TABLE 2
Evaluation of Vertical Hydraulic Gradients

WELL NUMBER[1]	LITHOLOGIC AND HYDROGEOLOGIC UNITS [2]	WELL LOCATION	NORTHING [3]	EASTING [3]	TOP OF CASING	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	TOTAL WELL DEPTH	ELEVATION TOP OF SCREEN	ELEVATION BOTTOM OF SCREEN	ELEVATION MID-POINT OF SCREEN	Sample Date	LABORATORY DATA: TDS	LABORATORY DATA: TEMP (Field)	GROUNDWATER: Measured DTW [7]	GROUNDWATER: Water Density[8]	GROUNDWATER: GW Elevation	GROUNDWATER: Fresh Water Head[10]	VERTICAL GRADIENT[11]: DATE shallow	VERTICAL GRADIENT[11]: DATE deep	VERTICAL GRADIENT[11]: Water Level	VERTICAL GRADIENT[11]: Fresh Water Head
			NAD	NAD	ft-msl	ft-bgs	ft-bgs	ft-bgs	ft-msl	ft-msl	ft-msl		mg/L	deg C	ft-toc	kg/m³	ft-msl	ft-msl			ft/ft	ft/ft
BARRIER AND INTERCEPTOR WELL FIELD																						
M-74	Qal Shallow WBZ	East Barrier	828713.651	26720062.179	1744.380	9.2	38.8	39	1735.18	1705.58	1720.4	1/22/08	*5,830*	*21.7*	29.35	1,002.28	1,715.03	1,715.02				
												2/6/08	5,860	21.7	29.33	1,002.30	1,715.05	1,715.04	**M-74**	**M-133**		
												3/14/08	*5,865*	*22.5*	29.35	1,002.12	1,715.03	1,715.02	1/22/08	1/17/08	-0.015	-0.016
												5/8/08	5,870	23.6	29.45	1,001.85	1,714.93	1,714.92	2/6/08	2/5/08	-0.008	-0.010
												8/7/08	5,940	25.1	29.82	1,001.51	1,714.56	1,714.55	5/8/08	5/12/08	-0.017	-0.017
												11/5/08	5,640	22.5	29.77	1,001.95	1,714.61	1,714.60	11/5/08	11/6/08	-0.011	-0.013
												12/10/08			29.72		1,714.66	1,720.38				
												5/6/09	5,930	25.5	29.35	1,001.40	1,715.03	1,715.02	5/6/09	5/21/09	-0.001	-0.034
M-132	UMCf Middle WBZ	East Barrier	26720048.491	828714.609	1744.27	80	90	90	1664.27	1654.27	1659.3	1/17/08	2,540	*19.1*	27.35	1,000.35	1,716.92	1,716.94				
												2/5/08	2,890	19.1	27.51	1,000.62	1,716.76	1,716.80				
												5/12/08	2,350	23.6	27.28	999.20	1,716.99	1,716.94	**M-133**	**M-132**		
												12/10/08	*2,590*	*20.0*	26.73	1,000.21	1,717.54	1,717.55				
												5/21/09	1,482	26.8	27.50	997.71	1,716.77	1,716.64	1/17/08	1/17/08	-0.065	-0.065
M-133	UMCf Shallow WBZ	East Barrier	26720067.292	828698.608	1743.62	60	70	70	1683.62	1673.62	1678.6	1/17/08	3,310	*21.4*	27.96	1,000.45	1,715.66	1,715.68	2/5/08	2/5/08	-0.071	-0.070
												2/5/08	4,800	21.4	28.23	1,001.57	1,715.39	1,715.45	5/12/08	5/12/08	-0.070	-0.064
												5/12/08	6,270	23.8	27.99	1,002.10	1,715.63	1,715.71	12/10/08	12/10/08	-0.129	-0.125
												8/5/08	--	--	--	--	--	--	5/21/09	5/21/09	-0.020	-0.011
												11/6/08	5,900	20.5	28.57	1,002.61	1,715.05	1,715.14				
												12/10/08	*5,070*	*20.3*	28.57	1,002.02	1,715.05	1,715.12				
												5/21/09	5,764	26.2	27.23	1,001.09	1,716.39	1,716.43				
M-134	UMCf Shallow WBZ	West Barrier	26719889.138	827144.353	1752.14	60	70	70	1692.14	1682.14	1687.1	1/17/08	2,760	*18.0*	34.51	1,000.74	1,717.63	1,717.66				
