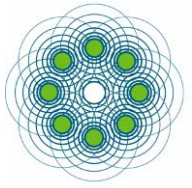
Los Angeles Basin

Water Augmentation Study
Phase II Monitoring Report Update



The Los Angeles and San Gabriel Rivers Watershed Council

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- Metropolitan Water District of Southern California
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EXECUTIVE SUMMARY

The Los Angeles Basin Water Augmentation Study determined there is no significant degradation of groundwater quality from the infiltration of storm water-borne pollutants. Based on trend analysis collected between 2000 and 2007, groundwater quality was stable or improved for most constituents at sites with shallow groundwater and sites with deep groundwater.

Monitoring was conducted throughout the Los Angeles basin with various land uses including, two industrial sites, an elementary school, a commercial office building, a private residence, and a public park. Samples were collected from stormwater runoff, vadose zone (lysimeters), and groundwater and analyzed for more approximately 80 constituents of concern including metals, organics, general water quality parameters, and emerging contaminants.

The Los Angeles Basin Water Augmentation Study is a long-term research project led by the Los Angeles & San Gabriel Rivers Watershed Council in partnership with eight local, state, and federal agencies. The study is evaluating the practical potential to improve surface water quality and increase local groundwater supplies though infiltration of urban storm water runoff. The results from this research have led to the development of the Elmer Avenue Neighborhood Retrofit Project to showcase best management practices to increase infiltration of stormwater in existing infrastructure.

INTRODUCTION

The Los Angeles Basin Water Augmentation Study is a long-term research project led by the Los Angeles & San Gabriel Rivers Watershed Council in partnership with eight local, state, and federal agencies. The study is evaluating the practical potential to improve surface water quality and increase local groundwater supplies though infiltration of urban storm water runoff. Initiated in 2000, the study addresses a number of questions to better characterize the benefits of storm water capture and infiltration, including implications for NPDES and TMDL compliance; long-term impacts of infiltration on the vadose zone and groundwater quality and quantity; and appropriate and favorable geographic, geologic, and hydrologic conditions for infiltration. The overall goals of the study will be to evaluate the costs and benefits of implementation, and determine the most effective strategy for developing this potentially significant source of water for southern California.

The focus of the early phases of the study was to monitor the fate and transport of runoff-borne pollutants by measuring storm water quality at the surface, and as it infiltrates through the soil to groundwater. Phase I focused on water quality assessment on single parcels utilizing infiltration structures, by monitoring two locations for one winter season. Phase II expanded the monitoring in time and scope, adding new sites with different land uses, hydrogeology, and infiltration techniques, and included monitoring of all six sites for several years.

The Phase II final report published in 2005 provides a summary of monitoring activities and results for the first four years of the program. We conducted limited monitoring for an

additional two years after that report was published. This report provides information on activities undertaken during the entire monitoring phase of the project, from July 1, 2001 through July 31, 2007, and summary analysis of the water quality results from that monitoring. The Appendix includes complete water quality and soil data results, trend analysis graphs, and other technical data. Further details on the monitoring sites and the monitoring program criteria are contained in the 2005 report, on the Watershed Council's website: www.lasgrwc.org/WAS.htm.

MONITORING PROGRAM

Monitoring sites are located throughout the Los Angeles area and include two industrial sites, an elementary school, a commercial office building, a private residence and a public park (see

Figure 1. Monitoring Site Locations). The sites are as follows:

- Broadous Elementary School, Pacoima
- Hall House, Los Angeles (private residence)
- IMAX Corporation, Santa Monica (commercial building)
- Scrap Metal Recycler, Los Angeles (industrial)
- Recycling Transfer Facility , Sun Valley (industrial)
- Veterans Park, Long Beach

Groundwater depths range from 20 feet to over 350 feet below ground surface (Table 1. Monitoring Sites BMP Hydrology). All sites were retrofit with various infiltration structures, ranging from simple landscaped swales to large-scale underground infiltration fields. Monitoring equipment installed as part of the study included soil water samplers (lysimeters) installed beneath the ground surface, groundwater wells and soil moisture sensors. Soil samples were collected when the monitoring equipment was installed and again in 2005.

Two locations (Broadous & IMAX) were monitored during the 2001-02 winter and, with the addition of the residential location, three sites were monitored during 2002-03. The other three monitoring locations, two industrial and one commercial/recreational site, were added prior to the 2003-04 winter. Geomatrix Consultants designed and constructed the BMPs and installed monitoring equipment at these three sites. All six locations were monitored during the 2003-04 and 2004-05 seasons.

The initial monitoring program consisted of taking storm water runoff samples during storm events, and taking post-storm vadose zone samples from lysimeters and groundwater samples from monitoring wells. Pre-season and post-season groundwater samples were also collected. Collectively, the six sites represent 12 storm water sample collection points, 17 lysimeters, and 10 groundwater wells.

A supplemental program of subsurface monitoring was conducted for an additional two years. Monitoring during 2006 and 2007 included all sites except the Hall House, which

does not have a groundwater well. We conducted post-storm monitoring of lysimeters and groundwater wells and pre- and post-season groundwater sampling. No storm water samples were collected, as surface runoff quality was previously well-characterized at these sites. Monitoring was scheduled after significant storm events and late in the storm season, to ensure that infiltration to the deepest lysimeters would occur.

