SOMACH, SIMMONS & DUNN
A Professional Corporation
STUART L. SOMACH, ESQ. (SBN 090959)
SANDRA K. DUNN, ESQ. (SBN 119161)
NICHOLAS A. JACOBS, ESQ. (SBN 210091)
813 Sixth Street, Third Floor
Sacramento, CA 95814-4407
Telephone: (916) 446-7979
Facsimile: (916) 446-8199

Attorneys for Plaintiff and Cross-Defendant
CALIFORNIA AMERICAN WATER

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF MONTEREY

CALIFORNIA AMERICAN WATER, Plaintiff, vs. CITY OF SEASIDE; CITY OF MONTEREY; CITY OF SAND CITY; CITY OF DEL REY OAKS; SECURITY NATIONAL GUARANTY, INC.; GRANITE ROCK COMPANY, INC.; D.B.O. DEVELOPMENT COMPANY NO. 27, INC.; MURIEL E. CALABRESE 1987 TRUST; ALDERWOODS GROUP (CALIFORNIA), INC.; PASADERA COUNTRY CLUB, LLC; LAGUNA SECA RESORT, INC; BISHOP MC INTOSH & MC INTOSH, a general partnership; THE YORK SCHOOL, INC.; and DOES 1 through 1,000, Inclusive, Defendants. MONTEREY PENINSULA WATER MANAGEMENT DISTRICT, Intervenor. MONTEREY COUNTY WATER RESOURCES AGENCY, Intervenor. AND RELATED CROSS-ACTIONS	Case No. M66343 **NOTICE OF THE 2006 ANNUAL REPORT** (Assigned to Hon. Roger D. Randall, Ret.)

//

NOTICE IS HEREBY GIVEN that California American Water, on behalf of the Seaside Groundwater Basin Watermaster Committee, is respectfully submitting for the Court's consideration the attached 2006 Annual Report as required by Section III.L.3.x. of the Decision issued by the Court on March 27, 2006.

Respectfully submitted,

SOMACH, SIMMONS & DUNN

Dated: February 14, 2007

By: _____
Sandra K. Dunn

Attorneys for California American Water

PROOF OF SERVICE

I am employed in the County of Sacramento; my business address is Hall of Justice Building, 813 Sixth Street, Third Floor, Sacramento, California; I am over the age of 18 years and not a party to the foregoing action.

On February 14, 2007, I served a true and correct copy of

NOTICE OF 2006 ANNUAL REPORT

X (by mail) on all parties in said action listed below, in accordance with Code of Civil Procedure §1013a(3), by placing a true copy thereof enclosed in a sealed envelope in a designated area for outgoing mail, addressed as set forth below. At Somach, Simmons & Dunn, mail placed in that designated area is given the correct amount of postage and is deposited that same day, in the ordinary course of business, in a United States mailbox in the City of Sacramento, California.

SEE ATTACHED SERVICE LIST

X (by e-mail) to the persons at the email addresses set forth on the attached E-Mail Service List.

___ (by personal delivery) by personally delivering a true copy thereof to the person and at the address set forth below:

___ (by facsimile transmission) to the person at the address and phone number set forth below:

I declare under penalty of perjury that the foregoing is true and correct under the laws of the State of California. Executed on February 14, 2007, at Sacramento, California.

Susan Bentley

SERVICE LIST

J. Terry Schwartz Craig A. Parton Price, Postel & Parma 200 E. Carrillo Street, Suite 400 Santa Barbara, CA 93101-2190 Facsimile: (805) 965-3978	Attorneys for Intervenor Monterey Peninsula Water Management District
Thomas D. Roth Law Offices of Thomas D. Roth One Market, Spear Tower, Suite 3600 San Francisco, CA 94105 Facsimile: (415) 435-2086	Attorneys for Defendant Security National Guaranty, Inc.
Jacqueline M. Zischke Virginia A. Hines Lombardo & Gilles 318 Cayuga Street P.O. Box 2119 Salinas, CA 93902-2119 Facsimile: (831) 754-2011	Attorneys for Defendant Laguna Seca Resort, Inc.
Robert Allan Goodin Anne Hartman James Squeri Goodin, MacBride, Squeri, Ritchie & Day, LLP 505 Sansome, Suite 900 San Francisco, CA 94111 Facsimile: (415) 398-4321	On behalf of Defendant Pasadera Country Club, LLC
James Heisinger Heisinger Buck Morris et al. P. O. Box 5427 Carmel, CA 93921-5427 Facsimile: (831) 625-0145	Attorneys for Defendant City of Sand City
David C. Sweigert Fenton & Keller 2801 Monterey-Salinas Highway P.O. Box 791 Monterey, CA 93942-0791 Facsimile: (831) 373-7219	Attorneys for Defendant D.B.O. Development Company
Rob Wellington Wellington Law Offices 857 Cass Street, Suite D Monterey, CA 93940 Facsimile: (831) 373-7106	Attorneys for Defendant City of Del Rey Oaks

Scott S. Slater Russell McGlothlin Hatch and Parent 21 East Carrillo Street Santa Barbara, CA 93101-2782 Facsimile: (805) 965-4333	Attorneys for Defendant City of Seaside
Donald G. Freeman, City Attorney Law Offices of Perry and Freeman P.O. Box 805 Carmel, CA 93921 Facsimile: (831) 624-5839	Attorneys for Defendant City of Seaside
Deborah Mall Office of the City Attorney City Hall Monterey, CA 93940 Facsimile: (831) 373-1634	Attorneys for Defendant City of Monterey
Mark Pearson Iverson, Yoakum, Papiano & Hatch 1 Wilshire Bldg., 27th Fl. 624 S. Grand Avenue Los Angeles, CA 90017 Facsimile: (213) 629-4563	Attorneys for Defendant Mission Memorial Park
Brian Finegan Law Offices of Brian Finegan P.O. Box 2058 Salinas, CA 93902 Facsimile: (831) 757-9329	Attorneys for Defendant Granite Rock Company
Michael Albov Hudson, Martin, Ferrante & Street P.O. Box 112 Monterey, CA 93942-0112 Facsimile: (831) 375-0131	Attorneys for Defendant Muriel E. Calabrese 1987 Trust
David Laredo DeLay & Laredo 606 Forest Avenue Pacific Grove, CA 93950 Facsimile: (831) 646-0377	Attorneys for Intervenor Monterey Peninsula Water Management District
James J. Cook Horan, Lloyd, Karachale, et al. 499 Van Buren Street Monterey, CA 93940 Facsimile: (831) 373-8302	Attorney for Defendant The York School

Eric N. Robinson
Kronick, Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, CA 95814
Facsimile: (916) 325-4555

Attorneys for Bishop McIntosh & McIntosh

Irven L. Grant
Office of County Counsel
County of Monterey
168 West Alisal St., 3rd Floor
Salinas, CA 93901-2680
Facsimile: (831) 755-5283

Attorneys for County of Monterey

Kevin M. O'Brien
Downey, Brand
555 Capitol Mall, 10th Floor
Sacramento, CA 95814
Facsimile: (916) 444-2100

Attorneys for Intervenor Monterey County Water Resources Agency

John Garrick
Larson, Garrick & Lightfoot, LLP
633 West Fifth St., Suite 1750
Los Angeles, CA 90071
Facsimile: (213) 404-4123

Attorneys for Alderwood Group, Inc. dba Mission Memorial Park

Dewey Evans
Watermaster Executive Officer
2600 Garden Road, Suite 228
Monterey, CA 93940

Watermaster Executive Officer

Steve Leonard
Vice President and Manager
California American Water
50 Ragsdale Dr., Suite 100
P.O. Box 951
Monterey, CA 93940-5758

Robert Costa
Laguna Seca Golf Ranch
10520 York Road
Monterey, CA 93940

Kelly Morgan
City Administrator
City of Sand City
1 Sylvan Park
Sand City, CA 93955

Bill Mitchell
P.O. Box 2157
Yucca Valley, CA 92286

Mayor Dan Albert
City of Monterey
City Manager's Office Attn: Elaine Ramos
Monterey, CA 93940

Mayor Ralph Rubio
City of Seaside
440 Harcourt Avenue
Seaside, CA 93955

Mayor Joseph Russell
650 Canyon Del Rey Road
Del Rey Oaks, CA 93940

Jerry Smith
District 4 Supervisor
2616 1st Avenue
Marina, CA 93933

E-MAIL SERVICE LIST

David Pendergrass <sandcitymyr@aol.com>, '
Jeff Haferman' haferman@ci.monterey.ca.us
Paul Bruno <paul@mpe2000.com
Barbara Carballo <bcarballo@ci.seaside.ca.us
Curtis Weeks <weeksc@co.monterey.ca.us
David Berger <david@mpwmd.dst.ca.us
Diana Ingersoll <Dingersoll@ci.seaside.ca.us
Elizabeth Gianola <gianola@horanlegal.com
Fred Meurer <meurer@ci.monterey.ca.us
Judi Lehman' <jlehman@redshift.com
Kathleen Thomasberg <thomasbergk@co.monterey.ca.us
Laura J. Paxton" <laura.paxton@paxtonadhoc.com
Les Turnbeaugh <turnbeau@ci.monterey.ca.us
MCWRA (e-mail)" <lampor@co.monterey.ca.us
MPWMD <arlene@mpwmd.dst.ca.us
Nancy Rose <rose@ci.monterey.ca.us
Pat Kelly <PKelly@oroscogroup.com
Ray Corpuz <rcorpuz@ci.seaside.ca.us
Ron Langford <droclerk@redshift.com
Tim O'Halloran <TO'Halloran@ci.seaside.ca.us
Tom Bunosky tom.bunosky@amwater.com
Ann Hartman <ahartman@gmssr.com
Bob McKenzie bobmck@mbay.net
Charles W. Kemp" <charles.kemp@amwater.com
Darby Fuerst <darby@mpwmd.dst.ca.us
Ed Ghandor <sng1@speakeasy.net
Heidi A. Quinn" <heidi@laredolaw.net
Janna Aldrete <jaldrete@sierraholdings.net
Jim Markman <jim@rwglaw.com
Joe Oliver <joe@mpwmd.dst.ca.us
John Fischer <wyrdjon@yahoo.com
John P. Christian" <jchristian@tobinlaw.com
Larry Silver larrysilver@celproject.net
Lawrence E. Gallery" <gallery100@rbf.com
Michael Stamp <stampoffice@yahoo.com
Nancy Isakson <nisakson@mbay.net
Patrick Orosco <porosco@oroscogroup.com
Richard Simonitch rsimonitch@mt.cdengineers.com
Roger K. Masuda" <rmasuda@calwaterlaw.com
Ron Scholl <rscholl@fentonkeller.com
Sarah Hardgrave <shardgrave@rbf.com
Sierra Club <ventana@mbay.net
Steve Beals <steve@carmellaw.com
Tom Squeri <tsqueri@Graniterock.com
Tyla Montgomery <tmontgomery@rbf.com>

SEASIDE GROUNDWATER BASIN
WATERMASTER

ANNUAL REPORT – 2006

Integral to the Superior Court Decision (Decision) rendered by Judge Roger D. Randall on March 27, 2006 is the requirement to file of an Annual Report. The recent ruling of the Court requires that the Annual Report be prepared and filed with the Court and mailed to all the parties on or before the 15th day of November every year for the preceding Water Year. This 2006 Annual Report is being filed on or before February 15, 2007, consistent with the prior provisions of the Decision. This Annual Report addresses the specific Watermaster functions set forth in Section III. L. 3. x. of the Decision.

A. Groundwater Extractions

The schedule summarizing the 2006 Water Year (WY 2006) groundwater production from all the producers allocated a Production Allocation in the Seaside Groundwater Basin is provided in Attachment 1, "Seaside Groundwater Basin Watermaster, Reported Quarterly and Annual Water Production From the Seaside Groundwater Basin for all Producers Included in the Seaside Basin Adjudication During Water Year 2006." For the purposes of this Annual Report the Water Year is defined as beginning October 1, 2005 and ending on September 30, 2006. As the schedule indicates, some of the producers have not yet reported the results for each of the quarters for WY 2006, but all producers have reported their annual pumping quantities either to the Watermaster or to the Monterey Peninsula Water Management District. The Watermaster will continue to actively pursue and emphasize the importance of submitting quarterly reports on a timely and routine basis. The quarterly information submitted from the producers was used in the Report, when available. If the producers were only able to submit annual information that production figure was used and for those producers that have not yet submitted any information the annual production submitted to the Monterey Peninsula Water Management District is indicated.

B. Groundwater Storage

Except for the Seaside Basin ASR testing program, described further herein, there has been no reported groundwater storage into the Seaside Basin for WY 2006. Monterey Peninsula Water Management District (WPWMD) in cooperation with California American Water (CAW) operated the Seaside Basin Aquifer Storage and Recovery (ASR) testing program during WY 2006. 411 acre-feet of water was diverted by CAW from Carmel River sources during periods of flow in excess of NOAA-Fisheries' recommended flows, transported through existing CAW distribution system for injection and storage in the Seaside Basin at MPWMD's Santa Margarita Injection Well No. 1 located on former Fort Ord property. Injection testing by MPWMD and CAW under this program since 1998 has served as a pilot for the MPWMD's Phase 1 ASR Project, which received approval for construction by MPWMD in 2006. This project includes a second

ASR well at the existing site. This well is currently under construction and is expected to be operational in March 2007. MPWMD and CAW are currently seeking approval from the SWRCB of a jointly-held water right from the Carmel River for the Phase 1 ASR Project.

Based upon production reported for WY 2006, the following Standard Producers are entitled to a Carryover Credit in accordance with the Decision, Section III. H. 5. for WY 2007:

California American Water (Coastal)	140 acre-feet
DBO Development	49 acre-feet
Granite Rock	27 acre-feet

C. Amount of Artificial Replenishment, if any, performed by Watermaster

No Artificial Replenishment of water was performed by the Watermaster for the WY 2006.

D. Leases or sales of Production Allocation

There have been no water leases or sales during the WY 2006.

