AIR MONITORING REPORT
SOIL OPERABLE UNIT S-5
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

DAMES & MOORE

SAC143.30

MARCH 1995
PROJECT NO. 00173-080-044

DAMES & MOORE
8801 FOLSOM BOULEVARD, SUITE 200, SACRAMENTO, CALIFORNIA 95826
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March 30, 1995

Mr. James L. Tjosvold, P.E., Branch Chief
Site Mitigation Branch
Region 1, Department of Toxic Substances Control
California Environmental Protection Agency
10151 Croydon Way, Suite 3
Sacramento, CA 95827

Attention: Mr. Jose Salcedo

Re: Air Monitoring Report
Operable Unit S-5
Union Pacific Railroad Yard
Sacramento, California
Dames & Moore Project No. 00173-080-044

Dear Mr. Salcedo:

At the request of Union Pacific Railroad Company, we are forwarding to you the above-referenced document. If you have any questions, please call me at (916) 387-7530.

Sincerely,

DAMES & MOORE

Jim Brake, R.G.
Project Manager

Enclosure

SAC143.30

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SACRAMENTO, CALIFORNIA
PROJECT NUMBER 00173-080-044

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SACRAMENTO, CALIFORNIA
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SACRAMENTO, CALIFORNIA
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AIR MONITORING REPORT
SOIL OPERABLE UNIT S-5
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

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AIR MONITORING REPORT
SOIL OPERABLE UNIT S-5
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

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AIR MONITORING REPORT
SOIL OPERABLE UNIT S-5
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

1.0 INTRODUCTION

This report summarizes the results of air monitoring in the active portion of the Union Pacific Railroad Company's (UPRR) Sacramento, California railyard to assess arsenic and lead levels in airborne particulate emissions. Air monitoring at the active railyard was performed at the request of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). Arsenic and lead were targeted by the air monitoring program because these metals are present in railroad track ballast that is used in some areas of the active railyard. Wear and weathering of the ballast could potentially produce fines that could become airborne.

2.0 PURPOSE AND SCOPE

The purpose of the air monitoring program was to characterize the concentrations of arsenic and lead in airborne particulates emanating from the active yard over an extended period of time. The air monitoring program targeted the portion of the active railyard where the greatest amount of work activities and vehicular traffic occurs. Consequently, these are the areas where the most airborne particulates could potentially be generated.

2.1 AIR MONITORING SCOPE

Air monitoring was performed by AeroVironment, Inc., of Monrovia, California. AeroVironment, Inc., reports for each round of air monitoring are provided in Appendix A. The scope of services provided by AeroVironment, Inc., included:

- Set-up and operation of a meteorologic station to measure and record wind speed and direction;
- Set-up of air monitoring stations;
- Preparation of sample filters;
- Weighing of used sample filters to determine airborne particulate concentrations; and

- Reporting of meteorologic data, airborne particulate concentrations, and elemental analysis results. Elemental analyses were performed by an outside laboratory subcontracted to AeroVironment, Inc.

The air monitoring program consisted of three five-day sampling rounds scheduled to provide seasonal data upon which to base an evaluation of long-term impacts. The rounds of monitoring were conducted during the following time periods:

- August 8-12, 1994;
- September 29 and 30 and October 3-5, 1994; and
- November 28-30 and December 1 and 2, 1994.

This schedule allowed the air monitoring to occur during both dry and wet periods. Airborne particulate samples were collected during normal working hours at the site (between 7 A.M. and 5 P.M.).

2.2 AIR MONITORING LOCATIONS

Air monitoring was conducted at five locations illustrated on Figure 1. The locations included two stations located on the western boundary of the active yard, two stations on the eastern boundary of the active yard; and one "background", off-site station located southwest of the site on top of Hughes Stadium. One of the monitoring locations on the east side of the active yard consisted of two stations set approximately 10 feet apart (collocated) to assess the precision of the sampling method for a given location.

The locations of the monitoring stations were selected to be both upwind and downwind of the portion of the active yard with the greatest potential to produce airborne particulate emissions. The locations were also intended to accommodate variations in wind direction as much as possible. The background location was chosen for its potential to be unaffected by the site in a variety of wind directions. The predominant wind direction, based on review of regional meteorologic data, as illustrated on Figure 1, is typically from the south-southwest. However, immediately following the passing of low-pressure systems, winds from the north/northwest are common.

2.3 METEOROLOGICAL DATA COLLECTION

A portable weather station was installed by AeroVironment, Inc., to provide meteorological data corresponding to each day of sampling for the air monitoring program. The weather station was

located in an open area of the inactive railyard adjacent to the active yard (Figure 1). The weather station recorded hourly wind direction and wind speed data. Vector averaging was used to determine the average wind direction for the sampling period of each day. The average wind speed, irrespective of direction, was calculated from the hourly data for the same period. Average wind direction and speed data corresponding to the sampling periods during each sampling round are presented in Section 3.0.

2.4 AIRBORNE PARTICULATE SAMPLE COLLECTION AND ANALYSIS

Samples were collected with low-volume (lovols) air samplers equipped with "wind decelerator" TSP inlets. Each sampler was fitted with a pre-weighed 47-millimeter teflon filter supplied by AeroVironment, Inc. Dames & Moore personnel installed new filters each morning and removed them at the end of each day. Filters in the Hughes Stadium background monitoring station were left in place for 24-hour periods (changed each morning) because access to the sampling station was not available at the end of the day.

To assess the concentrations of airborne particulates at each station for a given sampling day, filters from the lovol samplers were weighed to measure the total particulate mass deposited during each daily sampling. Based upon the air flow rate through the lovol sampler and the duration of the sampling, the particulate mass was converted to an airborne concentration. Each round generated a total of 30 samples (five days/round × one sample/location/day × six stations). The results of analysis of samples for particulate concentrations are presented in Section 3.0.

2.5 ELEMENTAL ANALYSIS OF PARTICULATE SAMPLES

After the particulate concentrations were determined, 20 percent of the samples (6 samples per event) were selected for analysis for arsenic and lead by x-ray fluorescence (XRF). Samples were selected from the days with the highest levels of downwind particulate concentrations. The concentrations of 22 metals were determined by XRF analysis. As with the particulate mass, the air flow rate through the lovol sampler and the duration of the sampling was used to convert the metals masses to airborne concentrations. The results of elemental analyses are presented in Section 3.0.

3.0 AIR MONITORING RESULTS

This section presents the results of measurement of meteorological conditions and analysis of air monitoring samples for total particulate mass and arsenic and lead concentrations.

3.1 METEOROLOGIC DATA

A summary of meteorologic data (wind direction and speed) measured and recorded during each sampling round is presented in Table 1. Table 1 presents the average daily wind direction and speed for each day's sampling period (7:00 A.M. to 5:00 P.M.). Complete listings of hourly wind direction and speed measured and recorded during each monitoring round is presented in the AeroVironment, Inc., reports in Appendix A.

During the first round of air monitoring, the average daily wind directions ranged from 202 to 231 degrees (southwest) and average wind speeds varied from 1.38 to 2.48 meters per second (m/s). Round 2 average daily wind directions ranged from 177 (south) to 350 degrees (north/northwest) with average daily wind speeds from 1.53 to 3.04 m/s. Round 3 average daily directions ranged from 158 (southeast) to 333 (northwest) with average daily wind speeds from 0.93 to 3.50 m/s. A discussion of these results is provided in Section 4.0.

3.2 PARTICULATE DATA

Airborne particulate concentrations for samples collected during each round are summarized on Table 2, and depicted graphically on Figures 2, 3, and 4. Data used to calculate the airborne particulate concentrations for each round are summarized in the AeroVironment, Inc., reports (Appendix A).

Airborne particulate concentrations for Round 1 ranged from a low of 21.6 micrograms per cubic meter ($\mu g/m^3$) for a sample collected from Station NW, to a high of 89.2 $\mu g/m^3$ for a sample collected from Station SE-N (Table 2). Round 1 background concentrations of particulates ranged from 24.2 to 49.6 $\mu g/M^3$.

Some of the lowest and the highest particulate concentrations were reported for samples collected during Round 2. Particulate concentrations ranged from a low of 2.2 $\mu g/m^3$ for a sample collected from Station NW, to a high of 165.9 $\mu g/m^3$ for a sample collected from Station SE-S (Table 2). Round 2 background concentrations of particulates ranged from 21.8 to 110.7 $\mu g/m^3$.

Round 3 particulate concentrations ranged from a low of 0.6 $\mu g/m^3$ for a sample collected from Station NW, to a high of 98.5 $\mu g/m^3$ for a sample collected from Station SW (Table 2). The background particulate concentrations measured during Round 3 were consistently the highest or near the highest of all the stations sampled during Round 3, and ranged from 35.8 to 87.9 $\mu g/m^3$ (Appendix A).

3.3 ARSENIC AND LEAD ANALYSIS RESULTS

The results of XRF analysis for arsenic and lead are presented on Table 3. Complete results of XRF analyses for a total of 22 metals are presented in the AeroVironment, Inc., reports (Appendix A).

3.3.1 Arsenic Concentrations

Arsenic was not detected in any of the samples collected during Round 1 or Round 2 monitoring. Two samples collected during Round 3, the Hughes Stadium background sample and a sample collected from Station SE-S, had detections of arsenic of 0.0053 and 0.0044 $\mu g/m^3$, respectively. The arsenic detections are within, or only slightly greater than, the range of the detection limits reported for arsenic (0.0037 to 0.0046) for Round 3 analyses.

3.3.2 Lead Concentrations

Lead was detected in each sample analyzed (including the background station samples) for each round of air monitoring (Table 3). Lead concentrations reported for Round 1 samples ranged from a minimum of 0.0080 $\mu g/m^3$ in the sample collected from Station NW to a maximum of 0.0212 $\mu g/m^3$ for the sample collected from Station SE-S. The lead concentration for the background station sample during Round 1 was 0.0090 $\mu g/m^3$ (Table 3).

Round 2 lead concentrations ranged from 0.0080 $\mu g/m^3$ for a sample collected from the Hughes Stadium background station to 0.0318 $\mu g/m^3$ for a sample collected from Station SE-S. The lead concentrations reported for the two background station samples analyzed were 0.0080 and 0.0108 $\mu g/m^3$, respectively (Table 3).

Round 3 lead concentrations ranged from 0.0169 $\mu g/m^3$ for the sample collected from Station NW, to 0.0213 $\mu g/m^3$ for the sample collected from Station SW. The background sample had a reported concentration of 0.0200 $\mu g/m^3$ (Table 3).

All reported lead concentrations are less than the California ambient air quality standard for lead of 1.5 $\mu g/m^3$.

3.4 QUALITY ASSURANCE/QUALITY CONTROL

Three blank samples were analyzed during Round 1 and four during Round 2. All seven blank samples were analyzed for total particulates. Particulate masses ranged from 0.7 $\mu g/m^3$ to 2.9 $\mu g/m^3$. One blank sample was analyzed for arsenic and lead. No detections of arsenic and lead were reported for this sample.

4.0 DISCUSSION OF RESULTS

This section provides a discussion of the meteorologic data, airborne particulate concentrations, and XRF analysis results derived from the air monitoring program for the active railyard.

4.1 METEOROLOGIC DATA

Meteorologic data collected during Round 1 shows that wind conditions with respect to direction and speed were the most consistent of any of the three rounds of monitoring (Figure 1). Winds during the working hours of Round 1 were from the southwest at moderate speeds (1 to 3 m/s) which is typical for the region during that time of year.

Wind direction and speed during Round 2 and Round 3 were more variable, which is characteristic of unsettled weather patterns (Figure 3 and Figure 4). Both Round 2 and Round 3 monitoring were conducted during dry periods either following or preceding periods of precipitation. The highest wind speeds occurred during Round 2 when northwest winds were recorded at up to 4.55 m/s (Appendix A). Consequently, some of the highest particulate concentrations were reported for samples collected during that round.

4.2 AIRBORNE PARTICULATE DATA

The airborne particulate concentration data presented on Figures 2 through 4 show that samples collected from one or both of the collocated stations, SE-S and SE-N, typically had the highest reported airborne particulate concentrations during the first two monitoring rounds. These two stations are near (and often directly downwind of) the greatest amount of work activity in the active railyard. Round 3 particulate concentrations from these two stations were still some of the highest measured but, as discussed below, the background station and station southwest had higher concentrations of particulates.

Airborne particulate concentrations for the Hughes Stadium background station during Round 3 are anomalous in that they are consistently the highest or nearly the highest of all stations. AeroVironment, Inc., reported that this is likely due to increased wood smoke and not ground surface-derived particulates based on:

- Very low concentrations of iron and nickel (two of the most prevalent metals in particulates derived from a ground source) reported for the background samples; and

- Elevated bromine concentrations reported in the background sample particulates which are characteristic of smoke from burning of hardwoods and not typically found in ground-derived particulates.

In addition to the above factors, the background sample filters were uncharacteristically dark gray or black in color suggesting a higher than normal carbon content in the air.

Depending on wind direction, particulates emanating from sources other than the active railyard could have been captured by the sampling stations. Other potential sources of particulates surrounding the active railyard include:

- Sacramento City College parking lots west of the railyard (particularly when school is in session);
- Sutterville Road traffic south of the railyard; and
- The inactive portion of the rail yard.

The inactive portion of the railyard is less-likely to be a source of airborne particulates than the other off-site sources because of the lack of activity in this area.

4.3 XRF DATA

The XRF data shows that arsenic is not a typical constituent of airborne particulates in the active railyard. The one reported detection of arsenic for a sample collected from Station SE-S during Round 3 (0.004 $\mu g/m^3$) was within the range of detection limits reported for other Round 3 analyses (0.0037 to 0.0046 $\mu g/m^3$). The detection of arsenic reported for the background sample during Round 3 may be attributed to wood smoke. There is no promulgated ambient air quality standard for arsenic.

The XRF data shows that lead concentrations in airborne particulates were relatively consistent for each round of monitoring. For Rounds 1 and 2 the highest lead concentrations were measured in samples from Stations SE-S or SE-N. However, in Round 3 the highest lead concentrations were measured in samples from the background station, station NE and station SW. All lead results are one to two orders of magnitude less than the ambient air quality standard of 1.5 $\mu g/m^3$.

