

APPENDIX E

TIDAL INFLUENCE STUDY LETTER REPORT DATED JULY 7, 2003, AND TIDAL INFLUENCE STUDY DATA



July 7, 2003

Mr. Thomas M. Cota, Chief
Southern California Cleanup Operations Branch – Cypress Office
Attention: Ms. Christine Chiu, Project Manager
Southern California Cleanup Operations Branch, Cypress
Department of Toxic Substance Control
5796 Corporate Avenue
Cypress, California 90630-4732

RE: Tidal Study and Well Gauging Results
Ascon Landfill Site
Huntington Beach, California

Dear Ms. Chiu:

1.0 INTRODUCTION

A Draft Groundwater RI/FS Workplan (draft workplan) was submitted to DTSC on March 10, 2003 for the Ascon Landfill Site (Figure 1). In a letter dated April 28, 2003 DTSC requested that the Responsible Parties (RPs) conduct a tidal influence study including one round of well/monitoring point gauging prior to final approval of the draft workplan. This work, including details on the proposed methodology, was originally proposed in the draft workplan and approved by DTSC in their letter dated May 15, 2003. The results of the tidal influence study and gauging are summarized below in this letter report.

2.0 METHODOLOGY

Tidal Influence Study

The tidal influence study was conducted in general accordance with the draft workplan and conditions specified in DTSC's letter dated April 28, 2003 and the RP's response to comment letter dated May 9, 2003. The following tasks were conducted:

- Two transducers were placed in standpipes installed within the Huntington Beach Flood Control Channel (channel) at locations shown on Figure 1.
- Transducers were also placed in site wells AW-4, AW-5, B-4 and MW-9 (Figures 1 and 2)
- One transducer was placed on site to collect barometric pressure readings.



- Water level measurements were obtained between June 5, 2003 and June 13, 2003 (approximately 11,000 minutes). This period included intervals when the ocean tides (as predicted for Balboa Pier in Newport Beach) were measured with a range of over 6 feet (spring tides).
- Hand measurements of water levels were collected periodically over this period as a general check on the transducer data.
- The standpipe elevations were surveyed on June 17, 2003 by Nunez Engineering of Whittier, California. The well casing elevations (AW-4, AW-5, B-4 and MW-9) were previously surveyed by Nunez Engineering in August 2002. As part of the June 2003 survey, the AW-4 elevation was resurveyed as a common reference point between the 2002 and 2003 survey events.
- The data were analyzed to evaluate:
 - The extent of water level fluctuation in the channel due to tides.
 - The extent of this tidal influence on site groundwater levels.
 - Whether water level fluctuation in the channel changes the groundwater flow direction beneath the site.
 - The potential for site groundwater to discharge into the channel as a result of tidal fluctuation.

Gauging

Site wells were inventoried and gauged in general accordance with the procedures outlined in the draft workplan and DTSC's letter dated April 28, 2003. The location of the well and monitoring points are shown on Figure 2. The site wells and monitoring points were inventoried on June 23, 2003. The inventory included surface condition observations and bottom sounding measurements of each well and monitoring point. Following the inventory, the semi-perched aquifer (SPA) wells and monitoring points were gauged on June 26, 2003 with the exception of GP-2 and GP-24, which were gauged on June 27, 2003. The perched zone monitoring points were gauged on June 27, 2003. A groundwater contour map was generated, based on the results of the gauging of the SPA points.



3.0 RESULTS OF THE TIDAL STUDY

The results of the tidal influence study are summarized in Figure 3. Water level elevations are reported as feet above mean sea level (MSL). The transducer data, as collected from the pressure transducers, was corrected for water density assuming brackish conditions (1,020 grams per liter) in the channel and the SPA, and for barometric pressure changes. The significance of the results is discussed below.

Extent of Water Level Fluctuation in the Channel Due to Tides

Both channel measuring points ("Channel Standpipe" and "Bridge Standpipe") showed approximately the same amount of water level fluctuation. The fluctuation was clearly in response to tides. The greatest fluctuation (>4 feet) occurred on June 12th and June 13th (near the end of the test) during a period when ocean tides at Balboa Pier in Newport Beach showed an approximate 6 feet of difference from high to low tide. This indicates that water level fluctuation in the channel is muted somewhat compared to fluctuation in the ocean, as would be expected in a restricted channel inland of the beach. Nevertheless, water levels in the channel are clearly influenced by tides.