E. Use of imported, reclaimed, or desalinated Water as a source of Water for Storage or as a water supply for lands overlying the Seaside Basin

No imported, reclaimed or desalinated water use (either direct or for storage in the groundwater basin) has been reported to the Watermaster during the WY 2006.

F. Violations of the Decision and any corrective actions taken

Section III. D. of the Decision enjoins all Producers from any Over-Production beyond the Operating Yield in any Water Year in which the Watermaster declares that Artificial Replenishment is not available or possible. Section III. L. 3. j. iii. requires that the Watermaster declare the unavailability of Artificial Replenishment prior to the beginning of the Water Year so that the Producers are informed of the prohibition against pumping in excess of the Operating Yield.

Because the Court's Decision was not issued until late March 2006, midway through the Water Year, no declaration was made by the Watermaster regarding the unavailability of Artificial Replenishment for WY 2006. Accordingly, no producer was informed of a prohibition on pumping in excess of the Operating Yield.

Total pumping for WY 2006 did not exceed the Operating Yield for the Seaside Basin; however, the City of Seaside reported an annual pumping quantity that exceeds its Standard Production by 45 acre-feet. The Watermaster has assessed the City of Seaside a

Replenishment Assessment for the Operating Yield Over Production, as further described in Section H, below.

The Watermaster intends to make its declaration regarding the availability of Artificial Replenishment for WY 2007 at its March 2007 meeting.

G. Watermaster administrative costs

The total Administrative costs for Fiscal Year 2006 amounted to $41,148.93. This included the total cost of setting up an office and paying a part time administrator and some part time staff to take and transcribe minutes of the Watermaster Board meetings for a period of five months. "Fiscal Year 2006 Administrative Fund Report" is provided as Attachment 2.

H. Replenishment Assessments

A Replenishment Assessment of $1,132 per acre-feet was established by the Watermaster. Based upon the reported production for WY 2006, CAW's Replenishment Assessment is $2,106,652 for production over the natural safe yield. City of Seaside's Replenishment Assessment for production over the natural safe yield is $168,668 and its Replenishment Assessment for Operating Yield Over Production is $50,940. A summary of the calculations for Replenishment Assessment is provided for in Attachment 3.

I. All components of the Watermaster budget

In Fiscal Year 2006 and 2007, the Watermaster established three separate funds: Administrative Fund; Monitoring & Management–Operations; and Monitoring and Management–Capital Fund. Copies of both Fiscal year 2006 and 2007 adopted budgets are provided for the Court's review as Attachments 4A, 4B, 4C for Fiscal Year 2006 and 5A, 5B and 5C for Fiscal Year 2007. The executive officer provides monthly financial status reports to the Watermaster Board on all financial activities for each month with year to date totals.

J. Water Quality Monitoring

Water quality data collected in the fall of 2006 by the Monterey Peninsula Water Management District does not indicate evidence of seawater intrusion at the locations monitored in and near the coastal area of the Seaside Groundwater Basin. A copy of Results of Ground Water Quality Samples Collected in Fall 2006 from MPWMD Monitor Wells in and Near the Seaside Groundwater Basin is provided for the Court's review as Attachment 6.

K. Recommendations

The Seaside Basin Watermaster Board has taken an aggressive approach to meet all of the Court's established deadline dates. This point has been made clear to all participants,

chosen administrative staff, consultants, and the public. At the Watermaster Board meeting held on January 31, 2007, the Board adopted a workplan pertaining to the location and construction of additional water quality monitoring wells. Seawater Sentinel Monitoring Wells Workplan is provided as Attachment 7. It is expected that initial data from the wells constructed would be available by the summer of 2008. Many variables are associated with the construction of the wells, but the Watermaster Board is actively working very hard to adhere to the Court's order. Information from MPWMD's existing monitoring program will continue to be utilized to detect any seawater intrusion and will be supplemented by the additional wells, when constructed.

ATTACHMENT 1

Seaside Groundwater Basin Watermaster

Reported Quarterly and Annual Water Production From the Seaside Groundwater Basin For All Producers Included in the Seaside Basin Adjudication During Water Year 2006 (All Values in Acre-Feet)

Producer	Quarters				Water Year
	Oct 05-Dec 05	Jan 06-Mar 06	Apr 06-Jun 06	Jul 06-Sep 06	2006
Security National Guaranty	---	2.1	2.1	2.1	**8.1**
M.E. Calabrese 1987 Trust	---	0.0	0.0	0.0	**0.0**
Sand City	---	---	---	---	**0.5**
Alderwoods Group	---	---	---	---	**21.9**
Pasadera Country Club	---	---	---	---	**150.9**
Laguna Seca/Bishop	---	1.5	80.6	148.4	**264.7**
York School	---	---	---	---	**29.5**
Granite Rock Company	---	---	---	---	**0.0**
DBO Development No. 27	0.0	0.0	0.0	0.0	**0.0**
Seaside (Municipal)	---	---	---	---	**332.0**
Seaside (Golf)	---	---	---	---	**464.7**
Cal-Am (Coastal Subareas)	---	51.0	641.0	1,422.0	**3,264.1**
Cal-Am (Inland Subareas)	---	63.0	118.0	159.0	**445.9**
Laguna Seca Park (County)	6.4	4.5	10.9	16.0	**37.8**
Total					**5,020.1**

Notes:

1. The water year begins October 1 and ends September 30 of the following calendar year. For example, WY 2006 began on October 1, 2005, and ended on September 30, 2006.

2. For the first reporting year, i.e., Water Year (WY) 2006, annual production values from the Monterey Peninsula Water Management District's *Well Reporting Program* were used for all producers. For the producers who submitted reports to the Watermaster for all quarters in WY 2006, i.e., DBO Development No. 27 and Laguna Seca County Park, the annual values are the same as reported to the District. For the producers who did not submit reports for all quarters in WY 2006, the quarterly production that was reported to the Watermaster is shown and the annual production reported to the District is shown.

3. Values shown in the table are based on reports received by the Watermaster by February 7, 2007.

4. All values are rounded to the nearest tenth of an acre-foot.

ATTACHMENT 1

ATTACHMENT 2

Seaside Groundwater Basin Watermaster
Budget vs. Actual
Administrative Fund
January through December 2006

	Expenses	Budget	Variance	% of Budget
Assessment				
Administrative Fund	100,000.00	77,800.00	22,200.00	128.54%
Total Assessment	100,000.00	77,800.00	22,200.00	128.54%
PRA processing fee	15.40			
Total Assessment	100,015.40	77,800.00	22,215.40	128.55%
Expense				
Administrative				
Computer Maint. & Supplies	489.97	1,000.00	-510.03	49.0%
Contract Staff	26,685.00	35,000.00	-8,315.00	76.24%
Employee Benefits	0.00	800.00	-800.00	0.0%
Equip. Maint. & Rental	0.00	500.00	-500.00	0.0%
Furniture and Equipment	8,783.78	10,000.00	-1,216.22	87.84%
Legal Notice	0.00	1,000.00	-1,000.00	0.0%
Meetings, Travel & Membership				
Publications & Memberships	34.16	500.00	-465.84	6.83%
Travel, Conf. & Meetings	0.00	1,000.00	-1,000.00	0.0%
Total Meetings, Travel & Membership	34.16	1,500.00	-1,465.84	2.28%
Mileage Reimbursement	0.00	500.00	-500.00	0.0%
Office Consumables & Other				
Insurance	0.00	500.00	-500.00	0.0%
Office Supplies, Postage	745.07	500.00	245.07	149.01%
Printing	92.86	1,000.00	-907.14	9.29%
Total Office Consumables & Other	837.93	2,000.00	-1,162.07	41.9%
Office Rental	1,680.00	3,000.00	-1,320.00	56.0%
Part-time	0.00	2,000.00	-2,000.00	0.0%
Professional Services	2,362.50	20,000.00	-17,637.50	11.81%
Utilities	275.59	500.00	-224.41	55.12%
Total Administrative	41,148.93	77,800.00	-36,651.07	52.89%
Total Expense	41,148.93	77,800.00	-36,651.07	52.89%
Rollover to 2007	58,866.47	0.00	58,866.47	100.0%

ATTACHMENT 2

ATTACHMENT 3

Replenishment Assessments

Using the Basin-wide methodology approved by the Court on January 12, 2007, and as shown in detail on the spreadsheet attached hereto, Watermaster calculated the Water Year 2006 Replenishment Assessments as follows:

Natural Safe Yield: 3000 acre-feet

Cumulative Alternative Production Allocations: 978 acre-feet

Natural Safe Yield Available to Standard Producers: 2022 (3000 minus 978)

Standard Producers' Allocation of Natural Safe Yield:

California American – 1848 acre-feet (91.38 percent)
Seaside Municipal – 138 acre-feet (6.81 percent)
DBO – 23 acre-feet (1.16 percent)
Granite Rock – 13 acre-feet (.64 percent)

Standard Producers' Natural Yield Overproduction:

California American – 1861 acre-feet
Seaside Municipal – 194 acre-feet
DBO – 0
Granite Rock – 0

Natural Yield Over Production Replenishment Assessments:

California American – $2,106,652 (1861 acre-feet of Over Production multiplied by the $1132 per acre-foot replenishment assessment approved by Watermaster)
Seaside Municipal - $168,668 (149 acre-feet of Over Production multiplied by the $1132 per acre-foot replenishment assessment approved by Watermaster)

Operating Yield Over Production Replenishment Assessment:

The City of Seaside produced 45 acre-feet in excess of its Standard Production Allocation. Watermaster is imposing an additional replenishment assessment on this Over Production.

Seaside Municipal - $50,940

Total Water Year 2006 Replenishment Assessments: $2,326,260.

ATTACHMENT 3

ATTACHMENT 4

SEASIDE GROUNDWATER BASIN WATERMASTER
PROPOSED ADMINISTRATIVE BUDGET

Salary-Contract Staff	Part-time Director (20 hours per week @ $75 per hour) 21 weeks	$35,000
Salary-Part-time	Part-time Admin. Asst. (16 hrs. per mo. @$23 per hr.) 5 months. Take & transcribe minutes, assist in preparing Board agenda, etc.	2,000
Employee Benefits	Retirement, health, dental, vision, etc.	800
Office Supplies, Postage	General office, admin. Supplies and postage	500
Printing	Copies, brochures, maps, enlargements, etc.	1,000
Insurance	Workers Comp., liability and property insurance	500
Legal Notices	Newspaper and legal notices	1,000
Publications & Memberships	Water and related misc. publications and memberships (details unknown at this time).	500
Travel, Conferences & Meetings	Water related for Board and Admin. Staff	1,000
Mileage Reimbursement	Reimbursement for staff	500
Computer Maintenance/Supplies	Maintenance services, printer ink, paper, etc.	1,000
Equipment Maintenance/Rental	Misc. office and postage machines	500
Office Rental	Est. 400psf @$1.50 per psf per month for five months.	3,000
Utilities	Office-power, gas, phones, water, waste, etc.	500
Professional Services	Legal counsel, audit, special studies, fees. Etc.	20,000
	Sub Total	$67,800
Furniture & Equipment	Est. office set-up costs for desk, chairs, locking file cabinets, computer, fax, copier, recorder, etc.	10,000
	Total	$77,800
Reserve	To allow for unexpected and unanticipated expenses incurred during the year. All reserve funds will be used only with the approval of the Board and will be evaluated each year at the time of budget adoption.	22,200
	Total	$100,000

ATTACHMENT 4A

SEASIDE GROUNDWATER BASIN WATERMASTER
PROPOSED
PLANNING AND MONITORING PLAN - OPERTIONAL BUDGET
ADMINISTRATIVE YEAR 2006

Professional Services	$100,000
Computer Software & Supplies	100,000
Total	$200,000

ATTACHMENT 4B

SEASIDE GROUNDWATER BASIN WATERMASTER
PROPOSED
CAPITAL REPLENISHMENT BUDGET
ADMINISTRATIVE YEAR 2006

Exploratory Drilling, Geophysical Surveying and Monitor Well Drilling	$1,000,000
Total	$1,000,000

ATTACHMENT 4C

ATTACHMENT 5

SEASIDE GROUNDWATER BASIN WATERMASTER

PROPOSED
ADMINISTRATIVE BUDGET
Administrative Year 2007
(January 1 through December 31, 2007)

CEO-Compensation	$60,000
Professional Services:	
Legal—(6 mo. @ $1,000 and 6 mo. @ $500)	10,000
Administrative Support—(Minutes, agendas, filing, etc.)	8,000
Total Personnel Budget	$78,000
Office Consumables and Other Expenses (Supplies, postage, printing, insurance, etc.)	6,000
Office Rental	3,500
Computer Maintenance and Supplies	3,000
Meetings, Travel, Publications and Memberships	2,000
Mileage Reimbursement	1,500
Utilities (Power, Gas, Water, Waste, Telephone, Internet, etc.)	1,000
Office Equipment Maintenance	1,000
Total Budget	$96,000

Note:
Budget and Finance Committee recommends that a separate reserve account of $25,000 be established that will only be used with the approval of the Watermaster Board of Directors

ATTACHMENT 5A

SEASIDE GROUNDWATER BASIN WATERMASTER

MONITORING AND MANAGEMENT PLAN BUDGET
OPERATING

PLANNING AND MONITORING
Administrative Year 2007
(January 1 through December 31, 2007)

Original Judgment Assessment (collected in March, 2006)	$200,000
Watermaster Board Assessment for 2007	200,000
Total Available	$400,000
Consulting costs:	
Martin Feeney Contract	$14,600
Modeling Consultants Meeting expenses	16,370
Basic groundwater resource database	
Annual maintenance: 40 hours/quarter	11,200
Develop/populate: 200 hours	14,000
Monitoring of coastal "sentinel" monitor wells	48,240
Monitoring of inland monitor wells	2,240
Total current estimated costs	$106,650
Projected to Reserve	$293,350

Notes:

1. Cost estimates are at the preliminary "order of magnitude" level, with estimated accuracy of +/-40% (an industry standard)

ATTACHMENT 5B

2. Mr. Feeney is tasked with bringing the parties' hydrologic experts together to discuss, and if necessary, improve upon the Basin groundwater flow modeling that was previously performed, and to issue a recommendation to Watermaster concerning additional modeling work. As indicated in the Budget, Mr. Feeney's expenses are anticipated to be approximately $14,600. Mr. Feeney will collaborate with Gus Yates, Joe Scalmanini, Terry Foreman, and Tim Durbin in assessing the model and future modeling work. An additional expense of roughly $14,000 is necessary to reimburse these four experts for their participation and contributions to this collaborative process.