Analytical Suite

A summary of the analytical suite is presented in Table 3. Additionally, temperature, pH and conductivity were measured in the field. During the last two years of monitoring, the analytical suite was limited to metals, general parameters, volatile organics, and perchlorate. Not all constituents were analyzed from lysimeter samples, for several reasons. Sampling from the lysimeters is restricted by the amount of water that can be evacuated from a lysimeter, which varies according to soil moisture conditions. Additionally, some analytes, such as total suspended solids and turbidity, are not measurable from a lysimeter sample as they would be filtered by the lysimeter itself. Therefore, the sampling suite for lysimeters was reduced to selected priority analytes. A detailed list of constituents, including detection limits and laboratory methods, is provided in Appendix B. All soil and water samples were analyzed by a state-certified laboratory.

Some constituents consistently resulted in non-detects at all sample points. Bacteriological constituents (total coliforms, E. coli, and fecal coliforms) occur in storm water, sometimes in very high concentrations, but detections in the lysimeter and groundwater samples were extremely low or not detected at all. At the end of each season, the TAC revisited the constituent list to eliminate some of these constituents for the next season. For example, NDMA, pesticides, 1,4-Dioxane and bacteriological constituents were dropped from the list for the oldest sites after two years, and for the newest sites after one round of samples. Fuel oxygenates, in addition to MtBE, were added to the organics analysis (DIPE, ETBE, TAME, TBA and ethanol). The detection limit for 1,2,3-trichloropropane, an emerging contaminant in groundwater, was reduced to 0.005 µg/L for one round of samples at all sites.

Description of the Storm Seasons

Annual rainfall for the six monitoring locations is shown in
Figure 3, measured from the nearest Los Angeles County rain gauge. The four years of monitoring saw a wide range of rainfall variability, from the driest years on record (2001-02 and 2006-07) to the second wettest year on record (2004-05). Rainfall varied geographically as well during the study. Total rainfall amounts during 2004-05 ranged from about 22 inches at Veterans Park, to over 37 inches at the Sun Valley site. This spatial and temporal variability presented challenges not just for monitoring, but also for designing appropriately sized infiltration facilities to capture runoff cost-effectively.

MONITORING RESULTS

Monitoring results include all analytical results from:

- Soil samples collected from all sites during lysimeter installation (pre-infiltration) and at the end of the initial monitoring phase in 2005.
- Pre- and post-season groundwater samples from up gradient and down gradient wells at each site except the residential site.
- Storm water samples at all sites.
- Post-storm lysimeter samples from all sites.
- Post-storm groundwater samples from down gradient wells.

Comprehensive water quality and soil sample analytical results for each site are presented in Appendix C and D, respectively. The concentration ranges for selected water quality constituents (minimum and maximum detected values) are presented in summary tables for each site in this report (Tables 4 to 9). The summary tables contain the ranges of analytical results for general monitoring parameters, metals, biological and other constituents of concern, and any VOCs and SVOCs detected in at least one sample. Polycyclic aromatic hydrocarbons, or PAHs, were not detected in any sample during the course of this study.

Water quality results were analyzed both temporally and spatially. Time-concentration charts were plotted for constituent concentrations at each monitoring point over the period of the monitoring program. Mann-Kendall trend analysis was conducted, which indicates whether there is a significant increasing or decreasing trend in concentrations for any constituent at a given monitoring point. This analysis was performed for over 600 combinations of constituent and monitoring point. The time-concentration charts and the results of the Mann-Kendall trend analysis are contained in Appendix E. For spatial analysis, depth-concentration charts were plotted that show the variation in concentrations for a particular constituent between each sampling point by depth. These are contained in Appendix F. Examples of the two types of charts are included for chloride at Veterans Park (Figure 4 and 5).

Discussion of Analytical Results

This discussion includes the results reported in the 2005 report, and an updated discussion of trends detected in groundwater quality. Overall, trends observed from the initial monitoring period have continued: data collected to date indicate that there is no significant degradation of groundwater quality from the infiltration of storm water-borne pollutants, and groundwater quality is stable or improved for most constituents at sites with shallow groundwater. Thus we continue to find that there are still no significant trends indicating that infiltration of storm water runoff is negatively impacting groundwater at these sites.

Time-concentration Trends

Of the over 600 Mann-Kendall trend analysis tests conducted, less than 80 trends were detected in subsurface samples (lysimeter and groundwater) over the entire monitoring period. Most of these, 84%, were negative trends. Positive trends were detected for four constituents in groundwater sampling locations, as discussed below.

1. Chloride in the monitoring well at the metal recycler. The increase in chloride at the metal recycler is likely not due to contributions from storm water, given the depth to groundwater at that site. Concentrations are consistently higher in groundwater than in storm water, and there are no corresponding increasing trends in any of the lysimeters at that site indicating downward migration of chloride.
2. Chloride in one monitoring well at Veterans Park. While concentrations of chloride in groundwater well #1 show an increasing trend, the other three wells and the two lysimeters have statistically significant downward trends in concentration. MW-01 is the furthest monitoring point from the infiltrator and the least likely to be impacted by infiltrating storm water. It is possible that chloride from the vadose zone could be mobilized by infiltrating water and transported to the vicinity of MW-01. This lateral transport might be possible because of the amount of clay in the subsurface.
3. Nitrate in one monitoring well at Veterans Park Nitrate in monitoring well #2 appears to indicate an increasing trend, but may actually be a false positive. Concentrations of nitrate are low in all samples, ranging from 0.56 to 3.9 mg/L, lower than that of the other groundwater wells at the site. There are decreasing trends in nitrate in the two adjacent wells (MW-03 and MW-04), and MW-02 seems to have stabilized over the past two years at about 3 mg/L.
4. Dissolved zinc in one monitoring well at Veterans Park. In monitoring well #3, dissolved zinc indicated a slight increasing trend in groundwater. Although statistically significant, concentrations are very low compared with the other wells at that site and have actually decreased since the fall of 2006. Storm water concentrations were much higher than groundwater, and fluctuated a great deal during the initial monitoring period thus no direct correlation is apparent. Zinc concentrations also decreased in soil samples during the same period.