												2/5/08	2,670	18.0	34.64	1,000.67	1,717.50	1,717.52				
												5/11/08	2,810	24.4	33.22	999.35	1,718.92	1,718.90	**M-135**	**M-134**		
												12/10/08	*2,750*	*19.0*	32.72	1,000.53	1,719.42	1,719.44	1/17/08	1/17/08	-0.013	-0.014
												5/20/09	3,000	27.4	34.00	998.68	1,718.14	1,718.10	2/5/08	2/5/08	-0.076	-0.077
M-135	UMCf Shallow WBZ	West Barrier	26719890.173	827154.482	1751.85	29	39	39	1722.85	1712.85	1717.9	1/17/08	3,260	*22.0*	34.63	1,000.27	1,717.22	1,717.22	5/11/08	5/11/08	-0.007	-0.006
												2/5/08	3,420	20.7	36.69	1,000.69	1,715.16	1,715.16	12/10/08	12/10/08	-0.005	-0.006
												5/11/08	6,620	25.0	33.14	1,002.05	1,718.71	1,718.71	5/5/09	5/20/09	-0.003	-0.001
												8/5/08	3,380	25.0	32.17	999.62	1,719.68	1,719.68				
												11/5/08	3,470	23.2	32.13	1,000.14	1,719.72	1,719.72				
												12/10/08	*3,380*	*22.8*	32.59	1,000.17	1,719.26	1,719.26	**M-134**	**M-136**		
												5/5/09	3,440	24.5	33.79	999.80	1,718.06	1,718.06	1/17/08	1/17/08	-0.232	-0.241
M-136	UMCf Middle WBZ	West Barrier	26719889.774	827165.342	1751.87	80	90	90	1671.87	1661.87	1666.9	1/17/08	7,120	*19.7*	29.54	1,003.71	1,722.33	1,722.54	2/5/08	2/5/08	-0.227	-0.224
												2/5/08	1,380	19.7	29.77	999.35	1,722.10	1,722.06	5/11/08	5/11/08	-0.184	-0.184
												5/11/08	1,400	23.7	29.16	998.46	1,722.71	1,722.62	12/10/08	12/10/08	-0.179	-0.176
												12/10/08	*1,400*	*20.0*	28.82	999.30	1,723.05	1,723.01	5/20/09	5/21/09	-0.216	-0.213
												5/21/09	1,504	25.6	29.35	998.05	1,722.52	1,722.41				
VERTICAL DELINEATION WELLS																						
M-31A	UMCf Shallow WBZ	850 ft north of Unit 5 Building	828368.371	26718289.578	1796.87	35	55	55	1761.87	1741.87	1751.9	11/4/09	8,300	24.0	43.65	1,003.57	1,753.22	1,753.22	**M-31A** 11/4/09	**M-153** 11/5/09	-0.146	-0.144
M-149	UMCf Middle WBZ	850 ft north of Unit 5 Building	828373.149	26718285.780	1796.81	100	120	120	1696.81	1676.81	1686.8	11/4/09	2,800	22.8	42.62	999.74	1,754.19	1,754.17	**M-153** 11/5/09	**M-149** 11/4/09	-0.317	-0.312
M-153	UMCf Middle WBZ	850 ft north of Unit 5 Building	26718287.910	828385.605	1796.69	150	170	170	1646.69	1626.69	1636.7	11/5/09	570	23.6	26.62	997.85	1,770.07	1,769.79				
M-36	UMCf Shallow WBZ	2200 ft north of Unit 5 Building	828069.092	26719556.628	1759.82	20	35	35	1739.82	1724.82	1732.3	11/5/09	15,400	23.4	31.82	1,009.06	1,728.00	1,727.96	**M-36** 11/5/09	**M-154** 11/6/09	-0.102	-0.099
M-150	UMCf Middle WBZ	2200 ft north of Unit 5 Building	26719569.830	828059.148	1758.86	125	145	145	1633.86	1613.86	1623.9	11/6/09	590	24.1	23.87	997.74	1,734.99	1,734.74	**M-154** 11/6/09	**M-150** 11/6/09	-0.182	-0.179
M-154	UMCf Middle WBZ	2200 ft north of Unit 5 Building	26719568.610	828047.739	1758.78	175	195	195	1583.78	1563.78	1573.8	11/6/09	540	25.0	14.66	997.47	1,744.12	1,743.69				

