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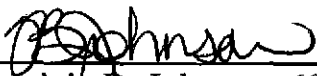
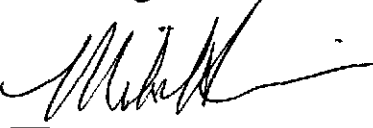

**Routine Calculations Report
In Support of Task 6 of AP-114**

**Potentiometric Surface, Adjusted to Equivalent Freshwater Heads, of the
Culebra Dolomite Member of the Rustler Formation near the WIPP Site,
March-April 2004**

**(AP-114: Analysis Plan for Evaluation and Recalibration of Culebra
Transmissivity Fields, ERMS# 537208)**

WBS 1.4.2.3

Report Date: September 29, 2005

Author:	 _____ Patricia B. Johnson, 6822 Consulting Scientist	<u>10/3/05</u> Date
Technical Review:	 _____ Mike Hillesheim, 6822 Sandia National Laboratories	<u>10/3/05</u> Date
QA Review:	 _____ Steve Davis Carlsbad Programs Group	<u>10/3/05</u> Date

Title of Calculation:

Potentiometric Surface, Adjusted to Equivalent Freshwater Heads, of the Culebra Dolomite Member of the Rustler Formation near the WIPP Site, March-April 2004 in support of Task 6 of AP-114.

1. Planning Document:

AP-114: Analysis Plan for Evaluation and Recalibration of Culebra Transmissivity Fields, ERMS #537208

2. Description of Calculation Process:

A. The available freshwater head data for WIPP wells completed in the Culebra Dolomite Member of the Rustler Formation to be used in the Sitewide MODFLOW model of the Culebra Dolomite at the WIPP for March and April 2004 were calculated in CUL2004, a spreadsheet created in Excel. The CUL2004 spreadsheet includes the supporting data and calculations utilized in the development of freshwater heads to create the March-April 2004 Culebra potentiometric surface map. The CUL2004FORM spreadsheet includes the formulas contained in the CUL2004 spreadsheet cells. Each column in the CUL2004 and CUL2004FORM spreadsheets and its contents are described below:

- A – Well ID – Well name
- B – State X (Easting) – State Plane location coordinate provided in Gonzales, SAND88-1065
- C – State Y (Northing) – State Plane location coordinate provided in Gonzales, SAND88-1065
- D – Site X – calculated using State Plane X (Column B - 611,500 = Site X)
- E – Site Y – calculated using State Plane Y (Column C - 424,500 = Site Y)
- F – Monument/Ground Surface Elevation (ft AMSL) – provided in Gonzales (SAND88-1065) and/or individual SAND reports (listed in the reference section)
- G – Top of Casing Elevation (ft AMSL) – provided in Gonzales (SAND88-1065) and/or individual SAND reports (listed in the reference section)
- H – Adjustment for Depth from KB to GS (ft AMSL) – adjustment from kelly bushing reference point to ground surface, provided in individual SAND reports (listed in the reference section)
- I – Adjusted March 2004 Depth to Water (ft BTOC) (SNL) – depth to water level measurement collected by SNL
- J – March 2004 Water Level Elevation (ft AMSL) (SNL) – top of casing elevation minus depth to water level measurement (Column G - Column I)
- K – Adjusted March 2004 Depth to Water (ft BTOC) (WRES) – depth to water level measurement collected by WRES
- L – March 2004 Water Level Elevation (ft AMSL) (WRES) – top of casing elevation minus depth to water level measurement (Column G – Column K)
- M – Adjusted April 2004 Depth to Water (ft BTOC) (SNL) – depth to water level measurement collected by SNL
- N – April 2004 Water Level Elevation (ft AMSL) (SNL) – top of casing elevation minus depth to water level measurement (Column G – Column M)
- O – Adjusted April 2004 Depth to Water (ft BTOC) (WRES) – depth to water level measurement collected by WRES

- P – April 2004 Water Level Elevation (ft AMSL) (WRES) – top of casing elevation minus depth to water level measurement (Column G – Column O)
 - Q – Depth to Middle/Center of Culebra (ft BGS) – provided in individual SAND reports (top of Culebra – (top of Culebra-bottom of Culebra)/2) (listed in the reference section)
 - R – Source of Depth to Culebra Center – reference information for depth to center of culebra values
 - S – Center of Culebra Elevation (ft AMSL) – monument/ground surface elevation minus the depth to Culebra (Column F – Column Q)
 - T – March 2004 Head (ft BTOC) (SNL) – March 2004 SNL water level elevation minus center of Culebra elevation (Column J – Column S)
 - U – March 2004 Head (ft BTOC) (WRES) – March 2004 WRES water level elevation minus center of Culebra elevation (Column L – Column S)
 - V – April 2004 Head (ft BTOC) (SNL) – April 2004 SNL water level elevation minus center of Culebra elevation (Column N – Column S)
 - W – April 2004 Head (ft BTOC) (WRES) – April 2004 WRES water level elevation minus center of Culebra elevation (Column P – Column S)
 - X – Density Measurement Date/Source – reference for the time period and source of the surveyed density measurement, specific gravity, or calculated density value (listed in the reference section)
 - Y – Density Measurement Result (g/cc) – pressure density survey, calculated density, or specific gravity measurement value used to calculate the freshwater head for each well
 - Z – March 2004 Freshwater Head (ft AMSL) (SNL) – SNL March 2004 head multiplied by the density measurement plus the center of Culebra elevation ((Column T*Column Y)+Column S)
 - AA – March 2004 Freshwater Head (ft AMSL) (WRES) – WRES March 2004 head multiplied by the density measurement plus the center of Culebra elevation ((Column U*Column Y)+Column S)
 - AB – April 2004 Freshwater Head (ft AMSL) (SNL) – SNL April 2004 head multiplied by the density measurement plus the center of Culebra elevation ((Column V*Column Y)+Column S)
 - AC – April 2004 Freshwater Head (ft AMSL) (WRES) – WRES April 2004 head multiplied by the density measurement plus the center of Culebra elevation ((Column W*Column Y)+Column S)
 - AD – Freshwater Head to be Used for Model (ft AMSL) – the freshwater head value used for the potentiometric surface map (Column Z, AA, AB, or AC) (Note: The freshwater head values from columns AC, AA, and AB, respectively, were used in order based on availability. Data in column Z were not used for the potentiometric surface map, and were only included for data comparison purposes.)
- B.** A potentiometric surface map depicting the freshwater heads (ft AMSL) was prepared utilizing the data spreadsheet referenced in item A. The potentiometric surface map contours were developed using the software program Surfer, version 8.0. The parameters used in the Surfer program are as follows:
- Gridding method – Kriging

