

557405



Sandia National Laboratories

Operated for the U.S. Department of Energy

by

Sandia Corporation

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date: May 9, 2012

to: Records Center

from: Patricia Johnson, SNL Contractor

A handwritten signature in black ink, appearing to read 'Patricia Johnson'.

subject: 2004 Calculated Densities

The groundwater densities for the WIPP Culebra monitoring wells were calculated for 2004 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 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 fresh 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 *2004 Calc Dens.xlsx* spreadsheet file created in Excel. Within that spreadsheet, the worksheet *2004 Calc Dens* summarizes the resulting density values and supporting information for the calculated densities. 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 – Well ID – Well name
- B – 2004 Avg Calc Dens (g/cm³) – Average Calculated Density Value for 2004
- C – # of Dens Averaged – number of density values averaged to get the final value
- D – Timeframe of Data – Time period for pressure data used in calculations
- E – Troll File Name(s) – File names for pressure data
- F – Troll Install Depth (ft BTOC/T) – Depth below primary measuring point at which the Troll was installed, below top of casing or tubing
- G – Date of Install – Date the Troll was installed into the well

WIPP:1.4.2.3:TD:QA1:REPORT:541153

Information Only

- H – Installation Logbook Page – Reference to the logbook and page where the Troll installation was documented
- I – 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 – 2004 Calc Dens.xlsx
 - Worksheet 1 – 2004 Calc Dens (printed copy attached)
 - Worksheet 2 – C-2737
 - Worksheet 3 – ERDA-9
 - Worksheet 4 – H-2b2
 - Worksheet 5 – H-3b2
 - Worksheet 6 – H-4b
 - Worksheet 7 – H-5b
 - Worksheet 8 – H-6b
 - Worksheet 9 – H-7b1
 - Worksheet 10 – H-9c
 - Worksheet 11 – H-15
 - Worksheet 12 – H-17
 - Worksheet 13 – IMC-461
 - Worksheet 14 – P-17
 - Worksheet 15 – SNL-1
 - Worksheet 16 – SNL-2
 - Worksheet 17 – SNL-3
 - Worksheet 18 – SNL-5
 - Worksheet 19 – SNL-9
 - Worksheet 20 – SNL-12
 - Worksheet 21 – WIPP-11
 - Worksheet 22 – WIPP-13
 - Worksheet 23 – WIPP-25
 - Worksheet 24 – WIPP-26
 - Worksheet 25 – WIPP-30

3. Data Qualification for Compliance Decision Analysis:

Data sources provided in Column E (Troll File Name(s)), F (Troll Install Depth (ft BTOC/T)), G (Date of Install), and H (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 file names, installation data, and SNL water level data are from the following scientific notebooks (package ERMS 543277):
Troll Logbook 2 – Troll-2
Troll Logbook 3 – Troll-3
Magenta Hydrology Notebook 5 – Magenta-5
Magenta Hydrology Notebook 6 – Magenta-6
WIPP Site Well Testing 2 – WSWT-2
WIPP Site Well Testing 3 – WSWT-3
WIPP Site Well Testing 4 – WSWT-4
- WRES Water Level Data submitted to SNL in monthly memoranda (package ERMS 525178)

