SEASIDE BASIN WATERMASTER
MEMORANDUM 2007-02

Date: April 11, 2007
To: Seaside Basin Watermaster
From: Joe Oliver, PG, CHg, Senior Hydrogeologist
       Tom Lindberg, Associate Hydrologist
Subject: Results of Quarterly Ground Water Quality Samples Collected in Winter 2007 from MPWMD Seaside Ground Water Basin Coastal Monitor Wells

Summary

This memorandum transmits and summarizes quarterly ground water quality data collected in Winter 2007 by the Monterey Peninsula Water Management District (MPWMD or District) from its network of Seaside Ground Water Basin coastal monitor wells. This information is being provided to the Seaside Basin Watermaster Board for information purposes, and is in compliance with the monitoring protocols described in the Watermaster’s Seaside Basin Monitoring and Management Program (revised September 5, 2006), which was prepared in response to the March 27, 2006 court decision in the Seaside Basin adjudication case. The chemical data from the Winter 2007 sampling of the District’s existing coastal “sentinel” monitor wells do not indicate evidence of seawater intrusion at these locations in the Seaside Basin.

MPWMD Seaside Basin Coastal Monitor Well Network

The District initiated a ground water quality monitoring program in the coastal area of the Seaside Basin in 1990, and the network has been expanded since that time. The water quality data collected from the monitor wells are utilized for the purposes of: (1) characterizing the chemical nature of the ground water, (2) establishing long-term ground water quality trends, and (3) monitoring of seawater intrusion potential into the Seaside Basin. The chemical data reported herein provide information about present water quality conditions in the coastal portion of the basin, and serve as background water quality data for comparison in future studies. The District collects ground water quality data annually in the Fall from its network of 12 monitor wells at 6 separate sites in and near the coastal area of the Seaside Basin. In addition to this annual sampling, the District is currently collecting quarterly samples from the six monitor wells that are part of this network, which are located at the 3 sites closest to the coastline. These sites,
described herein as the “MPWMD coastal sentinel wells”, are shown on Figure 1. At each of these 3 sites, a “shallow” and “deep” monitor well have been installed (either in separate boreholes or as multiple completions in a single borehole), generally corresponding to well completions within the two principal aquifer units in the Seaside Basin, known as the Paso Robles Formation (QTp) and Santa Margarita Sandstone (Tsm), respectively. The Pliocene/Pleistocene-Age QTp is a continental formation comprised of a fluvial mix of clay, silt, sand and gravel, deposited as ancestral valley fill sediments. The Miocene-Age Tsm is a marine and brackish-marine, fine- to coarse-grained arkosic sandstone, which overlies the shales of the Monterey Formation. The monitor wells are constructed of 2-inch PVC casing, with screens isolated in sand “packages” within each aquifer unit. The aquifer units are separated from each other in the wells by cement strata isolation seals.

Water Sample Collection

Water sample collection is accomplished by “air-lift” pumping. The method utilizes a 3/4-inch PVC dedicated airline in the well, which is coupled to an air compressor. The wellhead configuration is fashioned after that shown in Figure 2. Due to the small diameter of the monitor wells, the well casing is used as the “eductor” pipe, rather than a separate eductor pipe inside the well. Through experience, it has been determined that acceptable pumping results can be achieved if the bottom of the airline is placed at a depth that gives approximately 50 percent pumping submergence (i.e., the ratio of the length of the airline below the pumping water level to the total length of the airline). The air-lift method can be inappropriate for certain water quality constituents due to chemistry changes brought about by air entrainment in the purged water; however, it is considered appropriate for the suite of inorganic constituents that are currently analyzed from the collected samples.

The volume of water removed from each well prior to sampling is generally three casing volumes, consistent with standard sampling protocol. Sampling is supplemented by field measurement of several indicator parameters that are collected during pumping, which ensures that water quality has stabilized prior to sample collection. Once the samples are collected, they are taken to a State-certified laboratory for analysis.

