010 ERDA-9 (C14) 2011-08-25 09.30.45.wsl	717.2	716.8	-0.42	8/25/2011	LTM#16 PG 119	
H-2b2	1.01	1.011	-0.001	6	Level - non-vented	June - August	SN121791 111710 H-2b2 (C8) 2011-06-29 13.16.38.wsl, SN147945 062911 H-2b2 (C9) 2011-12-09 13.59.33.wsl	635.5	635.5	0.00	SN121791 11/17/10 SN147945 06/29/11	LTM#15 PG 38-39 LTM#16 PG 76-77	
H-3b2	1.039	1.041	-0.002	7	Level - non-vented	June - August	SN133569 032111 H-3b2 (C14) 2011-06-30 10.21.00.wsl, SN102920 063011 H-3b2 (C15) 2011-12-07 10.26.57.wsl	670.6	687.7	17.10	SN133569 03/21/11 SN102920 06/30/11	LTM#15 PG 206-207 LTM#16 PG 79	
H-4bR	1.015	1.016	-0.001	6	Level - non-vented	June - August	SN121033 042811 H-4bR (C6) 2011-12-09 13.41.35.wsl	507.9	504.1	-3.80	4/28/2011	LTM#16 PG 8-9	
H-5b	1.095	1.091	0.004	6	Level - non-vented	June - August	SN116350 040611 H-5b (C11) 2011-10-26 10.20.51.wsl	909.2	910.3	1.08	4/6/2011	LTM#15 PG 238-239	Actual SN # is 116305 file was named incorrectly
H-6bR	1.036	1.035	0.001	5	Level - non-vented	June - August	SN136296 053111 H-6bR (C5) 2011-12-09 12.31.49.wsl	616.6	617.5	0.90	5/31/2011	LTM#16 PG 47-48	
H-7b1	1.004	1.004	0.000	6	Level - non-vented	June - August	SN122632 053111 H-7b1 (C15) 2011-12-07 15.46.27.wsl	269.9	269.9	0.00	5/31/2011	LTM#16 PG 48-50	
H-9bR	0.994	1.005	-0.011	6	Level - non-vented	Aug - Nov	SN133569 072811 H-9bR (C2) 2011-12-07 14.10.43.wsl	640.9	660.54	19.62	07/28/11	LTM#16 Pg 97	2010 calc density from H-9c
H-10c	1.092	1.089	0.003	7	Level - non-vented	June - August	SN178126 042911 H-10c (C12) 2011-11-29 10.16.28.wsl	1372.1	1372.1	0.00	4/29/2011	LTM#16 PG 18-19	
H-11b4	1.039	1.049	-0.010	6	Level - non-vented	June - August	SN116300 042811 H-11b4 (C14) 2011-11-28 11.46.50.wsl	736.2	736.2	-0.08	4/28/2011	LTM#16 PG 11-12	
H-11b4R/H-11bR	Data Not Available Yet												
H-12	1.105	1.105	0.000	6	Level - non-vented	June - August	SN164456 053111 H-12 (C21) 2011-12-07 13.20.44.wsl	820.0	838.4	18.40	5/31/2011	LTM#16 Pg 46-47	
H-15R	1.117	1.117	0.000	7	Level - non-vented	June - August	SN121344 113010 H-15R (C8) 2011-08-25 08.36.54.wsl	872.5	872.5	0.04	11/30/2010	LTM#15 Pg 48-49	
H-16	1.035	1.035	0.000	6	Level - non-vented	June - August	SN123356 100510 H-16 (C3) 2011-07-12 10.28.31.wsl, SN128518 071211 H-16 (C4) 2011-12-09 14.26.01.wsl	715.1	715.1	-0.01	SN123356 10/05/10 SN128518 07/12/11	LTM#14 Pg 241-242 LTM#16 PG 91-92	
H-17	1.134	1.134	0.000	6	Level - non-vented	June - August	SN147947 090110 H-17 (C8) 2011-06-29 12.18.17.wsl, SN134842 062911 H-17 (C9) 2011-12-07 11.37.12.wsl	700.6	720.4	19.80	SN147947 09/01/10 SN134842 06/29/11	LTM#14 Pg 194-195 LTM#16 PG 76	
H-19b0	1.064	1.066	-0.002	7	Level - non-vented	June - August	SN123363 032211 H-19b0 (C13) 2011-08-24 13.00.42.wsl	754.0	754.0	0.00	3/22/2011	LTM#15 Pg 210	
IMC-461	0.995	1.003	-0.008	7	Level - non-vented	June - August	SN153537 030311 IMC-461 (C20) 2011-09-27 12.10.43.wsl	376.5	376.5	0.00	3/3/2011	LTM#15 Pg 173	
SNL-1	1.029	1.026	0.003	6	Level - non-vented	June - August	SN116306 060111 SNL-1 (C19) 2011-12-08 13.32.31.wsl	612.9	612.9	-0.03	6/1/2011	LTM#16 Pg 50-51	