In most cases, concentrations of metals tended to be higher in storm water than in subsurface water samples. Metal concentrations in subsurface samples showed continued variability and generally stable or decreasing concentrations. Exceptions are slightly increasing trends of copper and zinc in one of the lysimeters at the Sun Valley site that could be associated with infiltration of storm water with relatively higher concentrations of these metals. A similar trend occurred in one lysimeter at the metal recycler. These trends are not reflected in groundwater samples.

Other Results

As reported previously, soil appears to be very efficient at removing bacteria from storm water. Total coliforms were detected at high levels in nearly all storm water samples at all sites, while fecal coliform and E. coli were detected in at least one storm water sample from each site except Hall House. With the exception of one sample at the Broadous School, bacteria were not detected, or detected at very low concentrations, in lysimeter and groundwater samples.

Most inorganic groundwater quality constituents do not show clear trends or show decreasing concentrations over the study period. Except in the four cases discussed above, concentrations do not show any statistically significant increases. Groundwater quality data from the shallow groundwater sites continue to show water quality improvements

(decreasing salt concentrations) potentially associated with dilution by infiltrating storm water.

At the non-industrial sites the concentrations of general monitoring parameters such as TDS and chloride tended to be less than or similar to concentrations in lysimeter and groundwater samples. This suggests that the infiltration of storm water is not likely to have a significant negative impact to groundwater from these constituents. At Veterans Park, concentrations of TDS, nitrate, chloride, and other salts in groundwater samples (including pre-infiltration background samples) was much higher than concentrations in storm water samples. Data collected to date continue to show that concentrations of many of these constituents in lysimeter and groundwater samples are decreasing with time, possibly due to dilution by infiltrated storm water.

Other than acetone, VOCs and SVOCs detected in storm water are different than VOCs detected in subsurface samples. VOCs detected in groundwater samples during the monitoring period were also detected in initial background samples. With the possible exception of occasional low level detections of acetone, VOCs in storm water do not appear to impact groundwater at all. At the industrial sites, groundwater constituents such as MtBE and chlorinated solvents were present in some lysimeter samples at greater concentrations than present in any storm water samples. This finding suggests the presence of subsurface contamination prior to the installation of storm water infiltration facilities.

Although perchlorate was detected in some storm water samples, there is no apparent correlation between storm water and groundwater detections. Other constituents of concern for groundwater (disinfection byproducts, 1,4-Dioxane, PAHs and DBCP) were not detected in storm water.

Summary

The data collected during this study show no immediate impacts, and no apparent trends to indicate that storm water infiltration will negatively impact groundwater at these sites. Over the long term, given the depth to groundwater at the two industrial sites and at Broadous, it seems unlikely that constituents introduced into the soil from storm water infiltration would migrate all the way to the groundwater at a detectable concentration. At the sites with shallow groundwater, water quality continues to show improvements for many constituents.

While variations in storm water and groundwater constituents between types of land use were apparent, they may not be a barrier to infiltration. Filtration methods employed at the industrial sites seemed to be effective at removing certain constituents prior to entering the infiltration system, which may make infiltration more feasible at these more contaminated sites. However, site characterization of surface and soil constituents at industrial sites should be conducted prior to implementing infiltration strategies.

While it is clear that site-specific conditions must be considered when urban runoff is considered for recharge as potable groundwater, it is also important to note that groundwater recharge offers a number of benefits to municipal water managers. Groundwater storage is less costly in terms of construction costs, environmental impacts, evaporation loss of water, and eutrophication as compared to surface-water reservoirs.

Further, recharging groundwater puts the resource in closer proximity to the end-user than pumping water from reservoirs, an additional cost savings. With proper planning and research, the use of urban runoff for recharge of groundwater offers a viable alternative to relying solely on purchased water for such activities, water that may not be available in present quantities for purchase in the future. On average, over 500,000 acre-feet of runoff flow to the ocean from the Los Angeles County basin each year. If some portion of this water can be captured for reuse, the pressure on supplies in northern and central California may be moderated.

NEXT STEPS

The WAS is now in its eighth year and is currently funded through completion of the study in 2010.
Figure 6 illustrates each of the project phases, the goal of each, and sources of funding.

The third phase of the study will incorporate a demonstration project on a neighborhood scale. Plans are underway to retrofit a residential block in Sun Valley with Best Management Practices to address storm water infiltration as well as water conservation, pollution reduction and treatment, flooding, and community enhancement. Specific techniques will include conversion to native drought-tolerant landscapes, facilities to capture runoff for infiltration and reuse, and adding green space and habitat areas. The demonstration project will be monitored for water quality as well as for reduction of runoff and water use, changes in property values, and other potential benefits. This neighborhood project will provide a real-world model of addressing existing infrastructure and will serve to integrate many on-going efforts in the region to address flood management, water quality, water supply and environmental restoration. Our goal is to demonstrate how these approaches can be applied on a regional scale in Southern California as well as in other geographic regions.

In addition to the demonstration project, we are assessing the overall feasibility of utilizing infiltration techniques to capture storm water for groundwater recharge. The Bureau of Reclamation has developed a groundwater augmentation model to predict the amount of additional water that could be available for deep percolation if infiltration is increased. We are also developing a regional cost and benefit assessment to determine the real cost of this new water supply. The long-term goal of this project is a regional strategy for implementation.