- Base map – WIPP Site Boundary
- Smoothing contours – high
- Contour interval – 5 feet

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

- Excel spreadsheet including the data – CUL2004.xls (printed copy attached)
- Excel spreadsheet including the data as formulas – CUL2004FORM worksheet in CUL2004.xls (printed copy attached)
- Contour maps – CUL2004.srf (printed copy attached)
- Supporting Surfer files – CUL2004.grd (electronic copy provided on attached CD)

4. Data Qualification for Compliance Decision Analysis:

Data sources provided below in Section 7.0, References

5. Software Used:

Microsoft Office Excel 2003 and Surfer 8.0 run on Dell OPTIPLEX GX280, Intel Pentium 4 processor under Microsoft Windows XP

6. Reviews:

Technical: Mike Hillesheim, 10/3/05

QA: Steve Davis, 10/3/05

7. References:

Location and Elevation Data Sources (Columns B, C, F, and G)

Well ID	Source of Data
All wells except those listed below separately	Compilation and Comparison of Test-Hole Location Surveys in the Vicinity of the WIPP, SAND88-1065, Record ERMS# 224121 (Note: H-10b top of casing elevation was used for H-10c)
C-2737	Basic Data Report for Drillhole C-2737 (Waste Isolation Pilot Plant – WIPP), March 2002, DOE/WIPP 01-3210
H-19b2	Basic Data Report for Drillholes on the H-19 Hydropad (Waste Isolation Pilot Plant – WIPP), SAND98-0071
IMC-461	As built well configuration and survey coordinate information included in R.L. Beauheim Memo, ERMS Package #540982
SNL-1	Basic Data Report for Drillhole SNL-1 (C-2953) (Waste Isolation Pilot Plant), August 2004, DOE/WIPP 04-3301, ERMS# 539621
SNL-2	Basic Data Report for Drillhole SNL-2 (C-2948) (Waste Isolation Pilot Plant), October 2003, DOE/WIPP 03-3290, ERMS# 539617
SNL-3	Basic Data Report for Drillhole SNL-3 (C-2949) (Waste Isolation Pilot Plant), May 2004, DOE/WIPP 03-3294, ERMS# 539619
SNL-9	Basic Data Report for Drillhole SNL-9 (C-2950) (Waste Isolation Pilot Plant), December 2003, DOE/WIPP 03-3291, ERMS# 539618
SNL-12	Basic Data Report for Drillhole SNL-12 (C-2954) (Waste Isolation Pilot Plant), April 2004, DOE/WIPP 03-3295, ERMS# 539620
WQSP-1, WQSP-2, WQSP-3, WQSP-4, WQSP-5, WQSP-6	Basic Data Report for WQSP-1, WQSP-2, WQSP-3, WQSP-4, WQSP-5, WQSP-6, WQSP-6a, DOE/WIPP-95-2154, ERMS# 243329

* The site coordinates (X and Y) were calculated from state plane coordinates as described in 2.A. above. Monument/Ground Surface and Top of Casing elevations were taken directly from the above sources.

Adjustments for Depth and Culebra Interval Data Sources (Columns H and Q)

Well ID	Source of Data
AEC-7	Interpretations of Single-Well Hydraulic Tests of the Rustler Formation Conducted in the Vicinity of the Waste Isolation Pilot Plant, 1988-1989, SAND89-0869
C-2737	Basic Data Report for Drillhole C-2737 (Waste Isolation Pilot Plant – WIPP), March 2002, DOE/WIPP 01-3210
DOE-1	Basic Data Report for Borehole DOE-1, TME 3159, WPO#42668
ERDA-9	Basic Data Report for Drillhole ERDA-9 (Waste Isolation Pilot Plant) WIPP, SAND79-0270
H-2b2	Interim Data Report of the Geohydrology of the Proposed WIPP Site Southeast New Mexico, USGS Water Resources Investigations 79-80, ERMS # 242431
H-3b2	Interim Data Report of the Geohydrology of the Proposed WIPP Site Southeast New Mexico, USGS Water Resources Investigations 79-80, ERMS # 242431
H-4b	Results of Hydrologic Tests and Water Chemistry Analyses, Wells H-4a, H-4b, and H-4c at the proposed WIPP Site, Southeastern New Mexico, USGS Water Resources Investigations 81-36, ERMS # 242987
H-5b	Results of Hydrologic Tests and Water Chemistry Analyses, Wells H-5a, H-5b, and H-5c, at the Proposed WIPP Site, Southeastern New Mexico, USGS Water Resources Investigations 82-19, ERMS # 242332
H-6b	Results of Hydrologic Tests and Water-Chemistry Analyses, Wells H-6a, H-6b, and H-6c at the Proposed WIPP Site, Southeastern New Mexico, USGS Water Resources Investigations 82-8, ERMS # 242623
H-7b1	Geologic and Well-Construction Data for the H-7 Borehole Complex Near the Proposed WIPP Site, Southeastern New Mexico, USGS Water-Resources Investigations 82-38, ERMS# 242437
H-9c	Geologic and Well-Construction Data for the H-9 Borehole Complex Near the Proposed WIPP Site, Southeastern New Mexico, USGS Water-Resources Investigations 82-4111, ERMS # 242314
H-10c	Geologic and Well-Construction Data for the H-10 Borehole Complex Near the Proposed WIPP Site, Southeastern New Mexico, USGS Water-Resources Investigations 83-4124, ERMS # 243199
H-11b4	Basic Data Report for Drillholes at the H-11 Complex (Waste Isolation Pilot Plant-WIPP), SAND 89-0200
H-15	Basic Data Report for Drillholes H-14 and H-15 (Waste Isolation Pilot Plant – WIPP), SAND 89-0202
H-17	Basic Data Report for Drillholes H-17 and H-18 (Waste Isolation Pilot Plant – WIPP), SAND 89-0204
H-19b2	Basic Data Report for Drillholes on the H-19 Hydropad (Waste Isolation Pilot Plant – WIPP), SAND 98-0071
IMC-461	Well construction log, ERMS #540982
P-17	Test Drilling for Potash Resources: Waste Isolation Pilot Plant Site, Eddy County, New Mexico, USGS, Open-file Report 78-592, 1978, ERMS# 243108

Adjustments for Depth and Culebra Interval Data Sources (Columns H and Q)
(cont'.)