SNL-2	1.007	1.007	0.000	7	Level - non-vented	June - August	SN143789 050411 SNL-2 (C28) 2011-12-08 11.15.44.wsl	470.7	470.7	0.00	5/4/2011	LTM#16 Pg 29-30	
SNL-3	1.026	1.026	0.000	6	Level - non-vented	June - August	SN148736 101410 SNL-3 (C13) 2011-06-29 10.42.38.wsl, SN134838 062911 SNL-3 (C14) 2011-12-08 13.11.37.wsl	766.5	766.5	0.00	SN148736 10/14/10 SN134838 06/29/11	LTM#14 Pg 276-277 LTM#16 PG 75	
SNL-5	1.007	1.006	0.001	7	Level - non-vented	June - August	SN110390 040611 SNL-5 (C17) 2011-10-26 11.57.32.wsl	649.0	649.0	0.00	4/6/2011	LTM#15 Pg 233-234	
SNL-6	1.239	1.231	0.008	5	Level - non-vented	June - August	SN144634 053111 SNL-6 (C12) 2011-12-08 14.17.57.wsl	1338.2	1338.2	0.00	5/31/2011	LTM#16 Pg 45-46	
SNL-8	1.092	1.092	0.000	6	Level - non-vented	June - August	SN129856 060111 SNL-8 (C29) 2011-12-09 10.09.56.wsl	969.7	969.7	0.00	6/1/2011	LTM#16 Pg 51-52	
SNL-9	1.016	1.016	0.000	6	Level - non-vented	June - August	SN162604 060211 SNL-9 (C23) 2011-12-08 09.43.27.wsl	567.2	567.2	0.00	6/2/2011	LTM#16 Pg 53-54	
SNL-10	1.007	1.007	0.000	6	Level - non-vented	June - August	SN162609 060211 SNL-10 (C13) 2011-12-09 13.00.54.wsl	613.5	613.5	-0.04	6/2/2011	LTM#16 Pg 54-55	
SNL-12	1.003	1.003	0.000	7	Level - non-vented	June - August	SN121047 032411 SNL-12 (C15) 2011-09-27 09.21.51.wsl	570.9	570.9	0.00	3/24/2011	LTM#15 Pg 214-215	
SNL-13	1.023	1.021	0.002	7	Level - non-vented	June - August	SN110407 030311 SNL-13 (C14) 2011-08-25 11.33.18.wsl	401.2	401.2	0.00	3/3/2011	LTM#15 Pg 171-172	
SNL-14	1.045	1.044	0.001	7	Level - non-vented	June - August	SN170831 113010 SNL-14 (C23) 2011-08-02 08.37.24.wsl, SN147216 080211 SNL-14 (C24) 2011-12-07 11.23.33.wsl	670.1	669.5	-0.58	SN170831 11/30/10 SN147216 08/02/11	LTM#15 PG 45-46 LTM#16 PG 100-101	
SNL-15	1.23	1.226	0.004	7	Level - non-vented	June - August	SN123357 113010 SNL-15 (C18) 2011-08-24 10.58.47.wsl	922.2	922.8	0.62	11/30/2010	LTM#15 Pg 51-52	
SNL-16	1.006	1.007	-0.001	7	Level - non-vented	June - August	SN122638 120710 SNL-16 (C12) 2011-08-24 13.48.07.wsl	206.3	206.3	0.00	12/7/2010	LTM#15 Pg 62	
SNL-17A	1.004	1.002	0.002	7	Level - non-vented	June - August	SN115536 111710 SNL-17 (C15) 2011-09-27 10.28.15.wsl	349.6	349.6	-0.04	11/17/2010	LTM#15 Pg 40-41	
SNL-18	1.005	1.004	0.001	7	Level - non-vented	June - August	SN148779 050411 SNL-18 (C17) 2011-12-08 12.17.00.wsl	551.3	551.2	-0.11	5/4/2011	LTM#16 Pg 31	
SNL-19	1.004	1.004	0.000	6	Level - non-vented	June - August	SN162757 060811 SNL-19 (C14) 2011-12-08 10.58.45.wsl	355.1	355.1	0.00	6/8/2011	LTM#16 Pg 65	
WIPP-11	1.036	1.035	0.001	7	Level - non-vented	June - August	SN162603 062911 WIPP-11 (C23) 2011-12-08 12.44.13.wsl	857.8	857.8	0.00	6/29/2011	LTM#16 Pg 74-75	
WIPP-13	1.041	1.042	-0.001	6	Level - non-vented	June - August	SN102927 042811 WIPP-13 (C16) 2011-10-26 12.37.36.wsl	715.3	715.3	0.00	4/28/2011	LTM#16 Pg 12-13	
WIPP-19	1.05	1.049	0.001	6	Level - non-vented	June - August	SN121359 040111 WIPP-19 (C6) 2011-09-28 10.15.24.wsl	770.2	770.2	0.00	4/1/2011	LTM#15 Pg 217-218	

