

**Table 5-1  
Summary of Calculated Vertical Hydraulic Gradients  
4Q2013 (December 2013)  
Hoffmann-La Roche Inc. - Nutley, New Jersey**

Well ID	Depth to Center of Screen (feet amsl)	Measurement Date	Groundwater Elevation (feet amsl)	Vertical Hydraulic Gradient (-/+)	Flow Direction
<b>Vertical Gradient Between Zone S1 and Zone S2</b>					
53RI-MW4	115.7	12/12/13	118.33		
MW-16AW	90.8	12/12/13	117.53	-0.032	Downward ↓
MW-8W	125.7	12/12/13	123.25		
MW-7W	81.5	12/12/13	117.78	-0.124	Downward ↓
MW-10W	119.4	12/12/13	122.9		
MW-9W	85.1	12/12/13	122.62	-0.008	Downward ↓
MW-14A	103.3	12/12/13	105.49		
MW-252B	70.1	12/12/13	102	-0.105	Downward ↓
MW-38	115.1	12/12/13	113.01		
MW-41	70.0	12/12/13	104.51	-0.188	Downward ↓
MW-60O	106.1	12/12/13	109.98		
MW-234B	78.8	12/12/13	109.95	-0.001	Downward ↓
MW-80C	105.3	12/12/13	109.72		
MW-24B	82.7	12/12/13	109.28	-0.019	Downward ↓
MW-91	101.5	12/12/13	101.09		
MW-82	74.7	12/12/13	100.19	-0.034	Downward ↓
MW-106A	87.2	12/12/13	90.76		
MW-106B	68.8	12/12/13	97.11	0.345	Upward ↑
MW-218	105.7	12/12/13	95.85		
MW-218B	83.2	12/12/13	96.03	0.008	Upward ↑
MW-227A	90.3	12/12/13	95.19		
MW-227B	62.6	12/12/13	94.95	-0.009	Downward ↓
MW-257A	81.5	12/12/13	86.14		
MW-257B	56.5	12/12/13	85.01	-0.045	Downward ↓
MW-229A	119.1	12/12/13	117.22		
MW-229B	82.3	12/12/13	116.28	-0.026	Downward ↓
MW-44	113.2	12/12/13	116.36		
MW-44B	86.5	12/12/13	110.68	-0.213	Downward ↓
MW-207A	104.3	12/12/13	107.14		
MW-207B	71.5	12/12/13	105.48	-0.051	Downward ↓
MW-213B	103.8	12/12/13	116.93		
MW-213C	79.2	12/12/13	115.91	-0.041	Downward ↓
MW-226A	109.9	12/12/13	110.18		
MW-226B	79.9	12/12/13	107.49	-0.090	Downward ↓
ART-MW-3	108.4	12/12/13	107.95		
ART-MW-6	86.2	12/12/13	105.7	-0.101	Downward ↓
ART-MW-2	109.3	12/12/13	107.92		
ART-MW-6	86.2	12/12/13	105.7	-0.096	Downward ↓
MW-186A	105.7	12/12/13	107.95		
MW-186-2	84.6	12/12/13	105.71	-0.106	Downward ↓
MW-90	91.3	12/12/13	101.09		
MW-78	75.9	12/12/13	103.42	0.151	Upward ↑
MW-93	101.2	12/12/13	101.08		
MW-87	75.6	12/12/13	100.53	-0.021	Downward ↓
MW-94	98.2	12/12/13	100.9		
MW-22A	74.8	12/12/13	99.86	-0.044	Downward ↓
MW-92	95.1	12/12/13	100.96		
MW-84	73.4	12/12/13	99.91	-0.048	Downward ↓
MW-208A	101.9	12/12/13	99.81		
MW-208B	70.5	12/12/13	99.88	0.002	Upward ↑
MW-214A	99.6	12/12/13	101.31		
MW-214B	76.8	12/12/13	101.28	-0.001	Downward ↓
MW-7B	99.7	12/12/13	99.02		
MW-7C	87.2	12/12/13	98.67	-0.028	Downward ↓