Well ID	Source of Data
SNL-1	Basic Data Report for Drillhole SNL-1 (C-2953) (Waste Isolation Pilot Plant), August 2004, DOE/WIPP 04-3301, ERMS# 539621
SNL-2	Basic Data Report for Drillhole SNL-2 (C-2948) (Waste Isolation Pilot Plant), October 2003, DOE/WIPP 03-3290, ERMS# 539617
SNL-3	Basic Data Report for Drillhole SNL-3 (C-2949) (Waste Isolation Pilot Plant), May 2004, DOE/WIPP 03-3294, ERMS# 539619
SNL-9	Basic Data Report for Drillhole SNL-9 (C-2950) (Waste Isolation Pilot Plant), December 2003, DOE/WIPP 03-3291, ERMS# 539618
SNL-12	Basic Data Report for Drillhole SNL-12 (C-2954) (Waste Isolation Pilot Plant), April 2004, DOE/WIPP 03-3295, ERMS# 539620
WIPP-12	Basic Data Report for Drillhole WIPP-12 (Waste Isolation Pilot Plant – WIPP) SAND82-2336
WIPP-13	Basic Data Report for Drillhole WIPP-13 (Waste Isolation Pilot Plant – WIPP) SAND79-0273
WIPP-19	Basic Data Report for Drillhole WIPP-19 (Waste Isolation Pilot Plant – WIPP) SAND79-0276
WIPP-21	Basic Data Report for Drillhole WIPP-21 (Waste Isolation Pilot Plant – WIPP) SAND79-0277
WIPP-25	Basic Data Report for Drillhole WIPP-25 (Waste Isolation Pilot Plant – WIPP), SAND79-0279
WIPP-26	Basic Data Report for Drillhole WIPP-26 (Waste Isolation Pilot Plant – WIPP), SAND79-0280
WIPP-27	Basic Data Report for Drillhole WIPP-27 (Waste Isolation Pilot Plant – WIPP), SAND79-0281
WIPP-29	Basic Data Report for Drillhole WIPP-29 (Waste Isolation Pilot Plant – WIPP), SAND79-0283
WIPP-30	Basic Data Report for Drillhole WIPP-30 (Waste Isolation Pilot Plant – WIPP), SAND79-0284
WQSP-1 WQSP-2 WQSP-3 WQSP-4 WQSP-5 WQSP-6	Basic Data Report for WQSP-1, WQSP-2, WQSP-3, WQSP-4, WQSP-5, WQSP-6, WQSP-6a, DOE/WIPP-95-2154, ERMS# 243329

Water Level Data (Columns K and O)

Water Level Data	Source of Data
March 2004 and April 2004 WRES water levels	Transmittal of Monthly Water Level Data for March 2004 and April 2004, WRES transmittals to SNL, dated March 25, 2004 and April 27, 2004, respectively, ERMS # 525178

Water Level Data (Columns I and M)

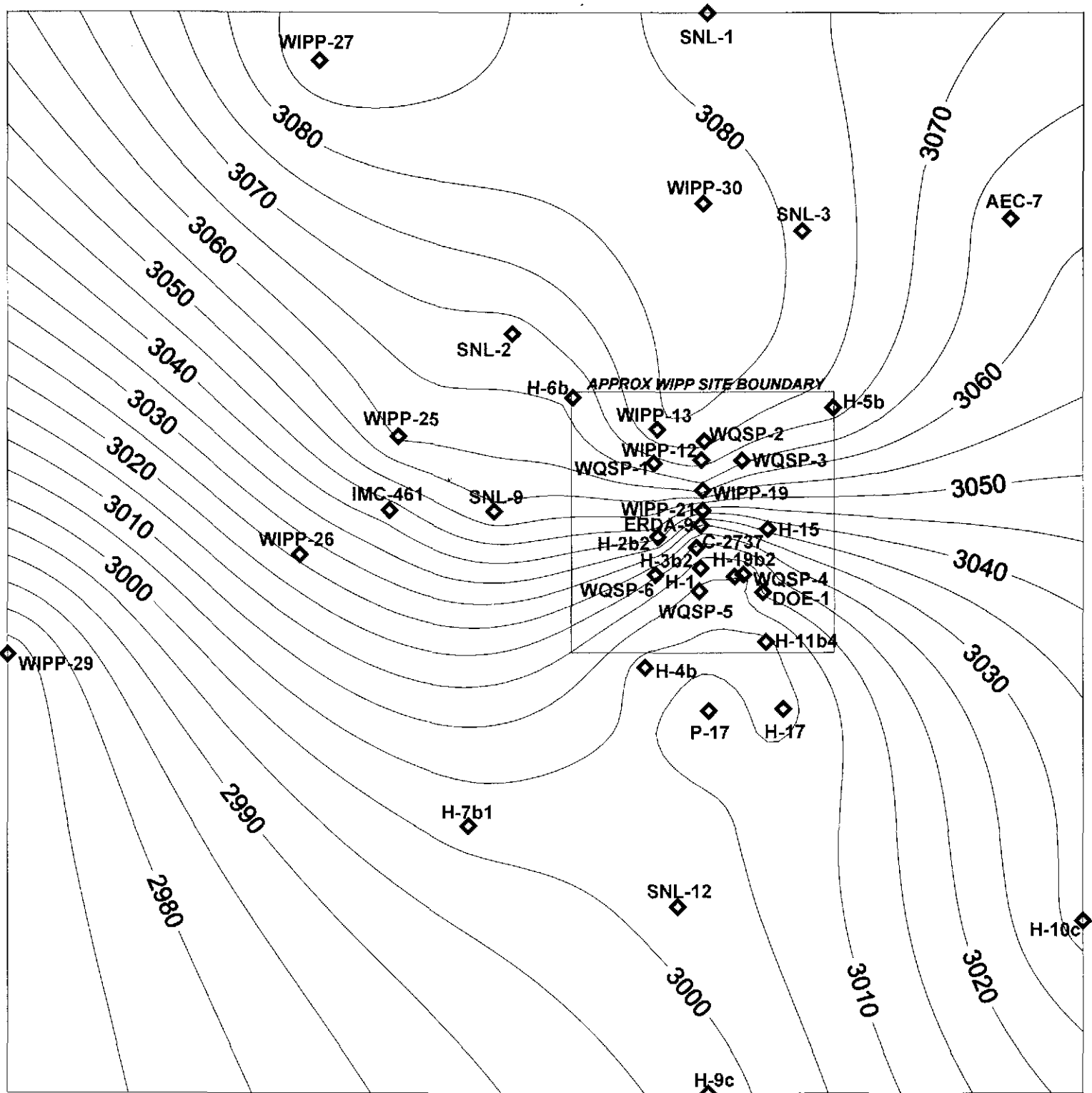
Water Level Data	Source of Data
March 2004 and April 2004 SNL water levels	Manually collected depth to water measurements recorded by SNL personnel in Troll Logbook #3 (ERMS #540244) and WIPP Site Well Testing Scientific Notebook #2 (ERMS #540891), except for depth to water measurements for H-15 which were calculated from Troll data located on \\Wippdata