Extent of Tidal Influence on Site Groundwater Levels

As shown on Figure 3, groundwater levels fluctuated during the test. Groundwater levels in all four wells responded in a similar manner throughout the monitoring period. Close inspection of the data indicate both a general decline of water levels in all wells over the monitoring period, as well as short-term fluctuations on the order of ½ to 1 day in duration with a magnitude of less than 0.2 foot. The data do not indicate a clear relationship between the observed short-term groundwater fluctuations and the tidally influenced water levels in the channel. Instead, the groundwater fluctuations coincide more closely with changes in barometric pressure that occurred over the monitoring period. Even if some of this fluctuation were caused by tidal influence, the magnitude of that influence is minimal (< 0.2 feet).

Does Water Level Fluctuation in the Channel Affect Groundwater Flow Direction Beneath the Site?

The water level fluctuations in the channel did not significantly affect the groundwater flow direction beneath the western portion of the site that is adjacent to the channel. As shown on Figure 3, the groundwater levels in all site wells responded in a similar manner throughout the monitoring period. Although the absolute elevation of groundwater changed during the monitoring period, the relative elevation did not change significantly. The groundwater flow direction as measured in the 4 wells remained relatively constant (north to northeast).



Does Site Groundwater Discharge Into the Channel?

Data collected during the tidal study clearly indicate that site groundwater does not discharge into the channel. Groundwater elevations were approximately 1 to 2 feet lower than water levels in the channel throughout the monitoring period. This relationship indicates that "losing stream" conditions occurred in the channel, that is, the channel discharges to shallow groundwater.

These observations support previous site monitoring data presented in the draft workplan, and in the next section of this letter report, indicating that the groundwater flow direction beneath the site is generally northward and away from the channel. Losing stream conditions also explain the occurrence of brackish groundwater beneath the site.

4.0 RESULTS OF WELL INVENTORY AND GAUGING

Prior to gauging, the site wells and monitoring points were inventoried to assess current conditions and to prepare for gauging. The results of the site inventory are presented in Table 1.

Data from the June 26-27, 2003 gauging event are presented in Table 2. The gauging event identified non-aqueous phase liquid (NAPL), sometimes referred to as "free product", present in more wells than was previously measured. During previous gauging in 2002, free product was measured in B-6, MW-14, P-1, P-3, P-5, and GP-2. During the recent June 2003 gauging, product was measured in these wells (with the exception of B-6) and the following additional wells: B-2, B-5, P-6, P-8, P-10, and GP-3. The recently observed product in some of the monitoring points appears to be the result of delayed emergence of very viscous product into the wells following drilling in 2002. No product was detected in the offsite wells.

Groundwater elevation data were plotted onto a site map and contoured by hand. Only data from SPA wells/monitoring points that did not contain measurable product were contoured. This map is presented as Figure 4. It is significant to note that this is the first gauging event that includes all wells and monitoring points in a single gauging event. The data indicate a groundwater flow direction that is generally northerly; however, the data suggest a slight groundwater trough around the pond areas in the middle portion of the site. The June 2003 gradient is consistent with the previous gauging events and demonstrates that groundwater flow direction in the western portion of the site is away from the channel (generally to the north and northeast).



5.0 CONCLUSIONS

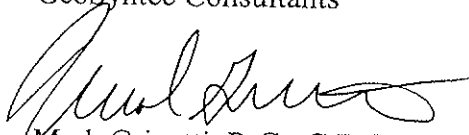
In summary, the recent tidal influence study and gauging event indicate:

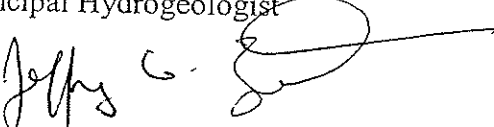
- Groundwater does not discharge to the channel.
- The groundwater flow direction continues to be away from the channel.
- NAPL was identified in more wells than previously measured.

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Please feel free to call us if you have any questions or comments at (805) 897 3800.

Sincerely
GeoSyntec Consultants


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Principal Hydrogeologist


Jeffrey Zukin, R.G., C.E.G.
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cc: Frank Gonzales, DTSC
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Ascon Responsible Parties
Alex Isaly, Project Navigator, Ltd.



