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By Alameda County Environmental Health 2:35 pm, Jan 26, 2016

January 26, 2016

Mr. Keith Nowell
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: Transmittal of Work Plan for Groundwater Sampling and Well Abandonment at Oakland Maintenance Center Site, Oakland International Airport, 1100 Airport Drive, Oakland, California (Toxic Leaks Case RO0000414)

Dear Mr. Nowell:

Please find attached the above-referenced work plan for groundwater sampling and well abandonment prepared by BASELINE Environmental Consulting requested by the Alameda County Environmental Health Care Services Agency, Department of Environmental Health related to the Oakland Maintenance Center Site.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.

Please feel free to contact me at the Port of Oakland at (510) 627-1184 if you have any questions.

Sincerely,

Douglas Herman
Environmental Scientist
Port of Oakland



26 January 2016
12315-30.02387

Douglas Herman
Port of Oakland
530 Water Street
Oakland, CA 94607

Subject: Work Plan for Groundwater Sampling and Well Abandonment at Oakland Maintenance Center Site, Oakland International Airport, 1100 Airport Drive, Oakland, California (Toxic Leaks Case RO0000414)

Dear Mr. Herman:

This letter presents a work plan in response to the Alameda County Health Care Services Agency – Department of Environmental Health (“ACEH”) most recent request for additional evaluation at the Oakland Maintenance Center (“OMC”) site to address the concern that nickel concentrations in groundwater could pose an ecological risk to aquatic organisms in the nearby storm water drainages channels (Figures 1 and 2). These concerns were originally conveyed to the Port of Oakland (“Port”) via an email from ACEH dated 23 October 2015. Since then, the Port has been in communications with the County and Regional Water Quality Control Board staff to discuss possible approaches for addressing this one remaining concern for the OMC site.

This letter presents a proposal to conduct one-time sampling of three wells (ERM-MW-9, ERM-MW-10, and ERM-MW-15 in Figure 2) at the OMC site nearest a storm water drainage channel presumed to be downgradient of the monitoring wells where prior groundwater samples were found to contain elevated nickel concentrations. The Port also proposes to abandon the remaining 27 groundwater monitoring wells at the OMC site that are not necessary for further evaluation of the site. In addition, as requested by agency staff, this letter evaluates whether there may be a correlation between locations where elevated nickel concentrations have been identified in soil samples versus groundwater samples at the OMC site.

GROUNDWATER SAMPLING WORK PLAN

Nickel Concentrations in Groundwater

Table 1 and Figure 2 summarize nickel concentrations in groundwater samples previously collected from the OMC site. Nickel concentrations in groundwater samples varied spatially and also temporally in individual wells. For example, in the area about 500 feet northwest of the hangar building (“Building M110”), elevated nickel concentrations were reported in samples collected from groundwater monitoring wells

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ERM-MW-8 and ERM-MW-9, while concentrations in nearby wells ERM-MW-15 and ERM-MW-16 were significantly lower (Figure 2). These wells are located in vicinity of Areas of Concern (“AOC”) 2 and 3.¹ AOC 2 was defined as the former aircraft wash rack, and AOC 3 was defined as a former industrial wastewater vault associated with the wash rack.

In the vicinity of the Building M110, elevated nickel concentrations in groundwater were found in samples collected from monitoring wells ERM-MW-1, ERM-MW-4, ERM-MW-13, and ERM-MW-14 (Figure 2). There was significant spatial variability in nickel concentrations among wells in this area. While AOC 1 (small parts wash rack/cleaning room) was considered a possible source of nickel to groundwater and wells located ERM-MW-1 and ERM-MW-4 were located at AOC 1, there were no known possible sources of nickel in the vicinity of wells ERM-MW-13 and ERM-MW-14 where higher nickel concentrations were previously identified.

Groundwater Flow Direction

Prior investigations at the OMC site were typically focused on small portions of the site and seldom were groundwater elevation data across the entire site collected at the same time. Figure 3 shows groundwater elevation contours on two occasions when site-wide data were available, from January 2004 and June 2006.

These contours indicate that in the vicinity of AOC 1 and Building M110, groundwater appeared to flow in the east to northeast direction, toward Ron Cowan Parkway. The side of the Ron Cowan Parkway adjacent to the OMC site is depressed on the order of 10 to 20 feet below the OMC site and protected by a retaining wall. Groundwater flowing in the east to northeast direction from the Building M110 area would not be intercepted by any features with potential aquatic receptors (e.g., storm water drainage channels).

In the vicinity of AOCs 2 and 3, the contours on Figure 3 indicate that groundwater appeared to flow to the northwest, toward the nearby storm water drainage channel.

Proposed Groundwater Monitoring Event

The only portion of the OMC site where elevated nickel concentrations in groundwater has the potential to impact aquatic organisms is the AOCs 2 and 3 area (former aircraft wash rack and industrial wastewater vault). This area appears to be upgradient of and

¹ The AOCs at the OMC site were originally defined in a report titled, *Former United Airlines Oakland Maintenance Center, Site Investigation and Risk Assessment Report, Oakland, California*, prepared by ERM-West and dated June 2004. Figure 2 shows the locations of AOC 1 (small parts wash rack/cleaning room), AOC 2 (aircraft wash rack), and AOC 3 (industrial wastewater vault), which were possible sources of nickel to groundwater.

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near a storm water drainage channel. This work plan proposes to perform one-time groundwater sampling of wells ERM-MW-9, ERM-MW-10, and ERM-MW-15, which are the three wells nearest the channel. The groundwater samples will be analyzed for dissolved metals. In addition, water level measurements may be recorded in other nearby wells to provide more data for groundwater flow direction determination.

No sampling of wells at AOC 1 or Building M110 is proposed because the available data indicate that there is no potential downgradient aquatic receptors that could be impacted by nickel concentrations in groundwater from this area.

Prior to sample collection, wells ERM-MW-9, ERM-MW-10, and ERM-MW-15 will be redeveloped because these wells have not been sampled since 2006. Well construction details for these wells are provided in Table 2. Groundwater samples will be collected using a low-flow purging and sampling method with a peristaltic pump. Groundwater parameters such as temperature, pH, electrical conductivity will be monitored during purging and samples will be collected when they have stabilized. Samples will be placed directly into unpreserved plastic bottles provided by the laboratory. The laboratory will be instructed to filter the samples and analyze the samples for dissolved Title 22 metals using EPA Methods 6010B and 7471A.

The procedures used during groundwater monitoring activities, field sampling forms, groundwater elevation contours, laboratory results, and a revised screening evaluation will be documented in a letter report to be submitted to the ACEH.

ABANDONMENT OF GROUNDWATER MONITORING WELLS

In addition to the three wells proposed for one-time sampling, there are 27 other wells at the OMC site that have not been abandoned (Table 2). All 27 wells are proposed for abandonment as they serve no further purpose. After review of the data from the proposed sampling of the three wells, the Port may modify this proposal to abandon all 30 wells at the OMC site. Proper abandonment would eliminate the potential for the wells to serve as vertical conduits in the future from accidental spills or other mishaps. A well abandonment permit will be obtained from the Alameda County Public Works Agency, a licensed driller will be retained to perform abandonment activities, and a well abandonment report will be prepared for submittal to the ACEH.