Pressure Density/Specific Gravity Data (Column Y)

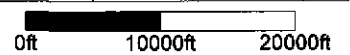
Well ID	Source of Data
AEC-7	Calendar Year 2000 Pressure-Density Survey Results (June 3, 2002 Memo from M. Crawley at WRES to R.L. Beauheim at SNL), ERMS #522425
DOE-1, H-2b2, H-4b, H-5b, H-6b, H-10c, H-17, H-19b2, P-17, SNL-2, SNL-12, WIPP-12, WIPP-19, WIPP-21, WIPP-29,	Calendar Year 2004 Pressure-Density Survey Results (e-mail transmittal on January 20, 2005), Package ERMS #522424, Record ERMS # 539308
H-11b4	Calendar Year 2003 Pressure-Density Survey Results, Reported in DOE/WIPP 05-2225
C-2737, ERDA-9, H-3b2, H-7b1, H-9c, H-15, IMC-461, SNL-3, WIPP-13, WIPP-25, WIPP-26, WIPP-30	Calculated density values derived using pressure data collected by Trolls, (Calculated Density Formula = (Troll Pressure/(Troll Depth-Depth to Water))*144/62.4), Troll data located at \\Wippdata
SNL-1, SNL-9, WIPP-27,	Field specific gravity measurements collected by SNL and recorded in field scientific notebooks, Package ERMS# 540891
WQSP-1, WQSP-2, WQSP-3, WQSP-4, WQSP-5, WQSP-6	Laboratory density values of samples collected from WQSP wells, reported in DOE/WIPP 05-2225

List of Attachments:

1. Printout of Excel file CUL2004.xls
2. Printout of Excel file CUL2004FORM.xls
3. Printout of Potentiometric Surface Map, 2004
4. CD including the CUL2004 Excel file and Surfer files



Note: Contour elevations are in feet above mean sea level



Potentiometric Surface, Adjusted to Equivalent Freshwater Heads, of the Culebra Dolomite Member of the Rustler Formation near the WIPP Site, March-April 2004