Winter 2007 Quarter Water Quality Results

Water chemistry analytical results for the quarterly ground water samples collected from the District’s six existing coastal “sentinel” monitor wells on January 30, 2007, are provided in Table 1. For comparison, the analytical results from the previous sampling of these same wells in Fall 2006 are provided in Table 2. Note that Table 2 also includes the chemical data for six additional monitor wells that are sampled annually from locations that are farther from the coastline.

The chemical data from the depth intervals sampled at these monitor wells do not indicate evidence of water quality changes indicative of seawater intrusion at these locations in the coastal area of the Seaside Basin. Additional descriptions of the ground water quality results from the District’s Seaside Basin coastal monitor wells can be found in MPWMD Seaside Basin
*Watermaster Memorandum 2007-01*, as well as *MPWMD Technical Memorandum 97-02*. Both of these documents are available at the District office for review.

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Figure 1. MPWMD Seaside Basin Coastal “Sentinel” Monitor Well Locations.
Ground Water Quality Monitoring Results

Tables
**Table 1**

**MONTEREY PENINSULA WATER MANAGEMENT DISTRICT**

**GROUND WATER QUALITY MONITORING RESULTS**

Seaside Basin Sample Collection Date: January 30, 2007

Units are milligrams per liter unless otherwise noted.

<table>
<thead>
<tr>
<th>Water Quality Constituent</th>
<th>Specific Conductance (micromhos/cm)</th>
<th>Total Alkalinity (as CACO3)</th>
<th>pH</th>
<th>Chloride</th>
<th>Sulfate</th>
<th>Ammonia Nitrogen (as NH3)</th>
<th>Nitrate Nitrogen (as NO3-N)</th>
<th>Total Organic Carbon</th>
<th>Calcium</th>
<th>Sodium</th>
<th>Magnesium</th>
<th>Potassium</th>
<th>Iron</th>
<th>Manganese</th>
<th>Orthophosphate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water Standard (1)</td>
<td>1000-1800-2200 (2)</td>
<td>NA</td>
<td>NA</td>
<td>250-500-600 (2)</td>
<td>250-500-600 (2)</td>
<td>NA</td>
<td>45</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.3</td>
<td>0.05</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Sampling Location**

| 15S/1E-15N3 (shal) | 325 | 69 | 8.1 | 47 | 18 | 0.07 | <1 | <0.05 | 0.26 | 19 | 38 | 5 | 3.5 | <0.10 | 0.031 | <0.05 |
| 15S/1E-15N2 (deep) | 1005 | 238 | 8.2 | 150 | 45 | 0.09 | <1 | <0.05 | 0.45 | 80 | 102 | 15 | 4.6 | <0.10 | 0.072 | <0.05 |
| 15S/1E-15F1 (shal) | 311 | 69 | 8.1 | 47 | 11 | <0.05 | 4 | 0.97 | 0.41 | 20 | 33 | 5 | 2.2 | <0.10 | <0.02 | <0.05 |
| 15S/1E-15F2 (deep) | 993 | 224 | 7.9 | 152 | 43 | 0.10 | <1 | <0.05 | 0.65 | 83 | 105 | 16 | 4.9 | 0.199 | 0.101 | <0.05 |
| 15S/1E-11Pa (shal) | 323 | 62 | 8.1 | 56 | 13 | <0.05 | 1 | 0.14 | 0.35 | 23 | 33 | 4 | 3.6 | <0.10 | <0.02 | <0.05 |
| 15S/1E-11Pb (deep) | 433 | 82 | 8.2 | 71 | 15 | <0.05 | 1 | 0.14 | 0.29 | 28 | 50 | 3 | 3.4 | <0.10 | <0.02 | <0.05 |

<table>
<thead>
<tr>
<th>Water Quality Constituent</th>
<th>Total Dissolved Solids</th>
<th>Hardness (as CaCO3)</th>
<th>Boron</th>
<th>Bromide</th>
<th>Fluoride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water Standard (1)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Sampling Location**

| 15S/1E-15N3 (shal) | 234 | 68 | 0.24 | 0.15 | 0.15 |
| 15S/1E-15N2 (deep) | 581 | 262 | 0.26 | 0.44 | 0.25 |
| 15S/1E-15F1 (shal) | 198 | 71 | 0.12 | 0.15 | <0.10 |
| 15S/1E-15F2 (deep) | 576 | 273 | 0.20 | 0.43 | 0.28 |
| 15S/1E-11Pa (shal) | 232 | 74 | 0.18 | 0.18 | <0.10 |
| 15S/1E-11Pb (deep) | 262 | 82 | 0.18 | 0.22 | 0.12 |