3. Watermaster staff has received three responses to its Requests for Proposals (RFP) to manage and administering the monitoring component of the Basin Monitoring and Management Program, including the drilling and construction of the additional monitoring wells. A recommendation will be made to the Watermaster Board, and the Board is scheduled to select a consultant to perform this work at a special meeting, set for November 15, 2006. The costs for this work will be included in a revised budget once the consultant is selected.

4. As indicated in the Budget, Watermaster presently possesses $200,000 in this Budget, which was assessed in 2006. The Watermaster Board approved a 2007 assessment of an additional $200,000 for this budget for Administrative (Calendar) Year 2007, and instructed that this assessment be collected on or before January 15, 2007. The collective surplus of $309,720, which is in addition to the known expenses that are itemized in the Budget, will be used to fund the still-uncertain expenses noted above, including those arising from the groundwater flow modeling work, and the administrative and preparatory cost of the monitoring work.

5. In approving this Budget, Watermaster acknowledged the uncertainty of several anticipated expenses. Accordingly, Watermaster agreed to a quarterly review of the Budget to revise the Budget as more accurate costs are determined.

SEASIDE GROUNDWATER BASIN WATERMASTER

MONITORING AND MANAGEMENT PLAN BUDGET

CAPITAL IMPROVEMENT
Administrative Year 2007
(January 1 through December 31, 2007)

Judgment Assessment	$1,000,000
Monitor Well Construction—(4 to 6) well sites per adopted Seaside Groundwater Basin Monitoring and Management Plan @ approximately $180,000 per well site (based on 5 well sites)	$900,000
Coastal Well sites Dataloggers (22)—(6 existing wells & 16 new wells)	44,000
Inland Well sites Dataloggers (2 existing well sites)	4,000
Total estimated expense	$948,000
Projected Reserve	$52,000

Notes:

1. Cost estimates are preliminary "order of magnitude" level, with estimated accuracy of +/-40% (an industry standard)

2. The number of well sites and cost estimates are subject to change as plans and scope are refined by Watermaster. The budgeted $900,000 figure is based on the approximate cost of constructing 5 well sites at the estimated cost of $180,000 per well site. In approving this Budget, Watermaster acknowledged the uncertainty of the estimates relating the capital elements of this Budget. Accordingly, Watermaster agreed to a quarterly review of the Budget to revise the Budget as more accurate costs are determined.

3. The Watermaster Board has approved an assessment of $1,000,000 during the Administrative (Calendar) year 2006 to fund the capital projects set forth within this Budget. Watermaster adopted a phased collection of the $1,000,000 assessment. One quarter of the full $1,000,000 or $250,000, will be due on or before January 15, 2007. The remaining $750,000 will be assessed and be due approximately 30 days before the execution of contracts for the drilling and construction of the monitoring wells. This proposed schedule will be reviewed regularly by the Watermaster Board, and changed , as appropriate, to ensure that funds are received by Watermaster with sufficient time to pay all anticipated expenses set forth is this Budget.

ATTACHMENT 5C

ATTACHMENT 6

MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

5 HARRIS COURT, BLDG. G
POST OFFICE BOX 85
MONTEREY, CA 93942-0085 • (831) 658-5600
FAX (831) 644-9560 • http://www.mpwmd.dst.ca.us

SEASIDE BASIN WATERMASTER MEMORANDUM 2007-01

Date: February 2, 2007
To: Seaside Basin Watermaster
From: Joe Oliver, PG, CHg, Senior Hydrogeologist
Tom Lindberg, Associate Hydrologist
Subject: Results of Ground Water Quality Samples Collected in Fall 2006 from MWPMD Coastal Monitor Wells in and Near the Seaside Ground Water Basin

Summary

This memorandum transmits and summarizes ground water quality data collected in Fall 2006 by the Monterey Peninsula Water Management District (MPWMD) from its network of coastal monitor wells in and near the Seaside Ground Water Basin. 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 Fall 2006 sampling of MPWMD's existing monitor well network do not indicate evidence of seawater intrusion at the locations monitored in and near the coastal area of the Seaside Basin.

MPWMD Seaside Basin Coastal Monitor Well Network

The MPWMD initiated a ground water quality monitoring program in the coastal portion 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. Currently, the MPWMD collects water quality data annually from 12 monitor wells at 6 separate sites, as shown on **Figure 1**. At each site, 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. A summary of the monitor well completion data is provided in **Table 1**.

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. An example of the recordation of field data is provided on the field ground water sampling form in **Figure 3**. Once the samples are collected, they are taken to a State-certified laboratory for analysis.

Fall 2006 Water Quality Results

Water chemistry analytical results for the ground water samples collected from the MPWMD's existing coastal monitor wells on October 24 and 25, 2006, are provided in **Table 2**. Historical water chemistry analytical results from samples collected at each monitor well are provided in the tables in **Appendix** A. The chemical data from the depth intervals sampled at these monitor wells do not indicate evidence of present or past seawater intrusion at these locations in and near the coastal area of the Seaside Basin. This is most clearly expressed by review of graphs showing Specific Electrical Conductance (SEC) and Chloride (Cl^-) concentration for the period of record at each well, as shown on the long-term plots provided in **Figures 4, 5 and 6**, for the three sites that are closest to the coastline: PCA West, MSC, and FO-09. These two parameters were selected because identification of saline water intrusion is always associated with an

increase in SEC (which is an indicator of Total Dissolved Solids concentration) and Cl^- concentration (which is the most-used tracer for seawater intrusion analysis). For all three graphs, the scales are similar to facilitate relative comparisons from each aquifer unit and well location. As shown in these figures, ground water sampled from the shallower QTp aquifer unit is generally less mineralized than the deeper Tsm aquifer unit, but water quality for both aquifer units is well below the typical seawater concentration of approximately 50,000 micromhos per centimeter for SEC, and 19,000 milligrams per liter for Cl^-. Most importantly, little overall change has occurred in terms of any trends in increasing SEC or Cl^- concentration in the zones monitored at these coastal locations. It should be noted that the data plots shown in **Figures 4, 5 and 6** do not include the first water quality sample results collected at each well after construction. These initial data were not included based upon the poor comparison of these early data with subsequent analyses. It has been our experience that even though each well undergoes rigorous development subsequent to construction and before initial sample collection, the results are not representative of the native aquifer chemistry, presumably due to the limited ability in these small-diameter monitor wells to completely flush residual drilling fluids in the vicinity of the borehole. Additional information regarding assessment of the ground water quality analytical results from the coastal monitor wells is available from the MPWMD.

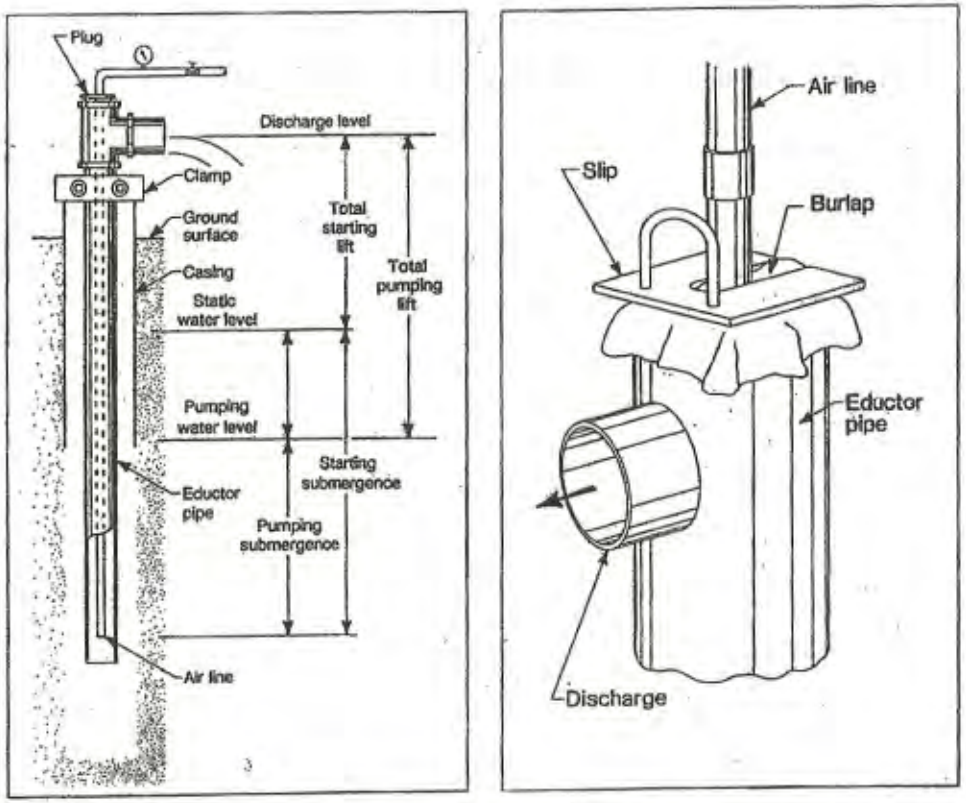


Figure 2. Diagrams illustrating the airlift-pumping method for water sample collection (from Driscoll, 1986, Figure 15.10)

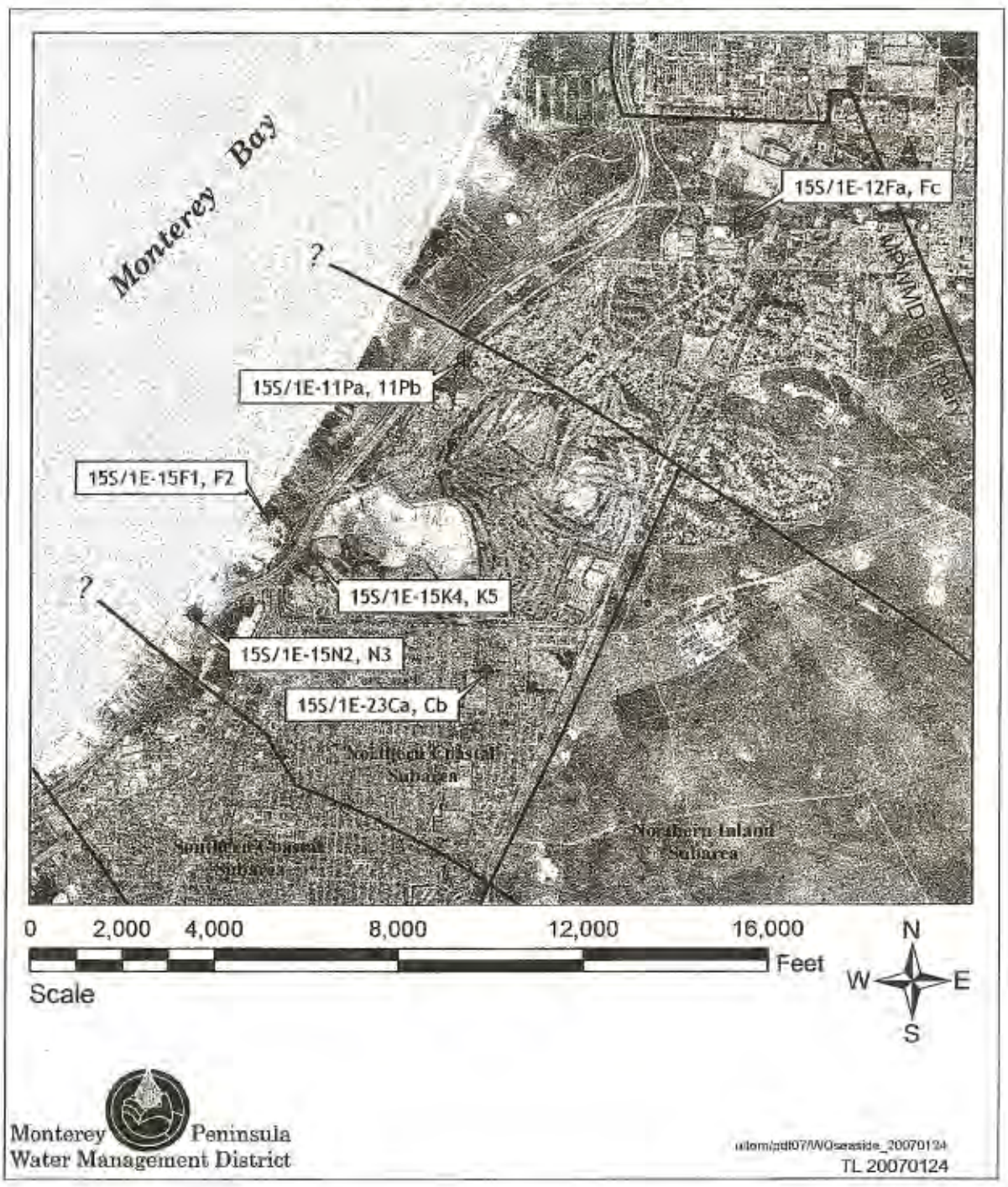
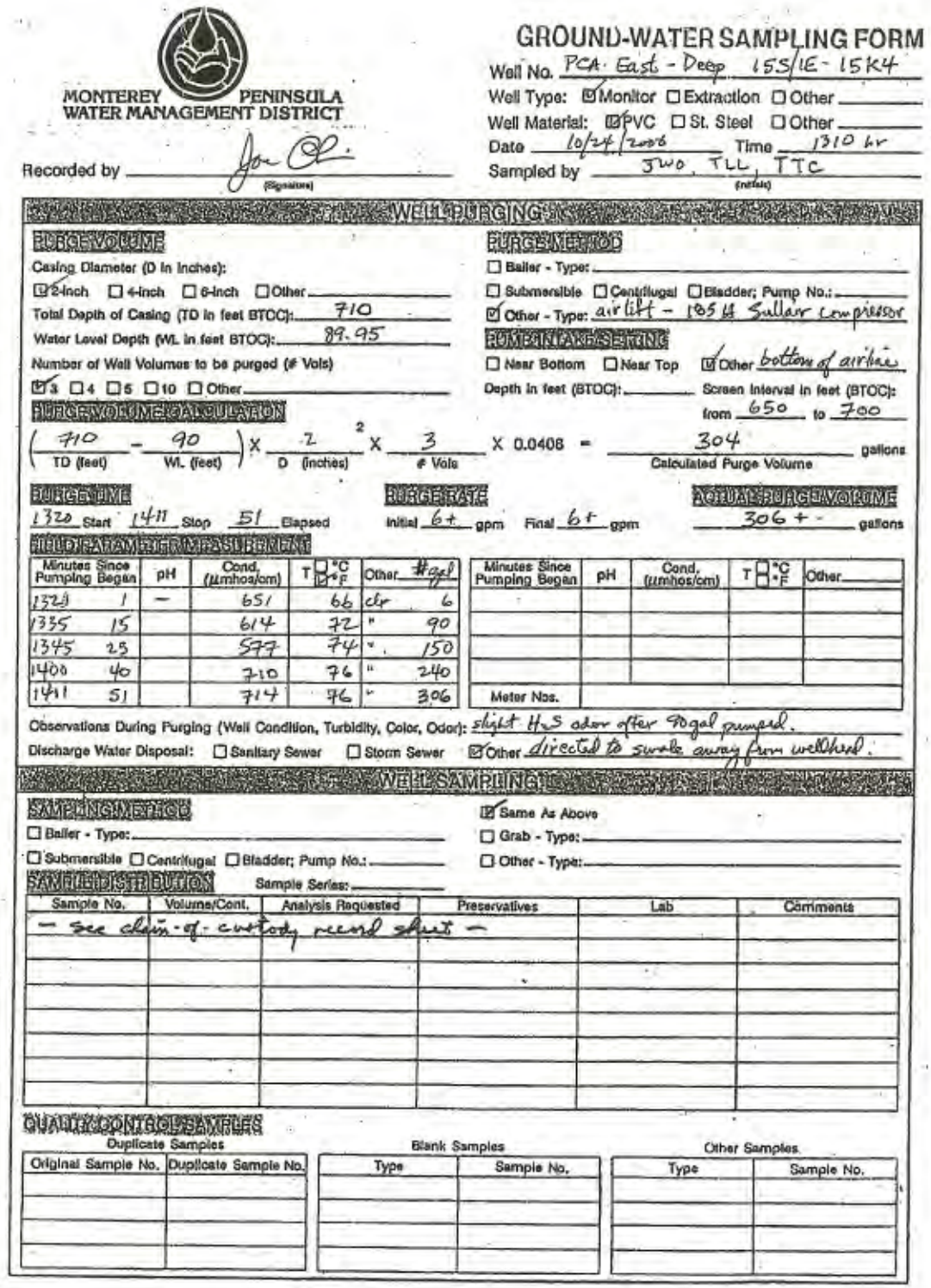