5.0 CONCLUSIONS

Based on the results of air monitoring, performed from August to December 1994, airborne particulates generated from or contributed to by the active railyard do not contain detectable levels of arsenic and contain levels of lead that are much less than the ambient air quality standard.

TABLES

TABLE 1

SUMMARY OF DAILY AVERAGE WIND DIRECTION AND SPEED DATA
SOIL OPERABLE UNIT S-5 AIR MONITORING
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

Round #	Monitoring Round	Average Daily[1] Wind Direction (compass degrees)	Average Daily[1] Wind Speed (meters per second)
1	08/08/94	204	2.48
	08/09/94	202	2.25
	08/10/94	204	2.10
	08/11/94	229	1.83
	08/12/94	231	1.38
2	09/29/94	212	1.63
	09/30/94	321	1.72
	10/03/94	334	3.04
	10/04/94	350	2.58
	10/05/94	177	1.53
3	11/28/94	333	3.50
	11/29/94	332	1.52
	11/30/94	188	0.93
	12/01/94	158	1.22
	12/02/94	160	1.52

Notes:
[1] Average calculated for standard working day between 7:00 A.M. and 5:00 P.M.

TABLE 2

SUMMARY OF AIRBORNE PARTICULATE ANALYSIS RESULTS
SOIL OPERABLE UNIT S-5
AIR MONITORING
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

Airborne Particulate Sampling Station	Round 1 Particulate Concentration (ug/m^3)	Round 2 Particulate Concentration (ug/m^3)	Round 3 Particulate Concentration (ug/m^3)
Hughes Stadium	24.2-49.6	21.8-110.7	35.8-87.9
NE	39.5-47.8	15.0-61.5	5.8-79.4
NW	21.6-50.5	2.2-155.4	0.6-61.6
SE-N	36.5-89.2	19.5-95.6	9.3-80.9
SE-S	48.0-86.8	17.0-165.9	6.2-82.9
SW	22.4-51.2	12.7-120.7	6.9-98.5

Notes:

Particulate concentrations determined by AeroVironment, Inc.
$\mu g/m3$ - micrograms per cubic meter.

TABLE 3

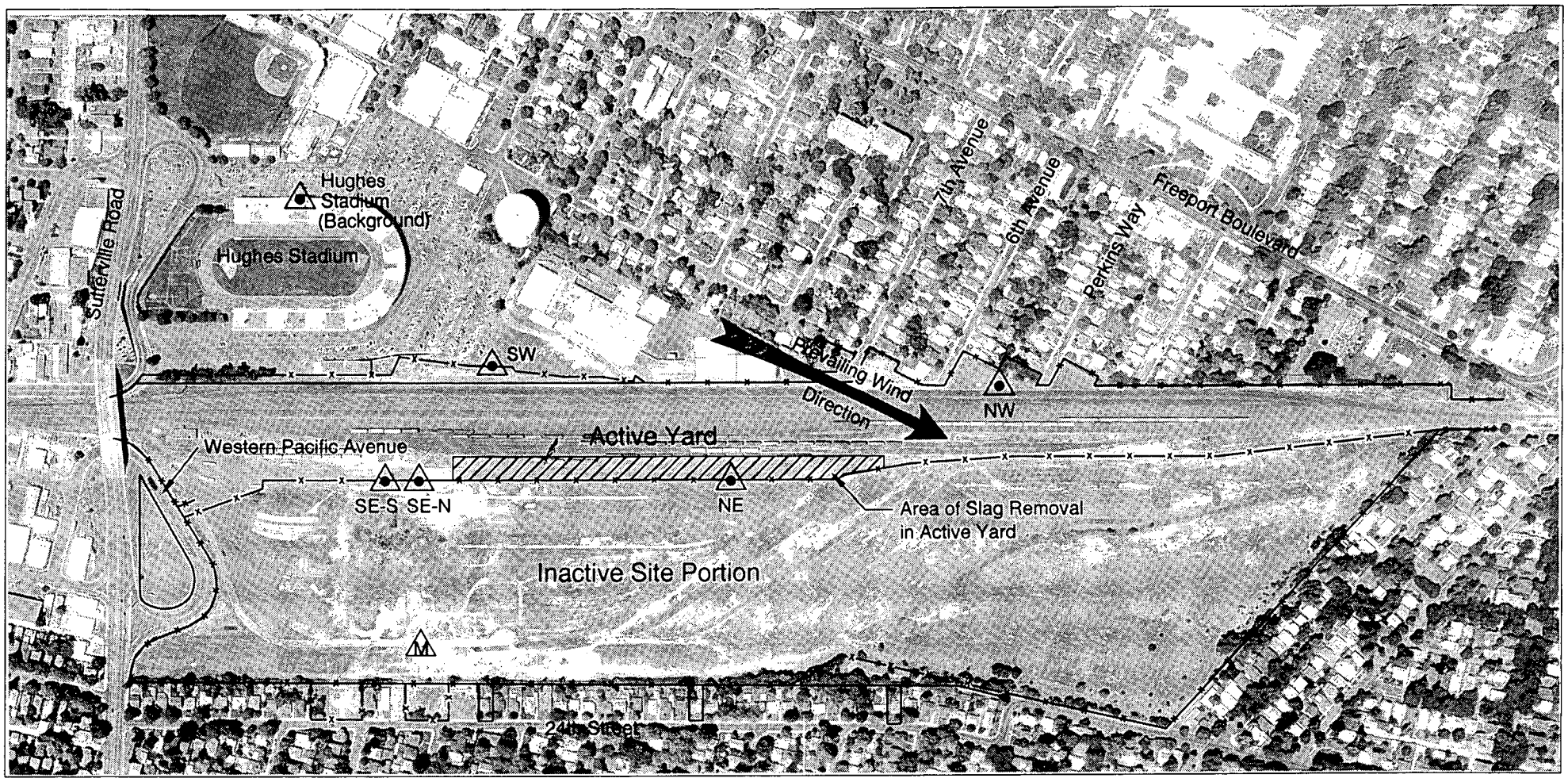
SUMMARY OF ARSENIC AND LEAD ANALYSIS RESULTS
SOIL OPERABLE UNIT S-5
AIR MONITORING
UNION PACIFIC RAILROAD YARD
SACRAMENTO, CALIFORNIA

Monitoring Round	Air Monitoring Station	Date	Arsenic Concentration ($\mu g/m^3$)	Lead Concentration ($\mu g/m^3$)
1	Hughes Stadium	08/11/94	<0.0020	0.0092
	NE	08/11/94	<0.0040	0.0138
	NW	08/11/94	<0.0034	0.0080
	SE-N	08/11/94	<0.0049	0.0196
	SE-S	08/11/94	<0.0047	0.0212
	SW	08/11/94	<0.0337	0.0096
2	Hughes Stadium	09/29/94	<0.0018	0.0080
	Hughes Stadium	10/03/94	<0.0022	0.0108
	NW	10/03/94	<0.0031	0.0094
	SE-N	09/29/94	<0.0065	0.0344
	SE-S	09/29/94	<0.0065	0.0318
	SE-S	10/03/94	<0.0040	0.0171
	SW	10/03/94	<0.0029	0.0103
3	Hughes Stadium	12/01/94	0.0053	0.0200
	NE	12/01/94	<0.0046	0.0203
	NW	12/01/94	<0.0037	0.0169
	SE-N	12/01/94	<0.0042	0.0182
	SE-S	12/01/94	0.0044	0.0171
	SW	12/01/94	<0.0046	0.0213

Notes:

Analysis performed by XRF (x-ray fluorescence) by Chester Lab Net of Tigard, Oregon under contract to AeroVironment, Inc.
$\mu g/m^3$ - micrograms per cubic meter.

FIGURES



EXPLANATION

- Fence Line
- UPRR Property Boundary
- Predominant Wind Direction
- SW — Air Monitoring Station
- Meteorological Station

N

0 500

Scale in Feet

ACTIVE RAILYARD AIR MONITORING STATIONS

Union Pacific Railroad Yard
Sacramento, California

FIGURE 1

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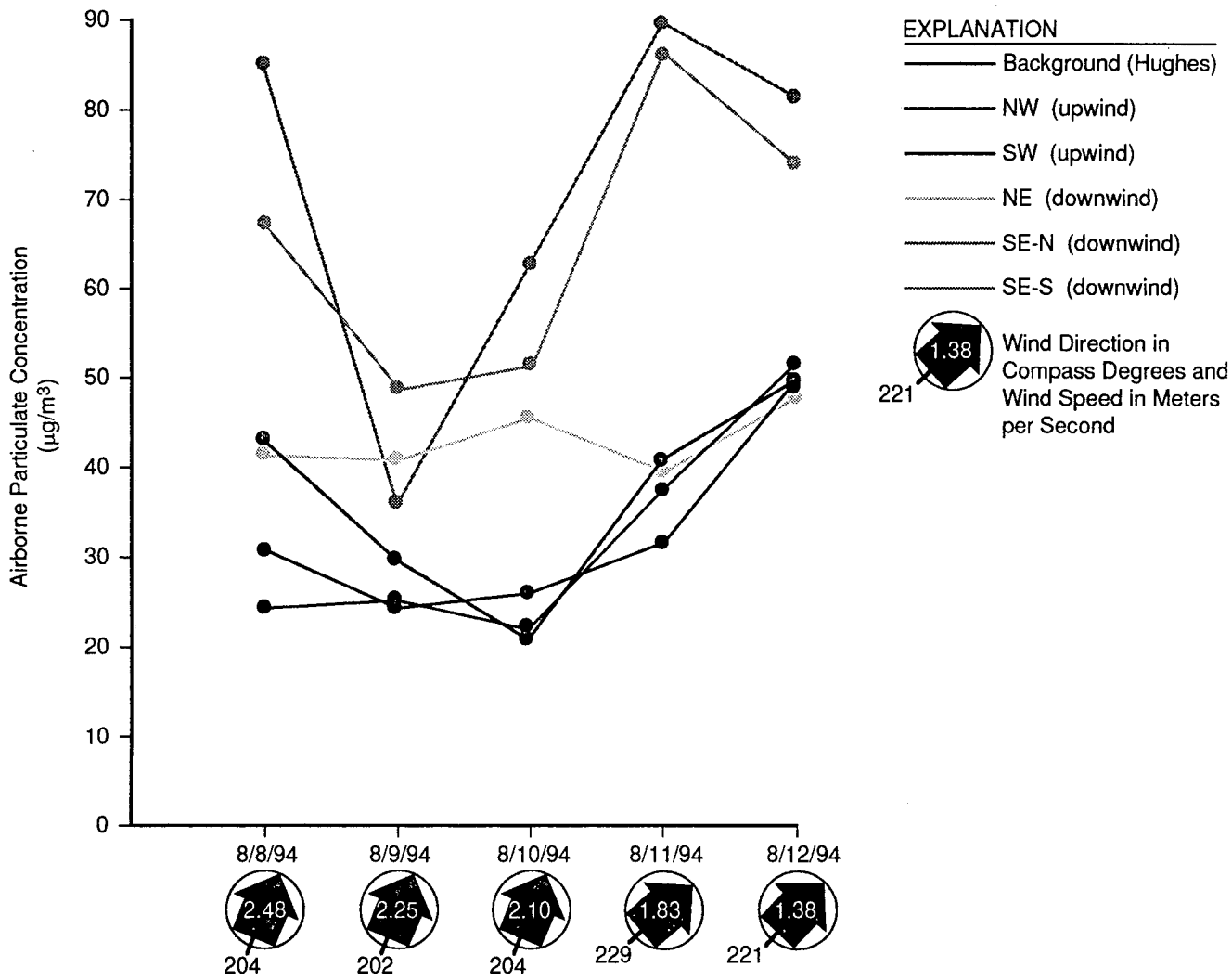
00173-080-5515-044 SJR 2/1/93



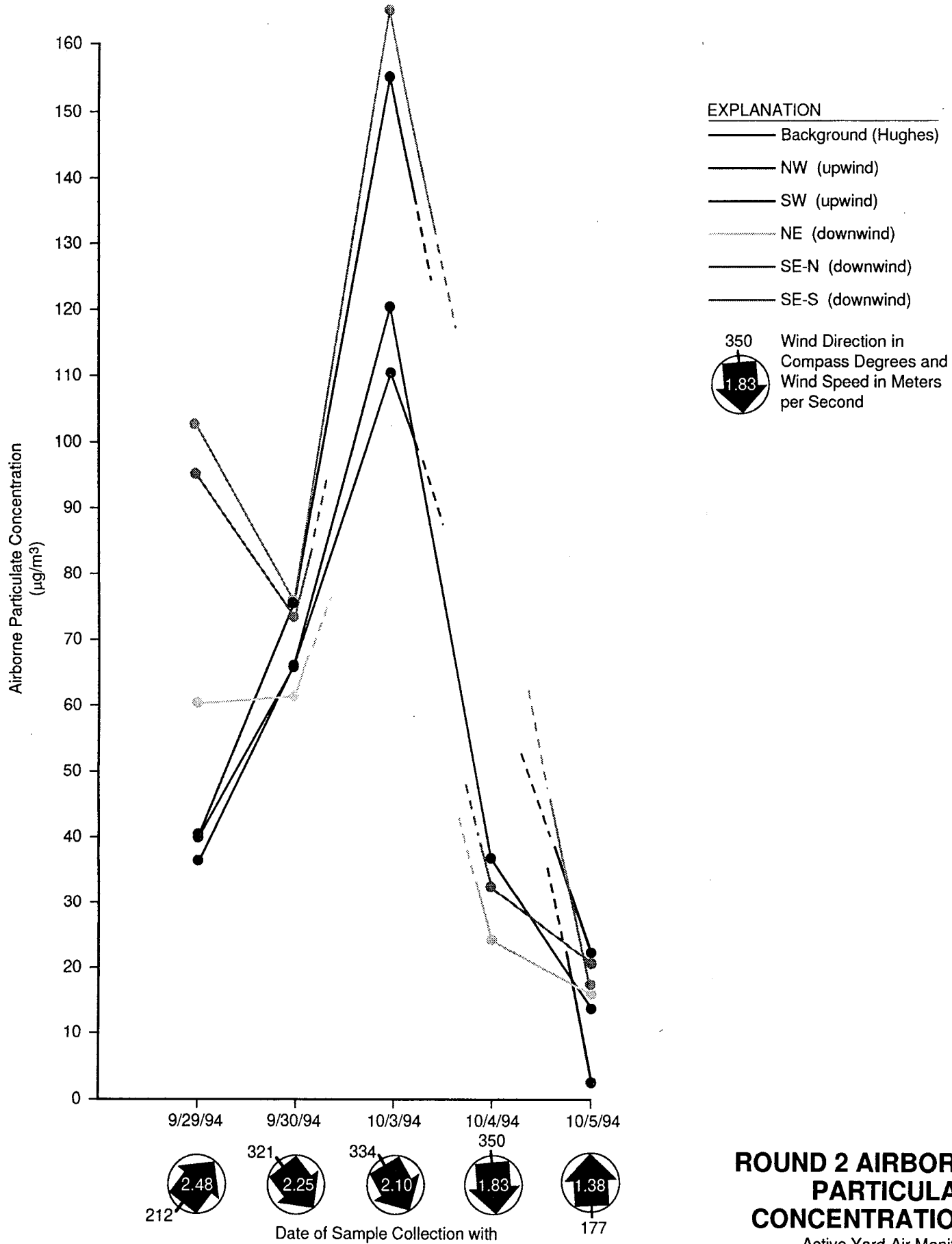
ROUND 1 AIRBORNE PARTICULATE CONCENTRATIONS