Notes:

Attempts have been made to explain changes in calculated density between 2009 and 2010 = to or >0.02 g/cm^3

All Trolls are Levels Trolls and cables are all non-vented

Barometric data are from SN13500 2010-06-17 100000 P-A-C (baro8).bin, SN16053 2011-07-12 080120 P-A-C (baro 8).bin, SN16053 2011-07-14 110000 P-A-C (baro9).bin, SN11064 2010-08-31 100000 prt-a-cmp.bin

ft BTOC = feet below top of casing

ft BTEC = feet below top of environmental casing

LTM = Long-Term Monitoring

2011 Calc Dens Formulas

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Monitor Well	2011 Avg Calc Dens (g/cm^3)	2010 Avg Calc Dens (g/cm^3)	2011 - 2010 Diff (g/cm^3)	# of Dens Averaged	Troll and Cable Type	2011 Timeframe of Data	Troll File Name(s)	Troll Install Depth (ft BTOC/BTEC)	Troll Ideal Install Depth (ft BTOC/BTEC) (ERMS 549564)	Length Off Ideal Depth (ft)	Date of Install	Installation Logbook Page	Comments/Explanations
AEC-7	1.069	1.076	=B4-C4	6	Level - non-vented	June - August	SN149041 120810 AEC-7 (C12) 2011-06-29 08.48.25.wsl, SN126697 062911 AEC-7 (C13) 2011-11-03 09.05.47.wsl	872.4	872.4	=J4-I4	SN149041 11/10/10 SN126697 06/29/11	LTM#15 pg 36-37 LTM#16 PG 74	
C-2737	1.025	1.025	=B5-C5	7	Level - non-vented	June - August	SN123384 111710 C-2737 (C22) 2011-06-30 08.54.55.wsl, SN146411 063011 C-2737 (C23) 2011-12-07 10.07.31.wsl	688.85	691	=J5-I5	SN123384 11/17/10 5N146411 06/30/11	LTM#15 PG 41-42 LTM#16 PG 78	
ERDA-9	1.071	1.07	=B6-C6	7	Level - non-vented	June - August	SN116299 113010 ERDA-9 (C14) 2011-08-25 09.30.45.wsl	717.2	716.78	=J6-I6	40780	LTM#16 PG 119	
H-2b2	1.01	1.011	=B7-C7	6	Level - non-vented	June - August	SN121791 111710 H-2b2 (C8) 2011-06-29 13.16.38.wsl, SN147945 062911 H-2b2 (C9) 2011-12-09 13.59.33.wsl	635.5	635.5	=J7-I7	SN121791 11/17/10 SN147945 06/29/11	LTM#15 PG 38-39 LTM#16 PG 76-77	
H-3b2	1.039	1.041	=B8-C8	7	Level - non-vented	June - August	SN133569 032111 H-3b2 (C14) 2011-06-30 10.21.00.wsl, SN102920 063011 H-3b2 (C15) 2011-12-07 10.26.57.wsl	670.6	687.7	=J8-I8	SN133569 03/21/11 SN102920 06/30/11	LTM#15 PG 206-207 LTM#16 PG 79	
H-4bR	1.015	1.016	=B9-C9	6	Level - non-vented	June - August	SN121033 042811 H-4bR (C6) 2011-12-09 13.41.35.wsl	507.9	504.1	=J9-I9	40661	LTM#16 PG 8-9	
H-5b	1.095	1.091	=B10-C10	6	Level - non-vented	June - August	SN116350 040611 H-5b (C11) 2011-10-26 10.20.51.wsl	909.22	910.3	=J10-I10	40639	LTM#15 PG 238-239	Actual SN # is 116305 file was named incorrectly
H-6bR	1.036	1.035	=B11-C11	5	Level - non-vented	June - August	SN136296 053111 H-6bR (C5) 2011-12-09 12.31.49.wsl	616.6	617.5	=J11-I11	40694	LTM#16 PG 47-48	
H-7b1	1.004	1.004	=B12-C12	6	Level - non-vented	June - August	SN122632 053111 H-7b1 (C15) 2011-12-07 15.46.27.wsl	269.9	269.9	=J12-I12	40694	LTM#16 PG 48-50	