MW-201A	105.6	12/12/13	110.79		
MW-201	91.1	12/12/13	110.69	-0.007	Downward ↓

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Well ID	Depth to Center of Screen (feet amsl)	Measurement Date	Groundwater Elevation (feet amsl)	Vertical Hydraulic Gradient (-/+)	Flow Direction
<b>Vertical Gradient Between Zone S1 and Zone S2</b>					
MW-170A	104.9	12/12/13	105.92	0.004	Upward ↑
MW-170B	84.3	12/12/13	106		
MW-169A	105.2	12/12/13	105.70	-0.023	Downward ↓
MW-169B	85.1	12/12/13	105.24		
MW-168A	105.0	12/12/13	102.99	0.149	Upward ↑
MW-168B	85.1	12/12/13	105.96		
MW-167A	105.4	12/12/13	104.86	0.037	Upward ↑
MW-167B	85.4	12/12/13	105.6		
MW-209A	90.3	12/12/13	98.32	-0.014	Downward ↓
MW-209B	68.2	12/12/13	98.01		
MW-103A	89.7	12/12/13	93.67	0.137	Upward ↑
MW-103B	67.2	12/12/13	96.76		
MW-104A	90.4	12/12/13	91.18	0.044	Upward ↑
MW-104B	68.8	12/12/13	92.13		
MW-105A	90.4	12/12/13	96.28	0.030	Upward ↑
MW-105B	65.0	12/12/13	97.04		
MW-106A	87.2	12/12/13	90.76	0.345	Upward ↑
MW-106B	68.8	12/12/13	97.11		
MW-62	83.5	12/12/13	94.17	-0.027	Downward ↓
MW-63	65.5	12/12/13	93.69		
MW-68	88.4	12/12/13	90.83	0.103	Upward ↑
MW-71	71.3	12/12/13	92.59		
MW-72	85.5	12/12/13	94.19	-0.069	Downward ↓
MW-74	68.0	12/12/13	92.99		
MW-25	96.0	12/12/13	94.29	0.017	Upward ↑
MW-26A	63.9	12/12/13	94.83		
MW-125	107.4	12/12/13	103.71	-0.330	Downward ↓
MW-125A	89.6	12/12/13	97.83		
MW-15A	100.3	12/12/13	102.44	-0.374	Downward ↓
MW-15B	85.1	12/12/13	96.76		
MW-128	105.7	12/12/13	102.29	0.066	Upward ↑
MW-128B	83.2	12/12/13	103.77		
MW-60G	105.4	12/12/13	110.18	-0.004	Downward ↓
MW-224B	89.3	12/12/13	110.11		
MW-39A	103.1	12/12/13	109.03	-0.205	Downward ↓
MW-40A	89.8	12/12/13	106.3		
MW-108A	86.5	12/12/13	89.51	0.124	Upward ↑
MW-108B	68.4	12/12/13	91.76		
MW-144A	87.0	12/12/13	91.44	0.017	Upward ↑
MW-144B	66.3	12/12/13	91.79		
MW-171A	73.6	12/12/13	86.45	-0.023	Downward ↓
MW-171B	58.5	12/12/13	86.11		
MW-145A	79.2	12/12/13	79.33	0.003	Upward ↑
MW-145B	66.8	12/12/13	79.37		
MW-124A	71.0	12/12/13	70.97	-0.413	Downward ↓
MW-124B	63.1	12/12/13	67.71		
<b>Vertical Gradient Between Zone S2 and Zone S3</b>					
MW-230B	75.5	12/12/13	115.62	-0.0004	Slight Downward ↓
MW-230C	50.5	12/12/13	115.61		
MW-206B	75.9	12/12/13	115.22	0.008	Upward ↑
MW-206C	50.5	12/12/13	115.43		
MW-229B	82.3	12/12/13	116.27	-0.009	Downward ↓
MW-229C	56.7	12/12/13	116.05		