CORRELATION OF NICKEL CONCENTRATIONS IN SOIL AND GROUNDWATER SAMPLES

Table 3 lists the boring locations and nickel concentrations where both soil and grab groundwater samples were analyzed for nickel across the OMC site. No soil samples were collected and analyzed for nickel during installation of any of the wells.

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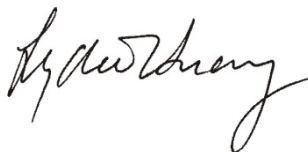
In the AOC 3 area, the soil sample with the highest concentration of nickel in soil samples was the 0.5-foot sample from borings W-B-12 at 340 milligram per kilogram (“mg/kg”); the three deeper soil samples from this boring had significantly lower nickel concentrations (ranged from 20 to 51 mg/kg, Table 3). The grab groundwater sample from W-B-12 was found to contain 63 micrograms per liter (“µg/l”) of nickel. This boring was located immediately adjacent to well ERM-MW-10, which had elevated but not the highest nickel concentrations (ranged from 26 to 120 µg/l during 3 sampling events) identified in groundwater samples collected from this area (Table 1 and Figure 2).

In the former USTs MF-35 and MF-36 area, near AOC 1, the soil samples with the highest concentration of nickel in soil samples were the 0.5-foot sample from borings W-B-1 and W-B-3, both at 120 mg/kg (Figure 2 and Table 3); deeper samples from these borings had lower nickel concentrations. This area is immediately outside of Building M110 and is believed to have been paved when the building was constructed; this would make past site operations an unlikely source of nickel to the near surface soil. The nickel concentration in the grab groundwater sample from boring W-B-1 was reported to be below the laboratory reporting limit of 50 µg/l. The grab groundwater sample from W-B-3 was collected and analyzed in duplicate and the nickel concentrations were reported as less than the laboratory reporting limit of 20 µg/l and at 60 µg/l (Table 3). Borings W-B-1 and W-B-3 are near wells UAL-MW-4 and UAL-MW-2, respectively (Figure 2); the one groundwater sample collected from these two wells did not identify nickel above the laboratory reporting limit of 50 µg/l.

Based on this evaluation, there does not appear to be a correlation between elevated nickel concentrations in soil versus groundwater.

Please contact us at your convenience if you have any questions or need additional information.

Sincerely,



Lydia Huang
P.E. No. 43995



LH

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Enclosures:

Figures

- 1: Regional Location
- 2: Nickel in Groundwater Samples Collected from Wells (Post-2002 Data)
- 3: Groundwater Contours – Sitewide

Tables

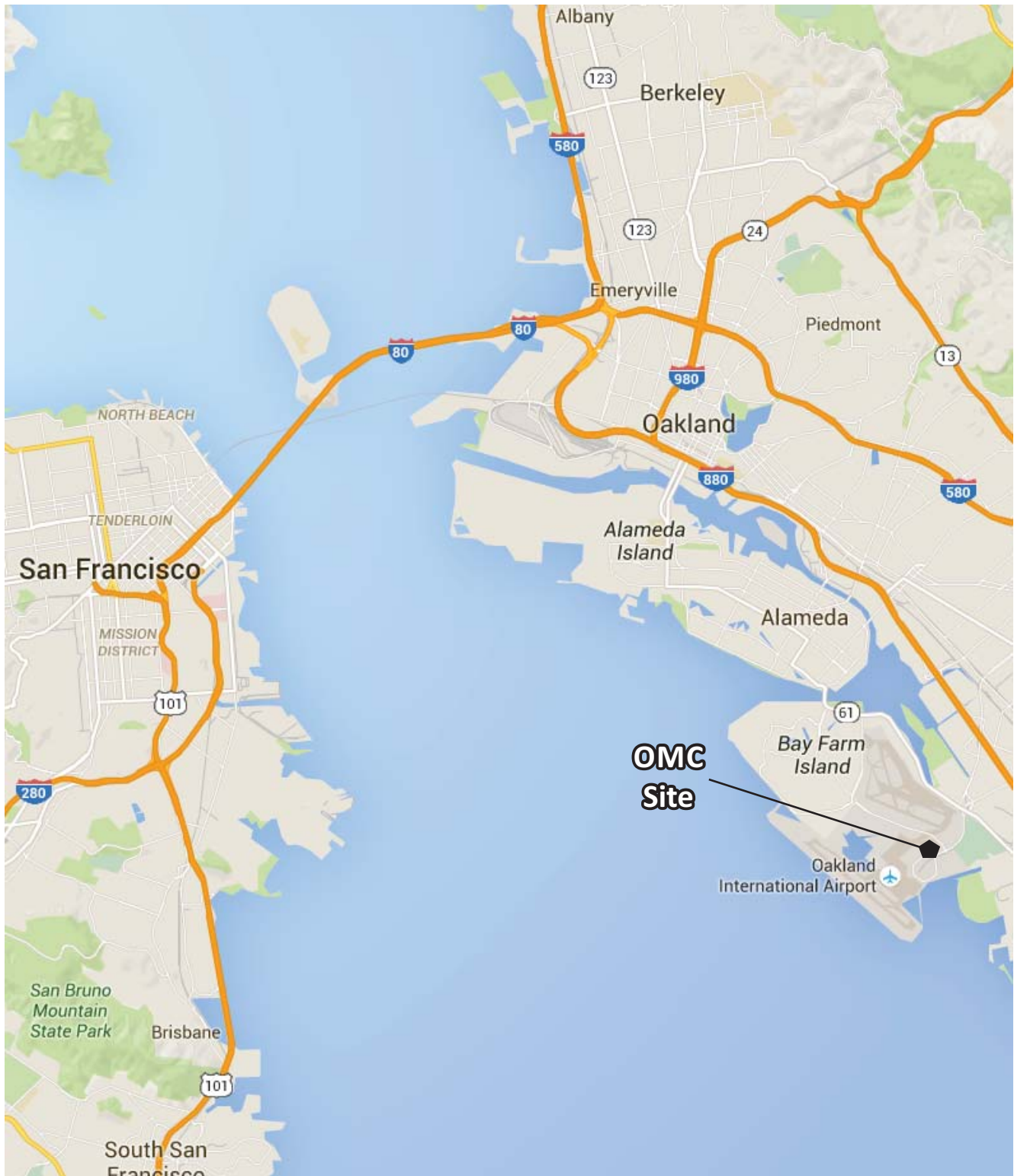
- 1: Nickel Concentrations in Groundwater Samples (Post-2002 Data Set)
- 2: Well Construction Details
- 3: Nickel Concentrations in Soil and Groundwater Samples