Table 1
 Ascon Well Inventory-June 23, 2003
 Huntington Beach, California

Groundwater Monitoring Well Number	Well Diameter (inches)	Well Type	Capped	Labeled	Measured Bottom of Monitoring Point (ft btoe)	Well Condition
Semi-Perched Monitoring Points						
AW-2	2	PVC	Yes	No	20.0	No well box lid
AW-3	2	PVC	Yes	Yes	20.2	Cap is threaded, No well box lid.
AW-4	2	PVC	Yes	No	27.2	Cap is threaded, No well box lid.
AW-5	2	PVC	Yes	No	20.3	Cap is threaded, well box lid was on.
AW-8	2	PVC	Yes	Yes	20.1	Cap is threaded, well box lid not on, labeled on asphalt.
B-2	2	Stainless Steel	No	No	74.2	No well box lid.
B-4	2	Stainless Steel	No	No	36.0	No well box lid.
B-5	2	Stainless Steel	No	No	30.5	No well box lid
B-6	2	Stainless Steel	Yes	Yes	23.3	Stainless steel cap, no well box lid, located in gated area.
B-7	2	Stainless Steel	Yes	Yes	28.8	Cap was PVC.
MW-4	4	PVC	Yes	Yes	45.0	Well box lid on.
MW-9	4	PVC	Yes	Yes	30.4	Well box lid on.
MW-13	4	PVC	Yes	Yes	25.5	Well box lid on, well located in gated area.
MW-14	4	PVC	Yes	Yes	44.9	Well box lid on.
MW-15	4	PVC	Yes	Yes	25.5	Well box lid on.
NMW-1	4	PVC	Yes	Yes	38.7	Well cap had 2" hole in center. Well box lid was on the ground beside the well.
NMW-2	4	PVC	Yes	Yes	38.2	No well box lid
MW-16	4	PVC	Yes	No	25.0	Well box locked, GeoSyntec replaced lock.
MW-17	4	PVC	Yes	No	24.9	Well box locked. GeoSyntec replaced lock.
MW-18	4	PVC	Yes	No	20.0	Well in Adelia Street. Well cap had a lock, but it was not locked. GeoSyntec replaced lock.
P-1	6	PVC	Yes	No	35.2	
P-2	6	PVC	Yes	No	37.0	
P-3	6	PVC	Yes	Yes	38.8	
P-4	6	PVC	Yes	No	35.4	
P-5	6	PVC	Yes	Yes	37.6	
P-6	6	PVC	Yes	No	41.9	Label was worn off.
P-8	6	PVC	Yes	Yes	30.4	
P-9	6	PVC	Yes	Yes	24.4	
P-10	6	PVC	No	No	15.0	Cap was lying on the ground beside the piezometer. Located in gated area.
GP-1	1	PVC	Yes	Yes	33.0	
GP-2	1	PVC	Yes	Yes	18.3	
GP-3	1	PVC	Yes	Yes	26.8	
GP-4	1	PVC	Yes	Yes	27.1	
GP-10	1	PVC	Yes	Yes	21.5	
GP-12	1	PVC	No	Yes	23.1	
GP-21	1	PVC	Yes	Yes	27.5	
GP-22	1	PVC	Yes	Yes	29.4	
GP-23	1	PVC	Yes	Yes	32.5	

Table 1
 Ascon Well Inventory-June 23, 2003
 Huntington Beach, California

Groundwater Monitoring Well Number	Well Diameter (inches)	Well Type	Capped	Labeled	Measured Bottom of Monitoring Point (ft btoc)	Well Condition
GP-24	1	PVC	Yes	No	33.2	Top of PVC casing ~6" to 8" below ground surface and capped with a blue oversized cap.
GP-25	1	PVC	Yes	Yes	39.6	
Perched Monitoring Points						
P-7	6	PVC	Yes	No	20.3	Label was worn off.
GP-5	1	PVC	Yes	Yes	17.9	
GP-6	1	PVC	Yes	Yes	18.1	
GP-7	1	PVC	Yes	Yes	22.2	
GP-8	1	PVC	Yes	Yes	7.5	
GP-9	1	PVC	Yes	Yes	10.2	
GP-11	1	PVC	Yes	Yes	14.8	
GP-13	1	PVC	Yes	Yes	22.1	
GP-14	1	PVC	Yes	Yes	23.5	
GP-15	1	PVC	Yes	No	12.2	Label was worn off.
GP-16	1	PVC	Yes	No	18.0	
GP-17	1	PVC	Yes	Yes	14.3	
GP-18	1	PVC	Yes	Yes	-	PVC casing bent at ground surface. Measurement could not be collected.
GP-19	-	-	-	-	-	Could not find. Believe it is buried under concrete debris.
GP-20	1	PVC	Yes	Yes	14.8	Label was on stake.