**NOTES:**

(1) Maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

(2) The three values listed for certain constituents refer to the "recommended" level, the "upper" level, and "short-term use" level, respectively.
### Table 2

**MONTEREY PENINSULA WATER MANAGEMENT DISTRICT**

**GROUND WATER QUALITY MONITORING RESULTS**

Seaside Basin Sample Collection Date: October 24 and October 25, 2006

Units are milligrams per liter unless otherwise noted.

<table>
<thead>
<tr>
<th>Water Quality Constituent</th>
<th>Specific Conductance (micromhos/cm)</th>
<th>Total Alkalinity (as CACO3)</th>
<th>pH</th>
<th>Chloride</th>
<th>Sulfate</th>
<th>Ammonia Nitrogen (as NH3)</th>
<th>Nitrate Nitrogen (as NO3)</th>
<th>Total Organic Carbon</th>
<th>Calcium</th>
<th>Sodium</th>
<th>Magnesium</th>
<th>Potassium</th>
<th>Iron</th>
<th>Manganese</th>
<th>Orthophosphate</th>
<th>Boron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water Standard (1)</td>
<td>900 1600 2200 (2)</td>
<td>NA</td>
<td>NA</td>
<td>250 500 600 (2)</td>
<td>250 500 600 (2)</td>
<td>NA</td>
<td>45</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.3</td>
<td>0.05</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Sampling Location**

15S/E1-15N3 (shal) 320 72 7.8 46 17 0.06 <1 <0.20 17 39 4.8 3.8 <0.10 <0.0005 0.04 0.39
15S/E1-15N2 (deep) 950 240 8.2 155 45 0.09 <1 <0.20 73 105 16 5.0 <0.10 0.051 <0.03 0.29
15S/E1-23Ca (shal) 800 212 8.3 106 37 <0.05 6 0.35 68 79 17 4.4 1.080 0.077 <0.03 0.29
15S/E1-23Cb (deep) 1280 318 8.2 181 89 0.47 <1 0.84 107 132 26 7.1 0.169 0.026 <0.03 0.58
15S/E1-15F1 (shal) 300 68 7.8 46 10 <0.05 4 <0.20 19 33 5.6 2.5 <0.10 <0.0005 <0.03 0.32
15S/E1-15F2 (deep) 960 246 7.7 150 42 0.08 <1 0.27 77 109 18 5.4 0.541 0.085 <0.03 0.34
15S/E1-15K5 (shal) 330 68 7.9 50 10 <0.05 3 <0.20 20 39 6.2 2.9 2.390 0.068 <0.03 0.28
15S/E1-15K4 (deep) 790 208 8.2 109 35 <0.05 <1 <0.20 57 93 12 4.2 0.216 0.092 <0.03 0.33
15S/E1-11Pa (shal) 330 64 7.8 56 12 <0.05 <1 0.42 22 34 4.5 4.1 <0.10 <0.0005 0.04 0.28
15S/E1-11Pb (deep) 420 92 7.9 70 14 <0.05 <1 0.31 26 53 3.7 3.7 <0.10 <0.0005 <0.03 0.31
15S/E1-12Fa (shal) 350 76 7.9 53 19 <0.05 <1 <0.20 22 40 5.7 2.2 <0.10 <0.0005 <0.03 0.23
15S/E1-12Fc (deep) 360 78 7.8 55 17 <0.05 <1 <0.20 22 40 5.5 2.8 <0.10 0.034 <0.03 0.32

**NOTES:**

1. Maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.
2. The three values listed for certain constituents refer to the "recommended" level, the "upper" level, and "short-term use" level, respectively.