APPENDIX

The following appendices are included on the project website www.lasgrwc.org/WAS.htm

Appendix A Site Location Maps
Appendix B Analytical List
Appendix C Complete Storm water, Lysimeter, and Groundwater Water Quality Results.
Appendix D Soil Analytical Results
Appendix E Time-Concentration Charts and Results of Trend Analysis
Appendix F Depth-Concentration Charts

Table 1. Monitoring Sites BMP Hydrology

Parameter	Units	Broadous	IMAX	Hall House	Metal Recycler	Veterans Park	Sun Valley
Sample Point		Paved school yard	1) Roof 2) Parking lot	1) Roof 2) Driveway	Paved Yard	Parking lot	1) Roof 2) Paved Yard
Design Rainfall	inches	0.75	0.75	10	0.75	0.75	0.75
Design Storm Intensity (max)	in/hr	0.75	0.75	100-year event	0.75	0.75	0.75
Catchment Area (est)	sq. ft.	305,000	1) 47,916 2) 68,390	3,000	37,200	21,200	1) 51,000 2) 75,000
Runoff Volume	gallons	95,200	N/A	N/A	17,400	9,900	1) 23,850 2) 35,065
Design Runoff Rate	gal/min	N/A	N/A	N/A	286	165	1) 394 2) 580
BMP Inlet		Sheet flow direct to pretreatment separator	1) roof drain to dry well 2) Sheet flow into landscape strip	1) Roof drain to landscaping 2) Sheet flow to driveway drain	Sheet flow direct to sedimentation basin	Sheet flow to catch basin; piped to buried sedimentation vault	1) Roof drain direct to buried perforated pipes 2) Sheet flow direct to sedimentation basin
Sediment Removal		Yes	No	Yes	Yes	Yes	1) No 2) Yes
Oil/Grease Removal		Yes	No	Yes	Yes	No	1) No 2) Yes
Recharge Method		Buried infiltration units in gravel bed	Direct through soil	Buried dry well	Buried perforated pipeline in gravel bed	Buried perforated pipeline in gravel bed	Buried perforated pipeline in gravel bed

N/A: data not available

Table 2. Monitoring Points

Site Name, Year Monitoring Started	Surface Water Monitoring Point ID	Surface Water Collection Point	Lysimeter ID	Installed Depth (ft)	Monitoring Well ID	Initial Groundwater Depth
Broadous 2001	B-SW-01	School Yard	B-LS-02*	24	B-MW-01	155 feet
					B-MW-02	139 feet
IMAX 2001	I-SW-01	Roof Drain	I-LS-01	8	I-MW-01	32 feet
	I-SW-02	Parking Lot	I-LS-03*	10	I-MW-02	31 feet
Hall House 2002	H-SW-01	Roof Drain	H-LS-01	8	none	
	H-SW-02	Driveway				
Veterans Park 2003	V-SW-01	Parking Lot	V-LS-01	15	V-MW-01	23 feet
	V-SW-02	Parking Lot	V-LS-02	15	V-MW-02	23 feet
					V-WM-03	23 feet
					V-MW-04	22 feet
Metal Recycler 2003	M-SW-01	Detention Basin Inlet	M-LS-01	37	M-MW-01	225 feet
	M-SW-02	Detention Basin Outlet	M-LS-02	51		
			M-LS-03	37		
			M-LS-04	51		
Sun Valley 2003	S-SW-01	Roof Drain	S-LS-01	25	S-MW-01	143 feet Installed casing to run geophysical logs. (groundwater depth is ~350 feet below surface)
	S-SW-02	Detention Basin Inlet	S-LS-02	47		
	S-SW-03	Detention Basin Outlet	S-LS-03	25		
			S-LS-04	47		
			S-LS-05	71		

*replaced original lysimeter in same vicinity (B-LS-01 and I-LS-02)

Table 3. Summary Analytical Suite

Category	Storm water and wells	Lysimeters
General Minerals	X	X
Trace Metals (total & dissolved)	X	X
Oil and Grease	X	Hall House
Perchlorate	X	X
Glyphosate	X	Vets Park
Volatile organic compounds (VOCs)	X	X
Semi-volatile organic compounds (SVOCs)	X	
NDMA	X	
Surfactants	X	
Bacteria (total coliform, fecal coliform, e. coli)	X	X