ft btoc: feet below top of casing

Table 2
Ascon -Well Gauging Data
June 26, 2003-June 27, 2003*

Groundwater Monitoring Well Number	Surveyed Well Head Elevation (ft)	Measured Total Depth of Well (ft above MSL) ²	Reported Screen Interval (ft above MSL)	Depth to Static water (ft below TOC)	Groundwater Elevation (ft above MSL)	Depth to Top of Product (ft below TOC)	Depth to Bottom of Product (ft below TOC)	Product Thickness (ft)	PID reading (ppm)	Comments
Semi-Perched Monitoring Points										
AW-2	5.62	-14.40	-4 (-14)	8.41	-2.79	-	-	-	0	
AW-3	8.38	-11.81	-1.62 (-11.62)	11.43	-3.05	-	-	-	0	
AW-4	6.01	-21.14	-10.99 (-20.99)	8.11	-2.10	-	-	-	0	
AW-5	4.86	-15.46	-5.14 (-15.14)	7.08	-2.22	-	-	-	0.8	
AW-8	5.78	-14.32	-	11.26	-5.48	-	-	-	0	
B-2	24.54	-49.61	-15.46 (-52.46)	31.15	-6.61	28.34	31.15	2.81	0	Product is very viscous.
B-4	18.84	-17.11	-9.16 (-19.16)	21.28	-2.44	-	-	-	0.2	
B-5	25.67	-4.80	-6.33 (-16.33)	ND	-	28.23	ND	-	0	Product is tar-like, water level could not be detected.
B-6	8.05	-15.26	-13.95 (-28.95)	10.86	-2.81	P	-	-	33	
B-7	15.11	-13.71	3.11 (-11.89)	17.98	-2.87	-	-	-	0	
MW-4	22.23	-22.77	2.23 (-22.77)	25.44	-3.21	-	-	-	0	
MW-9	15.03	-15.41	0.03 (-14.97)	17.43	-2.40	-	-	-	0.3	
MW-13	6.83	-18.66	-3.17 (-18.17)	9.84	-3.01	-	-	-	0.2	
MW-14	22.73	-22.21	-6.27 (-21.27)	ND	-	25.95	ND	-	142	Product was very viscous and covered probe. Water Level could not be detected.
MW-15	5.57	-19.90	-4.43 (-19.43)	8.48	-2.91	-	-	-	0	
NMW-1	21.28	-17.37	2.28 (-17.72)	25.4	-4.12	-	-	-	0	
NMW-2	17.35	-20.89	-0.65 (-20.65)	20.04	-2.69	-	-	-	0.1	
MW-16	7.01	-17.99	0.01 (-14.99)	10.21	-3.20	-	-	-	0.2	
MW-17	5.17	-19.73	-3.88 (-18.83)	11.13	-5.96	-	-	-	0	
MW-18	2.93	-17.02	-1.98 (-16.98)	5.76	-2.85	-	-	-	0.5	
P-1	24.96	-10.20	-0.19 (-10.54)	31.32	-6.36	28.5	31.32	2.82	29.4	Product has consistency of motor oil and strong hydrocarbon odor.
P-2	21.9	-15.13	-6.3 (-16.30)	26.29	-4.39	-	-	-	0	
P-3	26.6	-12.24	2.8 (-12.2)	29.64	-3.04	29.46	29.64	0.18	68.3	Product has consistency of motor oil and strong hydrocarbon odor.
P-4	25.18	-10.21	4.85 (-10.15)	28.5	-3.32	-	-	-	0.4	
P-5	27.55	-10.07	2.45 (-12.55)	32.35	-4.80	30.46	32.35	1.89	16.3	Product is very viscous.
P-6	27.16	-14.72	-6.92 (-16.92)	30.17	-3.01	30.1	30.17	0.07	115	Product is very viscous, had strong hydrocarbon odor.
P-8	21.99	-8.38	1.42 (-8.58)	25.12	-3.13	24.56	25.12	0.56	150	Product has consistency of motor oil and strong hydrocarbon odor.
P-9	14.44	-9.98	0.56 (-9.44)	18.06	-3.62	-	-	-	1.9	
P-10	5.18	-9.77	-0.14 (-10.14)	8.47	-3.29	14.65	14.95	0.3	1.4	Product is tar-like.
GP-1	21.71	-11.31	-1.37 (-11.37)	25.86	-4.15	-	-	-	16.5	
GP-2	24.03	5.69	0.98 (-9.02)	ND	-	25.25	ND	-	63.8	Product has consistency of motor oil and strong hydrocarbon odor. Water Level could not be detected.
GP-3	20.01	-6.75	2.98 (-7.02)	22.12	-2.11	22.04	22.12	0.08	23	Product has consistency of motor oil and strong hydrocarbon odor.
GP-4	18.64	-8.46	1.45 (-8.55)	21.37	-2.73	-	-	-	13.2	
GP-10	15.06	-6.41	2.06 (-7.94)	18.55	-3.49	P	-	-	0	Interface probe was sticking to sides of casing.
GP-12	16.23	-6.83	2.14 (-7.86)	19.38	-3.15	-	-	-	0.5	
GP-21	16.3	-11.22	-1.8 (-11.8)	18.78	-2.48	-	-	-	0.2	
GP-22	15.85	-13.51	-4.8 (-14.8)	18.77	-2.92	-	-	-	13	