Information Only

CUL2004

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
Well ID	State X (Easting)	State Y (Northing)	Site X	Site Y	Monument/ Ground Surface Elevation (ft AMSL)	Top of Casing Elevation (ft AMSL)	Adjustment for Depth from KB to GS (ft)	Adjusted March 2004 Depth to Water (ft BTOC) (SNL)	March 2004 Water-Level Elevation (ft AMSL) (SNL)	Adjusted March 2004 Depth to Water (ft BTOC) (WRES)	March 2004 Water-Level Elevation (ft AMSL) (WRES)	Adjusted April 2004 Depth to Water (ft BTOC) (SNL)	April 2004 Water-Level Elevation (ft AMSL) (SNL)	Adjusted April 2004 Depth to Water (ft BTOC) (WRES)	April 2004 Water-Level Elevation (ft AMSL) (WRES)	Depth to Middle/ Center of Culebra (ft BGS)	Source of Depth to Culebra Center	Center of Culebra Elevation (ft AMSL)	March 2004 Head (ft BTOC) (SNL)	March 2004 Head (ft BTOC) (WRES)	April 2004 Head (ft BTOC) (SNL)	April 2004 Head (ft BTOC) (WRES)	Density Measurement Date/ Source	Density Measurement Result (g/cc)	March 2004 Freshwater Head (ft AMSL) (SNL)	March 2004 Freshwater Head (ft AMSL) (WRES)	April 2004 Freshwater Head (ft AMSL) (SNL)	April 2004 Freshwater Head (ft AMSL) (WRES)	Freshwater Head to be Used for Model (ft AMSL)
AEC-7	691629	523133	80329	98633	3657.21	3657.25	0									874.00	(SAND89-0869 Beauheim et al., 1991)	2783.21		255.73			2000 Survey	1.089		3061.65			3061.6
C-2737	666960	497104	55460	72604	3397.14	3400.89	0	389.74	3011.15							686.50	(DOE/WIPP 01-3210, BDR for C-2737, Powers, March 2002)	2710.64	300.51		300.29	300.06	Calc Density Average 5-10/2004	1.024	3016.50		3018.28	3018.04	3018.0
DOE-1	672206	493563	60706	69063	3465.09	3465.22	8			484.52	2980.70					831.55	(Freeland, 1982, TME 3159, Table 2)	2633.54		347.16		348.14	8/2/2004 Survey	1.099		3015.07		3016.15	3016.1
ERDA-9	667301	498887	55801	74387	3408.8	3410.1	12	400.66	3009.44	400.90	3009.20	402.40	3007.70	401.80	3008.30	715.50	(SAND79-0270)	2893.30	316.14	315.90	314.40	315.00	Calc Density Average 5-9/2004	1.067	3030.71	3030.45	3028.85	3029.49	3029.5
H-2b2	663890	497938	52390	73438	3377.6	3378.31	0	339.71	3038.60	339.62	3038.69	339.41	3038.90	339.65	3038.66	633.00	(WIPP, Mercer & Orr, 1979-1998)	2744.60	294.00	294.09	294.30	294.06	10/25/2004 Survey	1.013	3042.42	3042.51	3042.73	3042.48	3042.5
H-3b2	667283	495476	55783	70976	3389.42	3390.03	0	390.73	2999.30	390.66	2999.37	390.49	2999.54	390.60	2999.43	682.00	(WIPP, Mercer & Orr, 1979-1998)	2707.42	291.88	291.95	292.12	292.01	Calc Density Average 2-8/2004	1.046	3012.61	3012.68	3012.86	3012.74	3012.7
H-4b	662906	487554	51406	63054	3332.67	3333.35	0			333.08	3000.27					503.00	(Mercer et al., 1981, USGS WRI 81-36, p. 36)	2829.67		170.60		171.11	8/20/2004 Survey	1.011		3002.15		3002.66	3002.7
H-5b	677777	508194	66277	83694	3505.38	3506.04	0			476.70	3029.34	476.31	3029.73	476.50	3029.54	906.50	(Dannehy and Mercer, 1982, USGS WRI 82-19, p. 37)	2596.88		432.46	432.85	432.66	8/18/2004 Survey	1.099	3072.15	3072.58	3072.37	3072.4	
H-6b	657180	508969	45680	84469	3347.57	3348.25	0	295.52	3052.73	296.04	3052.21	295.90	3052.35	295.77	3052.48	615.50	(Drellack and Wells, 1982, USGS WRI 82-38, p. 16)	2732.07	320.66	320.14	320.28	320.41	8/6/2004 Survey	1.041	3065.88	3065.34	3065.48	3065.62	3065.6
H-7b1	648882	475061	37382	50561	3163.56	3164.17	0	166.23	2997.94	166.84	2997.33	166.22	2997.95			255.25	(USGS WRI 82-4111, BDR for H-9)	2908.31	89.63	89.02	89.64		Calc Density Average 5/2004	1.054	3002.76	3002.12	3002.77	3002.7	
H-9c	667929	453890	56429	29390	3406.53	3407.3	0	414.59	2992.71	413.84	2993.46	412.66	2994.64	412.93	2994.37	662.00	(USGS WRI 82-4111, BDR for H-9)	2744.53	248.18	248.93	250.11	249.84	Calc Density Average 1-5/2004	1.012	2995.62	2996.38	2997.57	2997.30	2997.3
H-10c	697550	467513	86050	43013	3688.11	3689.47	0			663.54	3025.93					1372.00	(Drellack and Wells, 1983, USGS WRI 83-4124)	2316.11		709.82		709.66	11/8/2004 Survey	1.009		3032.32		3032.16	3032.2
H-11b4	672501	498620	61001	65120	3410.01	3410.89	0			427.25	2983.64					734.85	(SAND89-0200, H-11 Complex BDR, Mercer)	2675.96		308.28		308.50	12/2/2003 Survey	1.064		3003.37		3003.60	3003.6
H-15	672606	498572	61106	74072	3480.22	3481.63	0	482.72	2998.91			482.42	2999.21			871.90	(SAND89-0202, H-15 BDR, Mercer and Snyder, p.22)	2608.32	390.59		390.89		Calc Density Average 1-2/2004	1.097	3036.65		3036.97	3037.0	
H-17	673837	484304	62337	59804	3384.01	3385.31	0			422.96	2982.35			422.49	2982.82	716.60	(Mercer and Snyder, 1989, BDR for H-17 and H-18, SAND89-0204, p. 10)	2665.41		296.94		297.41	8/4/2004 Survey	1.136		3002.73		3003.27	3003.3