Table 4. Summary Results – Broadous School

			Monitoring Station[2]				
Constituent	**Units[1]**	**Fraction**	**B-SW-01**	**B-LS-01**	**B-LS-02**	**B-MW-01**	**B-MW-02**
General Monitoring Parameters							
Nitrate (as N)	mg/L	N/A	ND - 1	0.583 - 110	2.4 - 5.7	0.3 - 8.4	5.6 - 14
Total Kjeldahl Nitrogen	mg/L	N/A	1.1 - 6.2	--	ND - 1.3	ND - 0.56	ND - 0.35
Ammonia-Nitrogen	mg/L	N/A	ND - 1.02	0.14	ND - 0.35	ND - 0.14	ND - 0.33
Total Dissolved Solids	mg/L	N/A	43 - 330	78 - 1700	490 – 990	540 - 680	430 - 846
Total Suspended Solids	mg/L	N/A	12 - 200	130	--	ND - 2548	ND - 2100
Chemical Oxygen Demand	mg/L	N/A	23 - 220	247	ND – 120	ND - 32.37	ND - 120
Chloride	mg/L	N/A	2 - 72	70 - 160	34 – 130	22 - 87	19 - 38
Metals							
Aluminum	µg/L	Dissolved	ND - 259	ND	ND	ND	ND - 73.8
Aluminum	µg/L	Total	337 - 6500	ND - 68.7	ND	ND - 274	ND - 17900
Arsenic	µg/L	Dissolved	ND - 5.82	2.18 - 5.63	1.74 - 11.3	ND - 1	ND - 1.29
Arsenic	µg/L	Total	ND - 6.62	ND - 7.92	1.76 - 12.3	ND - 3.5	ND - 2.86
Cadmium	µg/L	Dissolved	ND	ND	ND - 0.789	ND	ND
Cadmium	µg/L	Total	ND - 0.663	ND	ND - 0.866	ND - 0.63	ND
Chromium, Hexavalent	µg/L	Dissolved	ND - 0.49	ND - 0.59	0.62 – 40	ND - 1.7	ND - 1.1
Copper	µg/L	Dissolved	ND - 22.1	5.83 - 66.9	2.68 – 19	ND - 5.27	ND - 87
Copper	µg/L	Total	4.33 - 39.9	10.3 - 220	2.85 – 19	ND - 73.1	ND - 87
Lead	µg/L	Dissolved	ND - 1.22	ND - 0.54	ND - 0.695	ND	ND - 9.56
Lead	µg/L	Total	0.716 - 36.3	ND - 6.44	ND - 0.84	ND - 34.7	ND - 30.4
Mercury	µg/L	Dissolved	ND	--	ND	ND	ND - 0.109
Mercury	µg/L	Total	ND - 0.122	ND	ND	ND	ND - 0.228
Zinc	µg/L	Dissolved	7.54 - 369	42.2 - 828	6.91 - 71.8	ND - 412	ND - 77.5
Zinc	µg/L	Total	14.1 - 369	ND - 2060	11.1 - 54.7	5.69 - 950	ND - 157
Other Constituents							
MBAS (Surfactants)	mg/L	N/A	ND - 0.38	--	--	ND	ND
Oil and Grease	mg/L	N/A	ND - 3.6	--	--	ND - 1.5	ND - 5.7
Perchlorate	µg/L	N/A	ND - 5.2	ND	ND - 0.3	ND - 0.64	ND - 1.1
Volatile Organic Compounds							
Benzene	µg/L	N/A	ND	ND	ND	ND - 2.3	ND - 1.6
Toluene	µg/L	N/A	ND	ND	ND	ND - 6.4	ND - 5.2

			Monitoring Station[2]				
Constituent	**Units[1]**	**Fraction**	**B-SW-01**	**B-LS-01**	**B-LS-02**	**B-MW-01**	**B-MW-02**
Ethylbenzene	µg/L	N/A	ND	ND	ND	ND - 1.2	ND - 1.1
o-Xylene	µg/L	N/A	ND	ND	ND	ND - 8.4	ND - 8.2
p/m-Xylene	µg/L	N/A	ND	ND	ND	ND - 5.7	ND - 5.2
Trichloroethylene (TCE)	µg/L	N/A	ND	ND	ND	ND - 2	ND - 1.4
Tetrachloroethylene (PCE)	µg/L	N/A	ND	ND	ND	ND - 44	ND - 40
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	N/A	ND	ND	ND	ND	ND - 0.54
1,1-Dichloroethane	µg/L	N/A	ND	ND	ND	0.8 - 1.2	ND
1,1-Dichloroethylene	µg/L	N/A	ND	ND	ND	ND - 5.2	0.98 - 1.7
1,2,4-Trimethylbenzene	µg/L	N/A	ND	ND	ND	ND - 1.1	ND - 1
1,3,5-Trimethylbenzene	µg/L	N/A	ND	ND	ND	ND - 1.1	ND - 1.3
2-Butanone (Methylethyl ketone)	µg/L	N/A	ND - 8.8	40	ND	ND - 1	ND
2-Hexanone	µg/L	N/A	ND - 0.93	ND	ND	ND	ND
Acetone	µg/L	N/A	ND - 37	ND	ND - 600	ND - 26	ND - 2.7
Bromoform	µg/L	N/A	ND	ND	ND	ND - 3.8	ND
Carbon disulfide	µg/L	N/A	ND	5.6	ND - 8.9	ND	ND
Chloroform	µg/L	N/A	ND	ND	ND	ND - 5.2	ND - 1.2
cis-1,2-Dichloroethene	µg/L	N/A	ND	ND	ND	ND - 0.71	ND
Dibromochloromethane	µg/L	N/A	ND	ND	ND	ND - 11	ND - 1.1
Dichlorobromomethane	µg/L	N/A	ND	ND	ND	ND - 8.6	ND - 0.56
Diethyl Ether	µg/L	N/A	ND - 0.8	ND	ND	ND	ND
Methylene Chloride	µg/L	N/A	ND - 1.6	ND	ND - 0.93	ND	ND
Naphthalene	µg/L	N/A	ND	ND	ND	ND - 1.1	ND - 1.1
Tert-Butyl Alcohol (TBA)	µg/L	N/A	ND	--	ND - 12	ND	ND
Tetrahydrofuran	µg/L	N/A	ND	94	ND	ND	ND
Semi-Volatile Organic Compounds							
Bis(2-Ethylhexyl) Phthalate	µg/L	N/A	ND - 20	--	--	ND - 150	ND - 74.3
Biological Parameters							
Total Coliforms	MPN/100 mL	N/A	1300 - 35000	ND - 90000	--	12 - 30000	ND - 11000
Fecal Coliform	MPN/100 mL	N/A	80 - 5000	ND	--	23	ND - 1.1
E. coli	MPN/100 mL	N/A	20 - 1300	ND	--	6.9	ND
1. Units of measure: mg/L = milligrams per liter, µg/L = micrograms per liter, MPN/100 mL = most probable number per 100 milliliters.							
2. "--" indicates the constituent was not analyzed. Analytes not detected are indicated by ND.							