Table 2
Ascon -Well Gauging Data
June 26,2003-June 27, 2003*

Groundwater Monitoring Well Number	Surveyed Well Head Elevation (ft)	Measured Total Depth of Well (ft above MSL) ²	Reported Screen Interval (ft above MSL)	Depth to Static water (ft below TOC)	Groundwater Elevation (ft above MSL)	Depth to Top of Product (ft below TOC)	Depth to Bottom of Product (ft below TOC)	Product Thickness (ft)	PID reading (ppm)	Comments
GP-23	24.88	-7.60	-3.4 - (-13.4)	27.87	-2.99	-	-	-	-	-
GP-24	26.32	-6.88	-0.49 - (-10.49)	27.15 (?)	-0.83 (?)	-	-	-	1.2	-
GP-25	19.89	-19.69	-10.64 - (-20.64)	23.31	-3.42	-	-	-	8.8	-
Perched Monitoring Points										
P-7	-	-	-	-	-	-	-	-	0	-
GP-5	-	-	-	8.94	-	-	-	-	0	-
GP-6	-	-	-	11.06	-	P	-	-	0	-
GP-7	-	-	-	12.16	-	12.12	12.16	0.04	5.3	Product was very viscous with strong hydrocarbon odor.
GP-8	-	-	-	11.04	-	-	-	-	6.3	Product was tar-like, water level could not be detected.
GP-9	-	-	-	ND	-	6.93	ND	-	7.1	Product was tar-like, water level could not be detected.
GP-11	-	-	-	ND	-	9.98	ND	-	5.2	Product was tar-like, water level could not be detected.
GP-13	-	-	-	7.06	-	-	-	-	0	-
GP-14	-	-	-	9.59	-	-	-	-	3.5	-
GP-15	-	-	-	12.8	-	-	-	-	15.5	-
GP-16	-	-	-	8.92	-	P	-	-	5.2	-
GP-17	-	-	-	8.17	-	7.81	ND	-	81.8	Product was tar-like, water level could not be detected.
GP-18	-	-	-	NM	-	-	-	-	0	-
GP-19	-	-	-	NM	-	-	-	-	2.1	PVC pipe broken at ground surface. Could not drop probe down pipe as it was bent.
GP-20	-	-	-	7.52	-	-	-	-	-	Could not find probe. Believe it is buried under concrete debris.

Explanation:

- ft Feet
- TOC Top of Casing
- MSL Mean Sea Level Based on Newport Bay Entrance Tidal Station
- ppm Parts per Million
- ND Not able to detect with interface probe
- PID Photionization Detector (organic vapor reading). Readings collected at well head at the top of the well casing.
- ? Only water detected with interface probe, however, product visually observed on interface probe after withdrawal from well or monitoring point. Data used for contouring.
- Footnotes:

1 Source: PNL 2002b, 2003. Surveying data based on NAVD88 datum with 2.46 foot correction to derive MSL elevation.
 2 Based on well sounding measurements conducted on June 23, 2003
 Note: All semi-perched monitoring points gauged on June 26, 2003 with the exception of GP-2 and GP-24. All perched monitoring points gauged on June 27, 2003

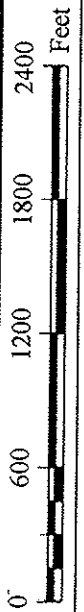
Notes:

- A Well AW-1 could not be located.
- B Wells AW-6 and AW-7 have been reported as being paved over during expansion of Hamilton Avenue in 1996.



Legend

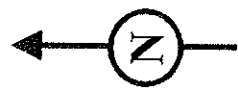
- ⊗ Standpipe Location in Channel
- Location of Well Monitored During Tidal Study



Site Location and Standpipe/Well Location Map for Tidal Study		Figure 1
Base Map Source: Modified from PNL Ascon Landfill Site, Huntington Beach, California		Prepared June 30, 2003