Attachment

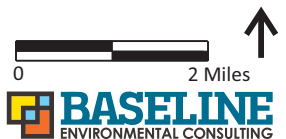
- A: ERM 2004 Figure showing AOCs and Sample Locations

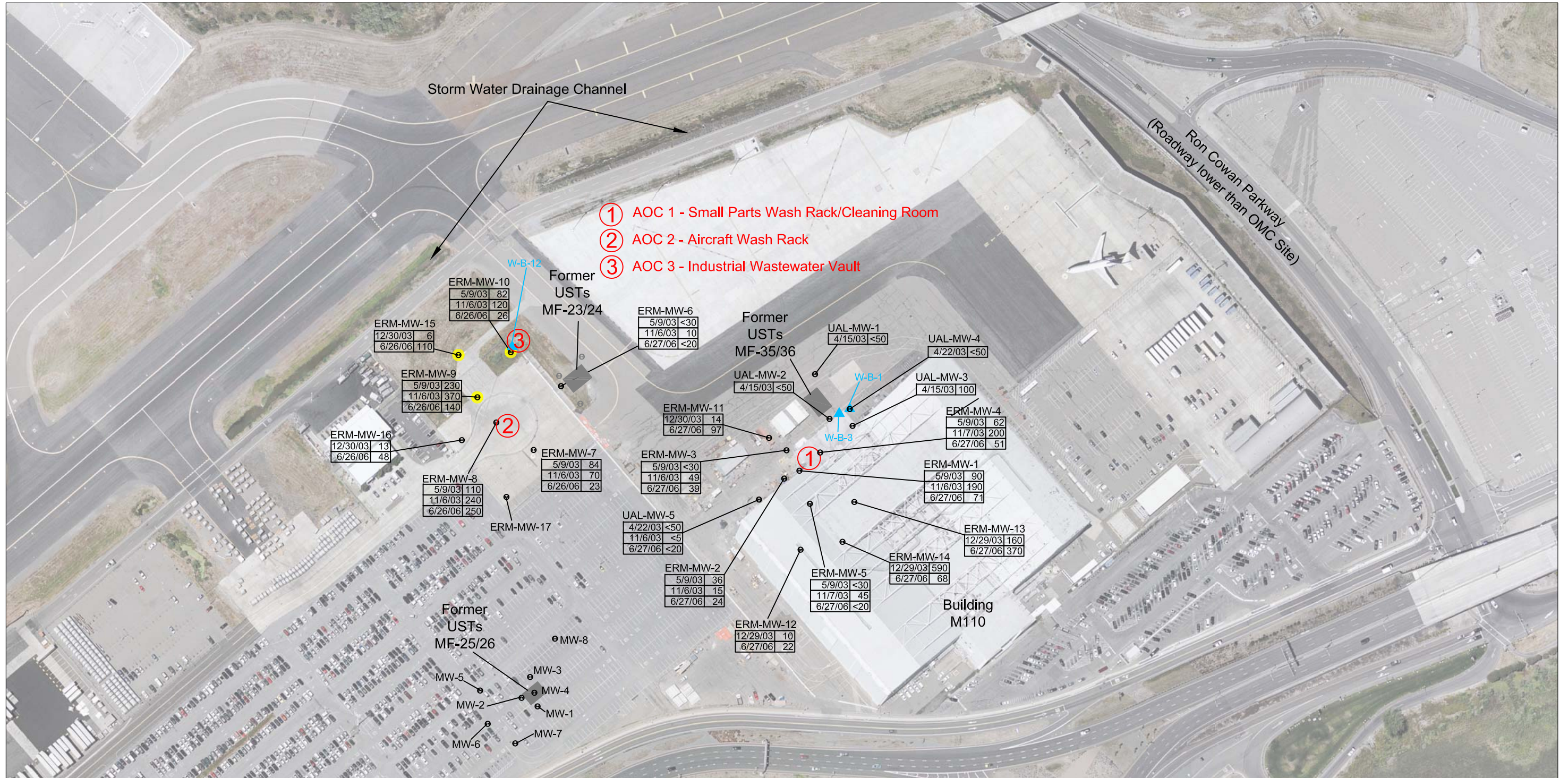
REGIONAL LOCATION

Figure 1



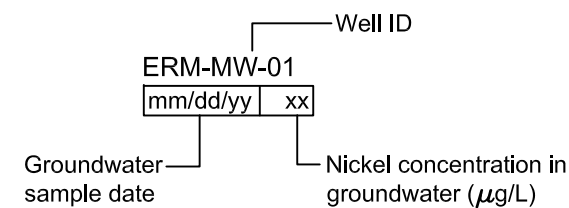
Oakland Maintenance Center
1100 Airport Drive, Oakland, California





Legend

- ⊙ Groundwater monitoring well
- ⊙ Abandoned groundwater monitoring well
- Approximate location of former USTs
- ⊙ Proposed well for groundwater sampling
- ▲ Boring from past investigation