Figure 1. Seaside Basin Coastal Ground Water Quality Monitor Well Locations.



MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND-WATER SAMPLING FORM

Well No. PCA East - Deep 15S/1E-15K4

Well Type: ☑ Monitor ☐ Extraction ☐ Other _____

Well Material: ☑ PVC ☐ St. Steel ☐ Other _____

Date 10/24/2006 Time 1310 hr

Recorded by _____ (Signature)

Sampled by JWO, TLL, TTC (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in Inches):

☑ 2-Inch ☐ 4-Inch ☐ 6-Inch ☐ Other _____

Total Depth of Casing (TD in feet BTOC): 710

Water Level Depth (WL in feet BTOC): 89.95

Number of Well Volumes to be purged (# Vols)

☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other _____

PURGE METHOD

☐ Bailer - Type: _____

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: _____

☑ Other - Type: airlift - 185 H Sullair compressor

PUMP INTAKE SETTING

☐ Near Bottom ☐ Near Top ☑ Other bottom of airline

Depth in feet (BTOC): _____ Screen Interval in feet (BTOC): from 650 to 700

PURGE VOLUME CALCULATION

$(710 \text{ TD (feet)} - 90 \text{ WL (feet)}) \times 2 \text{ D (inches)}^2 \times 3 \text{ \# Vols} \times 0.0408 = 304$ gallons Calculated Purge Volume

PURGE TIME 1320 Start 1411 Stop 51 Elapsed

PURGE RATE Initial 6+ gpm Final 6+ gpm

ACTUAL PURGE VOLUME 306+ gallons

FIELD PARAMETER MEASUREMENTS

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐°C ☐°F	Other #gal
1329 1	—	651	66	clr 6
1335 15		614	72	" 90
1345 25		577	74	" 150
1400 40		710	76	" 240
1411 51		714	76	" 306

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐°C ☐°F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): slight H_2S odor after 90 gal pumped.

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other directed to swale away from wellhead.

WELL SAMPLING

SAMPLING METHOD

☑ Same As Above

☐ Bailer - Type: _____

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: _____

☐ Grab - Type: _____

☐ Other - Type: _____

SAMPLE DISTRIBUTION Sample Series: _____

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
— see chain-of-custody record sheet —					

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Figure 3. Example Ground Water Data Collection Form, Fall 2006 Water Quality Sampling.

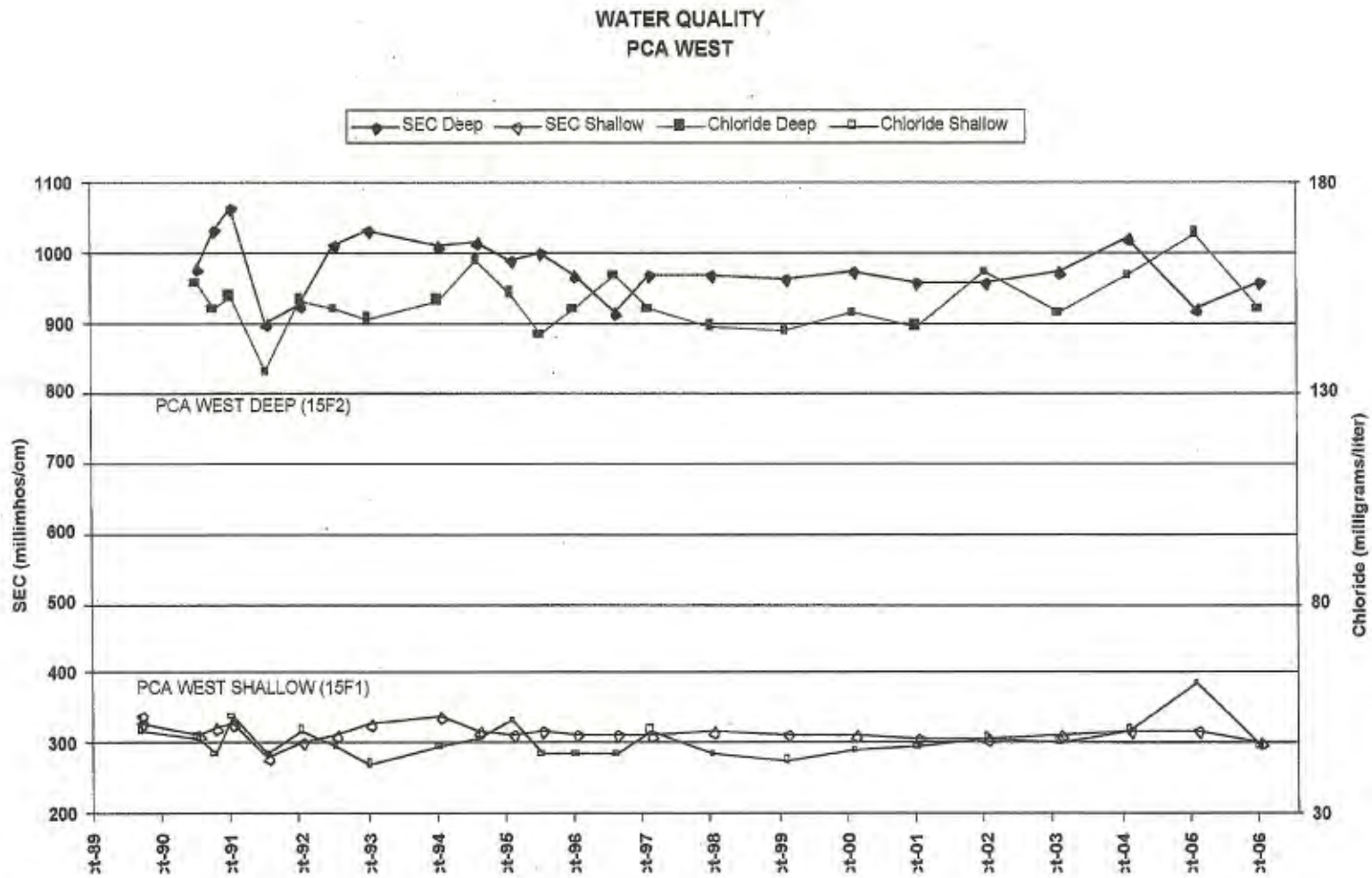


Figure 4. MPWMD PCA West Monitor Well Site: Historical Specific Electrical Conductance and Chloride Concentration.

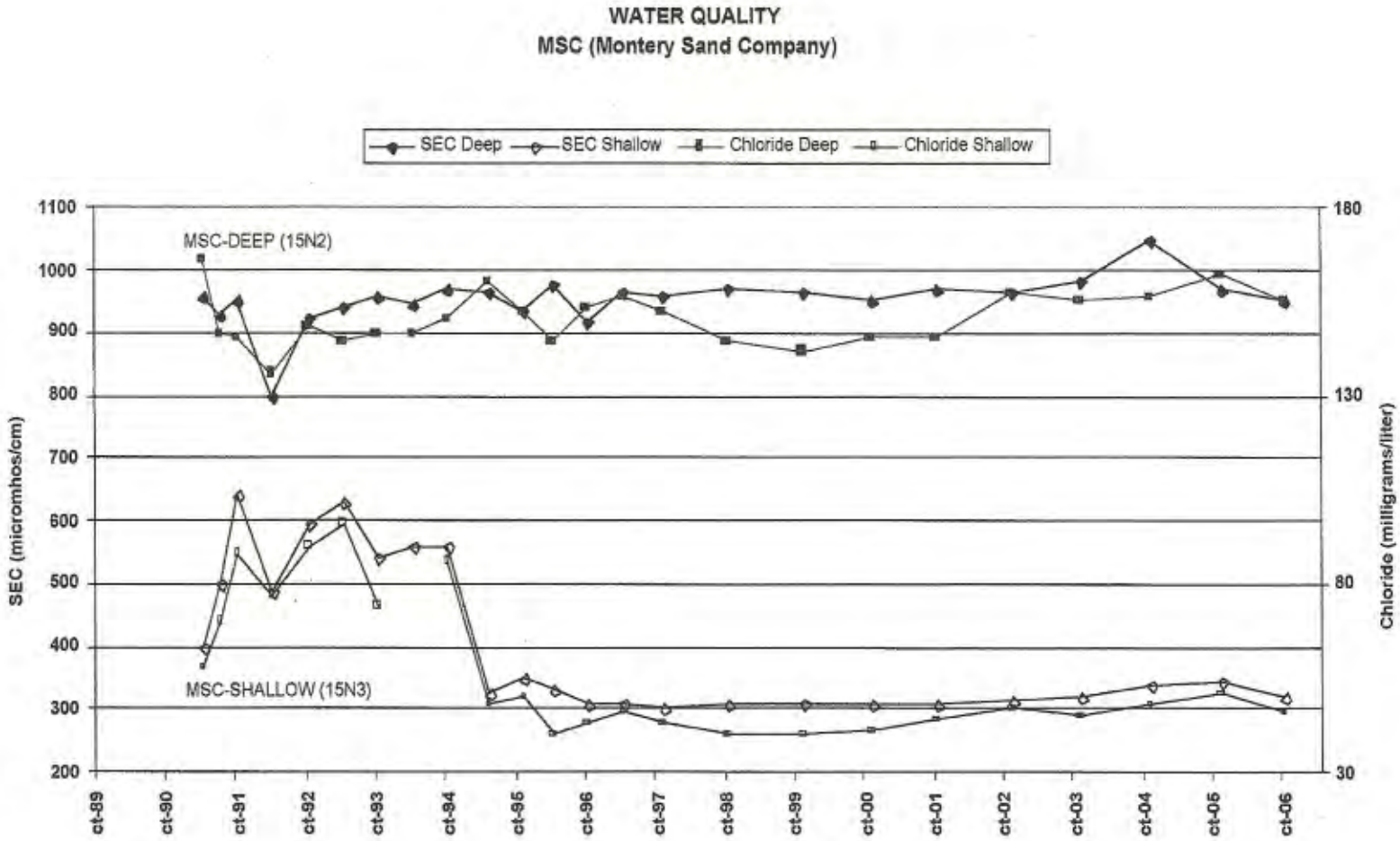


Figure 5. MPWMD MSC Monitor Well Site: Historical Specific Electrical Conductance and Chloride Concentration.