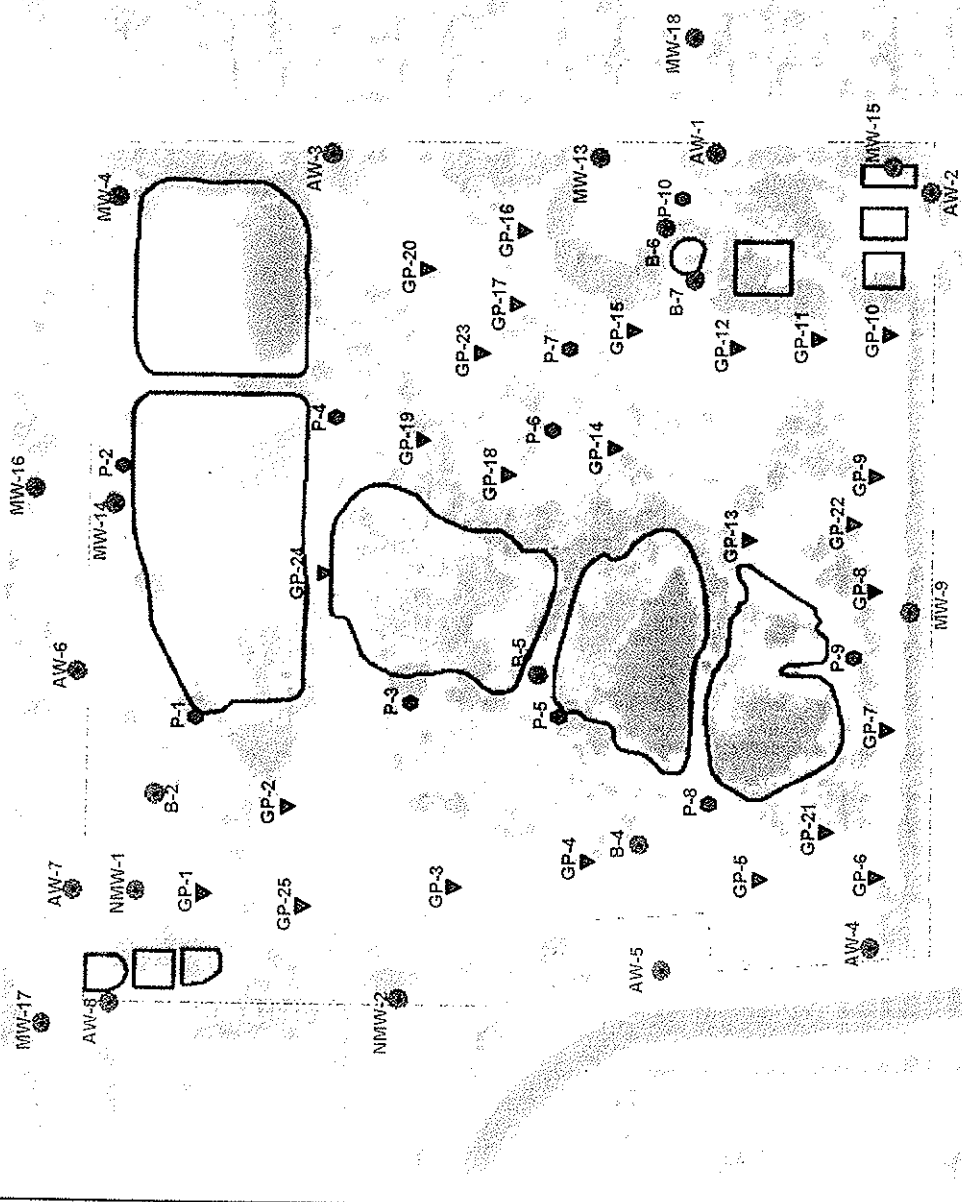
Legend

- GW Monitoring Well Locations
- ▼ Geoprobe Monitoring Well Locations
- Piezometer Well Locations
- Ascon Site Boundary
- Pits and Lagoons Boundaries



- NOTES:**
1. Monitoring wells AW-6 and AW-7 have been reported as being paved over during the expansion of Hamilton Avenue in 1986 (ESE, 1997).
 2. GP-18 casing damaged at surface.
 3. Monitoring well AW-1 and geoprobe monitoring location GP-19 could not be located.