H-9bR	0.994	1.005	=B13-C13	6	Level - non-vented	Aug - Nov	SN133569 072811 H-9bR (C2) 2011-12-07 14.10.43.wsl	640.92	660.54	=J13-I13	40752	LTM#16 Pg 97	2010 calc density from H-9c
H-10c	1.092	1.089	=B14-C14	7	Level - non-vented	June - August	SN178126 042911 H-10c (C12) 2011-11-29 10.16.28.wsl	1372.1	1372.1	=J14-I14	40662	LTM#16 PG 18-19	
H-11b4	1.039	1.049	=B15-C15	6	Level - non-vented	June - August	SN116300 042811 H-11b4 (C14) 2011-11-28 11.46.50.wsl	736.28	736.2	=J15-I15	40661	LTM#16 PG 11-12	
H-11b4R/H-11bR	Data Not Available Yet												
H-12	1.105	1.105	=B17-C17	6	Level - non-vented	June - August	SN164456 053111 H-12 (C21) 2011-12-07 13.20.44.wsl	820	838.4	=J17-I17	40694	LTM#16 Pg 46-47	
H-15R	1.117	1.117	=B18-C18	7	Level - non-vented	June - August	SN121344 113010 H-15R (C8) 2011-08-25 08.36.54.wsl	872.5	=870.5+2.04	=J18-I18	40512	LTM#15 Pg 48-49	
H-16	1.035	1.035	=B19-C19	6	Level - non-vented	June - August	SN123356 100510 H-16 (C3) 2011-07-12 10.28.31.wsl, SN128518 071211 H-16 (C4) 2011-12-09 14.26.01.wsl	715.1	=713.5+1.59	=J19-I19	SN123356 10/05/10 SN128518 07/12/11	LTM#14 Pg 241-242 LTM#16 PG 91-92	
H-17	1.134	1.134	=B20-C20	6	Level - non-vented	June - August	SN147947 090110 H-17 (C8) 2011-06-29 12.18.17.wsl, SN134842 062911 H-17 (C9) 2011-12-07 11.37.12.wsl	700.6	720.4	=J20-I20	SN147947 09/01/10 SN134842 06/29/11	LTM#14 Pg 194-195 LTM#16 PG 76	
H-19b0	1.064	1.066	=B21-C21	7	Level - non-vented	June - August	SN123363 032211 H-19b0 (C13) 2011-08-24 13.00.42.wsl	754	754	=J21-I21	40624	LTM#15 Pg 210	
IMC-461	0.995	1.003	=B22-C22	7	Level - non-vented	June - August	SN153537 030311 IMC-461 (C20) 2011-09-27 12.10.43.wsl	376.5	376.5	=J22-I22	40605	LTM#15 Pg 173	
SNL-1	1.029	1.026	=B23-C23	6	Level - non-vented	June - August	SN116306 060111 SNL-1 (C19) 2011-12-08 13.32.31.wsl	612.9	612.87	=J23-I23	40695	LTM#16 Pg 50-51	
SNL-2	1.007	1.007	=B24-C24	7	Level - non-vented	June - August	SN143789 050411 SNL-2 (C28) 2011-12-08 11.15.44.wsl	470.7	470.7	=J24-I24	40667	LTM#16 Pg 29-30	
SNL-3	1.026	1.026	=B25-C25	6	Level - non-vented	June - August	SN148736 101410 SNL-3 (C13) 2011-06-29 10.42.38.wsl, SN134838 062911 SNL-3 (C14) 2011-12-08 13.11.37.wsl	766.5	766.5	=J25-I25	SN148736 10/14/10 SN134838 06/29/11	LTM#14 Pg 276-277 LTM#16 PG 75	
SNL-5	1.007	1.006	=B26-C26	7	Level - non-vented	June - August	SN110390 040611 SNL-5 (C17) 2011-10-26 11.57.32.wsl	649	649	=J26-I26	40639	LTM#15 Pg 233-234	
SNL-6	1.239	1.231	=B27-C27	5	Level - non-vented	June - August	SN144634 053111 SNL-6 (C12) 2011-12-08 14.17.57.wsl	1338.2	1338.2	=J27-I27	40694	LTM#16 Pg 45-46	
SNL-8	1.092	1.092	=B28-C28	6	Level - non-vented	June - August	SN129856 060111 SNL-8 (C29) 2011-12-09 10.09.56.wsl	969.7	969.7	=J28-I28	40695	LTM#16 Pg 51-52	