Active Yard Air Monitoring
Union Pacific Railroad Yard
Sacramento, California

DAMES & MOORE

00173.080.044.5515A.SJR.1/3/94

FIGURE 2



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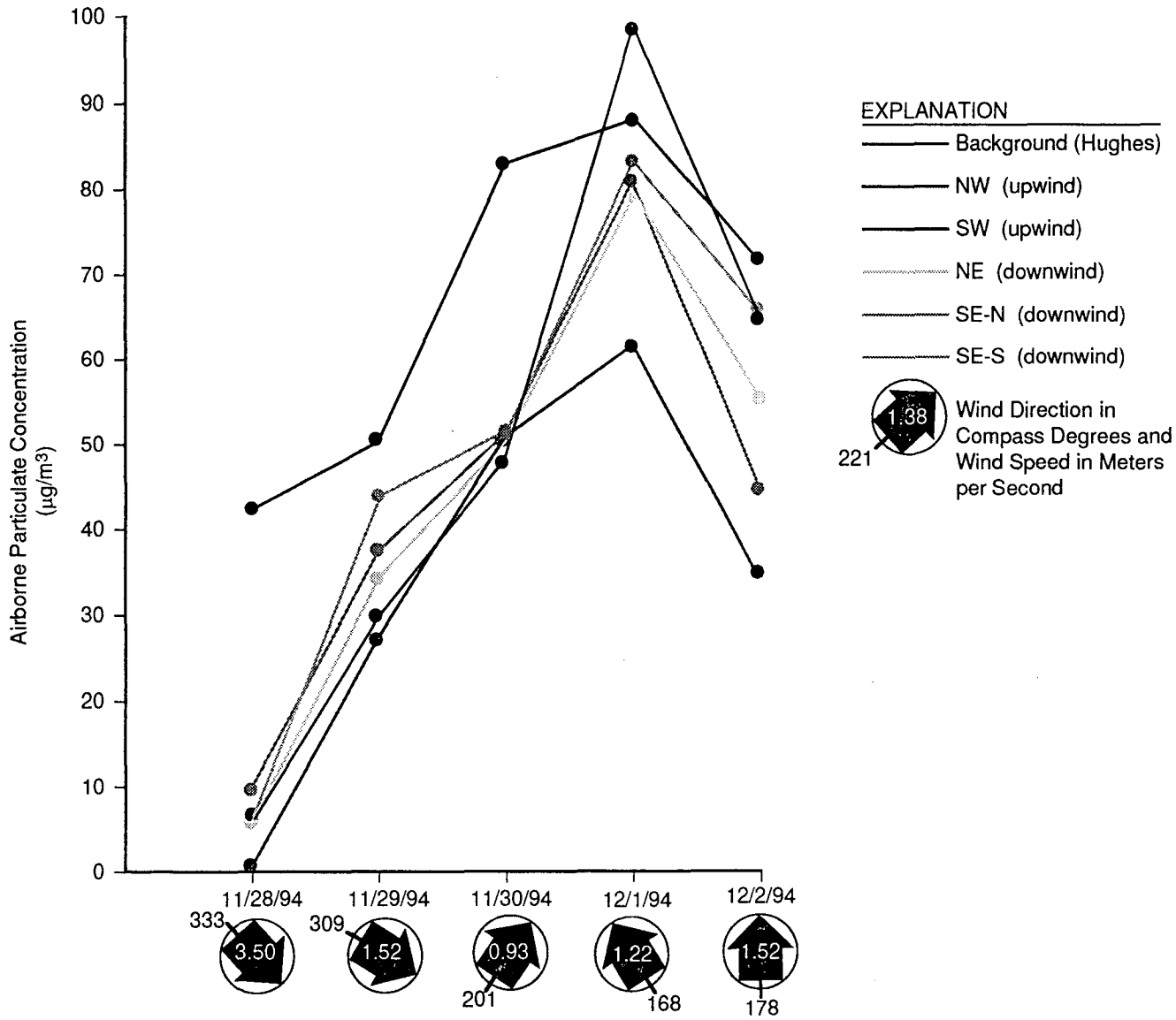
00173.080.044.5515B.SJR.1/3/94

ROUND 2 AIRBORNE PARTICULATE CONCENTRATIONS

Active Yard Air Monitoring
Union Pacific Railroad Yard
Sacramento, California

FIGURE 3



ROUND 3 AIRBORNE PARTICULATE CONCENTRATIONS

Active Yard Air Monitoring
Union Pacific Railroad Yard
Sacramento, California

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00173.080.044.5515C.CAW.1/17/95

FIGURE 4

Appendix A

APPENDIX A

AEROVIRONMENT, INC., REPORTS

AEROVIRONMENT, INC., REPORT
SEPTEMBER 2, 1994

ROUND 1 RESULTS

SAC134.02

AeroVironment Inc.

2 September 1994

Mr. Jim Brake
Dames & Moore
8801 Folsom Boulevard, Suite 200
Sacramento, CA 95826

RE: AMBIENT AIR MEASUREMENTS AT UPRR YARD

Dear Jim:

Enclosed are the preliminary results for the ambient air monitoring at the UPRR yard between August 8 and August 12, 1994. Particulate results are pretty much as expected, with higher readings on the eastern side of the site (downwind), especially at the Southeast sampling location. Also included are precision results from the collocated site. Results from the first day are not included in the calculations since the sample period for the southern collocated location was interupted and not known exactly. The reported variability is somewhat higher than normal, possibly because the SE location may inherently be susceptible to variability as it is impacted from yard activity. My recommendation is to move collocated sampling to one of the upwind sites during the next sampling period to see if precision results improve.

For XRF analysis, I recommend that we analyze all samples collected on August 11. This day shows the highest downwind concentrations (as well as the largest net increase from upwind to downwind locations), with light winds moving in a predominantly easterly direction. I will give you a call early next week to confirm the XRF analysis choice.

Sincerely

David H. Bush

David H. Bush
Project Manager

DHB/db
Attachments

222 East Huntington Drive • Monrovia, California 91016 • U.S.A.
Telephone 818/357-9983 • Telex 467 121, AEROVIR-C1 • FAX 818/359-9628

		UPRR Meteorological Hourly Averages (hour ending)					
Date	Time	Vector WD	Vector WS	Scalar WD	Scalar WS	Sigma Theta	
8/8/94	11:00	200	2.15	199	2.33	24	
8/8/94	12:00	197	1.58	197	1.93	37	
8/8/94	13:00	215	1.58	217	2	43	
8/8/94	14:00	212	1.55	214	1.95	49	
8/8/94	15:00	207	2.03	210	2.53	31	
8/8/94	16:00	189	2.45	189	2.68	24	
8/8/94	17:00	204	2.73	205	2.9	21	
8/8/94	18:00	209	2.8	208	2.98	21	
8/8/94	19:00	206	2.75	204	2.98	20	
8/8/94	20:00	206	2.28	205	2.43	20	
8/8/94	21:00	187	2.45	185	2.6	20	
8/8/94	22:00	168	2.08	162	2.4	25	
8/8/94	23:00	161	2.3	161	2.38	14	
8/8/94	0:00	147	2.23	148	2.28	13	
8/9/94	1:00	152	2.35	151	2.43	14	
8/9/94	2:00	152	2.43	152	2.5	12	
8/9/94	3:00	155	2.38	154	2.43	12	
8/9/94	4:00	143	2.18	143	2.23	12	
8/9/94	5:00	145	1.98	145	2.03	12	
8/9/94	6:00	145	2.3	145	2.35	12	
8/9/94	7:00	157	2.35	157	2.43	13	
8/9/94	8:00	180	2.4	180	2.5	15	
8/9/94	9:00	191	2.13	191	2.2	16	
8/9/94	10:00	197	1.78	196	1.93	22	
8/9/94	11:00	207	1.7	206	1.9	27	
8/9/94	12:00	223	1.68	221	2	30	
8/9/94	13:00	208	1.6	210	1.95	39	
8/9/94	14:00	225	1.9	224	2.15	27	
8/9/94	15:00	220	2.03	221	2.3	29	
8/9/94	16:00	210	2.1	213	2.48	30	
8/9/94	17:00	205	2.65	205	2.88	23	
8/9/94	18:00	213	2.75	214	2.98	23	
8/9/94	19:00	210	3.03	211	3.2	19	
8/9/94	20:00	194	2.7	195	2.85	16	
8/9/94	21:00	176	2.55	176	2.63	14	
8/9/94	22:00	175	2.13	174	2.2	15	
8/9/94	23:00	174	1.93	174	2.03	14	
8/9/94	0:00	149	2	149	2.08	14	
8/10/94	1:00	138	1.78	138	1.83	13	
8/10/94	2:00	142	1.75	142	1.8	13	
8/10/94	3:00	158	1.9	158	1.95	14	
8/10/94	4:00	145	2.13	145	2.2	12	
8/10/94	5:00	135	2.03	134	2.1	14	
8/10/94	6:00	143	2.1	143	2.15	13	
8/10/94	7:00	152	1.95	152	2.03	13	

8/10/94	8:00	166	2.45	166	2.53	15	
8/10/94	9:00	165	2.38	165	2.5	18	
8/10/94	10:00	186	2.25	186	2.43	22	
8/10/94	11:00	189	2.1	191	2.35	26	
8/10/94	12:00	194	1.53	194	1.83	38	
8/10/94	13:00	254	1.18	253	1.7	45	
8/10/94	14:00	238	1.03	236	1.65	53	
8/10/94	15:00	257	1.43	256	1.85	44	
8/10/94	16:00	220	1.88	221	2.2	31	
8/10/94	17:00	223	1.78	226	2	33	
8/10/94	18:00	217	2	219	2.33	22	
8/10/94	19:00	194	2.4	194	2.55	19	
8/10/94	20:00	199	2.65	199	2.78	18	
8/10/94	21:00	204	2.45	204	2.55	16	
8/10/94	22:00	201	1.63	201	1.7	19	
8/10/94	23:00	182	1.45	181	1.55	19	
8/10/94	0:00	144	1.4	142	1.53	23	
8/11/94	1:00	139	1.73	139	1.78	13	
8/11/94	2:00	127	1.43	125	1.5	14	
8/11/94	3:00	123	1.68	124	1.7	11	
8/11/94	4:00	117	1.5	116	1.55	12	
8/11/94	5:00	133	1.3	131	1.35	13	
8/11/94	6:00	130	1.3	127	1.35	14	
8/11/94	7:00	137	1.35	135	1.38	14	
8/11/94	8:00	165	1.83	163	1.93	16	
8/11/94	9:00	179	1.53	178	1.65	24	
8/11/94	10:00	202	0.88	202	1.23	44	
8/11/94	11:00	257	0.98	253	1.38	48	
8/11/94	12:00	242	1.03	240	1.58	46	
8/11/94	13:00	259	1.88	260	2.05	24	
8/11/94	14:00	261	1.73	260	2.1	35	
8/11/94	15:00	240	1.68	241	2.03	37	
8/11/94	16:00	251	1.85	249	2.05	27	
8/11/94	17:00	212	2.03	217	2.33	28	
8/11/94	18:00	192	2.2	192	2.38	22	
8/11/94	19:00	196	2.7	196	2.8	17	
8/11/94	20:00	184	2.5	183	2.63	16	
8/11/94	21:00	164	1.58	163	1.68	18	
8/11/94	22:00	149	1.43	145	1.58	18	
8/11/94	23:00	168	1.45	167	1.55	20	
8/11/94	0:00	164	1.55	163	1.65	16	
8/12/94	1:00	136	1.53	136	1.58	14	
8/12/94	2:00	118	1	118	1.03	14	
8/12/94	3:00	105	1.15	105	1.18	15	
8/12/94	4:00	105	1.18	105	1.2	12	
8/12/94	5:00	105	1.15	105	1.15	11	
8/12/94	6:00	102	0.95	101	0.98	14	
8/12/94	7:00	101	0.38	101	0.4	20	
8/12/94	8:00	149	1.1	148	1.18	16	

8/12/94	9:00	171	0.6	169	0.83	46	
8/12/94	10:00	297	0.05	271	0.88	71	
8/12/94	11:00	153	0.28	162	1.08	79	
8/12/94	12:00	266	1.05	263	1.53	47	
8/12/94	13:00	253	1.6	252	1.9	40	
8/12/94	14:00	256	1.43	256	1.75	39	
8/12/94	15:00	239	1.55	238	1.95	50	
8/12/94	16:00	233	1.6	235	1.88	37	
8/12/94	17:00	221	1.33	225	1.78	46	