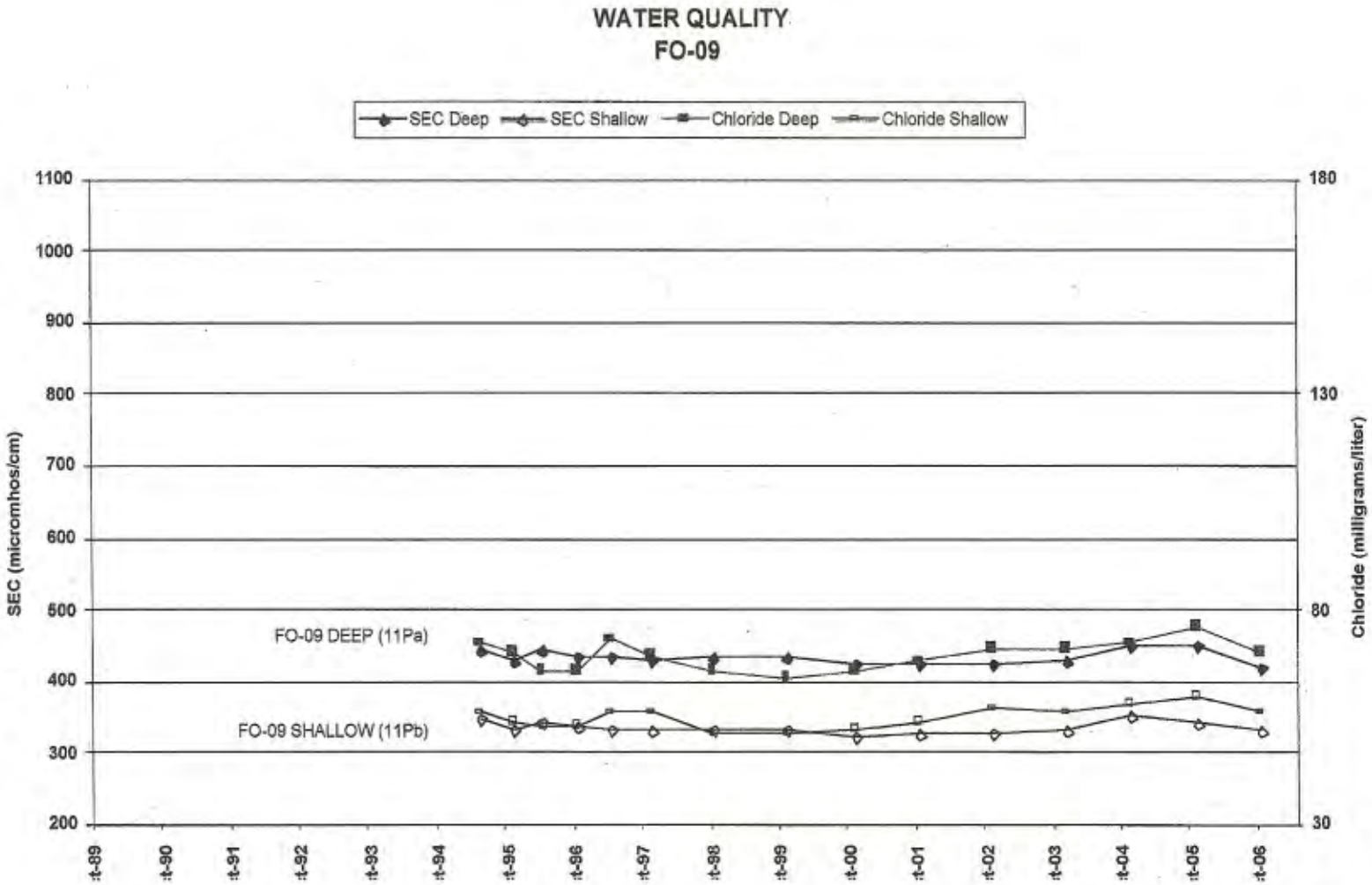


Figure 6. MPWMD FO-09 Monitor Well Site: Historical Specific Electrical Conductance and Chloride Concentration.

Table 1.

SUMMARY OF MPWMD COASTAL SEASIDE BASIN GROUND WATER QUALITY MONITOR WELLS

Site	Well Name	Location Description	Well Number	Date Drilled	DWR Drillers Log	Hole Depth (feet)	Well Depth (feet)	Screened Interval (feet)	Strata Seal (feet)	Casing Type	Geologic Unit	E-Log	Elevation (feet AMSL)
MSC		***former MSC mine north of Playa Ave. and west of Hwy. 1***											
	MSC-Shallow	approx. 10' S of north property line	15S/1E-15N3	5/25/199	338413	720	695	490 - - 680	95 - 275	2" pvc	QTp	- - -	80.58 (s1
	MSC-Deep	approx. 7' E of MSC-Shallow	15S/1E-15N2	5/25/199	338425	920	865	810 - 850	725 - 775	2" pvc	Tsm	yes	80.78 (s1
PCA WEST		***former PCA mine W of Hwy. 1***											
	PCA-W Shallow	approx. 200' SE of ocean bluff	15S/1E-15F	3/28/199	338400	600	585	525 - 575	120 - 150	2"pvc	QTp	- - -	64.64 (s1
	PCA-W Deep	approx. 50' E of PCA-W Shallow	15S/1E-15F2	3/90	338401	900	885	825 - 875	760 - 790	2" pvc	Tsm	yes	65.60 (s1
PCA EAST		***vacant lot NE of Seaside High baseball field***											
	PCA-E Shallow	approx. 300' E Monterey Rd, 50" N fence	15S/1E-15K	4/16/199	338402	863	410	350 - 400	110 - 150	2" pvc	QTp	- - -	69.31 (s1
	PCA-E Deep	(same borehole as shallow well)	15S/1E-15K	4/16/199	338402	863	710	650 - 700	580 - 620	2" pvc	Tsm	yes	69.31 (s1
ORD TERRACE		***Ord Terrace School property south of Ord Grove Ave.***											
	OT-Shallow	1700 block Ord Grove Ave.	15S/1E-23C	8/5/1999	- - -	530	340	280 - 330	0 - 260	2" pvc	upper Tsm	- - -	230 (e)
	OT-Deep	(same borehole as shallow well)	15S/1E-23C	8/5/1999	- - -	530	450	390 - 440	350 - 377	2" pvc	lower Tsm	yes	230 (e)
MPWMD #FO-09		***E of Hwy.1, SE of Okinawa Rd.***											
	#9-Shallow	50' east of utility service rd.	15S/1E-11Pa	8/16/1994	- - -	1,110	660	610 - 650	500 - 540	2" pvc	QTp	- - -	119.11 (s
	#9-Deep	(same borehole as shallow well)	15S/1E-11Pb	8/16/1994	- - -	1,110	840	790 - 830	700 - 765	2" pvc	Tsm	yes	119.15 (s2
MPWMD #FO-10		***south of Light Fighter Drive, behind Barker Theater Building***											
	#10-Shallow	20' north of access road curb	15S/1E-12Fa	9/3/1996	- - -	1,500	650	620 - 640	480 - 500	2" pvc	QTp	- - -	201.19 (s2
	#10-Deep	(same borehole as shallow well)	15S/1E-12Fc	9/3/1996	- - -	1,500	1,420	1380 - 1410	1280 - 1300	2" pvc	Tsm (?)	yes	201.10 (s2

NOTES:

1. Official State well numbers end with a numeral; unofficial MPWMD well numbers end with a small case letter.
2. Geologic Unit refers to the unit adjacent to the screened interval: QTp = Paso Robles Formation; Tsm = Santa Margarita Sandstone.
3. Elevation refers to the reference point elevation: (s1) = surveyed by Land Data Services (1990 and 1992); (s2) = surveyed by Sandis Humber Jones (1995); (e) = altimeter estimate.
4. Well completion data at site MSC are documented in "Installation of Monitoring Well Cluster, Monterey Sand Company", Staal, Gardner & Dunne, Inc. (SGD), July 1990.
5. Well completion data at sites PCA West and PCA East are documented in "Hydrogeologic Investigation, PCA Well Aquifer Test", SGD, July 1990.
6. Well completion data at site MPWMD FO-09 are documented in "Summary of 1994 Fort Ord Monitor Well Installations", MPWMD Tech. Mem. 94-07.
7. Well completion data at site MPWMD FO-10 are documented in "Summary of 1996 Seaside Basin Monitor Well Installations", MPWMD Tech. Mem. 97-04.
8. Two dashes (i.e., "- -") indicate multiple screened intervals.
9. Three dashes (i.e., "- - -") indicate not applicable or not available.

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.

Water Quality Constituent	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH	Chloride	Sulfate	Ammonia Nitrogen (as NH3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophosphate	Boron
Drinking Water Standard	900(1)1600 2200 (2)	NA	NA	250 500 600 (2)	250 500 600 (2)	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
Sampling Location																
15S/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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/1E-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.

SEASIDE BASIN WATERMASTER
MEMORANDUM 2007-01

APPENDIX A

Historical Ground Water Quality Monitoring Results
Seaside Coastal Monitor Wells

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-15N2 WELL NAME: MSC - Deep

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 220 [2]	NA	NA	250 500 60	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
5/31/1990	2500	488	7.3	420	371		<0.4		179	260	84		<0.05	<0.02		
4/26/1991	958	180	7.8	166	58	<0.5	0.5	2.6	58	121	9.4	5.9				
7/24/1991	928	186	7.9	146					55	112	10	5.6	<0.10	<0.03		
10/23/1991	952	200	7.5	145					57	116						
4/28/1992	800	216	7.2	136	40				70	116	12	5.2	<0.03			
6/3/1992				122	46		1.4		64	98	13	4.7	<0.01			
10/20/1992	925	216	8.4	148	46	<0.10	<0.05	0.4	69	112	11	5.0	<0.10	0.07		
4/28/1993	943	212	8.3	144	42	<0.10	<0.05	0.5	59	110	12	5.1	<0.10	<0.05		
10/28/1993	957	186	8.2	146	34	<0.01	<1.0	0.3	54	108	11	4.9	<0.10	0.09		
4/29/1994	944	150	8.2	146	38	<0.05	<1.0	1.7	66	121	13	5.1	<0.10	<0.03		
10/28/1994	968	218	8.2	150	70	<0.05	<1.0	0.4	70	109	12	5.0	<0.01	0.05		
5/3/1995	966	210	8.4	160	40	0.13	<1.0	0.8	70	112	12	4.7	<0.01	0.05		
11/30/1995	935	202	8.3	152	38	0.12	<1.0	1.3	62	105	13	4.9	<0.10	0.08	<0.03	
4/25/1996	978	219	7.8	144	45	<0.05	<1.0	0.7	62	107	14	4.8	<0.10	0.07	<0.03	
10/11/1996	917	205	7.8	153	43	0.28	1.0	1.5	57	109	13	5.1	<0.10	0.08	0.04	
4/24/1997	965	229	8.0	156	43	0.13	<1	0.4	54	107	13	4.9	<0.1	<0.03	<0.03	
11/19/1997	960	234	7.6	152	47	0.14	<1	1.3	72	104	16	4.9	<0.1	0.09	<0.03	
10/27/1998	972	234	7.8	144	42	0.08	<1	<0.2	73	112	15	5.2	<0.1	0.08	<0.03	
11/2/1999	967	236	8.4	142	42	0.11	<1	na	69	103	15	4.8	<0.1	0.06	<0.03	
11/1/2000	950	219	7.9	145	41	0.16	<1	1.0	75	105	15	4.7	<0.1	0.07	0.22	
10/26/2001	968	238	8.4	145	43	<0.05	<1	0.4	86	103	15	4.7	0.03	0.07	<0.03	
11/1/2002	965	238	8.3	157	45	0.10	<1	0.7	69	100	15	3.7	<0.1	0.07	<0.03	
11/6/2003	985	242	7.7	155	43	0.10	<1	0.5	75	103	14	4.8	0.13	0.05	<0.03	
11/8/2004	1050	221	7.9	156	45	0.15	<1	0.5	73	106	15	4.4	0.11	0.072	<0.03	0.28
11/2/2005	970	252	8.0	162	43	0.13	<1	0.5	76	111	15	4.6	<0.05	0.054	<0.03	0.51
10/25/2006	950	240	8.2	155	45	0.09	<1	<0.2	73	105	16	5.0	<0.10	0.051	<0.03	0.29

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, respectively.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-15N3 WELL NAME: MSC - Shallow

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 2200 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
5/31/1990	1190	96	7.2	210	271		<0.4		34	138	62	7.8	<0.05	<0.02		
4/26/1991	400	97	7.9	58	22	<0.5	0.5	0.3	25	44	6.8	3.7				
7/24/1991	500	108	8.0	70					31	55	8.0	4.5	<0.10	<0.03		
10/23/1991	642	146	7.7	88					36	74						
4/27/1992	490	130	7.4	77	23		1.0		36	68	9.2	5.5	<0.01			
6/4/1992									40	77	10.4	6.2	<0.01			
10/20/1992	595	140	8.4	90	57	<0.10	<0.5	0.2	37	72	9.0	5.6	<0.1	<0.05		
4/28/1993	630	150	8.3	96	26	<0.10	<0.5	0.1	37	74	10.0	5.8	<0.1	<0.05		
10/28/1993	542	118	8.1	74	29	<0.10	2.0	0.2	30	59	8.0	4.9	1.1	0.09		
4/29/1994	560	128	8.2	230	28	<0.05	2.0	0.1	33	65	9.0	5.3	0.8	0.04		
10/28/1994	560	128	8.2	86	28	<0.05	2.0	0.2	36	68	9.0	5.2	0.4	0.04		
5/3/1995	325	66	8.3	48	10	<0.05	2.0	0.3	21	35	5.0	2.7	0.24	<0.03		
11/30/1995	350	78	7.7	50	14	<0.05	1.0	1.0	18	39	6.0	3.3	0.40	0.08	0.03	
4/25/1996	331	65	7.1	40	21	<0.05	1.0	1.1	16	39	5.0	3.1	0.19	0.07	0.03	
10/11/1996	306	61	7.8	43	19	<0.05	1.0	0.4	15	38	4.0	3.1	0.10	<0.03	0.11	
4/24/1997	311	63	8.0	46	14	<0.05	2.0	0.2	17	34	5.0	2.9	0.20	<0.03	<0.03	
11/19/1997	301	64	7.9	43	17	<0.05	<1	0.3	18	33	53	2.9	0.21	<0.03	<0.03	
10/27/1998	306	64	7.7	40	18	<0.05	<1	<0.2	17	36	5.0	3.5	<0.1	<0.03	0.03	
11/2/1999	309	63	8.1	40	17	0.07	<1	na	16	35	5.0	3.3	<0.1	<0.03	<0.03	
11/1/2000	308	64	8.0	41	16	0.11	<1	<0.2	16	36	5.0	3.4	<0.1	<0.03	0.24	
10/26/2001	308	66	8.1	44	17	0.06	<1	<0.2	21	37	4.0	3.8	0.05	<0.03	<0.03	
11/1/2002	313	70	8.0	47	18	0.08	<1	0.3	16	35	5.0	2.5	<0.1	<0.03	<0.03	
11/6/2003	318	66	7.2	45	17	0.10	<1	0.5	17	36	4.6	3.3	<0.05	<0.0005	0.03	
11/8/2004	340	71	7.9	48	18	0.11	<1	<0.2	17	36	4.0	3.1	<0.05	<0.0005	<0.03	0.21
11/2/2005	345	74	7.9	51	18	0.09	<1	<0.2	17	40	4.6	3.5	<0.05	<0.0005	0.04	0.32
10/25/2006	320	72	7.8	46	17	0.06	<1	<0.2	17	39	4.8	3.8	<0.10	<0.0005	0.04	0.39