SNL-9	1.016	1.016	=B29-C29	6	Level - non-vented	June - August	SN162604 060211 SNL-9 (C23) 2011-12-08 09.43.27.wsl	567.2	567.2	=J29-I29	40696	LTM#16 Pg 53-54	
SNL-10	1.007	1.007	=B30-C30	6	Level - non-vented	June - August	SN162609 060211 SNL-10 (C13) 2011-12-09 13.00.54.wsl	613.5	613.46	=J30-I30	40696	LTM#16 Pg 54-55	
SNL-12	1.003	1.003	=B31-C31	7	Level - non-vented	June - August	SN121047 032411 SNL-12 (C15) 2011-09-27 09.21.51.wsl	570.9	570.9	=J31-I31	40626	LTM#15 Pg 214-215	
SNL-13	1.023	1.021	=B32-C32	7	Level - non-vented	June - August	SN110407 030311 SNL-13 (C14) 2011-08-25 11.33.18.wsl	401.16	401.16	=J32-I32	40605	LTM#15 Pg 171-172	
SNL-14	1.045	1.044	=B33-C33	7	Level - non-vented	June - August	SN170831 113010 SNL-14 (C23) 2011-08-02 08.37.24.wsl, SN147216 080211 SNL-14 (C24) 2011-12-07 11.23.33.wsl	670.08	669.5	=J33-I33	SN170831 11/30/10 SN147216 08/02/11	LTM#15 PG 45-46 LTM#16 PG 100-101	
SNL-15	1.23	1.226	=B34-C34	7	Level - non-vented	June - August	SN123357 113010 SNL-15 (C18) 2011-08-24 10.58.47.wsl	922.18	922.8	=J34-I34	40512	LTM#15 Pg 51-52	
SNL-16	1.006	1.007	=B35-C35	7	Level - non-vented	June - August	SN122638 120710 SNL-16 (C12) 2011-08-24 13.48.07.wsl	206.3	206.3	=J35-I35	40519	LTM#15 Pg 62	
SNL-17A	1.004	1.002	=B36-C36	7	Level - non-vented	June - August	SN115536 111710 SNL-17 (C15) 2011-09-27 10.28.15.wsl	349.6	349.56	=J36-I36	40499	LTM#15 Pg 40-41	
SNL-18	1.005	1.004	=B37-C37	7	Level - non-vented	June - August	SN148779 050411 SNL-18 (C17) 2011-12-08 12.17.00.wsl	551.3	551.19	=J37-I37	40667	LTM#16 Pg 31	
SNL-19	1.004	1.004	=B38-C38	6	Level - non-vented	June - August	SN162757 060811 SNL-19 (C14) 2011-12-08 10.58.45.wsl	355.1	355.1	=J38-I38	40702	LTM#16 Pg 65	
WIPP-11	1.036	1.035	=B39-C39	7	Level - non-vented	June - August	SN162603 062911 WIPP-11 (C23) 2011-12-08 12.44.13.wsl	857.8	857.8	=J39-I39	40723	LTM#16 Pg 74-75	
WIPP-13	1.041	1.042	=B40-C40	6	Level - non-vented	June - August	SN102927 042811 WIPP-13 (C16) 2011-10-26 12.37.36.wsl	715.3	715.3	=J40-I40	40661	LTM#16 Pg 12-13	
WIPP-19	1.05	1.049	=B41-C41	6	Level - non-vented	June - August	SN121359 040111 WIPP-19 (C6) 2011-09-28 10.15.24.wsl	770.2	770.2	=J41-I41	40634	LTM#15 Pg 217-218	

Notes:

Attempts have been made to explain changes in calculated density between 2009 and 2010 = to or >0.02 g/cm^3

All Trolls are Levels Trolls and cables are all non-vented

Barometric data are from SN13500 2010-06-17 100000 P-A-C (baro8).bin, SN16053 2011-07-12 080120 P-A-C (baro 8).bin, SN16053 2011-07-14 110000 P-A-C (baro9).bin, SN11064 2010-08-31 100000 prt-a-cmp.bin

ft BTOC = feet below top of casing

ft BTEC = feet below top of environmental casing

LTM = Long-Term Monitoring