DMTSP2.XLS

Filter #	Date	Site	Tare (mg)	Sample (mg)	Start time	End time	Start flow	End flow	(lpm)	ug	ug/m3
D703	8/8/94	Hughes	143.661	144.447	7:58	7:58	40	40	17.0	0.7860	32.1
D705	8/8/94	NE	143.591	144.006	10:15	20:10	40	39	16.7	0.4150	41.8
D702	8/8/94	NW	141.359	141.747	11:12	20:00	40	40	17.0	0.3880	43.3
D707	8/8/94	SE-N	145.810	146.633	10:36	20:05	40	40	17.0	0.8230	85.1
D708	8/8/94	SE-S	145.448	146.009	11:55	20:05	40	40	17.0	0.5610	67.4
D706	8/8/94	SW	144.257	144.456	11:46	19:55	40	40	17.0	0.1990	24.0
D712	8/9/94	Hughes	149.272	149.854	7:58	7:55	39.5	39.5	16.7	0.5820	24.2
D715	8/9/94	NE	149.858	150.224	7:35	16:33	39.5	39	16.6	0.3660	41.1
D717	8/9/94	NW	150.053	150.305	8:17	16:55	39.5	39	16.6	0.2520	29.4
D709	8/9/94	SE-N	143.746	144.064	7:41	16:37	38.5	39	16.3	0.3180	36.5
D704	8/9/94	SE-S	144.618	145.000	7:41	16:37	36.5	36	14.8	0.3820	48.0
D718	8/9/94	SW	0.000	0.221	7:49	16:45	39.5	39.5	16.7	0.2210	24.7
D720	8/10/94	Hughes	150.963	151.599	7:58	8:03	39.5	39.5	16.7	0.6360	26.4
D714	8/10/94	NE	152.441	152.781	8:58	16:42	39	38	16.1	0.3400	45.4
D710	8/10/94	NW	146.322	146.492	8:24	16:27	39.5	38	16.3	0.1700	21.6
D701	8/10/94	SE-N	142.657	143.171	8:36	16:47	38.5	38.5	16.1	0.5140	64.9
D711	8/10/94	SE-S	151.593	151.975	8:36	16:47	36.5	36.5	15.0	0.3820	51.9
D713	8/10/94	SW	136.088	136.265	8:09	16:20	39	38	16.1	0.1770	22.4
D725	8/11/94	Hughes	149.555	150.328	8:04	7:58	39.5	39.5	16.7	0.7730	32.3
D723	8/11/94	NE	153.604	153.9	8:31	16:37	37.5	37	15.4	0.2960	39.5
D726	8/11/94	NW	150.038	150.353	8:16	16:25	39	37	15.8	0.3150	40.7
D730	8/11/94	SE-N	150.228	150.917	8:37	16:40	38	38.5	16.0	0.6890	89.2
D719	8/11/94	SE-S	153.419	154.047	8:37	16:40	36.5	36.5	15.0	0.6280	86.8
D724	8/11/94	SW	155.231	155.569	7:56	16:18	41.5	41.5	17.9	0.3380	37.7
D729	8/12/94	Hughes	146.419	146.796	7:58	15:33	39.5	39.5	16.7	0.3770	49.6
D728	8/12/94	NE	146.493	146.88	7:33	16:14	38	37	15.6	0.3870	47.8
D721	8/12/94	NW	154.302	154.665	8:14	16:09	37.5	36	15.1	0.3630	50.5
D727	8/12/94	SE-N	148.01	148.755	7:38	16:57	38.5	39	16.3	0.7450	81.9
D716	8/12/94	SE-S	152.387	152.980	7:38	16:57	35.5	35.5	14.4	0.5930	73.6
D722	8/12/94	SW	154.928	155.363	7:50	15:46	42	41	17.9	0.4350	51.2
D731	Blank		137.006	137.024	8:00	16:30	40	40	16.7	0.0180	2.1
D732	Blank		137.816	137.832	8:00	16:30	40	40	16.7	0.0160	1.9
D733	Blank		135.213	135.223	8:00	16:30	40	40	16.7	0.0100	1.2

Elemental Analysis for August 11, 1994

	D719 - SE-S		D730 - SE-N		D723 - NE		D724 - SW		D726 - NW		D725 - Hughes		D731 - Blank	
	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3
Fe	43.6700	6.0352	45.4100	5.8814	15.6500	2.0895	17.1900	1.9183	16.2800	2.1015	34.7500	1.4508	0.2470	0.0290
Ni	0.0680	0.0094	0.0693	0.0090	0.0580	0.0077	0.0655	0.0073	0.0592	0.0076	0.1247	0.0052	<0.0113	<0.0013
Cu	0.0781	0.0108	0.0819	0.0106	0.0428	0.0057	0.0315	0.0035	0.0441	0.0057	0.1222	0.0051	0.0139	0.0016
Zn	0.2709	0.0374	0.3100	0.0402	0.1915	0.0256	0.1840	0.0205	0.1600	0.0207	0.5632	0.0235	0.0277	0.0033
Ga	<0.0113	<0.0016	<0.0113	<0.0015	<0.0113	<0.0015	<0.0113	<0.0013	<0.0113	<0.0015	<0.0113	<0.0005	<0.0076	<0.0009
Ge	<0.0113	<0.0016	<0.0113	<0.0015	<0.0113	<0.0015	<0.0113	<0.0013	<0.0113	<0.0015	<0.0113	<0.0005	<0.0076	<0.0009
As	<0.0340	<0.0047	<0.0378	<0.0049	<0.0302	<0.0040	<0.3020	<0.0337	<0.0265	<0.0034	<0.0491	<0.0020	<0.0076	<0.0009
Se	<0.0113	<0.0016	<0.0113	<0.0015	<0.0113	<0.0015	<0.0113	<0.0013	<0.0113	<0.0015	0.0365	0.0015	<0.0076	<0.0009
Br	0.0315	0.0044	0.0391	0.0051	0.0315	0.0042	0.0466	0.0052	0.0378	0.0049	0.1424	0.0059	<0.0113	<0.0013
Rb	<0.0227	<0.0031	0.0416	0.0054	<0.0227	<0.0030	<0.0227	<0.0025	<0.0227	<0.0029	0.0416	0.0017	<0.0151	<0.0018
Sr	0.1575	0.0218	0.1651	0.0214	0.0718	0.0096	0.0630	0.0070	0.0567	0.0073	0.1588	0.0066	<0.0151	<0.0018
Y	<0.0265	<0.0037	<0.0265	<0.0034	<0.0265	<0.0035	<0.0265	<0.0030	<0.0265	<0.0034	<0.0265	<0.0011	<0.0189	<0.0022
Pd	<0.1021	<0.0141	<0.1021	<0.0132	<0.0983	<0.0131	<0.0983	<0.0110	<0.0945	<0.0122	<0.1021	<0.0043	<0.0643	<0.0075
Ag	<0.1285	<0.0178	<0.1247	<0.0162	<0.1210	<0.0162	<0.1210	<0.0135	<0.1210	<0.0156	<0.1247	<0.0052	<0.0794	<0.0093
Cd	<0.1550	<0.0214	<0.1512	<0.0196	<0.1474	<0.0197	<0.1474	<0.0164	<0.1474	<0.0190	<0.1512	<0.0063	<0.0983	<0.0115
In	<0.1814	<0.0251	<0.1777	<0.0230	<0.1777	<0.0237	<0.1777	<0.0198	<0.1777	<0.0229	<0.1777	<0.0074	<0.1210	<0.0142
Sn	<0.2192	<0.0303	<0.2155	<0.0279	<0.2155	<0.0288	<0.2192	<0.0245	<0.2155	<0.0278	<0.2155	<0.0090	<0.1474	<0.0173
Sb	<0.2722	<0.0376	<0.2722	<0.0353	<0.2759	<0.0368	<0.2722	<0.0304	<0.2722	<0.0351	<0.2722	<0.0114	<0.1890	<0.0222
Ba	<1.2320	<0.1703	<1.2250	<0.1587	<1.2130	<0.1619	<1.2060	<0.1346	<1.1980	<0.1546	<1.2130	<0.0506	<0.8354	<0.0981
La	<1.6780	<0.2319	<1.6780	<0.2173	<1.6970	<0.2266	<1.6820	<0.1877	<1.6820	<0.2171	<1.6670	<0.0696	<1.1600	<0.1362
Hg	<0.0189	<0.0026	<0.0189	<0.0024	<0.0189	<0.0025	<0.0189	<0.0021	<0.0189	<0.0024	<0.0189	<0.0008	<0.0113	<0.0013
Pb	0.1537	0.0212	0.1512	0.0196	0.1033	0.0138	0.0857	0.0096	0.0617	0.0080	0.2205	0.0092	<0.0340	<0.0040

DMTSP2.XLS

Elemental Analysis for August 11, 1994

	D719 - SE-S		D730 - SE-N		D723 - NE		D724 - SW		D726 - NW		D725 - Hughes		D731 - Blank	
	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3
Fe	43.6700	6.0352	45.4100	5.8814	15.6500	2.0895	17.1900	1.9163	16.2800	2.1015	34.7500	1.4508	0.2470	0.0290
Ni	0.0680	0.0094	0.0693	0.0090	0.0580	0.0077	0.0655	0.0073	0.0592	0.0076	0.1247	0.0052	ND	ND
Cu	0.0781	0.0108	0.0819	0.0106	0.0428	0.0057	0.0315	0.0035	0.0441	0.0057	0.1222	0.0051	0.0139	0.0016
Zn	0.2709	0.0374	0.3100	0.0402	0.1915	0.0256	0.1840	0.0205	0.1600	0.0207	0.5632	0.0235	0.0277	0.0033
Ga	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ge	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Se	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0365	0.0015	ND	ND
Br	0.0315	0.0044	0.0391	0.0051	0.3150	0.0421	0.0466	0.0052	0.0378	0.0049	0.1424	0.0059	ND	ND
Rb	ND	ND	0.0416	0.0054	ND	ND	ND	ND	ND	ND	0.0416	0.0017	ND	ND
Sr	0.1575	0.0218	0.1651	0.0214	0.0718	0.0096	0.0630	0.0070	0.0567	0.0073	0.1588	0.0066	ND	ND
Y	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pd	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ag	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cd	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
In	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sn	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ba	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
La	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	0.1537	0.0212	0.1512	0.0196	0.1033	0.0138	0.0857	0.0096	0.0617	0.0080	0.2205	0.0092	ND	ND

Date	Site	ug/m3	
8/8/94	SE-N	85.1	
8/8/94	SE-S	67.4	
8/9/94	SE-N	36.5	24.10%
8/9/94	SE-S	48.0	
8/10/94	SE-N	64.9	-24.98%
8/10/94	SE-S	51.9	
8/11/94	SE-N	89.2	-2.82%
8/11/94	SE-S	86.8	
8/12/94	SE-N	81.9	-11.23%
8/12/94	SE-S	73.6	
	Average		-3.73%
	Std. Dev		20.68%

AEROVIRONMENT, INC., REPORT
NOVEMBER 28, 1994

ROUND 2 RESULTS

SAC134.02

AeroVironment Inc.

28 November 1994

Mr. Jim Brake
Dames & Moore
8801 Folsom Boulevard, Suite 200
Sacramento, CA 95826

RE: AMBIENT AIR MEASUREMENTS AT UPRR YARD

Dear Jim:

Enclosed are the preliminary results for the ambient air monitoring at the UPRR yard between September 29 and October 5, 1994. Particulate results are pretty much as expected, with higher readings on the eastern side of the site (downwind), especially at the Southeast sampling location. Also included are precision results from the collocated site. Results from two days are not included in the calculations due to missing samples. The reported variability is better than that reported for the first period of monitoring.

Also included are the XRF elemental data for the filters that we agreed to analyze. Basically, the analyzed filters are those with the highest total particulate concentrations during the monitoring period, occurring on September 29 and October 3, 1994.

If you have any questions, please feel free to call me at (916) 642-2312.

Sincerely

David H. Bush

David H. Bush
Project Manager

DHB/db
Attachments

222 East Huntington Drive • Monrovia, California 91016 • U.S.A.
Telephone 818/357-9983 • Telex 467 121, AEROVIR-C1 • FAX 818/359-9628

UPRR Meteorological Hourly Averages (hour ending)

Date	Time	Vector WD (degrees)	Vector WS (m/s)	Scalar WD (degrees)	Scalar WS (m/s)	Sigma Theta (degrees)
9/29/94	1:00	150	1.6	149	1.73	18
9/29/94	2:00	159	1.63	158	1.73	15
9/29/94	3:00	138	1.48	137	1.55	15
9/29/94	4:00	126	1.28	125	1.33	14
9/29/94	5:00	125	1.35	123	1.43	15
9/29/94	6:00	138	1.45	137	1.5	15
9/29/94	7:00	131	1.4	131	1.45	13
9/29/94	8:00	148	1.7	148	1.75	12
9/29/94	9:00	164	1.95	166	2.05	14
9/29/94	10:00	155	1.83	154	1.95	21
9/29/94	11:00	141	1.15	143	1.53	48
9/29/94	12:00	186	0.7	188	1.45	74
9/29/94	13:00	227	0.48	225	1.4	62
9/29/94	14:00	277	0.43	275	1.43	66
9/29/94	15:00	249	0.55	238	1.65	62
9/29/94	16:00	324	1.73	324	1.98	39
9/29/94	17:00	321	0.8	320	1.43	55
9/29/94	18:00	261	0.8	259	1.28	31
9/29/94	19:00	135	0.08	76	0.68	48
9/29/94	20:00	207	1.2	208	1.33	20
9/29/94	21:00	203	1.23	204	1.3	17
9/29/94	22:00	219	1.08	219	1.1	17
9/29/94	23:00	222	1.05	221	1.1	15
9/29/94	0:00	219	0.88	220	0.93	20
9/30/94	1:00	11	0.13	37	0.65	51
9/30/94	2:00	101	0.25	97	0.28	23
9/30/94	3:00	96	0.25	88	0.35	29
9/30/94	4:00	27	0.23	33	0.33	46
9/30/94	5:00	56	0.18	65	0.2	37
9/30/94	6:00	90	0.2	86	0.28	28
9/30/94	7:00	0	0.35	4	0.48	49
9/30/94	8:00	132	0.4	129	0.48	20
9/30/94	9:00	274	0.7	269	0.83	37
9/30/94	10:00	287	1.38	288	1.63	23
9/30/94	11:00	308	1.3	309	1.5	36
9/30/94	12:00	339	2.18	339	2.38	25
9/30/94	13:00	327	2.23	328	2.43	26
9/30/94	14:00	309	1.35	307	1.75	43
9/30/94	15:00	319	1.68	321	2.03	39
9/30/94	16:00	336	2.13	335	2.43	26
9/30/94	17:00	321	2.55	321	2.68	18
9/30/94	18:00	328	1.9	327	2.03	18
9/30/94	19:00	51	0.15	68	0.8	34
9/30/94	20:00	204	1.25	202	1.35	18
9/30/94	21:00	179	1.25	176	1.3	14