TABLE 2
Evaluation of Vertical Hydraulic Gradients

WELL NUMBER[1]	LITHOLOGIC AND HYDROGEOLOGIC UNITS [2]	WELL LOCATION	NORTHING [3]	EASTING [3]	TOP OF CASING	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	TOTAL WELL DEPTH	ELEVATION TOP OF SCREEN	ELEVATION BOTTOM OF SCREEN	ELEVATION MID-POINT OF SCREEN	Sample Date	LABORATORY DATA: TDS	LABORATORY DATA: TEMP (Field)	GROUNDWATER: Measured DTW [7]	GROUNDWATER: Water Density[8]	GROUNDWATER: GW Elevation	GROUNDWATER: Fresh Water Head[10]	VERTICAL GRADIENT[11]: DATE shallow	VERTICAL GRADIENT[11]: DATE deep	VERTICAL GRADIENT[11]: Water Level	VERTICAL GRADIENT[11]: Fresh Water Head
			NAD	NAD	ft-msl	ft-bgs	ft-bgs	ft-bgs	ft-msl	ft-msl	ft-msl		mg/L	deg C	ft-toc	kg/m³	ft-msl	ft-msl	shallow	deep	ft/ft	ft/ft
M-100	Qal/UMCf Shallow WBZ	3300 ft north of Unit 5 Building	827659.986	26720820.264	1730.93	19	29	30	1711.93	1701.93	1706.9	11/5/09	1,400	18.1	30.23	999.68	1,700.70	1,700.70	M-100 11/5/09	M-155 11/13/09	-0.161	-0.158
M-151	UMCf Middle WBZ	3300 ft north of Unit 5 Building	26720826.750	827643.033	1730.64	125	145	145	1605.64	1585.64	1595.6	11/12/09	480	22.3	17.62	998.09	1,713.02	1,712.79	M-155 11/13/09	M-151 11/12/09	-0.235	-0.232
M-155	UMCf Middle WBZ	3300 ft north of Unit 5 Building	26720827.400	827636.100	1730.69	200	220	220	1530.69	1510.69	1520.7	11/13/09	550	22.8	0.09	998.04	1,730.60	1,730.18				
M-44	Qal Shallow WBZ	5300 ft north of Unit 5 Building	827005.610	26722699.153	1698.31	5	35	35	1693.31	1663.31	1678.3	11/2/09	8,400	23.1	21.09	1,003.88	1,677.22	1,677.22	M-44 11/2/09	M-156 11/11/09	-0.016	-0.014
M-152	UMCf Middle WBZ	5300 ft north of Unit 5 Building	26722690.630	826973.486	1698.50	125	145	145	1573.50	1553.50	1563.5	11/9/09	850	23.9	24.34	997.99	1,674.16	1,673.94	M-156 11/11/09	M-152 11/9/09	-0.115	-0.112
M-156	UMCf Middle WBZ	5300 ft north of Unit 5 Building	26722690.740	826964.224	1698.38	175	195	195	1523.38	1503.38	1513.4	11/11/09	680	23.8	18.46	997.89	1,679.92	1,679.57				
ATHENS ROAD																						
PC-134	UMCf Shallow WBZ	Athens Road West Subchannel	26728126.415	828776.171	1617.01	59.7	69.7	70	1557.31	1547.31	1552.3	1/18/08	1,830	--	--		--	--				
												2/13/08	1,780	--	26.14		1,590.87	--				
												5/11/08	1,640	25.1	25.95	998.29	1,591.06	1,590.99				
												8/13/08	1,820	--	25.84		1,591.17					
												12/10/08	--	--	25.54 est.		1591.47 est.					
PC-135[12]	Qal Shallow WBZ	Athens Road West Subchannel	26728123.177	828765.250	1617.25	19.7	49.7	50	1597.55	1567.55	1582.6	1/18/08	8,500	--	28.71	--	1,588.54	--	PC-135	PC-134		
												2/13/08	8,100	--	28.72	--	1,588.53	--	2/13/08	2/13/08	-0.077	--
												5/11/08	--	--	--	--	--	--	6/26/08	5/11/08	-0.078	--
												6/26/08	--	--	28.55	--	1,588.70	--	8/13/08	8/13/08	-0.071	--
												8/13/08	7,950	--	28.22	--	1,589.03	--				--
												11/11/08	--	--	28.49	--	1,588.76	--				
PC-136[12]	Qal Shallow WBZ	Athens Road East Subchannel	26728191.374	829517.888	1615.08	17.7	37.7	38	1597.38	1577.38	1587.4	1/18/08	1,420	--	30.83	--	1,584.25	--				
												2/13/08	7,300	--	30.92	--	1,584.16	--	PC-136	PC-137		
												5/14/08	6,920	--	30.86	--	1,584.22	--	1/18/08	1/18/08	-0.059	--
																			2/13/08	2/13/08	-0.069	--
PC-137	UMCf Shallow WBZ	Athens Road East	26728198.976	829517.568	1614.83	59.7	69.7	70	1555.13	1545.13	1550.1	1/18/08	2,950	--	28.37		1,586.46		5/14/08	5/11/08	-0.067	--
												2/14/08	3,140	--	28.11		1,586.72					
												5/11/08	2,590	24.4	28.11	999.18	1,586.72	1,586.69				