H-18b2	669953	494837	58453	70337	3417.36	3419.01	0			429.76	2989.25					753.80	(SAND98-0071, H-19 Hydropad BDR, Mercer, Cole, and Holt)	2663.56		325.69			8/2/2004 Survey	1.066		3010.75			3010.7
IMC-461	642637	500009	31137	75509	3287.3	3289.48	0	252.57	3036.91			247.40	3042.08			374.00	(well construction diagram)	2913.30	123.61		128.78		Calc Density Average 8/2004-1/2005	1.004	3037.35		3042.54	3042.5	
P-17	667955	484185	56455	59685	3335.77	3337.24	0	353.40	2983.84	353.58	2983.66	352.97	2984.27	353.31	2983.93	570.50	(USGS, 1978, Open file report 78-592)	2785.27	218.57	218.39	219.00	218.66	4/2004 Calc Density (rounded down for Troll position)	1.115	3008.98	3008.77	3008.46	3009.08	3009.1
SNL-1	667826	539423	56326	114923	3510.62	3512.84	0					440.67	3072.17			611.00	(DOE/WIPP 04-3301, BDR for SNL-1, Powers & Richardson, August 2004)	2859.62			172.55		4/16/04 Sp. Gravity	1.024		3076.31		3076.3	
SNL-2	652349	514022	40849	89522	3320.87	3323.03	0	257.70	3065.33	258.05	3064.98	258.20	3064.83	257.95	3065.08	469.50	(DOE/WIPP 03-3290, BDR for SNL-2, Powers & Richardson, October 2003)	2851.37	213.96	213.61	213.46	213.71	8/16/2004 Survey	1.013	3068.11	3067.76	3067.60	3067.86	3067.9
SNL-3	675337	522141	63837	97641	3488.26	3490.34	0	431.47	3058.87	432.15	3058.19					765.00	(DOE/WIPP 03-3294, BDR for SNL-3, Powers, May 2004)	2723.26	335.61	334.83			Calc Density Average 1-3/2004	1.062	3079.71	3078.99		3079.0	
SNL-8	650921	499949	39421	75449	3358.12	3360.95	0	315.38	3045.57	315.80	3045.15	312.64	3048.31	312.68	3048.27	561.50	(DOE/WIPP 03-3291, BDR for SNL-9, Powers, December 2003)	2796.62	248.95	248.53	251.69	251.65	12/6/2003 Sp. Gravity	1.022	3051.05	3050.62	3053.85	3053.81	3053.8
SNL-12	665510	468654	54010	44154	3337.28	3339.44	0	341.55	2997.89	342.41	2997.03	340.25	2999.19	340.50	2998.94	567.00	(DOE/WIPP 03-3295, BDR for SNL-12, Powers & Richardson, April 2004)	2770.28	227.61	226.75	228.81	228.66	10/26/2004 Survey	1.015	3001.30	3000.43	3002.62	3002.37	3002.4
WIPP-12	667371	504066	55871	79568	3471.3	3472.06	12.2			439.98	3032.08			440.09	3031.97	810.00	(D. Appolonia, 1982, BDR for WIPP 12, SAND82-2336, p. 15, corrected by RLB)	2661.30		370.78		370.67	12/1/2004 Survey	1.107		3071.75		3071.63	3071.6
WIPP-13	663885	506464	52385	81964	3405.38	3405.71	0	349.56	3056.15	349.97	3055.74	350.10	3055.61	349.71	3056.00	714.50	(USGS, 1979, BDR for WIPP 13, SAND79-0273, p. 7)	2690.88	365.27	364.86	364.73	365.12	Calc Density Average 4-5/2004	1.063	3079.34	3078.91	3078.77	3079.18	3079.2
WIPP-19	667453	501632	55953	77132	3433.08	3435.14	0			394.98	3040.16					767.50	(USGS/SNL, 1979, BDR for WIPP 19, SAND79-0276, p. 15)	2665.58		374.58		374.56	12/1/2004 Survey	1.060		3062.63		3062.61	3062.6
WIPP-21	667459	500071	55959	75571	3417.08	3418.96	0			402.42	3018.54					741.00	(USGS/SNL, 1979, BDR for WIPP 21, SAND79-0277, p. 11)	2676.08		340.46		338.65	12/15/2004 Survey	1.081		3044.12		3042.16	3042.2
WIPP-25	643343	505888	31843	81368	3212.46	3214.39	0	154.63	3059.76	154.96	3059.43	154.68	3059.71	154.62	3059.77	459.50	(USGS/SNL, 1979, BDR for WIPP 25, SAND79-0278, p. 9)	2752.96	306.80	306.47	306.75	306.81	Calc Density Average 1-7/2004	1.003	3060.78	3060.45	3060.73	3060.79	3060.8
WIPP-26	635509	496516	24009	72016	3151.73	3153.2	0	131.00	3022.20	131.51	3021.69	130.06	3023.14	130.27	3022.93	197.50	(USGS/SNL, 1979, BDR for WIPP 26, SAND79-0280, p. 8)	2954.23	67.97	67.46	68.91	68.70	Calc Density 4/19/2004	1.049	3025.56	3025.02	3026.54	3026.32	3026.3
WIPP-27	637103	535812	25603	111112	3177.16	3178.98	0			96.38	3080.60			98.28	3080.70	305.00	(USGS/SNL, 1979, BDR for WIPP 27, SAND79-0281, p. 12)	2872.16		208.44		208.54	2/23/2005 Sp. Gravity	1.040		3088.94		3089.04	3089.0
WIPP-29	612378	488559	878	64059	2976.95	2978.26	0			11.07	2967.19			10.58	2967.66	27.00	(USGS/SNL, 1979, BDR for WIPP 29, SAND79-0283, p. 10)	2949.95		17.24		17.73	10/26/2004 Survey	1.206		2970.74		2971.33	2971.3
WIPP-30	667536	524937	56036	99837	3427.48	3429.05	0	359.68	3069.37	359.45	3069.60	359.20	3069.85	359.23	3069.82	642.00	(USGS/SNL, 1979, BDR for WIPP 30, SAND79-0284, p. 9)	2785.48	283.89	284.12	284.37	284.34	Calc Density 4/19/2004	1.046	3082.32	3082.56	3082.82	3082.79	3082.8
WQSP-1	663600	503774	52100	79274	3416.6	3419.2	0			365.79	3053.41			365.53	3053.87	710.50	(BDR DOE/WIPP-95-2154)	2706.10		347.31		347.57	3/3/200						