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, respectively.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-15F2 WELL NAME: PCA West - Deep

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophosphate	Boron
DWS [1]	900 1600 2200 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
4/26/1990	1080	200	7.2	144	214		<0.40		51	81	64	24.0	0.08	0.06		
4/26/1991	978	236	7.7	156	60	<0.5	1.3	1.2	63	114	17	6.8				
7/24/1991	1034	244	7.9	150					57	110	18	6.7	<0.10	<0.03		
10/21/1991	1065	252	7.9	153					68	114						
4/29/1992	900	247	7.5	135	38		0.5		76	117	18	5.9				
6/2/1992									73	113	18	6.1	<0.01			
10/20/1992	926	204	8.1	152	68	<0.1	<0.5	0.6	66	113	17	5.9	<0.1	<0.05		
4/28/1993	1012	238	8.0	150	42	<0.1	<0.5	0.6	64	108	19	6.0	<0.1	<0.05		
10/28/1993	1033	202	7.8	148	41	<0.1	<1.0	0.3	65	108	17	5.5	0.2	0.07		
10/28/1994	1011	238	7.9	152	71	<0.05	<1	0.5	72	107	17	5.6	0.8	0.11		
5/3/1995	1016	186	7.9	162	44	0.12	<1	0.4	73	112	18	5.3	0.98	0.14		
11/30/1995	992	228	8.0	154	42	0.10	<1	0.6	68	102	18	5.4	0.40	0.10	0.05	
4/25/1996	1003	247	7.8	144	46	<0.05	<1	1.0	66	107	18	5.3	0.11	0.08	<0.03	
10/11/1996	967	232	7.6	150	39	0.08	<1	0.5	63	107	17	5.6	<0.10	0.07	0.34	
5/21/1997	916	251	6.9	158	42	<0.05	<1	0.5	64	109	17	5.4	0.20	0.06	0.04	
11/19/1997	969	256	7.7	150	46	0.10	<1	0.3	71	106	20	5.3	0.18	0.05	<0.03	
10/30/1998	970	237	7.7	146	42	0.06	<1	0.4	79	109	18	5.4	<0.1	0.08	<0.03	
11/2/1999	964	234	8.0	145	43	0.13	4	na	75	105	12	5.8	0.49	0.11	<0.03	
11/1/2000	976	241	7.9	149	43	0.09	<1	<0.2	76	103	18	5.1	<0.1	0.09	0.21	
10/25/2001	960	224	8.2	146	42	<0.05	<1	0.5	90	103	17	5.2	1.25	0.11	<0.03	
10/31/2002	960	252	7.9	159	44	0.12	<1	0.7	75	98	17	4.1	0.88	0.11	<0.03	
11/6/2003	972	242	7.8	149	43	0.14	<1	1.1	75	102	16	5.3	0.49	0.08	0.23	
11/9/2004	1020	266	7.9	158	44	0.10	<1	0.90	78	104	16	5.0	1.192	0.131	0.47	0.28
11/3/2005	920	240	7.9	168	43	0.11	<1	0.54	76	111	17	4.9	0.200	0.088	<0.03	0.41
10/24/2006	960	246	7.7	150	42	0.08	<1	0.27	77	109	18	5.4	0.541	0.085	<0.03	0.34

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, respectively.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-15F1 WELL NAME: PCA West - Shallow

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophosphate	Boron
DWS [1]	900 1600 2200 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
4/26/1990	340	28	7.3	68	57		4.0		19	16	23.0	7.7	<0.05	<0.01		
6/14/1990	340			50												
6/17/1990	330			50												
4/26/1991	311	68	7.8	48	21	>.5	4.0	>0.2	19	33	5.4	2.7				
7/24/1991	321	66	7.9	44					21	33	5.2	2.5	<0.10	<0.03		
10/21/1991	326	66	8.2	53					19	36						
4/29/1992	280	65	7.7	44	11		4.4		20	35	5.1	2.4	<0.01			
6/3/1992									20	35	5.2	2.3	<0.01			
10/20/1992	302	66	8.2	50	16	<0.10	4.6		20	36	5.0	2.3	<0.10	<0.05		
4/28/1993	311	68	8.2	46	13	<0.10	4.6	0.3	19	34	5.0	2.2	<0.10	<0.05		
10/28/1993	327	64	8.2	42	20	<0.10	6.0	0.2	19	32	5.0	2.3	1.1	<0.05		
10/28/1994	338	66	8.2	46	20	<0.05	5.0	0.3	23	35	5.0	2.0	<0.10	<0.03		
5/3/1995	317	68	8.6	48	12	0.12	6.0	0.3	21	34	5.0	2.7	1.1	<0.03		
11/30/1995	315	64	8.3	52	6	<0.05	4.0	1.0	20	33	5.0	2.2	0.20	<0.03	<0.03	
4/25/1996	319	61	7.9	44	11	<0.05	5.0	1.3	19	33	5.0	2.2	0.11	<0.03	<0.03	
10/11/1996	315	63	7.8	44	9	<0.05	4.0	0.5	17	32	4.0	2.2	<0.10	<0.03	0.04	
5/21/1997	314	65	6.3	44	10	<0.05	4.0	0.3	18	34	5.0	2.1	<0.1	<0.03	<0.03	
11/19/1997	311	65	8.0	50	12	<0.05	4.0	0.2	20	33	6.0	2.2	<0.1	<0.03	<0.03	
10/30/1998	316	68	8.0	44	13	0.06	4.0	<0.2	20	35	5.0	2.3	<0.1	<0.03	0.04	
11/2/1999	315	66	8.2	43	11	<0.05	4	na	20	33	5.0	2.3	<0.1	<0.03	<0.03	
11/1/2000	311	63	8.2	45	10	<0.05	4.0	<0.2	19	34	5.0	2.2	<0.1	<0.03	0.19	
10/25/2001	308	66	8.1	46	11	<0.05	4.0	0.3	24	34	5.0	2.7	<0.1	<0.03	<0.03	
10/31/2002	307	66	8.0	48	11	0.12	<1	0.4	18	28	5.0	1.6	<0.1	<0.03	<0.03	
11/6/2003	310	64	7.3	47	11	0.36	4	0.6	20	31	5	2.2	<0.05	<0.0005	<0.03	
11/9/2004	320	70	8.1	50	11	<0.05	5	<0.2	19	32	5	2.1	0.107	<0.0005	<0.03	0.29
11/3/2005	320	72	8.1	61	11	<0.05	4	<0.2	19	34	5.0	2.3	<0.05	<0.0005	<0.03	0.23
10/24/2006	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

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, respectively.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-11Pb WELL NAME: FO-09 - Deep

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 220 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
8/19/1994	822	190	8.1	102	62	<0.05	6.0		51	88	10.0	4.5	0.57	0.07	0.05	
5/3/1995	442	103	8.3	72	12	<0.05	<1.0	0.3	27	52	4.0	3.4	<0.10	<0.03		
11/30/1995	427	80	8.3	70	17	<0.05	<1.0	1.1	27	51	4.0	3.6	0.30	<0.03	0.03	
4/25/1996	443	89	8.0	66	15	<0.05	<1.0	0.6	25	51	4.0	3.5	0.63	<0.03	0.03	
10/11/1996	436	91	7.7	66	13	<0.05	<1.0	1.3	27	53	4.0	3.9	0.29	<0.03	0.35	
4/21/1997	436	91	7.3	73	15	<0.05	<1.0	0.3	26	51	4.0	3.5	0.19	<0.03	0.05	
11/19/1997	429	90	8.0	69	15	<0.05	<1.0	0.1	28	50	4.0	3.6	<0.10	<0.03	<0.03	
10/27/1998	432	88	7.4	66	16	<0.05	<1.0	<0.2	27	49	4.0	3.6	<0.10	<0.03	0.04	
11/2/1999	432	92	8.2	64	14	<0.05	<1.0	na	26	50	4.0	3.5	<0.10	<0.03	<0.03	
11/2/2000	425	87	8.1	66	14	<0.05	1.0	<0.2	26	50	4.0	3.5	<0.10	<0.03	0.18	
10/25/2001	425	92	8.2	68	14	<0.05	<1.0	0.2	32	49	4.0	3.8	<0.10	<0.03	<0.03	
11/1/2002	426	92	8.1	71	15	0.06	<1.0	0.4	25	45	4.0	2.7	<0.10	<0.03	<0.03	
12/6/2003	428	88	8.4	71	15	<0.05	<1	0.5	26	50	4.5	3.4	<0.05	<0.0005	<0.03	
11/8/2004	450	94	8.1	72	15	<0.05	<1	<0.2	25	50	3.0	3.3	0.100	<0.0005	<0.03	0.19
11/2/2005	450	94	8.2	76	15	<0.05	<1	0.29	27	54	3.7	3.6	<0.05	<0.0005	0.06	0.35
10/25/2006	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

NOTES: 1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-11Pa WELL NAME: FO-09 - Shallow

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophosphate	Boron
DWS [1]	900 1600 2200 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
8/19/1994	315	154	9.5	55	47	0.11	2.0		12	57	4.0	5.8	0.31	<0.03	<0.03	
5/3/1995	348	62	8.4	56	19	0.08	<1.0	0.3	23	34	4.0	3.6	<0.10	<0.30		
11/30/1995	334	62	8.4	54	12	0.05	<1.0	0.8	23	35	4.0	3.7	<0.10	<0.03	0.07	
4/25/1996	343	63	7.9	53	11	<0.05	<1.0	0.5	22	33	4.0	3.7	<0.10	<0.03	0.05	
10/11/1996	336	61	7.8	53	13	<0.05	<1.0	0.4	22	35	4.0	4.0	<0.10	<0.03	0.29	
4/21/1997	333	59	6.9	56	13	<0.05	<1.0	0.4	22	35	4.0	3.7	<0.10	<0.03	0.06	
11/19/1997	330	60	8.0	56	13	<0.05	<1.0	0.2	23	33	5.0	3.7	<0.10	<0.03	0.05	
10/27/1998	334	60	7.4	51	16	<0.05	<1.0	0.2	23	36	4.0	3.9	<0.10	<0.03	0.03	
11/2/1999	333	61	8.1	51	13	<0.05	<1.0	na	21	32	4.0	3.6	<0.10	<0.03	0.05	
11/2/2000	322	59	8.1	52	12	<0.05	<1.0	<0.2	22	34	4.0	3.7	<0.10	<0.03	0.28	
10/25/2001	325	64	8.1	54	12	<0.05	<1.0	0.3	23	40	4.0	3.6	<0.10	<0.03	0.05	
11/1/2002	328	66	8.1	57	13	0.12	<1.0	0.4	21	30	4.0	2.9	<0.10	<0.03	0.04	
12/6/2003	330	62	7.6	56	13	0.06	<1	0.5	22	33	4.2	3.7	<0.05	<0.0005	<0.03	
11/8/2004	350	67	7.9	58	13	0.08	<1	0.20	21	33	4.0	3.4	<0.05	<0.0005	<0.03	0.24
11/2/2005	340	66	8.1	60	12	<0.05	<1	0.29	23	36	4.4	3.7	<0.05	<0.0005	0.05	0.31
10/25/2006	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

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, respectively.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-12Fc WELL NAME: FO-10 - Deep

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 2200 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
9/20/1996	1447	467	7.8	136	27	0.12	<1		148	107	25	7.2	1.22	0.84	0.04	
4/24/1997	652	165	7.7	78	12	0.77	<1	1.1	41	55	8	4.2	<0.10	0.20	<0.03	
11/19/1997	469	130	7.9	70	12	0.31	<1	0.5	36	46	10	3.1	0.76	0.15	0.03	
10/27/1998	442	108	7.5	66	46	0.09	<1	0.3	30	46	8	4.2	<0.10	0.20	<0.03	
11/2/1999	394	84	8.2	61	11	0.10	<1	na	24	39	6	2.6	0.97	0.09	0.04	
11/2/2000	380	77	8.1	60	16	0.09	1	0.5	23	41	6	2.6	0.84	0.04	0.20	
10/26/2001	372	80	8.2	60	13	<0.05	1	0.4	25	46	6	2.6	0.48	0.09	0.04	
11/1/2002	372	78	8.2	64	13	0.17	<1	0.7	21	36	6	1.8	0.33	0.04	<0.03	
12/16/2003	374	74	8.2	63	13	<0.05	<1	0.6	22	40	5.9	2.6	0.41	0.11	<0.03	
11/8/2004	400	86	8.0	62	15	0.07	<1	0.50	23	40	6.0	2.4	0.573	0.139	<0.03	0.33
11/3/2005	380	80	8.1	66	13	0.06	<1	0.41	23	42	5.6	3.0	0.560	0.053	0.05	0.33
10/25/2006	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.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-12Fa WELL NAME: FO-10 - Shallow