DEFINITIONS

ft/ft	feet per foot
ft-bgs	feet below ground surface
ft-msl	feet above mean sealevel
mg/L	milligrams per liter
NAD	North American Datum
umohs/cm	micromohs per centimeter

NOTES

(1) Wells M-74 and M-132 through M-136 are shown on Figure 2. Wells PC-134 through PC-137 are shown on Figure 8. Wells M-31A, M-36, M-44, M-100 and M-149 through M-156 are shown on Figure

(2) Lithologic and hydrogeologic unit designations follow nomenclature proposed in NDEP guidance letter dated January 6, 2009.
Lithologic units: Qal - Alluvium; UMCf - Upper Muddy Creek formation
Hydrogeologic units: Shallow water-bearing zone (WBZ) - Combined saturated Alluvium and UMCf to depth of about 90 ft-bgs; Middle WBZ - UMCf from about 90 ft-bgs to approximately 300 ft-bgs.

(3) Survey coordinates as provided in the June 2008 "all wells" database.

(5) Data reported in 2009 should be considered as "PRELIMINARY" (Not Validated). Data validation for these data is not complete. These data will be transmitted as validated in the annual report.

(7) Depth is assumed to be "positive" (vertically down from the measuring point). Those values shown with a "+" indicate distance above the measuring point (up).

(8) Water density estimated following online density calculation (http://www.earthwardconsulting.com/density) and using the water temperature and total dissolved solids concentration reported during sampling.
If temperature or TDS was not reported the average value was used and shown by *.

(10) Fresh water head after Post, V., Looi, H., and Simmons, C., 2007, Using Hydraulic Head Measurments in Variable-Density Ground Water Flow Analyses: Groundwater Volume 45, No.6 November-December 2007 (pages 664-671).

$$h_{fi} = (\rho_i/\rho_f)h_i - [(\rho_i-\rho_f)/(\rho_f)]z_i$$

h_{fi}	(ft)	"fresh water" head
ρ_i	kg/m^3	density at point of measurement
ρ_f	kg/m^3	fresh water density
h_i	(ft)	hydraulic head (point water head, i.e., water level measurement)
z_i	(ft)	elevation head (screen depth)

(11) Vertical gradient estimated as the difference between the groundwater elevations of shallow and deep wells divided by the distance between the mid-point elevations of their screen intervals. A negative (-) number indicates an upward gradient.

(12) There has not been temperature data collected from well PC-135 and PC-136 since its installation. As such, water density could not be estimate and fresh water head calculated.