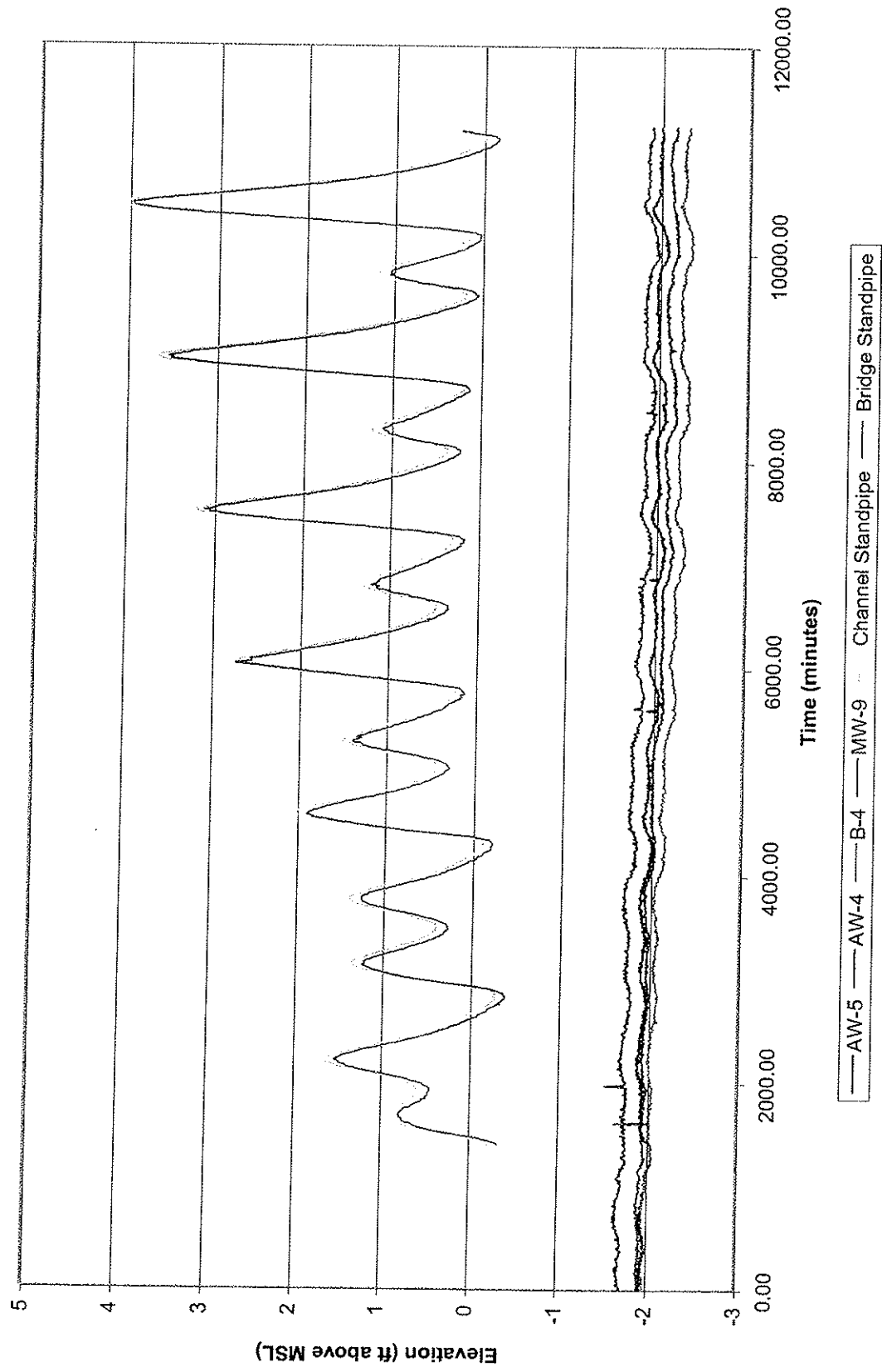
Base Map Source: PNL 2002b, 2003



Well and Piezometer Location Map

Figure 2

Figure 3 - Tidal Influence Investigation Water Elevation Data (6/5/03 14:40-6/13/03 9:50)