9/30/94	22:00	184	1.1	182	1.13	14
9/30/94	23:00	150	0.85	151	0.9	17
9/30/94	0:00	109	1.03	109	1.1	11
10/1/94	1:00	121	0.98	122	1	12
10/1/94	2:00	118	1.08	117	1.1	12
10/1/94	3:00	120	1.08	120	1.08	12
10/1/94	4:00	115	0.95	115	1	12
10/1/94	5:00	112	0.98	114	1.05	17
10/1/94	6:00	122	0.23	115	0.43	53
10/1/94	7:00	76	0.3	76	0.35	19
10/1/94	8:00	138	0.33	136	0.45	37
10/1/94	9:00	214	0.9	210	1.03	29
10/1/94	10:00	215	1.63	214	1.73	21
10/1/94	11:00	212	1.23	214	1.4	30
10/1/94	12:00	212	1.23	211	1.48	37
10/1/94	13:00	287	0.75	292	1.3	62
10/1/94	14:00	283	0.55	284	1.18	66
10/1/94	15:00	289	0.78	289	1.33	70
10/1/94	16:00	315	0.63	309	1.13	63
10/1/94	17:00	312	0.75	310	1.05	43
10/1/94	18:00	39	0.68	41	0.73	21
10/1/94	19:00	78	0.35	79	0.38	13
10/1/94	20:00	90	0.3	86	0.38	19
10/1/94	21:00	83	0.2	67	0.3	36
10/1/94	22:00	61	0.25	59	0.33	44
10/1/94	23:00	90	0.18	82	0.25	41
10/1/94	0:00	123	0.43	114	0.5	22
10/2/94	1:00	123	0.5	117	0.65	21
10/2/94	2:00	86	0.33	86	0.45	39
10/2/94	3:00	95	0.53	91	0.68	38
10/2/94	4:00	138	0.6	136	0.65	21
10/2/94	5:00	12	0.35	50	0.5	32
10/2/94	6:00	90	0.28	84	0.43	45
10/2/94	7:00	9	0.15	18	0.28	52
10/2/94	8:00	45	0.15	63	0.25	47
10/2/94	9:00	325	0.23	304	0.35	53
10/2/94	10:00	128	0.85	121	1.03	35
10/2/94	11:00	148	0.85	145	1.03	40
10/2/94	12:00	232	0.85	237	1.2	55
10/2/94	13:00	274	0.75	272	1.18	58
10/2/94	14:00	243	0.83	239	1.38	69
10/2/94	15:00	236	1.13	237	1.38	42
10/2/94	16:00	211	1.4	211	1.65	35
10/2/94	17:00	195	1.6	196	1.85	28
10/2/94	18:00	195	1.75	196	1.88	18
10/2/94	19:00	204	1.88	205	1.95	16
10/2/94	20:00	180	1.28	178	1.35	23
10/2/94	21:00	182	1.55	181	1.6	14
10/2/94	22:00	181	1.38	180	1.45	10

10/2/94	23:00	181	1.45	180	1.5	17
10/2/94	0:00	141	1.75	140	1.78	13
10/3/94	1:00	148	1.98	148	2.05	14
10/3/94	2:00	167	2.23	167	2.33	16
10/3/94	3:00	161	2.38	159	2.5	17
10/3/94	4:00	159	2.23	160	2.33	15
10/3/94	5:00	9	0.3	21	1.28	34
10/3/94	6:00	347	1.3	352	1.43	26
10/3/94	7:00	12	0.48	16	0.78	33
10/3/94	8:00	324	0.48	1	0.88	53
10/3/94	9:00	342	1.3	352	1.38	21
10/3/94	10:00	330	3.15	330	3.25	14
10/3/94	11:00	349	3.48	349	3.6	15
10/3/94	12:00	349	4.33	350	4.5	14
10/3/94	13:00	337	4.4	337	4.55	14
10/3/94	14:00	338	3.48	339	3.68	19
10/3/94	15:00	330	1.98	328	2.45	46
10/3/94	16:00	319	1.93	317	2.3	35
10/3/94	17:00	323	2.3	323	2.53	24
10/3/94	18:00	291	2.05	291	2.18	17
10/3/94	19:00	240	2.03	249	2.4	19
10/3/94	20:00	223	3.15	223	3.28	17
10/3/94	21:00	222	3.58	222	3.73	16
10/3/94	22:00	219	3.53	219	3.65	16
10/3/94	23:00	222	3.35	222	3.53	19
10/3/94	0:00	214	3.3	213	3.48	18
10/4/94	1:00	192	2.7	190	2.95	18
10/4/94	2:00	169	2.35	168	2.45	15
10/4/94	3:00	153	2.03	155	2.15	20
10/4/94	4:00	208	1.43	208	1.5	19
10/4/94	5:00	190	0.43	204	0.8	58
10/4/94	6:00	331	0.25	336	0.68	43
10/4/94	7:00	71	0.63	69	0.68	20
10/4/94	8:00	43	0.55	43	0.63	27
10/4/94	9:00	46	0.8	42	0.98	27
10/4/94	10:00	99	1.28	98	1.38	23
10/4/94	11:00	133	1.68	132	1.83	22
10/4/94	12:00	148	2.48	145	2.65	22
10/4/94	13:00	186	1.98	187	2.45	22
10/4/94	14:00	312	3.4	312	3.63	15
10/4/94	15:00	342	4.5	342	4.68	14
10/4/94	16:00	338	2.68	336	2.85	18
10/4/94	17:00	348	2.58	352	2.73	18
10/4/94	18:00	352	2.35	354	2.45	16
10/4/94	19:00	357	1.85	357	1.93	14
10/4/94	20:00	9	0.6	19	0.85	34
10/4/94	21:00	325	0.4	300	0.88	35
10/4/94	22:00	313	1.68	314	1.7	10
10/4/94	23:00	274	0.98	273	1.08	23

10/4/94	0:00	9	0.93	14	1.03	31
10/5/94	1:00	4	1.33	7	1.4	15
10/5/94	2:00	359	1.25	360	1.3	14
10/5/94	3:00	352	1.6	355	1.63	12
10/5/94	4:00	358	1.4	360	1.45	15
10/5/94	5:00	349	1.75	351	1.83	14
10/5/94	6:00	2	0.8	1	0.85	14
10/5/94	7:00	9	0.15	29	0.38	56
10/5/94	8:00	251	0.33	240	0.48	43
10/5/94	9:00	307	0.73	313	0.83	21
10/5/94	10:00	154	0.93	146	1.08	34
10/5/94	11:00	163	1.73	162	1.88	21
10/5/94	12:00	194	1.25	192	1.6	39
10/5/94	13:00	170	1.28	174	1.78	50
10/5/94	14:00	187	1.18	189	1.65	52
10/5/94	15:00	143	1.13	143	1.6	53
10/5/94	16:00	189	1.45	184	1.73	50
10/5/94	17:00	190	1.48	190	1.75	34
10/5/94	18:00	176	1.63	177	1.83	19
10/5/94	19:00	168	1.05	165	1.15	21
10/5/94	20:00	95	0.28	90	0.3	22
10/5/94	21:00	152	0.48	137	0.6	16
10/5/94	22:00	211	1.43	208	1.5	17
10/5/94	23:00	186	1	184	1.03	15
10/5/94	0:00	115	1.03	114	1.08	20

Particulate Analysis for Second Period

Filter #	Date	Site	Tare (mg)	Sample (mg)	Start time	End time	Start flow	End flow	Flowrate (lpm)	mg	ug/m3
D740	9/29/94	Hughes	155.922	156.834	9:00	8:35	40	38	16.4	0.9120	39.3
D748	9/29/94	NE	143.999	144.353	8:30	17:43	40	18	10.7	0.3540	60.0
D738	9/29/94	NW	155.795	156.120	10:00	18:06	40	40	17.0	0.3250	39.4
D736	9/29/94	SE-N	145.083	145.811	10:20	17:48	40	40	17.0	0.7280	95.6
D737	9/29/94	SE-S	151.832	152.613	10:20	17:48	40	40	17.0	0.7810	102.6
D742	9/29/94	SW	146.226	146.545	9:30	18:02	40	40	17.0	0.3190	36.7
D739	9/30/94	Hughes	153.658	154.142	8:35	15:40	40	41	17.3	0.4840	65.9
D743	9/30/94	NE	148.592	149.205	7:54	18:01	40	38	16.4	0.6130	61.5
D750	9/30/94	NW	142.925	143.533	8:26	17:37	40	32	14.7	0.6080	75.1
D745	9/30/94	SE-N	149.692	150.446	7:48	17:57	40	40	17.0	0.7540	72.9
D751	9/30/94	SE-S	135.617	136.408	7:48	17:57	40	40	17.0	0.7910	76.4
D749	9/30/94	SW	144.313	144.882	8:47	17:27	40	38	16.4	0.5690	66.7
D753	10/3/94	Hughes	133.327	136.016	9:20	9:10	40	40	17.0	2.6890	110.7
D744	10/3/94	NE	145.822		9:08	17:22	40	37	16.1	missing	
D752	10/3/94	NW	137.230	138.542	9:41	17:58	40	40	17.0	1.3120	155.4
D747	10/3/94	SE-N	144.686	145.005	9:30		40		sampler fell		
D746	10/3/94	SE-S	138.338	139.759	9:03	17:27	40	40	17.0	1.4210	165.9
D754	10/3/94	SW	135.066	136.014	9:35	17:42	40	37	16.1	0.9480	120.7
D765	10/4/94	Hughes	104.015		9:10	15:45	40	40	filter damaged during sampling		
D758	10/4/94	NE	134.617	134.808	8:59	17:05	40	40	17.0	0.1910	23.1
D760	10/4/94	NW	132.382		9:34	15:30	40		filter damaged during sampling		
D764	10/4/94	SE-N	137.375	137.640	8:53	16:57	40	40	17.0	0.2650	32.2
D766	10/4/94	SE-S	141.625		8:53	16:57	40	40	17.0	missing	
D755	10/4/94	SW	134.115	134.341	9:26	15:24	40	40	17.0	0.2260	37.2
D757	10/5/94	Hughes	134.41	134.912	10:15	8:52	40	40	17.0	0.5020	21.8
D741	10/5/94	NE	147.792	147.923	9:32	18:06	40	40	17.0	0.1310	15.0
D763	10/5/94	NW	136.282	136.302	9:58	18:53	40	39	16.7	0.0200	2.2
D759	10/5/94	SE-N	132.897	133.072	9:24	18:13	40	40	17.0	0.1750	19.5
D762	10/5/94	SE-S	136.098	136.251	9:24	18:13	40	40	17.0	0.1530	17.0
D761	10/5/94	SW	135.103	135.217	9:50	18:58	40	38	16.4	0.1140	12.7
D756		Field Blank	134.933	134.951	9:00	18:00	40	40	17.0	0.0180	2.0
D768		Shipping Blank	135.1	135.126	9:00	18:00	40	40	16.7	0.0260	2.9
D769		Shipping Blank	138.655	138.661	9:00	18:00	40	40	16.7	0.0060	0.7
D767		System Blank	135.997	136.005	9:00	18:00	40	40	16.7	0.0080	0.9

Precision Statistics for Second Period

Date	Site	ug/m3	% Diff.
9/29/94	SE-N	95.6	6.79%
9/29/94	SE-S	102.6	
9/30/94	SE-N	72.9	4.68%
9/30/94	SE-S	76.4	
10/3/94	SE-N		
10/3/94	SE-S	165.9	
10/4/94	SE-N	32.2	
10/4/94	SE-S		
10/5/94	SE-N	19.5	-14.38%
10/5/94	SE-S	17.0	
		Avg	-0.97%
		Std Dev	13.48%