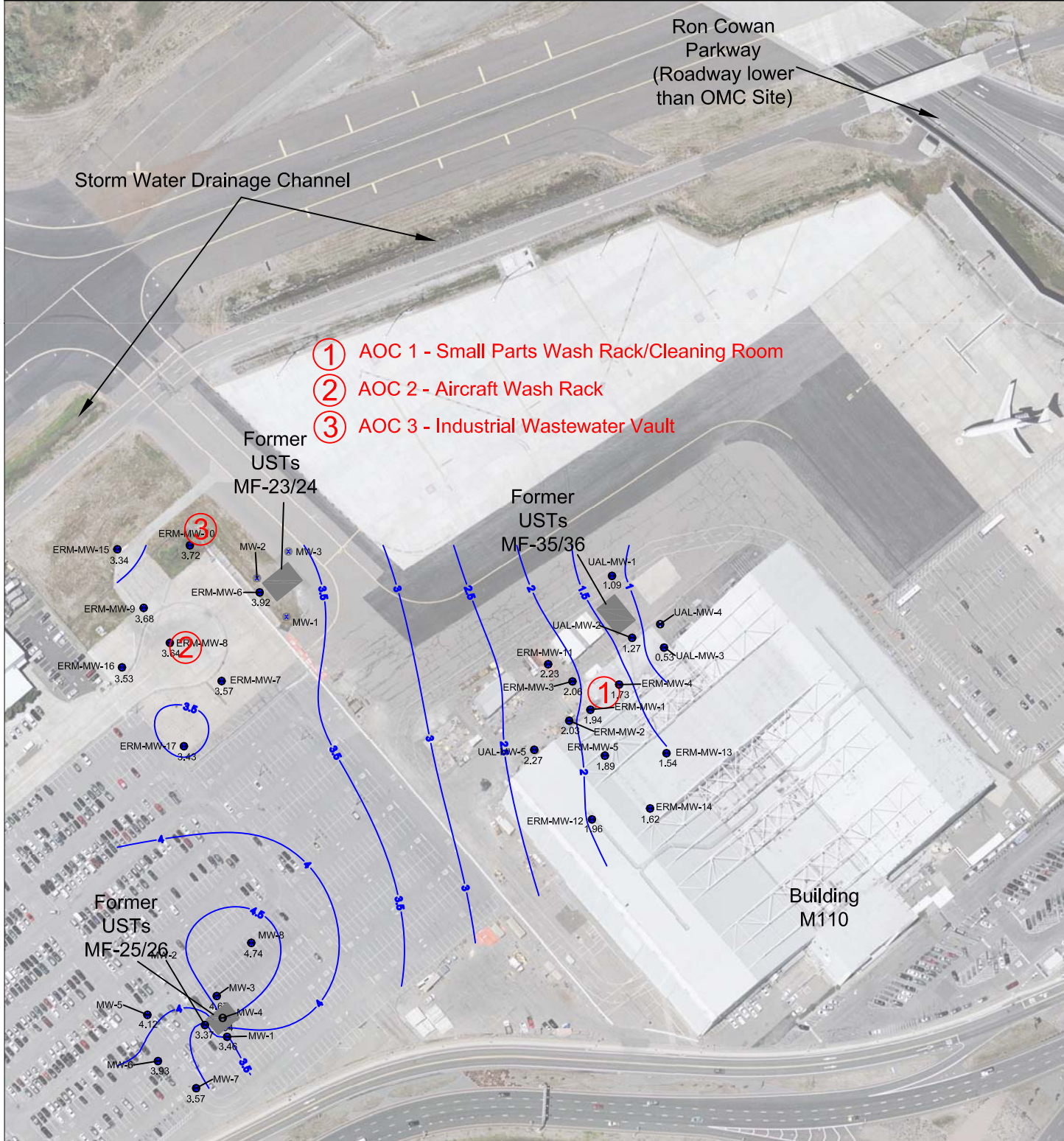


Note: The Environmental Screening Level for nickel for the protection aquatic habitat is 52 µg/L for fresh water, and 8.2 µg/L for salt water (RWQCB, December 2013 update).

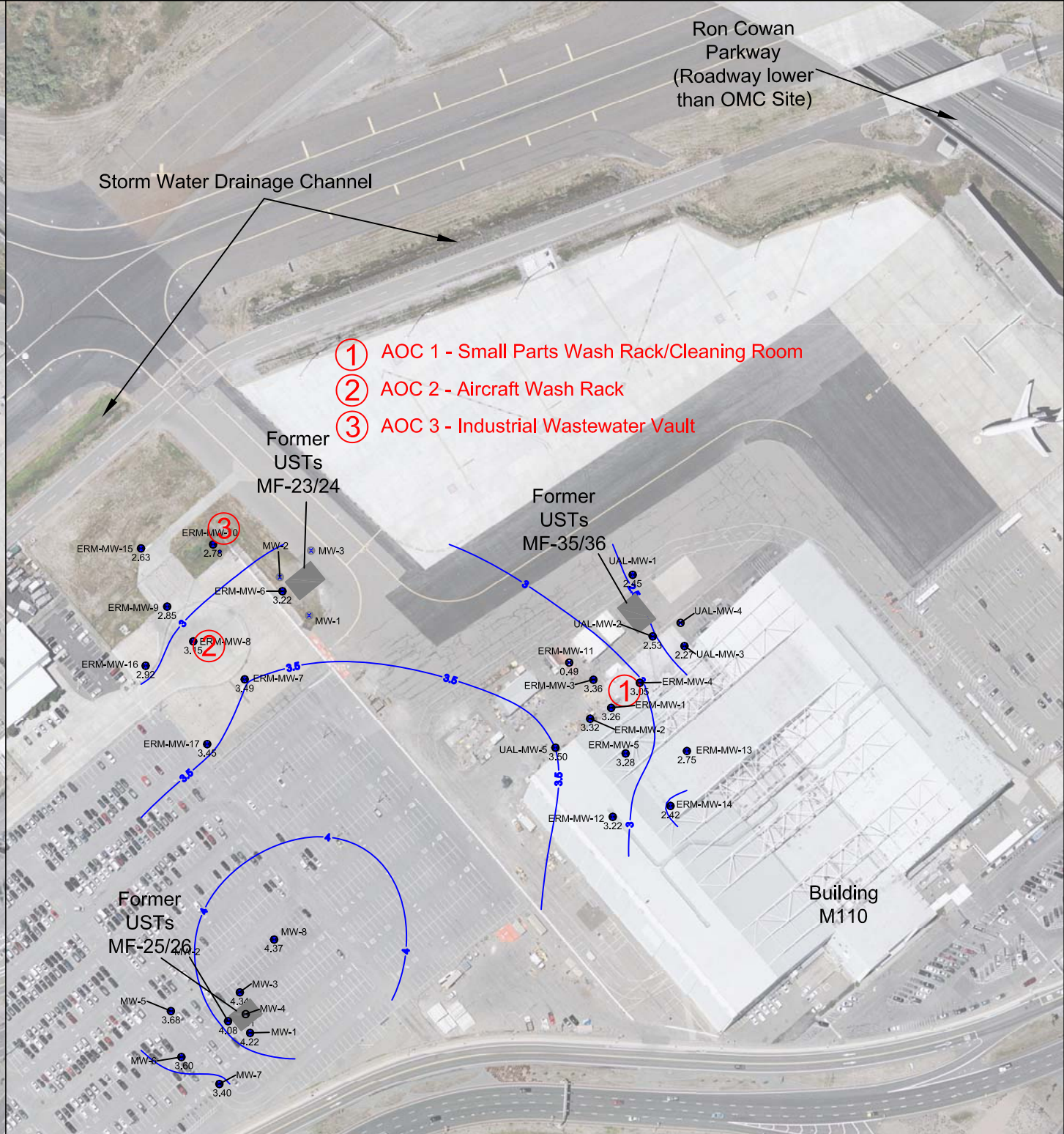


Oakland Maintenance Center
 1100 Airport Drive, Oakland, California





January 2004



June 2006 (without ERM-MW-11)

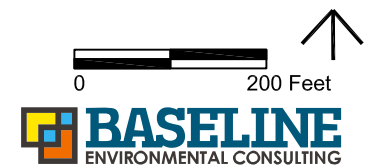


Legend

-  Groundwater monitoring well and elevation (Port of Oakland Datum)
-  Abandoned groundwater monitoring well
-  Approximate location of former USTs
-  Groundwater contour

Oakland Maintenance Center
 1100 Airport Drive, Oakland, California

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**Table 1: Nickel Concentrations in Groundwater Samples (Post-2002 Data Set)
Oakland Maintenance Center Site, Oakland, California**