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
Well ID	State X (Easting)	State Y (Northing)	Site X	Site Y	Monument Ground Surface Elevation (ft AMSL)	Top of Casing Elevation (ft AMSL)	Adjustment for Depth from KB to GS (ft)	Adjusted March 2004 Depth to Water (ft BTOC) (SNL)	March 2004 Water-Level Elevation (ft AMSL) (SNL)	Adjusted March 2004 Depth to Water (ft BTOC) (WRES)	March 2004 Water-Level Elevation (ft AMSL) (WRES)	Adjusted April 2004 Depth to Water (ft BTOC) (SNL)	April 2004 Water-Level Elevation (ft AMSL) (SNL)	Adjusted April 2004 Depth to Water (ft BTOC) (WRES)	April 2004 Water-Level Elevation (ft AMSL) (WRES)	Depth to Middle/Center of Culebra (ft BOS)	Source of Depth to Culebra Center	Center of Culebra Elevation (ft AMSL)	March 2004 Head (ft BTOC) (SNL)	March 2004 Head (ft BTOC) (WRES)	April 2004 Head (ft BTOC) (SNL)	April 2004 Head (ft BTOC) (WRES)	Density Measurement Date/Source	Density Measurement Result (g/cc)	March 2004 Freshwater Head (ft AMSL) (SNL)	March 2004 Freshwater Head (ft AMSL) (WRES)	April 2004 Freshwater Head (ft AMSL) (SNL)	April 2004 Freshwater Head (ft AMSL) (WRES)	Freshwater Head to be Used for Model (ft AMSL)
AEC-7	691829	623133	=B3-611500	=C3-424500	3657.21	3657.25	0			616.31	=G3-K3					=860-H3-(850-880)/2	(SAND88-0669 Beauheim et al., 1991; (DOEWIPP 01-3210, BDR for C-2737, Powers, March 2002) (Freeland, 1962, TME 3159, Table 2)	=F3-Q3	=J4-S4	=L3-S3		2000 Survey	1.0888	=T4*Y4+S4	=U4*Y4+S4	=V4*Y4+S4	=W4*Y4+S4	=A4	
C-2737	888990	497104	=B4-611500	=C4-424500	3397.14	3400.89	0	389.74	=G4-L4			389.96	=G4-M4	390.19	=G4-O4	=675-H4-(675-698)/2		=F4-Q4	=J4-S4	=L3-S3		Calc Density Average 5-10/2004	1.0244741158671	=T4*Y4+S4	=U4*Y4+S4	=V4*Y4+S4	=W4*Y4+S4	=A4	
DCE-1	672206	493563	=B5-811500	=C5-424500	3465.09	3465.22	8			484.52	=G5-K5			482.54	=G5-O5	=826.6-H5-(828.6-850.5)/2		=F5-Q5	=J5-S5	=L5-S5		8/2/2004 Survey	1.086	=T5*Y5+S5	=U5*Y5+S5	=V5*Y5+S5	=W5*Y5+S5	=A5	
ERDA-9	667301	498887	=B6-611500	=C6-424500	3408.8	3410.1	12	400.66	=G6-I6	400.9	=G6-K6	402.4	=G6-M6	401.8	=G6-O6	=718.4-H6-(718-739)/2		=F6-Q6	=J6-S6	=L6-S6		Calc Density Average 5-9/2004	1.06728217991822	=T6*Y6+S6	=U6*Y6+S6	=V6*Y6+S6	=W6*Y6+S6	=A6	
H-2b2	865890	497938	=B7-811500	=C7-424500	3377.8	3378.31	0	339.71	=G7-I7	339.62	=G7-K7	339.41	=G7-M7	339.65	=G7-O7	=624.4-H7-(624-642)/2		=F7-Q7	=J7-S7	=L7-S7		10/25/2004 Survey	1.013	=T7*Y7+S7	=U7*Y7+S7	=V7*Y7+S7	=W7*Y7+S7	=A7	
H-3b2	867283	495476	=B8-611500	=C8-424500	3388.42	3390.03	0	390.73	=G8-I8	390.66	=G8-K8	390.49	=G8-M8	390.8	=G8-O8	=670.4-H8-(670-684)/2		=F8-Q8	=J8-S8	=L8-S8		Calc Density Average 2-8/2004	1.04559402790487	=T8*Y8+S8	=U8*Y8+S8	=V8*Y8+S8	=W8*Y8+S8	=A8	
H-4b	862906	487554	=B9-611500	=C9-424500	3332.87	3333.36	0			333.08	=G9-K9			332.57	=G9-O9	=490.4-H9-(490-516)/2		=F9-Q9	=J9-S9	=L9-S9		3/20/2004 Survey	1.011	=T9*Y9+S9	=U9*Y9+S9	=V9*Y9+S9	=W9*Y9+S9	=A9	
H-5b	677777	508184	=B10-611500	=C10-424500	3505.38	3506.04	0			478.7	=G10-K10	478.31	=G10-M10	478.5	=G10-O10	=897.4-H10-(897-920)/2		=F10-Q10	=J10-S10	=L10-S10		8/16/2004 Survey	1.099	=T10*Y10+S10	=U10*Y10+S10	=V10*Y10+S10	=W10*Y10+S10	=A10	
H-6b	657180	508989	=B11-811500	=C11-424500	3347.57	3348.25	0	295.52	=G11-I11	296.04	=G11-K11	295.9	=G11-M11	295.77	=G11-O11	=604.4-H11-(604-627)/2		=F11-Q11	=J11-S11	=L11-S11		8/6/2004 Survey	1.041	=T11*Y11+S11	=U11*Y11+S11	=V11*Y11+S11	=W11*Y11+S11	=A11	
H-7b1	648862	475061	=B12-611500	=C12-424500	3163.56	3164.17	0	166.23	=G12-I12	166.84	=G12-K12	166.22	=G12-M12			=237.4-H12-(237-273.5)/2		=F12-Q12	=J12-S12	=L12-S12		Calc Density Average 5/2004	1.0538	=T12*Y12+S12	=U12*Y12+S12	=V12*Y12+S12	=W12*Y12+S12	=A12	
H-8c	667929	453890	=B13-611500	=C13-424500	3406.53	3407.3	0	414.59	=G13-I13	413.84	=G13-K13	412.86	=G13-M13	412.93	=G13-O13	=647.4-H13-(647-677)/2		=F13-Q13	=J13-S13	=L13-S13		Calc Density Average 1-3/2004	1.01173205041165	=T13*Y13+S13	=U13*Y13+S13	=V13*Y13+S13	=W13*Y13+S13	=A13	
H-10c	897550	467513	=B14-611500	=C14-424500	3688.11	3689.47	0			683.54	=G14-K14			683.7	=G14-O14	=1357.6-H14-(1357.6-1366.2)/2		=F14-Q14	=J14-S14	=L14-S14		11/8/2004 Survey	1.008	=T14*Y14+S14	=U14*Y14+S14	=V14*Y14+S14	=W14*Y14+S14	=A14	
H-11b4	872601	489620	=B15-611500	=C15-424500	3410.01	3410.89	0			427.25	=G15-K15			427.03	=G15-O15	=723.2-H15-(723.2-746.1)/2		=F15-Q15	=J15-S15	=L15-S15		12/22/2003 Survey	1.064	=T15*Y15+S15	=U15*Y15+S15	=V15*Y15+S15	=W15*Y15+S15	=A15	
H-15	672806	498872	=B16-611500	=C16-424500	3480.22	3481.63	0	482.72	=G16-I16			482.420679166	=G16-M16			=858.5-H16-(858.5-885.3)/2		=F16-Q16	=J16-S16	=L16-S16		Calc Density Average 1-2/2004	1.08681299843107	=T16*Y16+S16	=U16*Y16+S16	=V16*Y16+S16	=W16*Y16+S16	=A16	