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 22[2]	NA	NA	250 500 60	250 500 6	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
9/20/1996	910	303	7.7	73	9	<0.05	<1		91	45	18	4.4	4.69	1.01	0.41	
4/24/1997	430	95	7.5	71	25	0.13	<1	0.7	28	43	8	2.4	0.15	0.06	<0.03	
11/19/1997	386	74	7.9	72	14	<0.05	1	0.5	24	40	8	2.2	<0.1	<0.03	<0.03	
10/27/1998	389	74	7.5	64	14	<0.05	<1	0.2	24	40	7	2.3	<0.1	<0.03	<0.03	
11/2/1999	387	72	8.1	64	13	<0.05	1	na	23	38	7	2.2	<0.1	<0.03	<0.03	
11/2/2000	375	69	8.1	62	12	<0.05	2	<0.2	23	40	7	2.3	<0.1	<0.03	0.16	
10/26/2001	365	72	8.1	57	16	<0.05	1	0.2	24	44	6	2.0	<0.1	<0.03	<0.03	
11/1/2002	353	72	8.2	58	17	<0.05	1	0.5	20	34	5	2.1	<0.1	<0.03	<0.03	
12/16/2003	340	62	8.2	58	13	<0.05	1	0.5	22	35	5.8	2.6	<0.05	<0.0005	<0.03	
11/8/2004	370	75	7.9	57	17	0.06	<1	0.20	21	38	5.0	1.8	0.106	<0.0005	<0.03	0.39
11/3/2005	350	70	8.1	65	12	<0.05	<1	0.20	21	39	5.2	2.0	<0.05	<0.0005	<0.03	0.27
10/25/2006	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

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.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-15K4 WELL NAME: PCA East - Deep

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophosphate	Boron
DWS [1]	900 1600 22 [2]	NA	NA	250 500 6	250 500 6	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
4/27/1990	1080	216	7.4	142	214		<0.4		59	81	60	24.0	<0.05	0.30		
4/28/1992	900	241	7.2	135	41		0.3		77	114	16	5.0	<0.08			
6/2/1992									75	110	15	4.9				
6/4/1992				134	40		<0.1		74	114	16	5.3	<0.08			
11/30/1995	968	236	8.0	142	45	0.05	<1.0	2.5	65	105	15	4.7	0.10	0.11	0.07	
4/21/1997	*no access*															
11/19/1997	*no access*															
10/27/1998	*no access*															
11/2/1999	941	230	8.1	132	44	0.06	<1	na	73	103	15	4.8	0.50	0.15	<0.03	
11/1/2000	900	225	8.0	130	42	0.08	<1	<0.2	72	102	14	4.6	0.87	0.13	0.22	
10/26/2001	880	224	8.3	126	43	<0.05	<1	0.4	78	99	13	4.6	0.46	0.12	<0.03	
10/31/2002	*not sampled Fall 2002*															
11/6/2003	845	224	7.6	118	40	0.06	<1	1.7	64	93	12	4.6	1.13	0.06	0.32	
11/9/2004	880	236	8.1	115	40	0.06	<1	0.70	60	93	12	4.1	0.812	0.124	0.13	0.28
11/2/2005	800	222	8.2	126	38	0.07	<1	0.57	59	97	12	4.2	0.240	0.090	0.04	0.42
10/24/2006	790	208	8.2	109	35	<0.05	<1	<0.20	57	93	12	4.2	0.216	0.092	<0.03	0.33

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, r

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-15K5 WELL NAME: PCA East - Shallow

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophosphate	Boron
DWS [1]	900 1600 2200 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
4/27/1990	350	48	7.3	62	71		2.2		27	16	19.0	8.0	<0.05	<0.01		
4/28/1992	290	61	7.9	46	8		2.1		16	39	3.8	1.9	<0.02			
6/1/1992				45	8		2.0		16	39	3.8	2.3	<0.02			
11/30/1995	306	74	8.5	46	<5	<0.05	3.0	0.4	17	40	4.0	1.8	0.10	<0.03	0.04	
4/21/1997	*no access*															
11/19/1997	*no access*															
10/27/1998	*no access*															
11/2/1999	384	92	8.2	51	14	<0.05	<1	na	40	40	10.0	3.1	4.8	0.26	0.05	
11/1/2000	314	79	8.2	49	8	<0.05	2.0	0.6	20	40	4.0	2.1	38	0.74	0.22	
10/26/2001	302	64	8.1	49	8	<0.05	2.0	<0.2	22	38	5.0	2.7	2.07	0.06	0.03	
10/31/2002	*not sampled Fall 2002*															
11/6/2003	307	68	7.7	50	8	0.06	2	0.6	20	35	6	1.8	3.27	0.13	0.88	
11/9/2004	370	89	7.7	56	13	<0.05	<1	2.50	27	40	7	2.7	4.071	0.213	0.44	0.15
11/2/2005	330	70	8.0	56	9	<0.05	2	0.53	26	40	9.7	3.5	2.760	0.229	0.08	0.30
10/24/2006	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

NOTES:

1 DWS = Drinking Water Standard; maximum contaminant levels are from California Domestic Water Quality and Monitoring Regulations, Title 22, 1977.

2 The three values for each constituent refer to the "recommended" level, the "upper" level and the "short-term use" level, respectively.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-23Cb WELL NAME: Ord Terrace - Deep

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 220 [2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
11/2/1999	1255	294	8.3	147	123	0.21	<1	na	105	118	23	7.2	<0.1	0.09	<0.03	
11/2/2000	1241	303	8.3	156	115	0.82	<1	1.3	109	118	24	6.8	<0.1	0.09	0.21	
10/25/2001	1240	310	8.4	163	115	<0.05	<1	1.2	108	111	25	7.1	<0.1	0.09	<0.03	
11/1/2002	1235	300	8.2	170	122	0.52	<1	1.5	103	111	24	5.3	0.12	0.09	<0.03	
12/16/2003	1243	296	8.1	170	116	0.53	<1	1.3	104	113	24	6.4	0.12	0.08	<0.03	
11/9/2004	1300	298	8.2	178	107	0.45	<1	1.1	106	120	23	6.3	0.155	0.082	<0.03	0.38
11/2/2005	1230	326	8.2	194	95	0.57	<1	1.2	113	138	25	7.0	<0.05	0.055	<0.03	0.67
10/24/2006	1280	318	8.2	181	89	0.47	<1	0.84	107	132	26	7.1	0.169	0.026	<0.03	0.58

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.

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

GROUND WATER QUALITY MONITORING RESULTS

WELL NO.: T15S/R1E-23Ca WELL NAME: Ord Terrace - Shallow

Units are milligrams per liter unless otherwise noted.

Date	Specific Conductance (micromhos/cm)	Total Alkalinity (as CACO3)	pH (pH units)	Chloride	Sulfate	Ammonia Nitrogen (as NO3)	Nitrate Nitrogen (as NO3)	Total Organic Carbon	Calcium	Sodium	Magnesium	Potassium	Iron	Manganese	Orthophos-phate	Boron
DWS [1]	900 1600 22.[2]	NA	NA	250 500 600	250 500 600	NA	45	NA	NA	NA	NA	NA	0.3	0.05	NA	NA
11/2/1999	824	220	8.5	100	43	<0.05	3	na	65	94	12	5.0	0.63	0.08	<0.03	
11/2/2000	848	233	8.4	112	40	0.05	<1	1.5	73	86	15	4.3	0.99	0.10	0.36	
10/25/2001	780	220	8.6	106	39	<0.05	5	0.6	106	74	15	4.6	0.75	0.11	<0.03	
11/1/2002	798	222	8.4	111	41	0.07	6	0.6	66	72	16	3.3	1.84	0.23	<0.03	
12/16/2003	917	240	8.3	130	45	<0.05	<1	1.0	77	85	18	4.5	0.79	<0.0005	<0.03	
11/9/2004	990	248	8.3	127	51	<0.05	<1	1.50	85	90	18	4.2	0.556	0.185	0.35	0.18
11/2/2005	805	236	8.2	125	42	<0.05	6	0.82	82	86	20	5.6	1.080	0.280	<0.03	0.60
10/24/2006	800	212	8.3	106	37	<0.05	6	0.35	68	79	17	4.4	1.080	0.077	<0.03	0.29

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.

ATTACHMENT 7

Martin B. Feeney
Consulting Hydrogeologist

P.G. 4634
C.E.G. 1454
C.Hg 145

SEASIDE GROUNDWATER BASIN WATERMASTER

SEAWATER SENTINEL MONITORING WELLS WORKPLAN
January 26, 2007

INTRODUCTION

As part of the court decree, the Seaside Groundwater Basin Watermaster (Watermaster) is required to install a series of coastal monitoring wells for the purpose of enhancing the existing network of monitoring wells that can detect seawater intrusion into the Seaside Basin. As part of the judge's review of the Watermaster's progress, he imposed a set of deadlines for implementation of this work. The timelines set by the judge are aggressive and will be difficult to achieve without refocusing the scope and goals of this work. This document intends to detail a revised approach to the work, propose preliminary well locations, identify required permits, and suggest an achievable schedule. A preliminary estimate of costs is also provided.

BACKGROUND

The Watermaster has initiated a multi-faceted Basin Monitoring and Management Program (MMP) that includes data collection, management and analysis, ground water modeling, and hydrogeologic analysis. This program also includes the installation of monitoring wells for purposes of refining basin hydrogeology and water quality monitoring. Because of the wells dual purpose of refining basin hydrogeology and water quality monitoring, the magnitude of the monitoring well program was large and expensive. While the insight and data from these wells may be necessary in the long run, achieving the primary goal of detecting seawater intrusion can be achieved with well designs that focus on the water quality monitoring. Hydrogeologic data and understanding that are developed as part of implementation of the coastal monitoring wells will be useful, but not the primary purpose. The decoupling of the dual purposes for installing monitoring wells allows redesign of the coastal monitoring wells, reducing their cost and speeding implementation.

The MMP approved by the judge also includes the construction of several inland monitoring wells to further the understanding of the groundwater basin. The purpose of these wells is to provide better understanding of the structure, hydrostratigraphy, and water level conditions of the inland portions of the basin. These inland wells are not part of this work plan as the purpose of these wells is significantly different than the coastal monitors.

Previous Approach

The previous approach consisted of six monitoring well clusters. Each cluster would have four monitoring wells completed to various depths. One borehole would be drilled to the Monterey Formation and completed toward the lower portion of the aquifer system, one would be completed in the upper Santa Margarita Sandstone, and two would be completed in the overlying Paso Robles Formation. It was assumed that the deeper boring would extend as deep as 1,500 to 2,500 feet. Each well was to be constructed of PVC casing with gravel pack and perforations in the appropriate hydrostratigraphic interval. The deeper well was to be 3-inch diameter while the other wells would be 2-inch diameter. The drilling cost estimate included site preparation, well construction and development, fluid/cuttings disposal and site restoration. Total cost of the drilling program was estimated $3.8 million. The actual well sites were undetermined. The

P.O. Box 23240, Ventura, CA 93002 • **Phone: 805/643-7710** • e-mail mfeeney@lx.netcom.com

ATTACHMENT 7

estimated costs did not include site selection, design, permitting, site acquisition, or construction management. These costs were estimated at approximately $550,000 which bring total project cost to $4.35 million.

The proposed approach would have allowed collection of the following data:

- Water levels in the upper and lower Santa Margarita Sandstone
- Water levels in two discrete hydrostratigraphic intervals in the Paso Robles Formation
- Water Quality sampling of the Santa Margarita Sandstone and Paso Robles Formation intervals
- Conductivity/Resistivity (Induction) surveys of entire sediment column providing indirect measurement of water quality and water quality changes.
- Base of water bearing sediments – Depth to Monterey Formation

Revised Approach

With the exception of distilled water, all water contains some level of dissolved minerals or salts. Typical drinking water contains less that 1,000 part per million of dissolved salts whereas seawater contains approximately 35,000 parts per million of salts. Unlike organic contaminants which degrade water with concentrations measured in parts per billion; degradation of water by seawater is the result of contamination on the parts per million or even parts per thousand basis. The addition of more salts to the water, as the result of mixing with seawater, changes the physical properties of the water such as the density of the water and, most relevant to the subject project, the electrical properties of the water.

Distilled water is essentially electrically non-conductive; with increasing amounts of salinity water becomes increasingly more conductive. As such, the electrical conductivity of water can be used to infer the salt concentration. The revised work plan relies on this principal.

The change in electrical properties with increasing salinity makes the detection of seawater contamination into an aquifer relatively easy. As the water within the aquifer becomes more saline due to the intrusion of seawater, the electrical conductivity of the formation containing the water increases relative to the value measured when the aquifer was filled with native ground water.

The revised work plan utilizes single-well monitoring sites (as opposed to the multiple wells at each site described in the existing plan). The wells would extend into and perforate the Santa Margarita Sandstone. The well would be constructed of 3-inch diameter casing to allow the periodic cased-hole conductivity/resistivity (induction) profiling of the aquifer system. This would allow detection of seawater (as measured as an increase in formation conductivity) at any depth from the top of saturation (i.e. the water table) to bottom of the well.

Well Specifics for Each Site:

- One 8 ¾-inch boring to 1,500 feet or Monterey Formation (whichever comes first)
- Geophysical logging (Resistivity, SP and Natural Gamma)
- 3" diameter flush threaded Sch. 80 PVC Casing into Santa Margarita Sandstone

- 100 feet of 0.032-inch horizontally-cut PVC perforations. Continuous or placed in the most productive zones – the zones a production well would be perforated
- Gravel packed in the perforated interval(s)
- Well sealed from the top of Santa Margarita Sandstone
- Well air lifted developed until clean
- Flush-grade surface vault with room for data logging equipment

Data collection from the monitoring well network would include periodic induction logging of the cased borehole and collection of physical water samples from the Santa Margarita Sandstone for calibration purposes. Successive induction logs would be overlaid on previous logs for comparison. If a significant change in conductivity was detected, a depth-specific monitoring well should be drilled at the site to provide improved understanding of the nature of the change. In addition to the indirect measurement of water quality within all portions of the Paso Robles Formation and Santa Margarita Sandstone, the wells would allow monitoring of water level conditions in the Santa Margarita Sandstone.