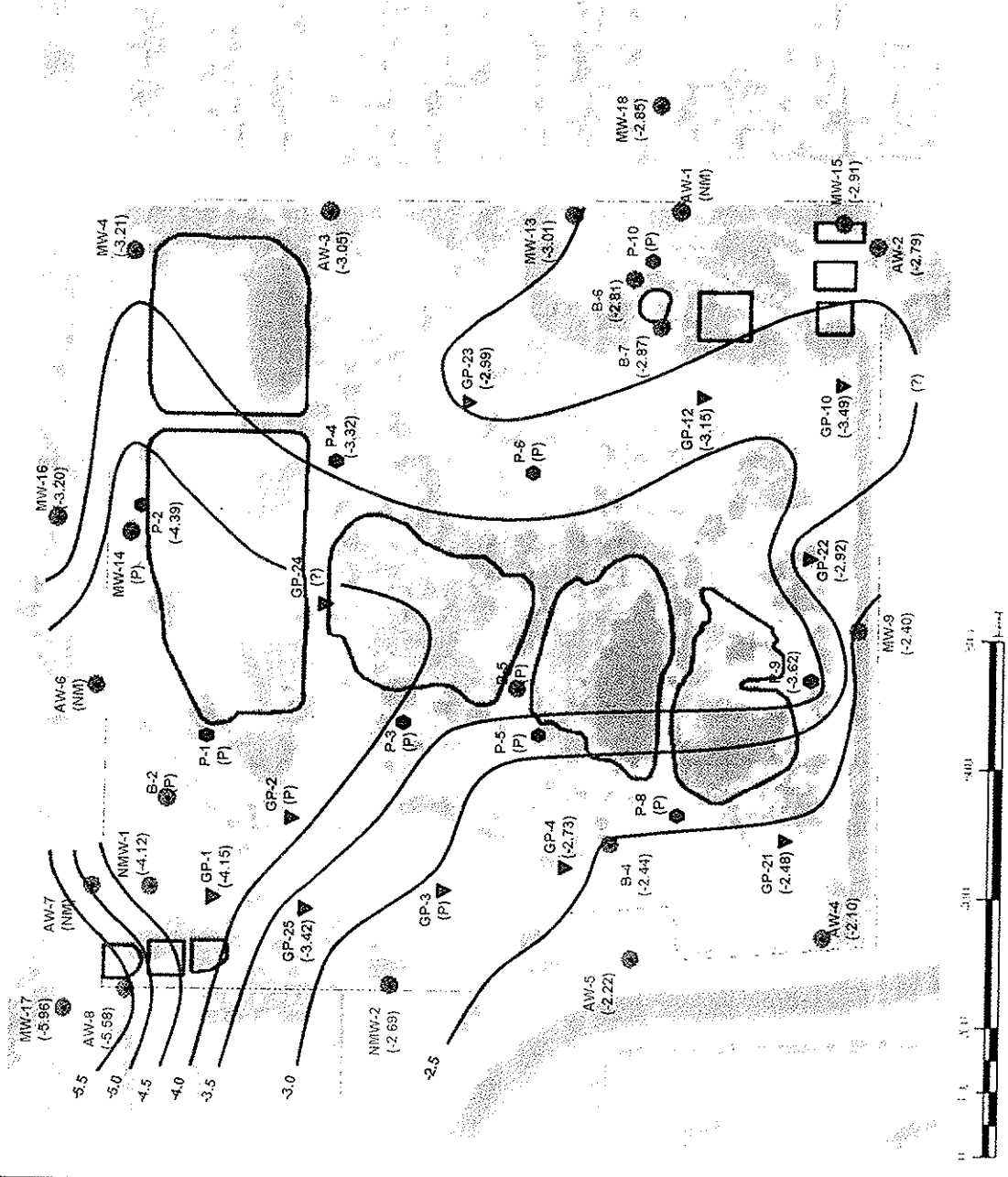


Legend

- GW Monitoring Well Locations
- ▼ Geoprobe Monitoring Well Locations
- Piezometer Well Locations
- Ascon Site Boundary
- Pits and Lagoons Boundaries
- Groundwater Contour for June 26, 2003
- (NM) Not Measured
- (P) Free Product Observed in Well
- (-1.03) Groundwater Elevation (ft above MSL)
- (?) Questionable Measurement



NOTES:
 1. Monitoring wells AW-6 and AW-7 have been reported as being paved over during the expansion of Hamilton Avenue in 1986 (ESE, 1997).
 2. Monitoring well AW-1 could not be located.



Semi-Perched Groundwater Contour Map—June 26, 2003

GeoSyntec 2003, Base Map Source: PNL, 2002
 Ascon Landfill Site, Huntington Beach, California

Prepared June 30, 2003

Figure 4

MONITORING WELL SUMMARY
ASCON LANDFILL SITE

WELL No.	COORDINATES		ELEV. (MARK OR NORTH) TOP OF CASING PIPE	REMARKS
	NORTHING	EASTING		
AW-4	2183435.8951	8036745.7182	8.48'	
-	2182472.6106	8036982.3506	18.95'	PIPE ON EDISON BRIDGE
-	2183866.5972	8036503.7704	8.20'	PIPE ON MID. POINT OF CHANNEL
-	2182476.4189	8036980.2873	14.39'	"X" MARK ON BRIDGE LABEL : EL. 12.10' FNT No. 78 STN. 36+42.94 x 8.45 RT.



BENCHMARK NOTE:

DESIGNATION	DESCRIPTION	NAVD 88 HEIGHT (FT.)
10-151-74	A 3-3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "10-151-74" MON. IS LOCATED IN THE N.W. COR. OF HAMILTON AVE. & MAGNOLIA ST., 87 FT. WESTERLY OF THE CENTERLINE OF MAGNOLIA ST. AND 81.30 FT. NORTHERLY OF THE CENTERLINE OF HAMILTON AVE., 1 FT. EASTERLY OF THE SIDEWALK. MON. IS DOWN 0.6 FT. BELOW SIDEWALK SURFACE.	5.508

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