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<b>Vertical Gradient Between Zone S2 and Zone S3</b>					
MW-44B	86.5	12/12/13	110.68	-0.029	Downward ↓
MW-44C	57.3	12/12/13	109.83		
MW-207B	71.5	12/12/13	105.48	-0.038	Downward ↓
MW-207C	44.5	12/12/13	104.45		
MW-218B	63.0	12/12/13	96.03	0.004	Upward ↑
MW-218C	33.2	12/12/13	96.15		
MW-223B	76.5	12/12/13	110.62	0.164	Upward ↑
MW-223C	46.2	12/12/13	115.59		
MW-225B	87.7	12/12/13	108.03	-0.066	Downward ↓
MW-225C	52.0	12/12/13	105.69		
MW-227B	62.6	12/12/13	94.95	0.004	Upward ↑
MW-227C	35.1	12/12/13	95.05		
MW-228B	82.0	12/12/13	106.22	-0.229	Downward ↓
MW-228C	51.9	12/12/13	99.32		
MW-234B	78.8	12/12/13	109.95	-0.059	Downward ↓
MW-233C	63.7	12/12/13	109.06		
MW-251B	71.5	12/12/13	106.56	-0.077	Downward ↓
MW-251C	41.4	12/12/13	104.23		
MW-252B	70.1	12/12/13	102	0.047	Upward ↑
MW-252C	45.2	12/12/13	103.18		
MW-253B	68.4	12/12/13	99.54	-0.020	Downward ↓
MW-253C	43.3	12/12/13	99.04		
MW-5N	61.1	12/12/13	61.49	0.152	Upward ↑
MW-13N	22.4	12/12/13	67.36		
MW-1N	63.9	12/12/13	61.85	-0.058	Downward ↓
MW-4N	47.3	12/12/13	60.88		
MW-9N	58.2	12/12/13	61.65	0.324	Upward ↑
MW-9IN	44.3	12/12/13	66.16		
MW-226B	79.9	12/12/13	107.49	-0.023	Downward ↓
MW-226C	49.7	12/12/13	106.8		
MW-231B	81.0	12/12/13	108.11	-0.009	Downward ↓
MW-231C	55.9	12/12/13	107.89		
MW-186-2	84.6	12/12/13	105.71	-0.016	Downward ↓
MW-186B	42.5	12/12/13	105.03		
MW-53	78.4	12/12/13	101.3	0.085	Upward ↑
MW-54	53.4	12/12/13	103.42		
MW-50	78.3	12/12/13	101.34	-0.020	Downward ↓
MW-56	53.2	12/12/13	100.83		
MW-76	77.0	12/12/13	100.53	-0.026	Downward ↓
MW-77	52.0	12/12/13	99.89		
MW-78	75.9	12/12/13	103.42	-0.123	Downward ↓
MW-79	50.5	12/12/13	100.3		
MW-87	75.6	12/12/13	100.53	-0.020	Downward ↓
MW-88	49.6	12/12/13	100.00		
MW-82	74.7	12/12/13	100.19	0.004	Upward ↑
MW-83	49.6	12/12/13	100.28		
MW-22A	74.8	12/12/13	99.86	0.015	Upward ↑
MW-86	50.1	12/12/13	100.24		
MW-84	73.4	12/12/13	99.91	0.006	Upward ↑
MW-85	48.3	12/12/13	100.06		
MW-208B	70.5	12/12/13	99.99	0.011	Upward ↑
MW-208C	41.2	12/12/13	100.32		
MW-214B	76.8	12/12/13	101.28	0.002	Upward ↑
MW-214C	52.1	12/12/13	101.32		
MW-209B	68.2	12/12/13	98.01	0.002	Upward ↑
MW-209C	33.2	12/12/13	98.09		
MW-104B	68.8	12/12/13	92.13	0.032	Upward ↑
MW-104C	27.9	12/12/13	93.45		

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<b>Vertical Gradient Between Zone S2 and Zone S3</b>					
MW-26A	63.9	12/12/13	97.83	-0.091	Downward ↓
MW-25C	34.1	12/12/13	95.11		