An example of the type of data that is collected as part of the proposed approach is presented on Figure 1. Figure 1 presents data collected recently from a coastal monitoring well. The data are taken from an induction survey conducted within a three-inch diameter monitoring well similar to the proposed design. This aquifer system has seawater at a depth of 450 feet below ground surface. The presence of seawater is indicated by the rapid increase in conductivity (decrease in resistivity) values below a depth of 450 feet. The presented data represent the baseline value. This well will be surveyed periodically. Data (curves) will be compared to detect the movement of seawater within the aquifer system at this location.

Supplement Network Through Use of Existing Monitoring Wells. In addition to the new wells, and the existing network of monitoring wells owned by MPWMD and California American (see attached map) there are other existing wells in the area of the proposed new wells that can be integrated into the sentinel well network. The proposed well sites are in the coastal bluffs area on the former Fort Ord. As part of the conversion of Fort Ord to civilian use, extensive subsurface exploration has been performed to assess environmental impacts of historical land use. At many locations along the coast, there remain monitoring wells that could be brought into the Watermaster's monitoring program. Many of these wells are quite shallow, but several extend to into the upper aquifer system. These wells would be useful additions to a coastal monitoring network, as many have water quality data extending back to the early 1990's.

In summary, the revised approach will allow collection of the following data:

- Water levels in the Santa Margarita Sandstone
- Collection of water quality samples from the Santa Margarita Sandstone
- Conductivity/Resistivity (Induction) surveys of entire sediment column providing indirect measurement of water quality and water quality changes

Compared to the previous approach the revised approach does not directly collect these data:

- *Base of water bearing sediments – Depth to Monterey Formation.* These data are desirable for increasing understanding of the basin structure. However, these data are very expensive, as drilling to the proposed depths requires a different class of drilling equipment, significantly raising costs. The proposed approach includes drilling into the Santa Margarita Sandstone/Purissima Formation. Within the coastal areas of the Seaside Basin, there are adequate data to project the depth to the Monterey Formation below the bottom of the borehole. In the areas where the Purissima may be encountered, this could be more problematic as there are few, if any, wells that fully penetrate the Purissima into the Monterey.
- *Water Quality sampling of the Paso Robles Formation.* The proposed approach would not allow collection of water quality samples from the Paso Robles Formation. However, the induction surveys will provide water quality data for water within the various units of the Paso Robles Formation.
- *Water levels in two discrete hydrostragraphic intervals in the Paso Robles Formation.* The proposed approach does not provide water level data from any of the various water bearing units of the Paso Robles Formation. However, some of the sites have existing shallow monitoring wells installed as part of Fort Ord clean-up investigations. Water level data from the shallow system may be available from these wells. Additionally, most of the basin's production and artificial recharge is from the confined Santa Margarita Sandstone, and water levels in this aquifer unit at the coast are the primary management tool.

MONITORING PROGRAM

It is assumed that the new monitoring wells would be folded into the existing Seaside Basin monitoring network. It is understood that the judge has specified collection of water data on a quarterly basis from the coastal monitoring well network. This could be accomplished cost-effectively by quarterly induction profiling of the wells supported by periodic (annual) collection of water quality samples. The quarterly induction surveys could be performed by a geophysical contractor who could provide the data to the Watermaster's designated technical personnel for analysis. This approach would reduce quarterly monitoring cost significantly.

WELL SITES

As part of the work associated with the preparation of this work plan, the team (Joe Oliver of the MPWMD and I) met with a representative of the California State Parks (Ken Gray) to identify locations for the coastal monitoring wells. The team visited and received conceptual approval for five sites in the coastal portion of Fort Ord north of Sand City, and I have identified four primary sites and one alternative location. The tentatively approved sites are shown on the attached map and are as follows:

- Range 8 – This site is at the extreme southwestern corner of Range 8. There is an existing shallow monitoring well at this site although actual depth is unknown. The well site would be with the existing paved road.
- Bunker 11 – This site is located immediately in front of the abandoned Ammo Bunker No. 11. The Ammo bunkers are planned to be maintained for public access and historical interest.
- Bunker 1–This site is located immediately in front of the abandoned Ammo Bunker No. 1.

- MCWD Lift Station – This site is located at the site of Marina Coast Water District's existing sewer lift station. There is an existing shallow monitoring well as this site. Again, its actual depth is unknown at the time of the preparation of this plan. Data on the construction of the existing well is likely available from BRAC personnel.

The site below was identified as an alternative site due to its distance from the ocean.

- Along Road – This site will be located along the existing north-south trending road. Several turn-out areas were identified that would support a well site and provide sufficient room for construction.

All of sites are located in existing roads and have sufficient previously-disturbed area for well construction staging. Additionally, each site is in an area where State Parks plans to maintain roads and access. This will allow for continued on-going access to the well sites for the purpose of collecting data.

Alternative Sites: If the well sites on State Park Land become infeasible, a fall back position would be to locate the wells within the TAMC right-of-way. These sites are less favorable for coastal monitoring wells because this right-of-way is significantly farther from the ocean than the above sites.

PERMITTING

Permitting of the well sites will likely be the critical path issue in meeting deadlines imposed by the judge. The discussion below assumes the construction on State Parks property. Construction in the TAMC right-of-way has similar permitting requirements.

The coastal bluffs property of former Fort Ord was formally transferred from the U.S. Army to the Dept. of Interior (Nat'l Parks Service) last fall. Ken Gray's best guess is that the Nat'l Park Service could do a formal transfer to State Parks as early as this March, but based on a field meeting with Mr. Gray on 1/22, the fact that this property has not yet been formally transferred to State Parks does not prevent State Parks from authorizing uses such as monitor wells, because State Parks currently has "operational authority" for the property. Assuming Mr. Gray's assumption is correct the permitting process would likely include:

- State Parks – Based on discussions with Mr. Gray, the Watermaster could submit a project description and an application for permission to install the monitoring wells. The application would need to include assessment of potential impacts for their review prior to granting the permit.
    - The key issue will likely be construction impacts on:
        - Biological resources, including habitat for special-status wildlife species (Smith's blue butterfly, snowy plover, and black legless lizard) and presence of special-status plant species (Monterey Spineflower, Wallflower, and Sand Gilia). If the land has been transferred to State Parks, implementation of the Habitat Management Plan would likely mitigate for these impacts, except for state listed plants. If land has not been transferred and remains federal property, there are existing biological opinions that would likely cover impacts to all these species.

- Coastal zone analysis/consistencies (aesthetics, impacts on visitor serving uses and coastal access)
- Other construction impacts (air quality, noise, etc.) - These can be easily mitigated with standard construction practices.

- CEQA - Assuming that the project can be designed and implemented without significant environmental impacts (i.e., possible biological resources impacts discussed below which require more comprehensive mitigation); a Notice of Exemption could be the appropriate document. This assumes that the project will not involve major controversy or objection.
- NEPA - The project would not be subject to NEPA if the US Army has conveyed or will convey ownership of the property to State Parks prior to commencement of construction. Ken Gray has indicated that he believes that State Parks has operational control giving them the permitting authority. If Mr. Gray's assumption is wrong regarding permitting authority, it is believed that there is a categorical exemption for monitor wells under NEPA.
- Coastal Act (California Coastal Commission) - The project would require, at a minimum, an "Amendment to an Existing Coastal Development Permit" which would be considered "Immaterial" (staff level approval). It may be considered "Material" (requiring approval by the Coastal Commission; therefore more coordination and longer time period). If there is no existing permit covering related activities, another process that would be expeditious would be for the project to be considered *de minimus* and receive a waiver from the Coastal Commission staff.

The sites have been selected to avoid impacts to habitat. However, if construction activities are deemed to potentially disturb sensitive habitat, the permits listed below would be necessary. However, the sites likely would be moved to avoid these issues.

- CA Endangered Species Act (ESA) Take permit (California Dept. of Fish and Game) - if the Sand Gilia is located at any sites that may be disturbed and the land has been transferred.
- Federal ESA Take permit (USFWS) - If habitat for snowy plover and/or Smith's blue butterfly is to be disturbed and the land has been transferred.

In addition to the above permits, well construction permits will be required from Monterey County Environmental Health Department. These permits are essentially ministerial and require 2 to 3 weeks to be issued. These permits can only be issued to the drilling contractor.

Timing of permits:

- Timing of State Park Permit: 1 month or less from submission of project definition and supporting documentation
- Well Construction Permits – 2 to 3 weeks.
- CEQA – Assuming a Notice of Exemption: 1 month or less from project definition.
- NEPA – Not Required
- Coastal Commission (if required): minimum 2 months, if Coastal Commission hearing required several months to a year.

- CA / Federal ESA: 6 months to a over a year depending upon resources affected and ownership/designation of land

SCHEDULE

Permitting and site acquisition will control schedule. After permitting is completed, sentinel wells can be installed within 6 weeks. Initial data from the wells would be available within 10 weeks.

COST

Permitting Costs:

Permitting Costs are always difficult to estimate, as the process can be unpredictable. Assuming the permitting process is somewhat similar to that discussed above; permitting costs are estimated at $ 35,000.

Well Construction/Hydrogeologic Data Collection Costs:

Cost for program management, well construction, hydrogeologic supervision and analysis, monitoring network review and initial data collection are estimated at between $850,000.

Annual Monitoring Program Costs:

As proposed the 4 coastal sentinel wells would be induction logged quarterly and water quality samples collected annually. This cost of this limited program is estimated $18,000 per year. This would include approximately $12,000 for induction logging ($3,000 per quarter) and annual collection and analysis of water quality samples of approximately $6,000.

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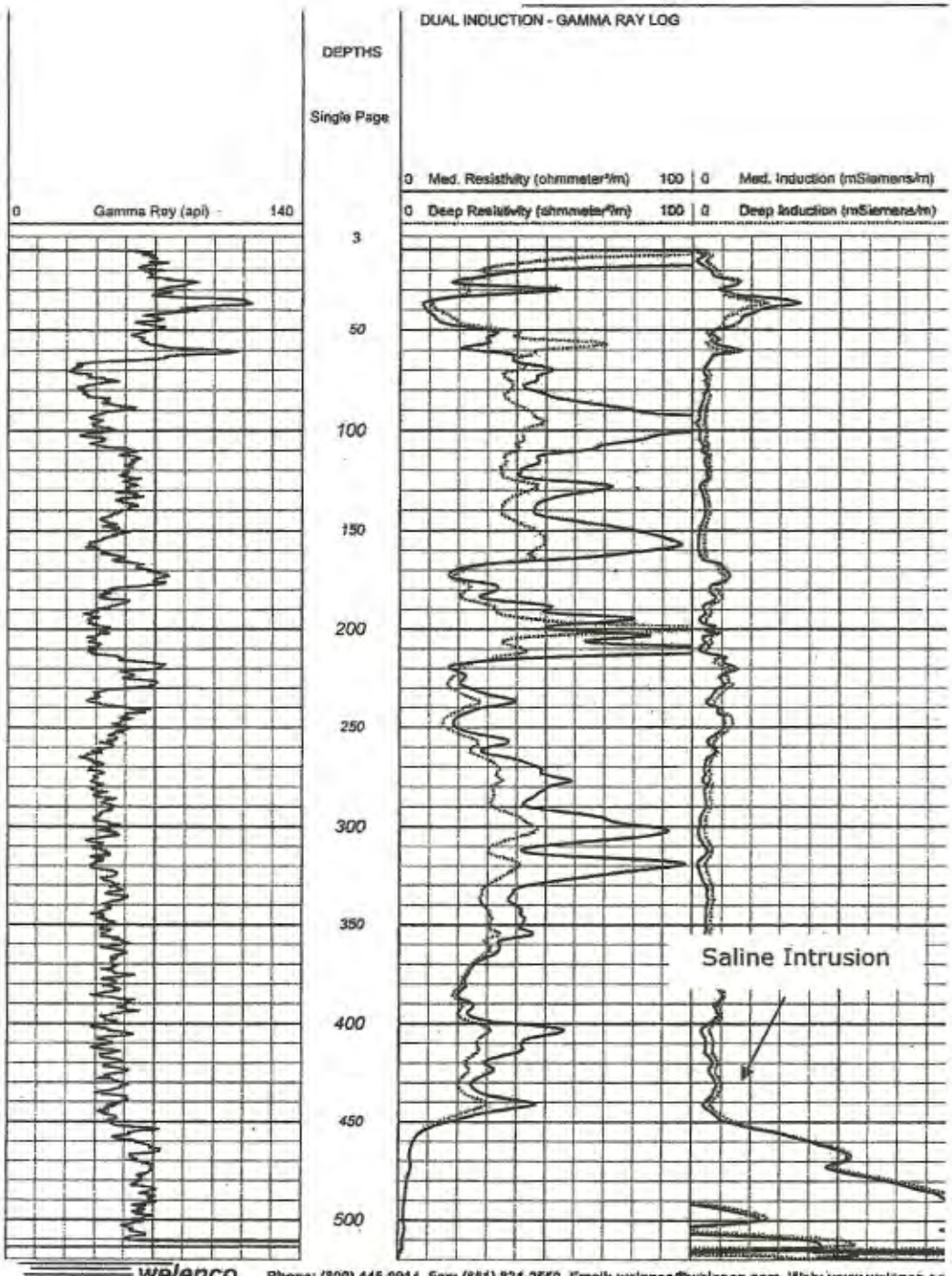
FIGURE 1 – CASED HOLE INDUCTION LOG



SITE MAP

[Hard Copy to Follow]

SEASIDE BASIN
COASTAL WATER QUALITY
MONITORING WELLS

0 2,000 4,000 8,000 12,000 16,000 Feet

Scale

N
W E
S

- Proposed SWI Sentinel Wells
- Existing Monitoring Wells