7. List of Attachments:

1. Printout of Excel file worksheet 2004 Calc Dens.xlsx
2. CD including the Excel file and memorandum

2004 Calculated Densities

A	B	C	D	E	F	G	H	I
Well ID	2004 Avg Calc Dens (g/cm ³)	# of Dens Averaged	Timeframe of Data	Troll File Name(s)	Troll Install Depth (ft BTOC/T)	Date of Install	Installation Logbook Page	Comments/Explanations
C-2737	1.024	9	Apr - Nov 2004	SN12807 2004-03-23 111413 C-2737(C5).bin, SN12807 2004-10-13 113313 C-2737(C6).bin	699.6	3/21/2004	WSWT #2, 133	
ERDA-9	1.059	7	Feb - Sept 2004	SN12473 2004-01-22 152424 ERDA-9(C).bin	475.0	1/22/2004	Troll #3, 2	
H-2b2	1.021	5	Aug - Oct 2004	SN07861 2004-07-19 125701 H-2b2(C2).bin	450.0	7/19/2004	Magenta #6, 99	
H-3b2	1.045	6	Feb - Aug 2004	SN11235 2004-01-25 124616 H-3b2(C).bin	500.0	1/25/2004	Troll #3, 3	
H-4b	1.020	4	Nov - Dec 2004	SN17716 2004-11-10 144039 H-4b (C1).bin	445.0	11/10/2004	Troll #3, 127	
H-5b	1.100	8	May - Dec 2004	SN00805 2004-04-15 114624 H-5b(C).bin	801.1	4/15/2004	Troll #3, 37	
H-6b	1.047	8	Mar - Sept 2004	SN11306 2004-02-19 090718 H-6b(C).bin	394.6	5/8/2003	Troll #2, 42	
				SN11306 2004-07-02 102749 H-6b(C1).bin	395	7/2/2004	WSWT #3, 136	
H-7b1	1.014	3	Nov - Dec 2004	SN11306 2004-10-18 132732 H-7b1(C2).bin	275.0	10/18/2004	Troll #3, 115	
H-9c	1.027	3	Oct - Dec 2004	SN11336 2004-09-14 092958 H-9c(C6).bin	500.0	6/30/2004	WSWT #3, 131	
H-15	1.091	5	Jan - Feb 2004	SN04580 2004-01-07 145025 H-15(C).bin	600.0	1/7/2004	Magenta #5, 126	
H-17	1.185	1	Aug 2004	SN16771 2004-08-09 135014 H-17(C).bin	450.0	8/9/2004	Troll #3, 68	
IMC-461	1.020	8	Aug - Nov 2004	SN08268 2004-07-02 085506 IMC-461(C4).bin	375.0	7/2/2004	WSWT #3, 135	
P-17	1.098	8	Feb - Jun 2004	SN00568 2004-01-27 092728 P-17(c).BIN	385.0	1/27/2004	Troll #3, 3	
SNL-1	1.046	6	Jul - Sept 2004	SN11134 2004-06-14 124520 SNL-1(C1).bin, SN11134 2004-09-10 121032 SNL-1(C2).bin	500.8	6/14/2004	WSWT #3, 126	
SNL-2	1.009	8	Mar - Jul 2004	SN13562 2004-02-19 110743 SNL-2(C10).bin	475.0	2/19/2004	Troll #3, 21	
SNL-3	1.027	7	May - Aug 2004	SN11028 2004-05-03 111511 SNL-3(C2).bin	600.0	5/3/2004	WSWT #3, 42	
SNL-5	1.007	7	Sept - Dec 2004	SN04558 2004-09-10 134143 SNL-5(C3).bin	450.0	8/18/2004	Troll #3, 72	
SNL-9	1.001	7	Apr - Sept 2004	SN13590 2004-04-12 095214 SNL-9(C4).bin	569.0	4/12/2004	Troll #3, 34	
SNL-12	1.000	7	Apr - Jul 2004	SN04558 2004-04-12 115158 SNL-12(C1).bin	490.0	4/12/2004	Troll #3, 35	
WIPP-11	1.003	1	Dec 2004	SN17337 2004-12-08 141221 WIPP-11(C4).bin	755.4	9/24/2004	WSWT #4, 105	
WIPP-13	1.063	3	Apr - May 2004	SN00819 2004-04-20 100020 WIPP-13(C).bin	445.0	2/23/2004	Troll #3, 18	
WIPP-25	1.007	4	Nov - Dec 2004	SN17457 2004-10-19 143756 WIPP-25(C6).bin	445.0	10/19/2004	WSWT #4, 150	
WIPP-26	1.119	4	Oct - Dec 2004	SN08276 2004-09-13 105120 WIPP-26(C1).bin, SN08276 2004-10-18 121919 WIPP-26(C2).bin	165.0	9/13/04, 10/18/04	Troll #3, 85 and 114	
WIPP-30	1.035	4	Nov - Dec 2004	SN04580 2004-10-14 132515 WIPP-30(C1).bin	400.0	10/14/2004	Troll #3, 112	

Notes:
ft BTOC = feet below top of casing
ft BTOT = feet below top of tubing
BGS = below ground surface
All Troll depths are presented as documented in the SN, universal compensation for Troll depth to sensor have not been made
All Trolls utilized were Mini Trolls on Vented Cables

NA = not applicable/available
LTM = Long-Term Monitoring
WSWT = WIPP Well Site Testing

Information Only