Elemental Analysis for Second Period

	D736	SE-N 9/29	D737	SE-S 9/29	D740	Hughes 9/29	D746	SE-S 10/3	D752	NW 10/3	D753	Hughes 10/3	D754	SW 10/3
Element	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3
Fe	44.2000	5.8070	50.5300	6.6386	33.5300	1.4435	58.6200	6.8458	45.4000	5.3766	87.9100	3.6183	36.0100	4.5844
Ni	0.0466	0.0061	0.0718	0.0094	0.0954	0.0041	0.1134	0.0132	0.0945	0.0112	0.2029	0.0084	0.0668	0.0085
Cu	0.1386	0.0182	0.1764	0.0232	0.1814	0.0078	0.2633	0.0307	0.2117	0.0251	0.4019	0.0165	0.1361	0.0173
Zn	0.3591	0.0472	0.4271	0.0561	0.7195	0.0310	0.4889	0.0571	0.3427	0.0406	0.9387	0.0386	0.2835	0.0361
Ga	<0.0076	<0.0010	<0.0113	<0.0015	<0.0076	<0.0003	<0.0113	<0.0013	<0.0076	<0.0009	0.0265	0.0011	<0.0076	<0.0010
Ge	<0.0076	<0.0010	<0.0076	<0.0010	<0.0076	<0.0003	<0.0076	<0.0009	<0.0076	<0.0009	<0.0113	<0.0005	<0.0076	<0.0010
As	<0.0491	<0.0065	<0.0491	<0.0065	<0.0416	<0.0018	<0.0340	<0.0040	<0.0265	<0.0031	<0.0529	<0.0022	<0.0227	<0.0029
Se	<0.0076	<0.0010	<0.0113	<0.0015	<0.0113	<0.0005	<0.0076	<0.0009	<0.0076	<0.0009	<0.0113	<0.0005	<0.0076	<0.0010
Br	0.0378	0.0050	0.0403	0.0053	0.1046	0.0045	0.0290	0.0034	0.0214	0.0025	0.1966	0.0081	0.0227	0.0029
Rb	0.0252	0.0033	0.0378	0.0050	0.0315	0.0014	0.0781	0.0091	0.0630	0.0075	0.1399	0.0058	0.0529	0.0067
Sr	0.1550	0.0204	0.1915	0.0252	0.1499	0.0065	0.2495	0.0291	0.2054	0.0243	0.4901	0.0202	0.1600	0.0204
Y	<0.0189	<0.0025	<0.0189	<0.0025	<0.0189	<0.0008	<0.0189	<0.0022	<0.0189	<0.0022	<0.0227	<0.0009	<0.0151	<0.0019
Pd	<0.0794	<0.0104	<0.0832	<0.0109	<0.0832	<0.0036	<0.0794	<0.0093	<0.0756	<0.0090	<0.1021	<0.0042	<0.0643	<0.0082
Ag	<0.0945	<0.0124	<0.1021	<0.0134	<0.1021	<0.0044	0.1021	0.0119	<0.0907	<0.0107	<0.1134	<0.0047	<0.0756	<0.0096
Cd	<0.1134	<0.0149	<0.1210	<0.0159	<0.1210	<0.0052	0.1172	0.0137	<0.1058	<0.0125	0.1739	0.0072	<0.0945	<0.0120
In	<0.1285	<0.0169	<0.1361	<0.0179	<0.1399	<0.0060	<0.1285	<0.0150	<0.1210	<0.0143	<0.1436	<0.0059	<0.1096	<0.0140
Sn	<0.1550	<0.0204	<0.1625	<0.0213	0.1978	0.0085	<0.1550	<0.0181	0.1588	0.0188	0.1865	0.0077	<0.1323	<0.0168
Sb	<0.1928	<0.0253	<0.2003	<0.0263	<0.2117	<0.0091	<0.1928	<0.0225	<0.1777	<0.0210	<0.2079	<0.0086	<0.1625	<0.0207
Ba	1.4730	0.1935	1.9920	0.2617	<0.9299	<0.0400	1.0240	0.1196	0.8480	0.1004	1.2760	0.0525	<0.7598	<0.0967
La	<1.1910	<0.1565	<1.2400	<0.1629	<1.3000	<0.0560	<1.1720	<0.1369	<1.1190	<0.1325	<1.2470	<0.0513	<1.0580	<0.1347
Hg	<0.0151	<0.0020	<0.0151	<0.0020	<0.0151	<0.0007	<0.0151	<0.0018	<0.0151	<0.0018	<0.0189	<0.0008	<0.0151	<0.0019
Pb	0.2621	0.0344	0.2419	0.0318	0.1865	0.0080	0.1462	0.0171	0.0794	0.0094	0.2633	0.0108	0.0806	0.0103

AEROVIRONMENT, INC., REPORT
JANUARY 20, 1995

ROUND 3 RESULTS

SAC134.02

AeroVironment Inc.

20 January 1995

Mr. Jim Brake
Dames & Moore
8801 Folsom Boulevard, Suite 200
Sacramento, CA 95826

RE: AMBIENT AIR MEASUREMENTS AT UPRR YARD

Dear Jim:

Enclosed are the results for the ambient air monitoring at the UPRR yard on November 14 and November 28 through December 2, 1994. Included are the XRF elemental data for the filters obtained on December 1, the date with the highest total particulate concentrations. Total particulate and elemental results are significantly different from those obtained during the first two monitoring periods. First, total particulate concentrations differ in that the results for the background site (Hughes Stadium) are consistently as high or higher than those for the sites around the yard perimeter. Second, the concentrations of earth elements such as iron and nickel obtained for the December 1 samples are significantly lower than those for pervious monitoring periods. For previous periods, iron accounted for approximately 50% of the total particulate concentration. For this period, iron accounts for only about 20% of the total concentration.

One likely explanation for the above observations is that the source of the high particulate concentrations was different from the particulate source for previous monitoring (namely, the UPRR yard). The weather immediately preceding November 28 was dominated by frequent periods of rain. The wetness, coupled with generally low wind speeds, most likely kept dust and mechanically generated particulate concentrations low, as is demonstrated by the extremely low concentrations on November 28, immediately after the rains. This condition most likely continue throughout the week of monitoring, resulting in the low iron and nickel concentrations. The most likely source of particulates other than wind generated dust is carbon from burning within the area. Two observations suggest this possibility. First, the samples obtained during this period were significantly darker than those obtained during previous periods, suggesting carbon loading. Second, the bromine concentrations for the December 1 samples were all approximately twice as high as concentrations obtained during the first two monitoring periods. Bromine is released during the burning of hardwoods, including orchard woods, suggesting that wood burning played a larger role as a particulate source during this monitoring period. The low winds very well may have compounded the problem, resulting in a more stable and generally smoky air mass that impacted all sites, including the background site, in roughly the same manner.

In summary, it appears that the samples obtained during this monitoring period may not necessarily be representative of the conditions for which this monitoring program was designed. Rather than

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having the source be dust mechanically entrained by steady winds over the railroad yard, the source appears to have been a relatively stable smoky air mass. This observation can be further substantiated through discussions with the local air quality agencies regarding the air quality during this period. It should be noted that arsenic was measured at levels slightly above the detection limit at two sites on December 1. One of which was the background site at Hughes Stadium. No arsenic was detected during the other monitoring periods. It is not known whether smoke could be a source of the arsenic. However, given that arsenic is most commonly in the form of water-soluable salts, it seems unlikely that the railroad yard would generate arsenic under wet ground conditions and light winds when it did not generate arsenic under the drier and windier conditions experienced during the first two monitoring periods.

I have enclosed the elemental analysis report and chain-of-custody forms with the data. In addition, I have enclosed revised tables for the elemental data obtained during the first two monitoring periods, correcting some minor errors. For the first period, the bromine concentration for Sample D723 was incorrect. For the second period, the mercury and lead concentrations were incorrect for sample D736. I apologize for the errors.

If you have any questions, please feel free to call me at (916) 642-2312.

Sincerely

David H. Bush

David H. Bush
Project Manager

DHB/db
Attachments

UPRR Meteorological Hourly Averages (hour ending)

Date	Time	Vector WD	Vector WS	Scalar WD	Scalar WS	Sigma Theta
11/14/94	1:00	14	0.33	30	0.4	42
11/14/94	2:00	14	0.23	35	0.28	31
11/14/94	3:00	58	0.05	80	0.15	46
11/14/94	4:00	14	0.08	37	0.2	42
11/14/94	5:00	355	0.38	0	0.4	51
11/14/94	6:00	349	0.25	355	0.28	22
11/14/94	7:00	7	0.23	3	0.28	34
11/14/94	8:00	340	0.5	341	0.5	9
11/14/94	9:00	337	0.73	347	0.8	23
11/14/94	10:00	319	0.68	313	0.83	44
11/14/94	11:00	304	1.6	304	1.73	20
11/14/94	12:00	314	1.38	314	1.58	23
11/14/94	13:00	337	1.6	339	1.8	31
11/14/94	14:00	355	0.95	357	1.28	47
11/14/94	15:00	351	0.68	350	1.03	55
11/14/94	16:00	317	1.03	323	1.2	25
11/14/94	17:00	328	0.85	331	0.95	22
11/14/94	18:00	12	0.43	19	0.43	14
11/14/94	19:00	22	0.1	25	0.13	26
11/14/94	20:00	69	0.18	48	0.23	20
11/14/94	21:00	85	0.15	70	0.25	49
11/14/94	22:00	50	0.23	56	0.33	35
11/14/94	23:00	105	0.5	101	0.53	14
11/14/94	0:00					
11/28/94	1:00	353	2.5	355	2.6	13
11/28/94	2:00	349	2.88	349	2.93	12
11/28/94	3:00	339	2.53	340	2.63	12
11/28/94	4:00	329	3.45	329	3.5	10
11/28/94	5:00	338	3.48	338	3.55	12
11/28/94	6:00	341	3.78	340	3.88	12
11/28/94	7:00	341	3.73	341	3.83	13
11/28/94	8:00	330	3.95	330	4.05	11
11/28/94	9:00	330	3.78	330	3.83	9
11/28/94	10:00	334	3.4	335	3.53	15
11/28/94	11:00	336	3.83	336	3.93	13
11/28/94	12:00	338	3.75	339	3.9	13
11/28/94	13:00	334	3.53	334	3.7	18
11/28/94	14:00	327	3.43	328	3.63	18
11/28/94	15:00	335	3.2	336	3.35	18
11/28/94	16:00	327	2.73	327	2.83	15
11/28/94	17:00	327	1.83	327	1.9	13
11/28/94	18:00	355	0.2	17	0.3	21
11/28/94	19:00	40	0.2	54	0.3	29
11/28/94	20:00	63	0.13	51	0.25	33
11/28/94	21:00	74	0.13	68	0.25	23
11/28/94	22:00	126	0.28	114	0.3	23
11/28/94	23:00	90	0.3	68	0.35	24
11/28/94	0:00	58	0.18	49	0.18	20

11/29/94	1:00	94	0.48	80	0.53	16
11/29/94	2:00	104	0.33	98	0.38	36
11/29/94	3:00	66	0.08	39	0.23	77
11/29/94	4:00	29	0.1	0	0.23	45
11/29/94	5:00	355	0.13	343	0.25	36
11/29/94	6:00	349	0.48	355	0.6	41
11/29/94	7:00	112	0.18	127	0.4	54
11/29/94	8:00	335	0.3	348	0.43	73
11/29/94	9:00	305	0.78	307	0.85	36
11/29/94	10:00	318	1.03	318	1.1	17
11/29/94	11:00	312	1.3	311	1.43	32
11/29/94	12:00	328	1.63	328	1.83	26
11/29/94	13:00	351	1.65	353	1.9	33
11/29/94	14:00	342	2.3	342	2.43	19
11/29/94	15:00	322	2.25	322	2.35	18
11/29/94	16:00	335	2.38	335	2.43	12
11/29/94	17:00	336	1.53	339	1.58	12
11/29/94	18:00	26	0.3	39	0.33	15
11/29/94	19:00	355	0.48	355	0.48	7
11/29/94	20:00	3	0.38	4	0.4	19
11/29/94	21:00	7	0.23	34	0.28	21
11/29/94	22:00	359	0.33	1	0.33	13
11/29/94	23:00	351	0.43	351	0.48	51
11/29/94	0:00	126	0.28	90	0.35	33
11/30/94	1:00	143	0.38	138	0.4	13
11/30/94	2:00	99	0.1	119	0.18	31
11/30/94	3:00	63	0.13	38	0.28	43
11/30/94	4:00	107	0.13	97	0.23	41
11/30/94	5:00	74	0.13	63	0.2	44
11/30/94	6:00	123	0.45	121	0.53	32
11/30/94	7:00	19	0.3	32	0.45	38
11/30/94	8:00	349	0.23	1	0.28	46
11/30/94	9:00	112	0.73	93	0.85	31
11/30/94	10:00	141	1.48	140	1.6	21
11/30/94	11:00	170	1.2	171	1.35	27
11/30/94	12:00	179	0.75	182	1.08	56
11/30/94	13:00	191	0.48	195	0.9	55
11/30/94	14:00	180	0.53	174	0.88	63
11/30/94	15:00	321	0.63	323	0.95	72
11/30/94	16:00	271	0.68	265	0.88	52
11/30/94	17:00	276	1.03	277	1.05	10
11/30/94	18:00	95	0.28	84	0.38	41
11/30/94	19:00	359	0.35	17	0.38	14
11/30/94	20:00	119	0.28	115	0.3	21
11/30/94	21:00	71	0.1	115	0.4	45
11/30/94	22:00	22	0.18	52	0.38	28
11/30/94	23:00	85	0.13	69	0.2	43
11/30/94	0:00	107	0.4	98	0.45	38
12/1/94	1:00	110	0.88	102	0.95	17
12/1/94	2:00	129	0.75	127	0.8	21
12/1/94	3:00	117	0.38	111	0.43	15

12/1/94	4:00	121	0.8	119	0.83	16
12/1/94	5:00	123	0.98	123	1	14
12/1/94	6:00	120	0.6	107	0.78	45
12/1/94	7:00	122	0.83	114	0.88	21
12/1/94	8:00	119	0.68	118	0.78	25
12/1/94	9:00	124	1.08	122	1.18	26
12/1/94	10:00	119	1.38	119	1.5	26
12/1/94	11:00	140	1.5	141	1.65	29
12/1/94	12:00	187	1.33	186	1.63	28
12/1/94	13:00	188	1.43	188	1.65	23
12/1/94	14:00	144	1.35	146	1.6	25
12/1/94	15:00	193	0.9	200	1.1	37
12/1/94	16:00	225	0.65	213	0.83	29
12/1/94	17:00	284	0.48	279	0.58	30
12/1/94	18:00	317	0.85	320	0.9	17
12/1/94	19:00	315	0.2	281	0.28	38
12/1/94	20:00	308	1	311	1.03	21
12/1/94	21:00	334	0.55	332	0.7	43
12/1/94	22:00	295	0.55	303	0.7	39
12/1/94	23:00	304	0.33	277	0.5	40
12/1/94	0:00	313	1	314	1.03	16
12/2/94	1:00	344	1.1	348	1.15	14
12/2/94	2:00	30	0.65	30	0.68	24
12/2/94	3:00	130	0.18	117	0.33	42
12/2/94	4:00	156	0.55	157	0.6	13
12/2/94	5:00	229	0.48	223	0.65	31
12/2/94	6:00	269	0.38	273	0.63	20
12/2/94	7:00	325	0.4	326	0.7	23
12/2/94	8:00	179	0.7	177	0.75	19
12/2/94	9:00	206	1.03	205	1.13	17
12/2/94	10:00	175	1.15	176	1.25	14
12/2/94	11:00	158	1.78	158	1.83	15
12/2/94	12:00	158	1.63	159	1.75	18
12/2/94	13:00	147	2	146	2.08	16
12/2/94	14:00	148	1.95	148	2.05	16
12/2/94	15:00	163	1.75	163	1.85	14
12/2/94	16:00	153	1.65	151	1.75	15
12/2/94	17:00	142	1.55	141	1.6	13
12/2/94	18:00	129	1.65	130	1.7	15
12/2/94	19:00	131	1.6	133	1.68	17
12/2/94	20:00	133	0.95	135	1.05	28
12/2/94	21:00	133	1.25	133	1.3	16
12/2/94	22:00	156	1.28	158	1.33	12
12/2/94	23:00	191	0.73	198	0.9	17
12/2/94	0:00	192	1.2	191	1.28	13