MW-204B	74.6	12/12/13	98.51	-0.042	Downward ↓
MW-204C	48.6	12/12/13	97.42		
MW-128B	83.2	12/12/13	103.77	0.007	Upward ↑
MW-128C	63.3	12/12/13	103.91		
MW-171B	59.5	12/12/13	86.11	0.063	Upward ↑
MW-171C	33.7	12/12/13	87.74		
MW-124B	21.0	12/12/13	67.71	0.031	Downward ↓
MW-124C	59.1	12/12/13	66.54		
MW-148A	65.1	12/12/13	65.7	-0.066	Downward ↓
MW-148B	45.1	12/12/13	64.38		
MW-48	56.1	12/12/13	58.43	0.032	Upward ↑
MW-48B	28.8	12/12/13	59.3		
<b>Vertical Gradient Between Zone S3 and Zone D1</b>					
DW-13A	23.6	12/12/13	100.87	0.008	Upward ↑
DW-13B	-65.6	12/12/13	101.62		
MW-258C	15.6	12/12/13	61.74	0.067	Upward ↑
DW-24	-29.6	12/12/13	64.76		
MW-215C	33.8	12/12/13	93.19	0.030	Upward ↑
DW-11B	8.5	12/12/13	93.95		
DW-3B	28.1	12/12/13	95.42	0.002	Upward ↑
DW-3C	-75.9	12/12/13	95.61		
MW-48B	28.8	12/12/13	59.30	-0.054	Downward ↓
MW-48C	-1.5	12/12/13	57.67		
<b>Vertical Gradient Between Zone D1 and Zone D2</b>					
DW-12A	-7.5	12/12/13	105.77	-0.050	Downward ↓
DW-12B	-65.0	12/12/13	102.92		
DW-14A	-58.3	12/12/13	108.88	-0.104	Downward ↓
DW-14B	-115.9	12/12/13	102.89		
DW-7B	-48.8	12/12/13	101.03	-0.016	Downward ↓
DW-7C	-216.2	12/12/13	98.39		
DW-8B	-64.4	12/12/13	98.23	-0.001	Downward ↓
DW-8C	-179.0	12/12/13	98.07		
DW-10B	-17.1	12/12/13	94.49	0.000	Downward ↓
DW-10C	-180.9	12/12/13	94.45		
DW-5B	-2.4	12/12/13	99.46	-0.012	Downward ↓
DW-5C	-171.5	12/12/13	97.49		
DW-6B	8.8	12/12/13	95.86	0.002	Upward ↑
DW-6C	-167.4	12/12/13	96.30		
<b>Vertical Gradient Between Zone D2 and Zone D3</b>					
DW-14B	-115.9	12/12/13	102.89	-0.006	Downward ↓
DW-14C	-260.3	12/12/13	102.03		
DW-7C	-216.2	12/12/13	98.39	0.006	Upward ↑
DW-7D	-314.2	12/12/13	99.02		
DW-8C	-179.0	12/12/13	98.07	0.015	Upward ↑
DW-8D	-318.7	12/12/13	100.17		
DW-6C	-167.4	12/12/13	96.30	-0.005	Downward ↓
DW-6D	-366.7	12/12/13	95.36		
<p>Vertical hydraulic gradients were calculated for each well pair as follows:</p> $\frac{\text{Deep Well Ground Water Elev. (ft)} - \text{Shallow Well Ground Water Elev. (ft)}}{\text{Deep Total Depth to Center of Screen (ft amsl)} - \text{Shallow Depth to Center of Screen (ft amsl)}} = \text{Vertical Hydraulic Gradient (ft/ft)}^*$ <p><sup>*</sup> This formula is being used in lieu of Todd (1980) to better address the site specific geologic/hydrogeologic conditions as they relate to ground water elevation and/or well screen length variation across the hydrostratigraphic zones.</p>					