H-17	679387	484304	=B17-611500	=C17-424500	3384.01	3385.31	0			422.96	=G17-K17			422.48	=G17-O17	=705.8-H17-(705.8-731.4)/2		=F17-Q17	=J17-S17	=L17-S17		8/4/2004 Survey	1.136	=T17*Y17+S17	=U17*Y17+S17	=V17*Y17+S17	=W17*Y17+S17	=A17	
H-19c2	669953	484837	=B18-611500	=C18-424500	3417.38	3418.01	0			429.78	=G18-K18					=741.6-H18-(741.6-788)/2		=F18-Q18	=J18-S18	=L18-S18		8/2/2004 Survey	1.086	=T18*Y18+S18	=U18*Y18+S18	=V18*Y18+S18	=W18*Y18+S18	=A18	
IMC-481	842637	500009	=B19-611500	=C19-424500	3287.3	3289.48	0	252.57	=G19-I19			247.4	=G19-M19			=362.4-H19-(362-388)/2		=F19-Q19	=J19-S19	=L19-S19		Calc Density Average 8/2004-1/2005 (rounded down for Trill)	1.003540856604703	=T19*Y19+S19	=U19*Y19+S19	=V19*Y19+S19	=W19*Y19+S19	=A19	
P-17	667955	484185	=B20-611500	=C20-424500	3335.77	3337.24	0	353.4	=G20-I20	353.58	=G20-K20	352.97	=G20-M20	353.31	=G20-O20	=558.4-H20-(558-583)/2		=F20-Q20	=J20-S20	=L20-S20			1.115	=T20*Y20+S20	=U20*Y20+S20	=V20*Y20+S20	=W20*Y20+S20	=A20	
SNL-1	667826	539423	=B21-611500	=C21-424500	3510.82	3512.84	0			440.67	=G21-K21					=596.4-H21-(596-628)/2		=F21-Q21	=J21-S21	=L21-S21		4/16/04 Sp. Gravity	1.024	=T21*Y21+S21	=U21*Y21+S21	=V21*Y21+S21	=W21*Y21+S21	=A21	
SNL-2	652349	514022	=B22-611500	=C22-424500	3320.87	3323.03	0	257.7	=G22-I22	258.05	=G22-K22	258.2	=G22-M22	257.85	=G22-O22	=458.4-H22-(458-481)/2		=F22-Q22	=J22-S22	=L22-S22		5/16/2004 Survey	1.019	=T22*Y22+S22	=U22*Y22+S22	=V22*Y22+S22	=W22*Y22+S22	=A22	
SNL-3	675337	522141	=B23-611500	=C23-424500	3488.26	3490.34	0	431.47	=G23-I23	432.15	=G23-K23					=755.4-H23-(755-775)/2		=F23-Q23	=J23-S23	=L23-S23		Calc Density Average 1-3/2004	1.06209169277386	=T23*Y23+S23	=U23*Y23+S23	=V23*Y23+S23	=W23*Y23+S23	=A23	
SNL-9	650921	499949	=B24-611500	=C24-424500	3358.12	3360.95	0	315.38	=G24-I24	315.8	=G24-K24	312.64	=G24-M24	312.88	=G24-O24	=550.4-H24-(550-573)/2		=F24-Q24	=J24-S24	=L24-S24		12/6/2003 Sp. Gravity	1.022	=T24*Y24+S24	=U24*Y24+S24	=V24*Y24+S24	=W24*Y24+S24	=A24	
SNL-12	665510	468654	=B25-611500	=C25-424500	3337.28	3339.44	0	341.55	=G25-I25	342.41	=G25-K25	340.26	=G25-M25	340.5	=G25-O25	=547.4-H25-(547-587)/2		=F25-Q25	=J25-S25	=L25-S25		10/28/2004 Survey	1.015	=T25*Y25+S25	=U25*Y25+S25	=V25*Y25+S25	=W25*Y25+S25	=A25	
WIPP-12	667371	504068	=B26-611500	=C26-424500	3471.3	3472.06	12.2			439.98	=G26-K26			440.09	=G26-O26	=809.8-H26-(809.8-834.6)/2		=F26-Q26	=J26-S26	=L26-S26		12/1/2004 Survey	1.107	=T26*Y26+S26	=U26*Y26+S26	=V26*Y26+S26	=W26*Y26+S26	=A26	
WIPP-13	663885	506464	=B27-611500	=C27-424500	3405.38	3405.71	0	349.58	=G27-I27	349.97	=G27-K27	350.1	=G27-M27	349.71	=G27-O27	=703.4-H27-(703-726)/2		=F27-Q27	=J27-S27	=L27-S27		Calc Density Average 4-5/2004	1.06348701068553	=T27*Y27+S27	=U27*Y27+S27	=V27*Y27+S27	=W27*Y27+S27	=A27	
WIPP-19	667453	501632	=B28-611500	=C28-424500	3433.08	3435.14	0			394.98	=G28-K28			396	=G28-O28	=768.4-H28-(768-779)/2		=F28-Q28	=J28-S28	=L28-S28		12/1/2004 Survey	1.06	=T28*Y28+S28	=U28*Y28+S28	=V28*Y28+S28	=W28*Y28+S28	=A28	
WIPP-21	667459	500071	=B29-611500	=C29-424500	3417.08	3418.96	0			402.42	=G29-K29			404.23	=G29-O29	=726.4-H29-(726-753)/2		=F29-Q29	=J29-S29	=L29-S29		12/15/2004 Survey	1.081	=T29*Y29+S29	=U29*Y29+S29	=V29*Y29+S29	=W29*Y29+S29	=A29	
WIPP-25	643343	505888	=B30-611500	=C30-424500	3212.46	3214.39	0	154.89	=G30-I30	154.96	=G30-K30	154.88	=G30-M30	154.82	=G30-O30	=447.4-H30-(447-472)/2		=F30-Q30	=J30-S30	=L30-S30		Calc Density Average 1-7/2004	1.00333675368787	=T30*Y30+S30	=U30*Y30+S30	=V30*Y30+S30	=W30*Y30+S30	=A30	
WIPP-26	635509	496516	=B31-611500	=C31-424500	3151.73	3153.2	0	131	=G31-I31	131.51	=G31-K31	130.06	=G31-M31	130.27	=G31-O31	=166.4-H31-(166-206)/2		=F31-Q31	=J31-S31	=L31-S31		Calc Density 4/18/2004	1.0494	=T31*Y31+S31	=U31*Y31+S31	=V31*Y31+S31	=W31*Y31+S31	=A31	
WIPP-27	637103	535612	=B32-611500	=C32-424500	3177.16	3178.98	0			98.38	=G32-K32			98.28	=G32-O32	=282.4-H32-(282-318)/2		=F32-Q32	=J32-S32	=L32-S32		2/3/2005 Sp. Gravity	1.04	=T32*Y32+S32	=U32*Y32+S32	=V32*Y32+S32	=W32*Y32+S32	=A32	
WIPP-29	612378	488559	=B33-611500	=C33-424500	2976.95	2978.26	0			11.07	=G33-K33			10.58	=G33-O33	=12.4-H33-(12-42)/2		=F33-Q33	=J33-S33	=L33-S33		10/26/2004 Survey	1.206	=T33*Y33+S33	=U33*Y33+S33	=V33*Y33+S33	=W33*Y33+S33	=A33	
WIPP-30	667536	524337	=B34-611500	=C34-424500	3427.46	3429.05	0	359.88	=G34-I34	359.45	=G34-K34	359.2	=G34-M34	359.23	=G34-O34	=631.4-H34-(631-653)/2		=F34-Q34	=J34-S34	=L34-S34		Calc Density 4/18/2004	1.0456	=T34*Y34+S34	=U34*Y34+S34	=V34*Y34+S34	=W34*Y34+S34	=A34	
WQSP-1	863800	503774	=B35-611500	=C35-424500	3416.6	3419.2	0			365.79	=G35-K35			365.53	=G35														