Particulate Analysis for Third Period

Filter #	Date	Site	Tare (mg)	Sample (mg)	Start time	End time	Start flow	End flow	Flowrate (lpm)	mg	ug/m3
D776	11/14/94	Hughes	145.774	148.334	9:00	7:45	40	39.5	16.8	2.5600	35.8
D788	11/14/94	NE	132.165	132.355	10:18	17:05	40	40	17.0	0.1900	27.5
D783	11/14/94	NW	134.801	135.001	9:45	16:45	40	39	16.7	0.2000	28.5
D787	11/14/94	SE-N	147.187	147.388	10:35	17:00	40	39.5	16.8	0.2010	31.0
D779	11/14/94	SE-S	135.769	135.999	10:35	17:00	40	40	17.0	0.2300	35.2
D784	11/14/94	SW	140.597	140.854	9:25	16:35	40	39.5	16.8	0.2570	35.5
D775	11/28/94	Hughes	143.224	144.246	9:00	8:40	40	40	17.0	1.0220	42.4
D778	11/28/94	NE	131.300	131.352	8:15	17:05	40	39.5	16.8	0.0520	5.8
D785	11/28/94	NW	134.482	134.487	8:30	16:55	40	36.5	16.0	0.0050	0.6
D782	11/28/94	SE-N	137.688	137.772	8:20	17:10	40	40	17.0	0.0840	9.3
D772	11/28/94	SE-S	118.951	119.007	8:20	17:10	40	40	17.0	0.0560	6.2
D780	11/28/94	SW	138.410	138.469	8:25	16:45	40	40	17.0	0.0590	6.9
D794	11/29/94	Hughes	127.682	128.918	8:40	8:12	40	40.5	17.1	1.2360	51.1
D774	11/29/94	NE	141.469	141.784	8:15	17:15	40	40.5	17.1	0.3150	34.0
D773	11/29/94	NW	132.916	133.133	9:00	16:55	40	39	16.7	0.2170	27.4
D789	11/29/94	SE-N	130.678	131.027	8:20	17:20	40	40.5	17.1	0.3490	37.7
D781	11/29/94	SE-S	143.653	144.054	8:21	17:21	40	40.5	17.1	0.4010	43.3
D771	11/29/94	SW	137.706	137.959	8:50	17:02	40	40	17.0	0.2530	30.3
D799	11/30/94	Hughes	141.800	143.797	8:13	7:51	40	40	17.0	1.9970	82.9
D790	11/30/94	NE	121.759	122.235	7:13	16:31	40	39.5	16.8	0.4760	50.6
D795	11/30/94	NW	126.805	127.239	7:31	16:00	40	39.5	16.8	0.4340	50.6
D796	11/30/94	SE-N	129.649	130.113	7:05	16:20	40	37.5	16.3	0.4640	51.4
D793	11/30/94	SE-S	120.581	121.048	7:07	16:21	40	39	16.7	0.4670	50.5
D798	11/30/94	SW	136.432	136.826	7:45	16:05	40	38.5	16.6	0.3940	47.6
D802	12/1/94	Hughes	132.429	134.578	7:52	8:03	40	39.5	16.8	2.1490	87.9
D800	12/1/94	NE	127.259	127.975	7:32	16:27	40	39.5	16.8	0.7160	79.4
D792	12/1/94	NW	126.367	126.928	7:00	16:05	40	39	16.7	0.5610	61.6
D797	12/1/94	SE-N	140.093	140.826	7:24	16:22	40	39.5	16.8	0.7330	80.9
D791	12/1/94	SE-S	133.271	134.029	7:25	16:23	40	40	17.0	0.7580	82.9
D786	12/1/94	SW	133.934	134.830	7:10	16:10	40	39.5	16.8	0.8960	98.5
D801	12/2/94	Hughes	138.305	138.818	8:04	15:04	40	40	17.0	0.5130	71.9
D804	12/2/94	NE	134.113	134.546	9:23	17:03	40	39.5	16.8	0.4330	55.9
D734	12/2/94	NW	138.633	138.898	9:00	16:40	40	38.5	16.6	0.2650	34.8
D735	12/2/94	SE-N	137.791	138.137	9:18	16:58	40	40	17.0	0.3460	44.3
D805	12/2/94	SE-S	147.636	148.147	9:19	16:59	40	40	17.0	0.5110	65.4
D803	12/2/94	SW	138.540	139.038	9:08	16:45	40	39.5	16.8	0.4980	64.7

Elemental Analysis for Third Period

	D802 Hughes 12/1		D800 NE 12/1		D792 NW 12/1		D797 SE-N 12/1		D791 SE-S 12/1		D786 SW 12/1	
Element	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3	ug/filter	ug/m3
Fe	18.1200	0.7413	9.2240	1.0234	9.8570	1.0828	9.8310	1.0847	10.2400	1.1203	17.4600	1.9193
Ni	0.0403	0.0016	<0.0113	<0.0013	0.0176	0.0019	0.0214	0.0024	<0.0113	<0.0012	0.0252	0.0028
Cu	0.3125	0.0128	0.0857	0.0095	0.1323	0.0145	0.0945	0.0104	0.1109	0.0121	0.3478	0.0382
Zn	1.5620	0.0639	0.5758	0.0639	0.4801	0.0527	0.5758	0.0635	0.6791	0.0743	0.7925	0.0871
Ga	<0.0113	<0.0005	<0.0076	<0.0008	<0.0076	<0.0008	<0.0076	<0.0008	<0.0076	<0.0008	<0.0076	<0.0008
Ge	<0.0076	<0.0003	<0.0076	<0.0008	<0.0076	<0.0008	<0.0076	<0.0008	<0.0076	<0.0008	<0.0076	<0.0008
As	0.1298	0.0053	<0.0416	<0.0046	<0.0340	<0.0037	<0.0378	<0.0042	0.0403	0.0044	<0.0416	<0.0046
Se	0.0340	0.0014	<0.0113	<0.0013	<0.0113	<0.0012	0.0151	0.0017	0.0151	0.0017	0.0126	0.0014
Br	0.3994	0.0163	0.1033	0.0115	0.0882	0.0097	0.0945	0.0104	0.0945	0.0103	0.1084	0.0119
Rb	0.0391	0.0016	<0.0189	<0.0021	<0.0151	<0.0017	0.0176	0.0019	<0.0151	<0.0017	<0.0189	<0.0021
Sr	0.0958	0.0039	0.0441	0.0049	0.0252	0.0028	0.0542	0.0060	0.0580	0.0063	0.0680	0.0075
Y	<0.0227	<0.0009	<0.0227	<0.0025	<0.0189	<0.0021	<0.0189	<0.0021	<0.0189	<0.0021	<0.0227	<0.0025
Pd	<0.0945	<0.0039	<0.0794	<0.0088	<0.0643	<0.0071	<0.0756	<0.0083	<0.0680	<0.0074	<0.0794	<0.0087
Ag	<0.1134	<0.0046	<0.1021	<0.0113	<0.0832	<0.0091	<0.0945	<0.0104	<0.0869	<0.0095	<0.1021	<0.0112
Cd	<0.1399	<0.0057	<0.1210	<0.0134	<0.1021	<0.0112	<0.1172	<0.0129	<0.1058	<0.0116	<0.1247	<0.0137
In	<0.1625	<0.0066	<0.1474	<0.0164	<0.1210	<0.0133	<0.1436	<0.0158	<0.1285	<0.0141	<0.1436	<0.0158
Sn	0.2848	0.0117	<0.1814	<0.0201	<0.1512	<0.0166	<0.1739	<0.0192	<0.1588	<0.0174	0.2029	0.0223
Sb	<0.2457	<0.0101	<0.2268	<0.0252	<0.1852	<0.0203	<0.2155	<0.0238	<0.1966	<0.0215	<0.2192	<0.0241
Ba	<1.0580	<0.0433	<0.9790	<0.1086	<0.8316	<0.0914	<0.9488	<0.1047	<0.8618	<0.0943	<0.9601	<0.1055
La	<1.4550	<0.0595	<1.3570	<0.1506	<1.1600	<0.1274	<1.3150	<0.1451	<1.2060	<0.1319	<1.3340	<0.1466
Hg	<0.0189	<0.0008	<0.0151	<0.0017	<0.0151	<0.0017	<0.0151	<0.0017	<0.0151	<0.0017	<0.0151	<0.0017
Pb	0.4889	0.0200	0.1827	0.0203	0.1537	0.0169	0.1651	0.0182	0.1562	0.0171	0.1940	0.0213

AEROVIRONMENT

JOB #A003-001
REPORT #95-005

SUBMITTED BY:
CHESTER LABNET - PORTLAND
12242 SW GARDEN PLACE
TIGARD, OREGON 97223
☎(503)624-2183/FAX (503)624-2653

CASE NARRATIVE

CHESTER LABNET

Portland

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Phone: (503) 624-2183
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Case Narrative

Date: January 11, 1995

General Information

Client:	AeroVironment
Project Manager:	Paul Duda
Sample Description:	47mm Teflon Filters
Sample Numbers:	95T306 - 95T311
Job Number:	A003-001
Report Number:	95-005

Analysis

Analytes:	XRF Metals (Fe - Pb)
Analytical Protocols:	X-Ray Fluorescence Protocol 7
Analytical Notes:	Results were not blank corrected.
QA/QC Review:	All of the data have been reviewed by the scientists performing the analyses and the Quality Assurance Officer. All of the quality control and sample-specific information in the package is complete and meets or exceeds the minimum requirements for acceptability.
Comments	If you should have any questions or concerns regarding the analysis, please feel free to contact the project manager.

J. Sprenger 1/12/95 — Paul Duda 1/12/95

Jeffrey Sprenger — Date — QA Officer

Paul Duda — Date — Project Manager

DATA SUMMARY

Client: AeroVironment
Project Number: A003-001

Lab ID: 95-T307
Client ID: D791
Deposit Area: 12.6 cm²

Analyte	µg/cm²	µg/filter
XRF		
Fe	0.8125	10.24
Ni	< 0.0009	< 0.0113
Cu	0.0088	0.1109
Zn	0.0539	0.6791
Ga	< 0.0006	< 0.0076
Ge	< 0.0006	< 0.0076
As	0.0032	0.0403
Se	0.0012	0.0151
Br	0.0075	0.0945
Rb	< 0.0012	< 0.0151
Sr	0.0046	0.0580
Y	< 0.0015	< 0.0189
Pd	< 0.0054	< 0.0680
Ag	< 0.0069	< 0.0869
Cd	< 0.0084	< 0.1058
In	< 0.0102	< 0.1285
Sn	< 0.0126	< 0.1588
Sb	< 0.0156	< 0.1966
Ba	< 0.0684	< 0.8618
La	< 0.0957	< 1.206
Hg	< 0.0012	< 0.0151
Pb	0.0124	0.1562

Client: AeroVironment
Project Number: A003-001

Lab ID: 95-T309
Client ID: D792
Deposit Area: 12.6 cm²

Analyte	µg/cm²	µg/filter
XRF		
Fe	0.7823	9.857
Ni	0.0014	0.0176
Cu	0.0105	0.1323
Zn	0.0381	0.4801
Ga	< 0.0006	< 0.0076
Ge	< 0.0006	< 0.0076
As	< 0.0027	< 0.0340
Se	< 0.0009	< 0.0113
Br	0.0070	0.0882
Rb	< 0.0012	< 0.0151
Sr	0.0020	0.0252
Y	< 0.0015	< 0.0189
Pd	< 0.0051	< 0.0643
Ag	< 0.0066	< 0.0832
Cd	< 0.0081	< 0.1021
In	< 0.0096	< 0.1210
Sn	< 0.0120	< 0.1512
Sb	< 0.0147	< 0.1852
Ba	< 0.0660	< 0.8316
La	< 0.0921	< 1.160
Hg	< 0.0012	< 0.0151
Pb	0.0122	0.1537

Client: AeroVironment
Project Number: A003-001

Lab ID: 95-T309
Client ID: D797
Deposit Area: 12.6 cm²

Analyte	µg/cm²	µg/filter
XRF		
Fe	0.7802	9.831
Ni	0.0017	0.0214
Cu	0.0075	0.0945
Zn	0.0457	0.5758
Ga	< 0.0006	< 0.0076
Ge	< 0.0006	< 0.0076
As	< 0.0030	< 0.0378
Se	0.0012	0.0151
Br	0.0075	0.0945
Rb	0.0014	0.0176
Sr	0.0043	0.0542
Y	< 0.0015	< 0.0189
Pd	< 0.0060	< 0.0756
Ag	< 0.0075	< 0.0945
Cd	< 0.0093	< 0.1172
In	< 0.0114	< 0.1436
Sn	< 0.0138	< 0.1739
Sb	< 0.0171	< 0.2155
Ba	< 0.0753	< 0.9488
La	< 0.1044	< 1.315
Hg	< 0.0012	< 0.0151
Pb	0.0131	0.1651

Client: AeroVironment
Project Number: A003-001

Lab ID: 95-T310
Client ID: D800
Deposit Area: 12.6 cm²

Analyte	µg/cm²	µg/filter
XRF		
Fe	0.7321	9.224
Ni	< 0.0009	< 0.0113
Cu	0.0068	0.0857
Zn	0.0457	0.5758
Ga	< 0.0006	< 0.0076
Ge	< 0.0006	< 0.0076
As	< 0.0033	< 0.0416
Se	< 0.0009	< 0.0113
Br	0.0082	0.1033
Rb	< 0.0015	< 0.0189
Sr	0.0035	0.0441
Y	< 0.0018	< 0.0227
Pd	< 0.0063	< 0.0794
Ag	< 0.0081	< 0.1021
Cd	< 0.0096	< 0.1210
In	< 0.0117	< 0.1474
Sn	< 0.0144	< 0.1814
Sb	< 0.0180	< 0.2268
Ba	< 0.0777	< 0.9790
La	< 0.1077	< 1.357
Hg	< 0.0012	< 0.0151
Pb	0.0145	0.1827