Sample Location	AOC	Date Sampled	Nickel ($\mu\text{g/L}$)
Area of Concern 1			
ERM-B-1	1	4/15/2003	190
ERM-B-2	1	4/15/2003	130
ERM-MW-01	1	5/9/2003	90
ERM-MW-01	1	11/6/2003	190
ERM-MW-01	1	6/27/2006	71
ERM-MW-02	1	5/9/2003	36
ERM-MW-02	1	11/6/2003	15
ERM-MW-02	1	6/27/2006	24
ERM-MW-03	1	5/9/2003	<30
ERM-MW-03	1	11/6/2003	49
ERM-MW-03	1	6/27/2006	39
ERM-MW-04	1	5/9/2003	62
ERM-MW-04	1	11/7/2003	200
ERM-MW-04	1	6/27/2006	51
ERM-MW-05	1	5/9/2003	<30
ERM-MW-05	1	11/7/2003	45
ERM-MW-05	1	6/27/2006	<20
ERM-MW-11	1	12/30/2003	14
ERM-MW-11	1	6/27/2006	97
ERM-MW-12	1	12/29/2003	10
ERM-MW-12	1	6/27/2006	22
ERM-MW-13	1	12/29/2003	160
ERM-MW-13	1	6/27/2006	370
ERM-MW-14	1	12/29/2003	590
ERM-MW-14	1	6/27/2006	68
W-B-4	1	4/15/2003	<20
W-B-5	1	4/15/2003	64
W-B-6	1	4/15/2003	31
Area of Concern 2			
ERM-B-3	2	4/15/2003	120
ERM-B-4	2	4/15/2003	160
ERM-B-5	2	4/15/2003	230
ERM-B-6	2	4/15/2003	260
ERM-B-7	2	4/15/2003	92
ERM-MW-06	2	5/9/2003	<30
ERM-MW-06	2	11/6/2003	10
ERM-MW-06	2	6/27/2006	<20

**Table 1: Nickel Concentrations in Groundwater Samples (Post-2002 Data Set)
Oakland Maintenance Center Site, Oakland, California**

Sample Location	AOC	Date Sampled	Nickel ($\mu\text{g/L}$)
ERM-MW-07	2	5/9/2003	84
ERM-MW-07	2	11/6/2003	70
ERM-MW-07	2	6/26/2006	23
ERM-MW-08	2	5/9/2003	110
ERM-MW-08	2	11/6/2003	240
ERM-MW-08	2	6/26/2006	250
ERM-MW-09	2	5/9/2003	230
ERM-MW-09	2	11/6/2003	370
ERM-MW-09	2	6/26/2006	140
ERM-MW-15	2	12/30/2003	6
ERM-MW-15	2	6/26/2006	110
ERM-MW-16	2	12/30/2003	13
ERM-MW-16	2	6/26/2006	48
W-B-7	2	4/17/2003	<20
W-B-8	2	4/14/2003	52
W-B-8 (duplicate)	2	4/14/2003	100
Area of Concern 3			
ERM-MW-10	3	5/9/2003	82
ERM-MW-10	3	11/6/2003	120
ERM-MW-10	3	6/26/2006	26
W-B-10	3	4/15/2003	<20
W-B-11	3	4/15/2003	<20
W-B-12	3	4/15/2003	63
Area of Concern 5			
ERM-B-10	5	4/17/2003	<20
ERM-B-11	5	4/17/2003	<20
W-B-1	5	4/14/2003	<50
W-B-2	5	4/14/2003	<20
W-B-2 (duplicate)	5	4/14/2003	<50
W-B-3	5	4/15/2003	<20
W-B-3 (duplicate)	5	4/15/2003	60
Area of Concern 7			
W-B-16	7	4/17/2003	54
W-B-16 (duplicate)	7	4/17/2003	54
W-B-17	7	4/17/2003	<20
W-B-17 (duplicate)	7	4/17/2003	<50
Area of Concern 8			
ERM-B-12	8	4/17/2003	63

**Table 1: Nickel Concentrations in Groundwater Samples (Post-2002 Data Set)
Oakland Maintenance Center Site, Oakland, California**

Sample Location	AOC	Date Sampled	Nickel ($\mu\text{g/L}$)
Area of Concern 9			
ERM-B-13	9	4/16/2003	<20
ERM-B-14	9	4/17/2003	<20
P-2/UAL-MW-5	9	4/22/2003	<50
P-2/UAL-MW-5	9	11/6/2003	<5
P-2/UAL-MW-5	9	6/27/2006	<20
W-B-22	9	4/18/2003	<20
Area of Concern 14			
ERM-B-23	14	4/17/2003	<20
W-B-32	14	4/16/2003	<20
W-B-38	14	4/15/2003	<20
Area of Concern 17			
UAL-MW-1	17	4/15/2003	<50
UAL-MW-2	17	4/15/2003	<50
UAL-MW-3	17	4/15/2003	100
P-1/UAL-MW-4	17	4/22/2003	<50
Area of Concern 18			
W-B-18	18	4/18/2003	<50
W-B-19	18	4/18/2003	<5
W-B-20	18	4/18/2003	<5
W-B-20 (duplicate)	18	4/18/2003	<5
W-B-9	18	4/18/2003	<5
Area of Concern 19			
W-B-25	19	4/16/2003	<20
W-B-29	19	4/16/2003	<20

Notes:

Sample locations are shown in Figure 2 and Attachment A.

$\mu\text{g/L}$ = micrograms per liter.

AOC = Area of Concern (see Attachment A for locations).

<xx = compound not identified above the laboratory reporting limit of xx.