Table 5. Summary Results – Hall House

			Monitoring Station[2]		
Constituent	**Units[1]**	**Fraction**	**H-SW-01**	**H-SW-02**	**H-LS-01**
General Monitoring Parameters					
Nitrate (as N)	mg/L	N/A	ND - 0.39	0.24 - 1.5	ND - 0.28
Total Kjeldahl Nitrogen	mg/L	N/A	ND - 2	1.4 - 24	ND - 0.28
Ammonia-Nitrogen	mg/L	N/A	ND - 0.49	0.28 - 2	ND
Total Dissolved Solids	mg/L	N/A	10 - 82	28 - 48	290 - 610
Total Suspended Solids	mg/L	N/A	ND - 51	9.6 - 110	--
Chemical Oxygen Demand	mg/L	N/A	5 - 74	69 - 280	ND - 5.1
Chloride	mg/L	N/A	ND-3.2	ND-3.4	ND-65
Metals					
Aluminum	µg/L	Dissolved	ND	ND - 122	ND
Aluminum	µg/L	Total	ND - 2540	1340 - 8210	ND
Arsenic	µg/L	Dissolved	ND	ND - 1.19	ND - 4.26
Arsenic	µg/L	Total	ND - 1.31	ND - 3.56	ND
Cadmium	µg/L	Dissolved	ND - 0.396	ND	ND - 0.245
Chromium, Hexavalent	µg/L	Dissolved	ND - 0.41	ND - 0.95	0.37 - 0.66
Copper	µg/L	Dissolved	1.3 - 6.93	3.81 - 17	1.58 - 7.71
Copper	µg/L	Total	1.55 - 41.3	28.8 - 123	2.43 - 6.4
Lead	µg/L	Dissolved	1.86 - 6.16	0.522 - 3.12	ND - 0.591
Lead	µg/L	Total	8.81 - 99.3	46 - 138	ND - 0.598
Mercury	µg/L	Dissolved	ND	ND	ND
Zinc	µg/L	Dissolved	86.3 - 496	27.4 - 88.1	ND - 56.9
Zinc	µg/L	Total	93.4 - 933	189 - 849	6.36 - 38.3
Other Constituents					
MBAS (Surfactants)	mg/L	N/A	ND - 0.37	ND - 0.36	--
Oil and Grease	µg/L	N/A	ND - 2.2	1.6 - 52	ND - 1.1
Volatile Organic Compounds					
2-Butanone (Methylethyl ketone)	µg/L	N/A	ND	ND - 1.8	ND
Acetone	µg/L	N/A	7.9 - 26	6.6 - 15	ND
Carbon disulfide	µg/L	N/A	ND	ND	ND - 3.6
Tert-Butyl Alcohol (TBA)	µg/L	N/A	ND	ND	ND - 12
Semi-Volatile Organic Compounds					
Bis(2-Ethylhexyl) Phthalate	µg/L	N/A	ND	400	--
Biological Parameters					
Total Coliforms	MPN/100 mL	N/A	ND - 600	--	--
Fecal Coliform	MPN/100 mL	N/A	ND	--	--
E. coli	MPN/100 mL	N/A	ND	--	--

1. Units of measure: mg/L = milligrams per liter, µg/L = micrograms per liter, MPN/100 mL = most probable number per 100 milliliters.

2. "--" indicates the constituent was not analyzed. Analytes not detected are indicated by ND.

Table 6. Summary Results – IMAX

			Monitoring Station[2]						
Constituent	**Units[1]**	**Fraction**	**I-SW-01**	**I-SW-02**	**I-LS-01**	**I-LS-02**	**I-LS-03**	**I-MW-01**	**I-MW-02**
General Monitoring Parameters									
Nitrate (as N)	mg/L	N/A	0.15 - 0.44	ND - 1.2	7.7 - 320	0.77 - 8.2	ND - 1	3.2 - 16	7.2 - 25
Total Kjeldahl Nitrogen	mg/L	N/A	ND - 1.5	0.84 - 2.1	ND - 1.4	ND	ND - 0.7	ND - 1	ND - 0.56
Ammonia-Nitrogen	mg/L	N/A	ND - 0.35	ND - 0.56	ND - 0.056	ND - 0.46	ND	ND - 0.337	ND - 0.14
Total Dissolved Solids	mg/L	N/A	6.7 - 34	6.7 - 37	710 - 3000	130 - 700	180 - 750	630 - 840	500 - 903
Total Suspended Solids	mg/L	N/A	ND - 110	ND - 140	--	--	--	7.1 - 130	ND - 1667
Chemical Oxygen Demand	mg/L	N/A	7.7 - 64	13 - 61	ND - 190	6 - 36	ND - 150	ND - 44	ND - 131.6
Chloride	mg/L	N/A	ND - 1.8	ND - 3.6	53 - 140	2.2 - 15	ND - 94	17 - 60	27 - 50
Metals									
Aluminum	µg/L	Dissolved	ND	ND - 105	ND	ND	ND	ND	ND
Aluminum	µg/L	Total	ND - 1180	105 - 952	ND - 455	124 - 455	ND - 440	8.8 - 3680	ND - 495
Arsenic	µg/L	Dissolved	ND	1.3 - 138	1.62 - 8.26	2.2 - 22.1	ND - 4.77	ND - 1.4	ND - 2
Arsenic	µg/L	Total	ND - 6.51	1.44 - 153	1.51 - 18.2	9.74 - 28.6	ND - 5.39	ND - 4.3	ND - 5.15
Cadmium	µg/L	Dissolved	ND	ND	ND - 0.524	ND	ND	ND	ND
Cadmium	µg/L	Total	ND - 0.997	ND - 0.267	ND - 0.626	ND	ND	ND - 0.751	ND
Chromium, Hexavalent	µg/L	Dissolved	ND - 0.3	ND - 0.61	2 - 35.2	8.4 - 74	0.32 - 1	ND - 24	ND - 18
Copper	µg/L	Dissolved	1.17 - 8.2	1.99 - 137	ND - 38.7	ND - 4.48	ND - 1.32	ND - 5.22	ND - 38.5
Copper	µg/L	Total	2.51 - 37.7	4.99 - 157	3.65 - 41.2	3.01 - 34	ND - 1.78	ND - 20.8	ND - 47.3
Lead	µg/L	Dissolved	ND	ND - 0.769	ND - 0.866	ND	ND	ND	ND - 0.816
Lead	µg/L	Total	ND - 76.4	0.95 - 13.7	ND - 6.3	0.723 - 9.4	ND	ND - 3	ND - 11.2
Mercury	µg/L	Dissolved	ND	ND	ND	ND	ND	ND	ND - 0.154
Mercury	µg/L	Total	ND	ND	ND	ND	ND	ND	ND - 0.181
Zinc	µg/L	Dissolved	37.7 - 169	32.5 - 757	25 - 130	21 - 4650	6.89 - 35.2	ND - 75.3	ND - 400
Zinc	µg/L	Total	60.6 - 566	50.3 - 1240	62.8 - 209	120 - 7050	8.5 - 46.8	ND - 80.1	ND - 400
Other Constituents									
MBAS (Surfactants)	mg/L	N/A	ND - 0.19	ND - 0.27	--	--	--	ND - 0.19	ND - 0.27