Client: AeroVironment
Project Number: A303-001

Lab ID: 95-T311
Client ID: D802
Deposit Area: 12.6 cm²

Analyte	µg/cm²	µg/filter
XRF		
Fe	1.438	18.12
Ni	0.0032	0.0403
Cu	0.0248	0.3125
Zn	0.1240	1.562
Ga	< 0.0009	< 0.0113
Ge	< 0.0006	< 0.0076
As	0.0103	0.1298
Se	0.0027	0.0340
Br	0.0317	0.3994
Rb	0.0031	0.0391
Sr	0.0076	0.0958
Y	< 0.0018	< 0.0227
Pd	< 0.0075	< 0.0945
Ag	< 0.0090	< 0.1134
Cd	< 0.0111	< 0.1399
In	< 0.0129	< 0.1625
Sn	0.0226	0.2848
Sb	< 0.0195	< 0.2457
Ba	< 0.0840	< 1.058
La	< 0.1155	< 1.455
Hg	< 0.0015	< 0.0189
Pb	0.0388	0.4889

QA/QC

Chester LabNet - Portland

XRF-3 **XRF Analytical Quality Assurance Report**

Client: AeroVironment
Analysis Period: January 10, 1995

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Fe(1)	1	1501.87	1523.35	n/a	n/a	1.43
Se(1)	1	2004.41	2013.45	n/a	n/a	0.45
Cd(1)	1	315.26	319.13	n/a	n/a	1.23
Pb(1)	1	2451.52	2480.22	n/a	n/a	1.17

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833

Analyte/ SRM	n	Certified Value(µg/cm²)	Measured Value (µg/cm²)					% Rec.
			High	Low	Average			
Fe 1833	4	13.6 +/- .45	13.47	13.35	13.39	+/-	0.05	98.5
Cu 1832	4	2.46 +/- .16	2.53	2.50	2.52	+/-	0.01	102.5
Zn 1833	4	3.88 +/- .23	3.95	3.91	3.93	+/-	0.01	101.3
Pb 1833	4	16.1 +/- .85	16.16	16.08	16.11	+/-	0.03	100.1

NIST: National Institute of Standards and Technology
% Rec: Percent Recovery = (Experimental/Given) x 100
n: Number of Observations
S.D.: Standard Deviation
c.v.: Coefficient of Variation = (S.D./Measured) x 100
% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

REPLICATE REPORT

Original ID: 95-T000306
Replicate ID: R0306

Filter Lot: 0000
Particle Size: T
Deposit Mass: 1. µg
Deposit Area: 12.60 cm²

Element	Original µg/cm²	Replicate µg/cm²	Difference µg/cm²	RPD
FE	1.3861+- .0696	1.3883+- .0697	-.0022+- .0985	-.2
NI	.0020+- .0004	.0023+- .0004	-.0003+- .0006	-14.0
CU	.0276+- .0015	.0278+- .0015	-.0002+- .0021	-.7
ZN	.0629+- .0032	.0642+- .0033	-.0013+- .0046	-2.0
GA	.0000+- .0002	.0002+- .0002	-.0002+- .0003	
GE	.0001+- .0002	.0002+- .0002	-.0001+- .0003	
AS	.0029+- .0011	.0026+- .0011	.0003+- .0016	
SE	.0010+- .0003	.0009+- .0003	.0001+- .0004	10.5
BR	.0086+- .0006	.0087+- .0006	-.0001+- .0008	-1.2
RB	.0014+- .0005	.0007+- .0004	.0007+- .0006	
SR	.0054+- .0006	.0061+- .0006	-.0007+- .0008	-12.2
Y	.0000+- .0006	.0000+- .0006	.0000+- .0008	
PD	.0002+- .0021	.0000+- .0022	.0002+- .0030	
AG	.0014+- .0027	.0010+- .0027	.0004+- .0038	
CD	.0030+- .0033	.0033+- .0032	-.0003+- .0046	
IN	.0038+- .0038	.0004+- .0039	.0034+- .0054	
SN	.0161+- .0047	.0138+- .0047	.0023+- .0066	15.4
SB	.0101+- .0058	.0000+- .0059	.0101+- .0083	
BA	.0224+- .0254	.0000+- .0256	.0224+- .0361	
LA	.0758+- .0353	.0000+- .0353	.0758+- .0499	
HG	.0000+- .0004	.0000+- .0004	.0000+- .0006	
PB	.0154+- .0014	.0154+- .0014	.0000+- .0020	.0

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

CHAIN OF CUSTODY

PROJ# 9401213

Chain of Custody Record

Send Results to:
David ~~[illegible]~~ BUSH
AeroVironment Inc.
222 E. Huntington Drive
Monrovia, CA 91016
818 357-9983 x.266

Send Sample to:
Paul Duda
Chester LabNet
12242 S.W. Garden Place
Tigard, OR 97223
503 624-2653

ANALYSES REQUIRED = ~~[illegible]~~

Analyses required: ~~[illegible]~~ CALL D. BOSH (916) 642-2312

	Filter ID	Sample Date	Site		Filter ID	Sample Date	Site	
1	D 803							15
2	D 800							16
3	D 793							17
4	D 797							18
5	D 791							19
(6)	D 786							20
7								21
8								22
9								23
10								24
11								25
12								26
13								27
14								28

Samples Relinquished by: D. Bush 1-5-95
Laboratory:
Samples Received by: Paul Duda 1/9/95
Keep original chain of custody record at site.
Send copy of chain of custody record to AeroVironment with sample results.

RAW DATA/CALCULATIONS

XRF Raw Data

Available upon request.

ED 558-2031

Chain of Custody Record

Send analysis results to:
AeroVironment Inc.
3570 Pleasant Valley Road
Placerville, CA 95667
Attn.: David Bush
916-642-2312

Send samples to:
Particulate Support Service
4631 Glencove Ave.
La Crescenta, CA 91214
Attn.: Jerry Thelen
818-248-2050

Analyses required: Total mass on all samples.

Filter ID	Sampler ID	Site	Sample Date	Time of Day Start Time	Time of Day Stop Time	Running time meter Start Time	Running time meter Stop Time	Sampler Flowrate Start (SCFH)	Sampler Flowrate Stop (SCFH)
D-800	NE	1	12/1/94	0732	1627	905.8	914.7	40.0	39.5
D-797	SE-N	2	"	0724	1622	—	—	40.0	39.5
D-791	SE-S	3	"	0725	1623	—	—	40.0	40.0
D-792	NW	4	"	0700	1605	2672.4	2672.4	40.0	39.0
D-786	SW	5	"	0710	1610	1395.1	1404.1	40.0	39.5
D-802	Hughes Stadium	6	"	0752	12/2/94 0803	—	—	40.0	39.5

Dames and Moore:
Samples Relinquished by: Glenn J. Gierszewski Date/Time: 12/16/94

Particulate Support Service:
Samples Received by: _____ Date/Time: _____

Send copy of chain of custody record to AeroVironment.

Chain of Custody Record

Send analysis results to:
AeroVironment Inc.
3570 Pleasant Valley Road
Placerville, CA 95667
Attn.: David Bush
916-642-2312

Send samples to:
Particulate Support Service
4631 Glencove Ave.
La Crescenta, CA 91214
Attn.: Jerry Thelen
818-248-2050

Analyses required: Total mass on all samples.

Filter ID	Sampler ID	Site	Sample Date	Time of Day Start Time	Time of Day Stop Time	Running time meter Start Time	Running time meter Stop Time	Sampler Flowrate Start (SCFH)	Sampler Flowrate Stop (SCFH)
D776	Hughes Stand.	1	11/14/94	0900	0745 11/17/94	—	—	40	34.5+
D784	SW	2	11/14/94	0925	1635	1360.8	1367.9	40	39.5
D783	NW	3	11/14/94	0945	1645	—	—	40	39.0
D788	NE	4	11/14/94	1018	1705	874.3	881.0	40	40.0
D779 ~~D773~~	SES	5	11/14/94	1036	1700	—	—	40	40.0
D787	SEN	6	11/14/94	1035	1700	—	—	40	39.5

Dames and Moore:
Samples Relinquished by: DMB Date/Time: 12/16/94

Particulate Support Service:
Samples Received by: _____ Date/Time: _____

Send copy of chain of custody record to AeroVironment.

D774 filter not seated properly in filter holder. - Validity questiona

Chain of Custody Record

Send analysis results to:
AeroVironment Inc.
3570 Pleasant Valley Road
Placerville, CA 95667
Attn.: David Bush
916-642-2312

Send samples to:
Particulate Support Service
4631 Glencove Ave.
La Crescenta, CA 91214
Attn.: Jerry Thelen
818-248-2050

Analyses required: Total mass on all samples.

Filter ID	Sampler ID	Site	Sample Date	Time of Day Start Time	Time of Day Stop Time	Running time meter Start Time	Running time meter Stop Time	Sampler Flowrate Start (SCFH)	Sampler Flowrate Stop (SCFH)
D804	NE	1	12/2/94	0923	1703	1404.1	1411.7	40.0	39.5
D735	SE-N	2	"	0918	1658	—	—	40.0	40.0
D805	SE-S	3	"	0919	1659	—	—	40.0	40.0
D734	NW	4	"	0900	1640	2672.4	2672.4	40.0	38.5
D803	SW	5	"	0908	1645	914.7	922.3	40.0	39.5
D801	HOAMES STADIUM	6	"	0804	1504	—	—	40.0	40.0

Dames and Moore:
Samples Relinquished by: GERALD J. GIERSZEWSKI Date/Time: 12/12/94

Particulate Support Service:
Samples Received by:_____ Date/Time:_____

Send copy of chain of custody record to AeroVironment.

3rd Round Samples
Monday 11/28/94
Aerovironment Copy (original)

Chain of Custody Record

Send analysis results to:
AeroVironment Inc.
3570 Pleasant Valley Road
Placerville, CA 95667
Attn.: David Bush
916-642-2312

Send samples to:
Particulate Support Service
4631 Glencove Ave.
La Crescenta, CA 91214
Attn.: Jerry Thelen
818-248-2050

Analyses required: Total mass on all samples.

Filter ID	Sampler ID	Site	Sample Date	Time of Day Start Time	Time of Day Stop Time	Running time meter Start Time	Running time meter Stop Time	Sampler Flowrate Start (SCFH)	Sampler Flowrate Stop (SCFH)
D778	NE	1	11/23/94	0815	1705	1367.9	1376.6	40.0	39.5
D782	SE-N	2	11/23/94	0820	1710	—	—	40.0	40.0
D772	SE-S	3	11/23/94	0820	1710	—	—	40.0	40.0-40.5
D780	SW	4	11/28/94	0825	1645	881.1	889.2	40.0	40.0
D785	NW	5	11/28/94	0830	1655	2672.4*	2672.4*	40.0	36.5
Hughes Stadium D775	Hughes Stadium	6	11/28/94	0900	0840 11/29/94	—	—	40.0	40.0

Dames and Moore:
Samples Relinquished by: _____ Date/Time: 11/29/94

Particulate Support Service:
Samples Received by: _____ Date/Time: _____

Send copy of chain of custody record to AeroVironment.

* Hourmeter not functioning.

Chain of Custody Record

Send analysis results to:
AeroVironment Inc.
3570 Pleasant Valley Road
Placerville, CA 95667
Attn.: David Bush
916-642-2312

Send samples to:
Particulate Support Service
4631 Glencove Ave.
La Crescenta, CA 91214
Attn.: Jerry Thelen
818-248-2050

Analyses required: Total mass on all samples.

Filter ID	Sampler ID	Site	Sample Date	Time of Day Start Time	Time of Day Stop Time	Running time meter Start Time	Running time meter Stop Time	Sampler Flowrate Start (SCFH)	Sampler Flowrate Stop (SCFH)
D774	NE	1	11/29/94	0815	1715	1376.6	1385.7	40.0	40.5
D789	SE-N	2	"	0820	1720	—	—	40.0	40.5
D781	SE-S	3	"	0824	1721	—	—	40.0	40.5
D773	NW	4	11/29/94	0900	1655	2672.4	2672.4	40.0	39.0
D771	SW	5	"	0850	1702	889.2	897.3	40.0	40.0
D794	Hughes Stadium	6	"	0840	11/30/94 0812	-	-	40.0	40.5

Dames and Moore:
Samples Relinquished by: [illegible] Date/Time: 12/16/94

Particulate Support Service:
Samples Received by: _____ Date/Time: _____

Send copy of chain of custody record to AeroVironment.

Chain of Custody Record

Send analysis results to:
AeroVironment Inc.
3570 Pleasant Valley Road
Placerville, CA 95667
Attn.: David Bush
916-642-2312

Send samples to:
Particulate Support Service
4631 Glencove Ave.
La Crescenta, CA 91214
Attn.: Jerry Thelen
818-248-2050

Analyses required: Total mass on all samples.

Filter ID	Sampler ID	Site	Sample Date	Time of Day Start Time	Time of Day Stop Time	Running time meter Start Time	Running time meter Stop Time	Sampler Flowrate Start (SCFH)	Sampler Flowrate Stop (SCFH)
D790	NE	1	11/30/94	0713	1631	1385.7	1395.1	40.0	39.5
D796	SE-N	2	"	0705	1620	–	–	40.0	37.5
D793	SE-S	3	"	0707	1621	–	–	40.0	39.0
D795	NW	4	"	0731	1600	897.3	905.8	40.0	39.5
D798	SW	5	"	0745	1605	2672.4	2672.4	40.0	38.5
D799	HUGHES STADIUM	6	"	0813	12/1/94 0751	–	–	40.0	40.0

Dames and Moore:
Samples Relinquished by: [illegible] Date/Time: 12/16/94

Particulate Support Service:
Samples Received by: _____ Date/Time: _____

Send copy of chain of custody record to AeroVironment.

IDEA