TABLE 2: WELL CONSTRUCTION DETAILS

Oakland Maintenance Center, 1100 Airport Drive, Oakland, California

Well	Date Installed	Northing (feet)	Easting (feet)	Ground Surface Elevation (POO Datum)	Top of Casing (feet POO Datum)	Total Borehole Depth (feet)	Total Well Depth (feet)	Well Diameter (inches)	Borehole Diameter (inches)	Well Material	Top of Grouted Interval (feet)	Bottom of Grouted Interval (feet)	Top of Bentonite Seal Interval (feet)	Bottom of Bentonite Seal Interval (feet)	Top of Sand Pack Interval (feet)	Bottom of Sand Pack Interval (feet)	Top of Screened Interval (feet)	Bottom of Screened Interval (feet)
Former USTs MF 23/24 Area																		
ERM-MW-6	5/7/2003	2,088,659.6	6,066,590.9	6.91	8.91	14.0	12.5	1.0	5.75	PVC	0.0	2.0	2.0	2.5	2.5	12.5	2.5	12.5
ERM-MW-7	5/7/2003	2,088,534.4	6,066,537.3	6.45	6.16	14.0	14.0	1.0	5.75	PVC	0.0	2.0	2.0	3.0	3.0	14.0	4.0	14.0
ERM-MW-8	5/7/2003	2,088,588.3	6,066,464.0	5.96	5.46	13.5	13.5	1.0	5.75	PVC	0.0	2.0	2.0	2.5	2.5	13.5	3.5	13.5
ERM-MW-9	5/7/2003	2,088,637.7	6,066,426.9	5.73	5.49	13.5	13.5	1.0	5.75	PVC	0.0	2.0	2.0	2.5	2.5	13.5	3.5	13.5
ERM-MW-10	5/8/2003	2,088,726.1	6,066,492.2	5.27	7.54	12.0	10.0	1.0	7.0	PVC	0.0	2.0	2.0	2.5	2.5	10.0	3.0	10.0
ERM-MW-15	12/19/2003	2,088,720.5	6,066,389.8	6.06	7.99	12.5	12.5	2.0	8.0	PVC	0.0	0.5	0.5	1.5	1.5	12.5	2.5	12.5
ERM-MW-16	12/19/2003	2,088,553.7	6,066,396.4	5.98	5.77	12.5	12.5	2.0	8.0	PVC	0.0	0.5	0.5	1.5	1.5	12.5	2.5	12.5
ERM-MW-17	12/19/2003	2,088,442.2	6,066,483.9	6.41	5.96	12.5	12.5	2.0	8.0	PVC	0.0	0.5	0.5	1.5	1.5	12.5	2.5	12.5
Former USTs MF 25/26 Area																		
MW-1	5/13/1992	2,088,031.4	6,066,545.0	7.30	6.91	12.0	12.0	2.0	8.0	PVC	0.0	5.0	5.0	6.0	6.0	12.0	7.0	12.0
MW-2	4/19/1995	2,088,048.2	6,066,513.6	6.90	6.58	11.5	11.0	2.0	8.0	PVC	--	--	0.0	1.0	1.0	11.5	1.5	11.0
MW-3	4/19/1995	2,088,089.2	6,066,530.3	7.60	7.36	11.5	11.0	2.0	8.0	PVC	--	--	0.0	1.0	1.0	11.5	1.5	11.0
MW-4 ¹	5/6/1998	2,088,058	6,066,539	7.30	6.92	11.5	10.0	4.0	12.0	PVC	0.0	1.3	1.3	1.5	1.5	10.0	2.0	10.0
MW-5 ¹	5/6/1998	2,088,063	6,066,432	6.30	5.79	10.0	8.0	2.0	8.0	PVC	0.0	1.3	1.3	1.5	1.5	8.0	2.0	8.0
MW-6 ¹	5/6/1998	2,087,997	6,066,447	6.90	6.39	9.0	8.0	2.0	8.0	PVC	0.0	1.3	1.3	1.5	1.5	8.0	2.0	8.0
MW-7 ¹	5/6/1998	2,087,959	6,066,501	6.50	5.86	9.0	8.5	2.0	8.0	PVC	0.0	1.3	1.3	1.5	1.5	8.5	2.0	8.5
MW-8 ¹	5/6/1998	2,088,164	6,066,579	7.85	7.56	10.5	9.5	2.0	8.0	PVC	0.0	1.3	1.3	1.5	1.5	9.5	2.0	9.5
Former USTs MF 35/36 and Building M110 Area																		
UAL-MW-1	7/21/1999	2,088,683.0	6,067,089.1	9.07	8.71	25.0	24.0	4.0	9.0	PVC	0.0	2.0	2.0	3.0	3.0	25.0	4.0	24.0
UAL-MW-2	7/21/1999	2,088,595.3	6,067,117.5	10.39	10.10	24.0	24.0	4.0	9.0	PVC	0.0	2.0	2.0	3.0	3.0	24.0	4.0	24.0
UAL-MW-3	7/21/1999	2,088,581.7	6,067,162.7	10.69	10.32	24.0	24.0	4.0	9.0	PVC	0.0	2.0	2.0	3.0	3.0	24.0	4.0	24.0
UAL-MW-4 ²	Unknown	2,088,614.7	6,067,157.1	10.15	10.05	Unknown	37.5	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
UAL-MW-5 ²	Unknown	2,088,437.1	6,066,979.2	9.50	9.38	Unknown	15.0	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
ERM-MW-1	5/8/2003	2,088,493.7	6,067,058.5	10.65	10.39	16.7	16.0	1.0	7.0	PVC	0.0	4.0	4.0	5.0	5.0	16.7	6.0	16.0
ERM-MW-2	5/8/2003	2,088,478.3	6,067,028.6	10.14	9.85	17.0	17.0	1.0	7.0	PVC	0.0	5.0	5.0	6.0	6.0	17.0	7.0	16.5
ERM-MW-3	5/9/2003	2,088,533.8	6,067,033.2	10.20	9.79	16.5	15.0	1.0	7.0	PVC	0.0	3.0	3.0	4.0	4.0	16.5	5.0	15.0
ERM-MW-4	5/9/2003	2,088,529.4	6,067,099.2	10.71	10.50	16.5	16.0	1.0	7.0	PVC	0.0	4.0	4.0	5.0	5.0	16.5	6.0	16.0
ERM-MW-5	5/8/2003	2,088,428.9	6,067,079.1	10.12	9.85	15.0	14.0	1.0	7.0	PVC	0.0	2.0	2.0	3.0	3.0	14.0	4.0	14.0

TABLE 2: WELL CONSTRUCTION DETAILS

Oakland Maintenance Center, 1100 Airport Drive, Oakland, California

Well	Date Installed	Northing (feet)	Easting (feet)	Ground Surface Elevation (POO Datum)	Top of Casing (feet POO Datum)	Total Borehole Depth (feet)	Total Well Depth (feet)	Well Diameter (inches)	Borehole Diameter (inches)	Well Material	Top of Grouted Interval (feet)	Bottom of Grouted Interval (feet)	Top of Bentonite Seal Interval (feet)	Bottom of Bentonite Seal Interval (feet)	Top of Sand Pack Interval (feet)	Bottom of Sand Pack Interval (feet)	Top of Screened Interval (feet)	Bottom of Screened Interval (feet)
ERM-MW-11	12/19/2003	2,088,558.1	6,066,998.8	9.69	9.31	15.0	15.0	2.0	8.0	PVC	0.0	3.0	3.0	4.0	4.0	15.0	5.0	15.0
ERM-MW-12	12/19/2003	2,088,338.8	6,067,060.7	9.30	8.93	15.0	15.0	2.0	8.0	PVC	0.0	3.0	3.0	4.0	4.0	15.0	5.0	15.0
ERM-MW-13	12/19/2003	2,088,432.3	6,067,166.1	10.67	10.36	15.0	15.0	2.0	8.0	PVC	0.0	3.0	3.0	4.0	4.0	15.0	5.0	15.0
ERM-MW-14	12/19/2003	2,088,354.3	6,067,142.8	10.15	9.71	15.0	15.0	2.0	8.0	PVC	0.0	3.0	3.0	4.0	4.0	15.0	5.0	15.0

NOTES:

Well locations are shown in Figure 2 and Attachment A.

Coordinates are in NAD83, State Plane, California Zone 3.

POO Datum = Port of Oakland datum which is 0.50 feet below the NAVD88 datum.

NAVD88 = North American Vertical Datum of 1988.

-- = None.

PVC= polyvinyl chloride.

¹ Coordinates are estimated.