			Monitoring Station[2]						
Constituent	**Units[1]**	**Fraction**	**I-SW-01**	**I-SW-02**	**I-LS-01**	**I-LS-02**	**I-LS-03**	**I-MW-01**	**I-MW-02**
Oil and Grease	mg/L	N/A	ND - 58	ND - 2	--	--	--	ND - 1	ND - 1.7
Perchlorate	µg/L	N/A	ND - 14	ND	ND - 110	ND	ND - 1.6	ND - 8.2	ND - 15
Volatile Organic Compounds									
Methyl-t-Butyl Ether (MtBE)	µg/L	N/A	ND	ND - 0.52	ND	ND - 0.54	ND	ND	ND - 1.3
Benzene	µg/L	N/A	ND	ND	ND	ND	ND	ND - 3.1	ND - 2.6
Toluene	µg/L	N/A	ND	ND	ND	ND	ND	ND - 7.5	ND - 16
Ethylbenzene	µg/L	N/A	ND	ND	ND	ND	ND - 27	ND - 2.1	ND - 9.3
o-Xylene	µg/L	N/A	ND	ND	ND	ND	ND - 37	ND - 10	ND - 19
p/m-Xylene	µg/L	N/A	ND	ND	ND	ND	ND - 170	ND - 7.6	ND - 33
Trichloroethylene (TCE)	µg/L	N/A	ND	ND	ND	ND	ND	ND - 16	ND - 88
Tetrachloroethylene (PCE)	µg/L	N/A	ND	ND	ND	ND	ND	ND - 54	ND - 38
1,2,4-Trimethylbenzene	µg/L	N/A	ND	ND	ND	ND	ND - 2.1	ND - 1.9	ND - 6.9
1,3,5-Trimethylbenzene	µg/L	N/A	ND	ND	ND	ND	ND - 0.6	ND - 1.3	ND - 3
2-Butanone (Methylethyl ketone)	µg/L	N/A	ND - 1.5	ND - 1.7	ND	ND - 1	ND	ND	ND
Acetone	µg/L	N/A	2.5 - 17	2.6 - 15	ND - 5.7	ND - 13	ND - 2.1	ND - 2.7	ND - 3.1
Bromoform	µg/L	N/A	ND	ND	ND	ND	ND	ND - 1	ND
Carbon disulfide	µg/L	N/A	ND	ND	ND - 1.2	ND - 1	1.4 - 24	ND	ND
Chloroform	µg/L	N/A	ND	ND	ND	ND	ND - 0.77	ND - 6.2	ND - 1.2
Dibromochloromethane	µg/L	N/A	ND	ND	ND	ND	ND	ND - 4.4	ND
Dichlorobromomethane	µg/L	N/A	ND	ND	ND	ND	ND	ND - 6.4	ND
Diethyl Ether	µg/L	N/A	ND - 0.88	ND - 1.2	ND	ND	ND	ND	ND
Methylene Chloride	µg/L	N/A	ND - 0.56	ND	ND - 1.1	ND	ND - 1.2	ND	ND - 2.9
Naphthalene	µg/L	N/A	ND	ND	ND	ND	ND	ND - 2.1	ND - 1.6
n-Propylbenzene	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND - 0.75
Tert-Butyl Alcohol (TBA)	µg/L	N/A	ND	ND	ND - 13	ND	ND	ND	ND
Semi-Volatile Organic Compounds									
Bis(2-Ethylhexyl) Phthalate	µg/L	N/A	ND	ND	--	--	--	ND - 13	ND - 202.3
Phenol	µg/L	N/A	ND	ND	--	--	--	ND	ND - 18

			Monitoring Station[2]						
Constituent	**Units[1]**	**Fraction**	**I-SW-01**	**I-SW-02**	**I-LS-01**	**I-LS-02**	**I-LS-03**	**I-MW-01**	**I-MW-02**
Biological Parameters									
Total Coliforms	MPN/100 mL	N/A	ND - 500	ND - 13000	ND - 8	ND - 13	--	ND - 800	ND - 110
Fecal Coliform	MPN/100 mL	N/A	ND - 20	ND - 260	ND	ND	--	ND	ND
E. coli	MPN/100 mL	N/A	ND - 20	ND - 120	ND	ND	--	ND	ND
1. Units of measure: mg/L = milligrams per liter, µg/L = micrograms per liter, MPN/100 mL = most probable number per 100 milliliters.									
2. "--" indicates the constituent was not analyzed. Analytes not detected are indicated by ND.									