² The Port has no information regarding the construction of this well. Well depth was determined by measurement.

**Table 3: Nickel Concentrations in Soil and Groundwater Samples
Oakland Maintenance Center, Oakland, California**

Sample ID	AOC	Sample Depth (feet bgs)	Date Sampled	Nickel in Soil (mg/kg)	Nickel in Groundwater ($\mu\text{g/L}$)
Area of Concern 1					
ERM-B-1	1	3.5	4/15/2003	21	190
ERM-B-2	1	3.5	4/15/2003	18	130
W-B-4	1	0.5	4/14/2003	51	<20
W-B-4	1	3	4/14/2003	21	
W-B-4	1	3.5	4/14/2003	17	
W-B-5	1	0.5	4/14/2003	68	64
W-B-5	1	3	4/14/2003	24	
W-B-5	1	3.5	4/14/2003	18	
W-B-6	1	0.5	4/14/2003	47	31
W-B-6	1	3	4/14/2003	19	
W-B-6	1	3.5	4/14/2003	35	
Area of Concern 2					
ERM-B-3	2	2.5	4/15/2003	19	120
ERM-B-4	2	2.5	4/15/2003	17	160
ERM-B-5	2	2.5	4/15/2003	21	230
ERM-B-6	2	2.5	4/15/2003	17	260
W-B-7	2	0.5	4/17/2003	24	<20
W-B-7	2	1.5	4/17/2003	22	
W-B-7	2	3	4/17/2003	20	
W-B-8	2	0.5	4/14/2003	51	52/100 (duplicate results)
W-B-8	2	2	4/14/2003	32	
W-B-8	2	3	4/14/2003	25	
Area of Concern 3					
W-B-10	3	0	4/15/2003	24	<20
W-B-10	3	3	4/15/2003	19	
W-B-10	3	3.5	4/15/2003	19	
W-B-10	3	6	4/15/2003	17	
W-B-11	3	0.5	4/15/2003	25	<20
W-B-11	3	1.5	4/15/2003	26	
W-B-11	3	3	4/15/2003	34	
W-B-11	3	8	4/15/2003	14	
W-B-12	3	0.5	4/15/2003	340	63
W-B-12	3	0.5	4/15/2003	51	
W-B-12	3	3	4/15/2003	50	
W-B-12	3	6	4/15/2003	20	
Area of Concern 5					
ERM-B-10	5	2.5	4/17/2003	21	<20
ERM-B-11	5	2.5	4/17/2003	20	<20
W-B-1	5	0.5	4/14/2003	120	<50
W-B-1	5	3	4/14/2003	37	

**Table 3: Nickel Concentrations in Soil and Groundwater Samples
Oakland Maintenance Center, Oakland, California**

Sample ID	AOC	Sample Depth (feet bgs)	Date Sampled	Nickel in Soil (mg/kg)	Nickel in Groundwater ($\mu\text{g/L}$)
W-B-2	5	0.5	4/14/2003	51	<20/<50 (duplicate results)
W-B-2	5	3	4/14/2003	42	
W-B-2	5	4	4/14/2003	15	
W-B-3	5	0.5	4/14/2003	120	<20/60 (duplicate results)
W-B-3	5	3	4/14/2003	43	
W-B-3	5	3.5	4/14/2003	21	
Area of Concern 7					
W-B-16	7	0.5	4/17/2003	23	54/54 (duplicate results)
W-B-16	7	1.5	4/17/2003	22	
W-B-16	7	3	4/17/2003	19	
W-B-17	7	0.5	4/17/2003	23	<20/<50 (duplicate results)
W-B-17	7	1.5	4/17/2003	25	
W-B-17	7	3	4/17/2003	25	
Area of Concern 8					
ERM-B-12	8	2	4/17/2003	24	63
Area of Concern 9					
ERM-B-13	9	3.5	4/16/2003	15	<20
ERM-B-14	9	4.5	4/17/2003	30	<20
W-B-21	9	0.5	4/17/2003	32	no data
W-B-21	9	3	4/17/2003	24	
W-B-22	9	0.5	4/18/2003	25	<20
W-B-22	9	2.5	4/18/2003	18	
W-B-22	9	3	4/18/2003	24	
W-B-23	9	0.5	4/18/2003	25	no data
W-B-23	9	3	4/18/2003	80	
Area of Concern 10					
ERM-B-15	10	1	4/17/2003	21	no data
Area of Concern 13					
ERM-B-22	13	1.5	4/17/2003	20	no data
Area of Concern 14					
ERM-B-23	14	4.5	4/17/2003	21	<20
W-B-32	14	0.5	4/16/2003	26	<20
W-B-32	14	1.5	4/16/2003	17	
W-B-32	14	3	4/16/2003	20	
W-B-32	14	8	4/16/2003	40	
W-B-38	14	0.5	4/15/2003	32	<20
W-B-38	14	2.5	4/15/2003	20	
W-B-38	14	3	4/15/2003	21	
W-B-38	14	8	4/15/2003	18	
W-B-39	14	0.5	4/14/2003	27	no data
W-B-39	14	3	4/14/2003	20	
W-B-39	14	8	4/14/2003	28	

**Table 3: Nickel Concentrations in Soil and Groundwater Samples
Oakland Maintenance Center, Oakland, California**

Sample ID	AOC	Sample Depth (feet bgs)	Date Sampled	Nickel in Soil (mg/kg)	Nickel in Groundwater ($\mu\text{g/L}$)
Area of Concern 16					
W-B-13	16	0.5	4/15/2003	34	no data
W-B-13	16	3	4/15/2003	18	
W-B-13	16	8	4/15/2003	15	
W-B-14	16	0	4/15/2003	23	no data
W-B-14	16	3	4/15/2003	28	
W-B-14	16	8	4/15/2003	18	
W-B-15	16	0.5	4/15/2003	39	no data
W-B-15	16	8	4/15/2003	18	
Area of Concern 18					
W-B-9	18	4	4/18/2003	21	<5
W-B-18	18	4.5	4/18/2003	26	<50
W-B-18	18	8	4/18/2003	18	
W-B-19	18	4	4/18/2003	22	<5
W-B-20	18	3	4/18/2003	24	<5/<5 (duplicate results)
Area of Concern 9					
W-B-24	19	0.5	4/14/2003	19	no data
W-B-24	19	3	4/14/2003	34	
W-B-24	19	8	4/14/2003	26	
W-B-25	19	0	4/15/2003	18	<20
W-B-25	19	1.5	4/15/2003	22	
W-B-25	19	3	4/15/2003	71	
W-B-25	19	8	4/15/2003	27	
W-B-26	19	0.5	4/16/2003	29	no data
W-B-26	19	12	4/16/2003	29	
W-B-26	19	3	4/16/2003	21	
W-B-27	19	0.5	4/16/2003	21	no data
W-B-27	19	3	4/16/2003	16	
W-B-27	19	8	4/16/2003	22	
W-B-28	19	0.5	4/16/2003	39	no data
W-B-28	19	3	4/16/2003	14	
W-B-28	19	8	4/16/2003	24	
W-B-29	19	0.5	4/16/2003	31	<20
W-B-29	19	1.5	4/16/2003	72	
W-B-29	19	3	4/16/2003	23	
W-B-29	19	8	4/16/2003	17	
W-B-30	19	0.5	4/16/2003	32	no data
W-B-30	19	3	4/16/2003	24	
W-B-30	19	8	4/16/2003	20	

**Table 3: Nickel Concentrations in Soil and Groundwater Samples
Oakland Maintenance Center, Oakland, California**

Sample ID	AOC	Sample Depth (feet bgs)	Date Sampled	Nickel in Soil (mg/kg)	Nickel in Groundwater ($\mu\text{g/L}$)
W-B-31	19	0.5	4/16/2003	25	no data
W-B-31	19	3	4/16/2003	56	
W-B-31	19	3.5	4/16/2003	53	
W-B-33	19	0.5	4/16/2003	43	no data
W-B-33	19	2.5	4/16/2003	34	
W-B-33	19	3	4/16/2003	36	
W-B-33	19	8	4/16/2003	44	
W-B-34	19	0.5	4/17/2003	17	no data
W-B-34	19	3	4/17/2003	52	
W-B-35	19	0.5	4/17/2003	43	no data
W-B-35	19	3	4/17/2003	24	
W-B-36	19	0.5	4/17/2003	25	no data
W-B-36	19	3	4/17/2003	20	
W-B-37	19	0.5	4/17/2003	21	no data
W-B-37	19	4	4/17/2003	23	

Notes:

Sample locations are shown in Figure 2 and Attachment A.

bgs = below ground surface.

mg/kg = milligrams per kilograms.

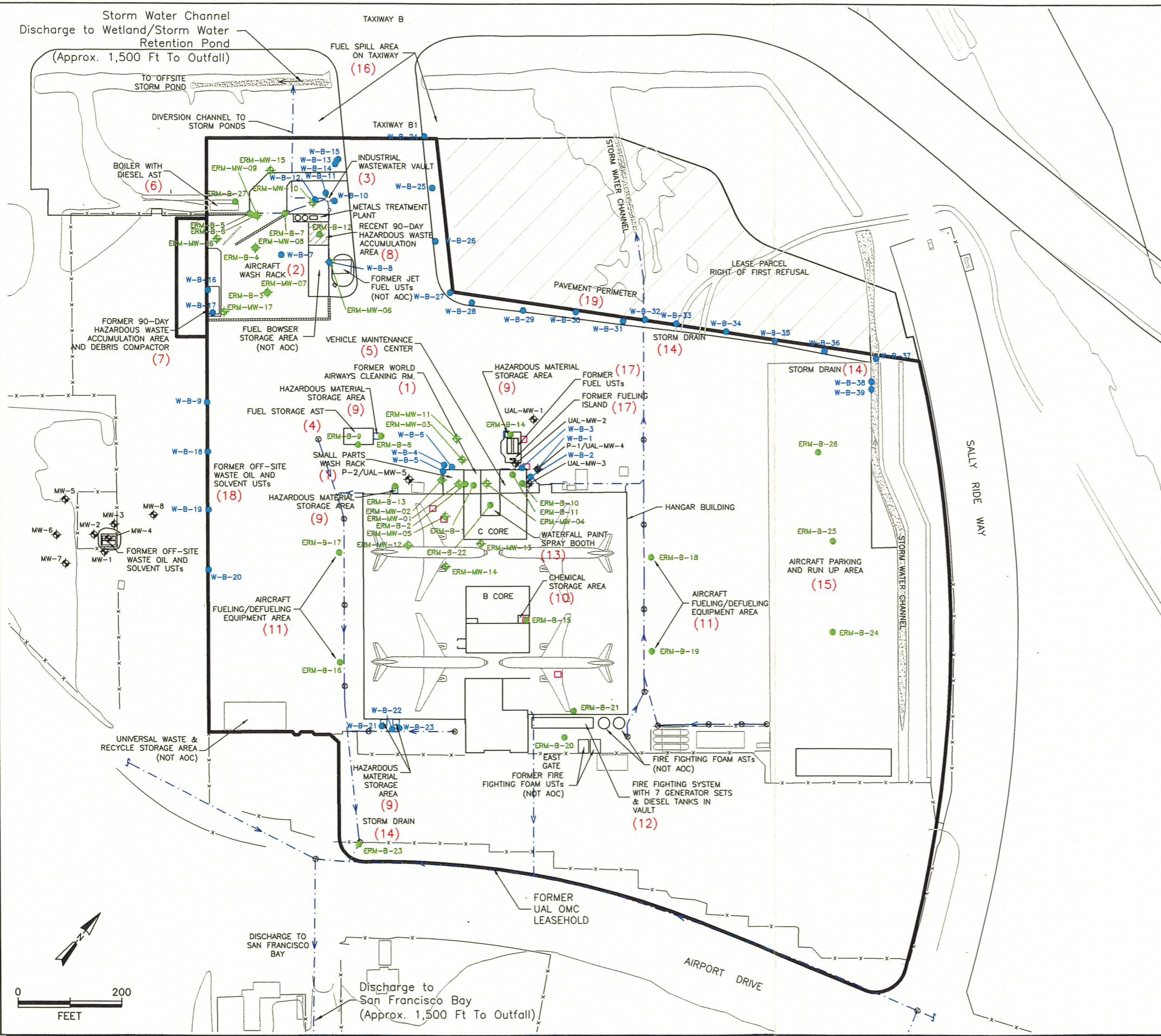
$\mu\text{g/L}$ = microgram per liter.

AOC = Area of Concern (see Attachment A for locations).

Attachment A

ERM 2004 Figure showing AOCs and Sample Locations

Project No. 5310.10
 Date: 01/20/04
 Drawn By: J. Estrada
 CAD File: g:\5310\10\53101020.dwg



LEGEND

- (5) AREA of CONCERN (AOC) FOR INVESTIGATION
- ERM-MW-01 ERM MONITORING WELL
- UAL-MW-3 OTHER MONITORING WELL
- ERM-B-10 ERM BORING
- W-B-2 WEISS BORING
- SATELLITE HAZARDOUS WASTE ACCUMULATION POINTS (NOT AOC)
- HAZARDOUS MATERIAL STORAGE AREA (9)
- STORM WATER DRAIN CATCH BASIN (14)
- STORM WATER SEWER LINE (14)
- TRENCH DRAIN (14)
- STORM WATER CHANNEL (14)

**Source: Former United Airlines
 Oakland Maintenance Center, Site
 Investigation and Risk Assessment
 Report, Oakland, California, prepared
 by ERM-West and dated June 2004.**

Figure 4
 Soil Boring and Monitoring Well Locations
 Former United Airlines Oakland Maintenance Center
 Oakland International Airport, Oakland, California