Table 7. Summary Results - Metal Recycler

			Monitoring Station[2]						
Constituent	**Units[1]**	**Fraction**	**M-SW-01**	**M-SW-02**	**M-LS-01**	**M-LS-02**	**M-LS-03**	**M-LS-04**	**M-MW-01**
General Monitoring Parameters									
Nitrate (as N)	mg/L	N/A	1.6 - 4.2	3.2 - 4.2	1.9 - 16	1 - 16	ND - 11	5.7 - 24	ND - 0.12
Total Kjeldahl Nitrogen	mg/L	N/A	6.4 - 11	8.3 - 9.5	ND - 2.7	ND - 1.4	0.98 - 1.3	1.4 - 2.5	ND - 1.1
Ammonia-Nitrogen	mg/L	N/A	0.84 - 1.9	0.91 - 2.5	ND - 2.1	ND - 0.28	ND	ND - 0.7	ND - 0.28
Total Dissolved Solids	mg/L	N/A	520 - 1400	670 - 1400	570 - 1700	630 - 1300	1100-1200	820 - 1330	840 - 1100
Total Suspended Solids	mg/L	N/A	61 - 1200	100 - 1200	--	--	--	--	ND - 20
Chemical Oxygen Demand	mg/L	N/A	570 - 3400	420 - 2100	5 - 54	13 - 46	23 - 79	64 - 240	ND - 57
Chloride	mg/L	N/A	35 - 100	50 - 72	28 - 110	35 - 99	60 - 140	36 - 120	70 - 95
Metals									
Aluminum	µg/L	Dissolved	ND - 248	ND - 379	ND	ND	ND	ND	ND
Aluminum	µg/L	Total	434 - 8360	868 - 5620	ND	ND	ND	ND	ND - 330
Arsenic	µg/L	Dissolved	ND - 2.96	ND - 2.94	ND - 5.14	ND - 3.1	0.98 - 13.9	1.19 - 5.67	0.566-5.65
Arsenic	µg/L	Total	1.72 - 11.9	4.16 - 10.3	ND - 4.02	0.992-2.98	ND - 13.5	1.57 - 5.44	1.07 - 8.39
Cadmium	µg/L	Dissolved	0.627 - 3.26	0.285-14.1	0.294-0.76	ND– 0.637	ND - 1.05	ND - 0.271	ND
Cadmium	µg/L	Total	9.1 - 24.1	11 - 46.4	0.33-0.797	ND– 0.732	ND - 1.02	ND - 0.269	ND
Chromium, Hexavalent	µg/L	Dissolved	6.3 - 74	ND - 52	ND - 3	ND - 4.2	ND - 26	3.5 - 14	ND - 0.23
Copper	µg/L	Dissolved	59.7 - 158	47 - 153	3.01 - 17.4	2.7 - 6.99	2.93 - 14.7	7.36 - 16.5	ND - 1.41
Copper	µg/L	Total	148 - 792	124 - 330	3.58 - 27.2	4.17 - 14.6	3.08 - 15	8.74 - 17.3	ND - 3.46
Lead	µg/L	Dissolved	11.8 - 120	3.69 - 185	ND - 6.82	ND - 0.632	ND - 1.62	ND - 0.95	ND
Lead	µg/L	Total	292 - 3020	460 - 1560	1.33 - 9.06	0.87 - 4.23	ND - 0.868	ND - 1.72	ND - 1.16
Mercury	µg/L	Dissolved	ND - 0.235	ND - 0.279	ND	ND	ND	ND	ND - 0.131
Mercury	µg/L	Total	0.994 - 8.19	1 - 3.92	ND	ND	ND	ND	ND - 0.103
Zinc	µg/L	Dissolved	16.9 - 244	26.6- 1550	35.7 - 101	20.6 - 165	19.5 - 106	21.2 - 46	ND - 14
Zinc	µg/L	Total	957 - 3220	1170-2790	64 - 141	18.5 - 195	12.2 - 92.5	11.4 - 57	ND - 39.3
Other Constituents									
MBAS (Surfactants)	mg/L	N/A	0.48 - 1.7	0.86 - 1.7	--	--	--	--	ND

			Monitoring Station[2]						
Constituent	**Units[1]**	**Fraction**	**M-SW-01**	**M-SW-02**	**M-LS-01**	**M-LS-02**	**M-LS-03**	**M-LS-04**	**M-MW-01**
Oil and Grease	mg/L	N/A	29 - 390	17 - 170	--	--	--	--	ND - 2.4
Perchlorate	µg/L	N/A	ND - 120	ND - 170	12 - 140	14 - 54	ND - 39	10 - 85	ND
Volatile Organic Compounds									
Methyl-t-Butyl Ether (MtBE)	µg/L	N/A	ND - 1.3	ND - 1.7	ND - 33	ND - 26	ND - 38	ND - 2.9	ND
Benzene	µg/L	N/A	ND - 0.83	ND - 2.3	ND - 0.65	ND - 2.3	ND - 0.7	ND	ND
Toluene	µg/L	N/A	ND - 5.8	ND - 25	ND - 13	ND - 5.8	ND - 3	ND	ND
Ethylbenzene	µg/L	N/A	ND - 2	ND - 7.1	ND - 4.3	ND - 0.7	ND - 0.93	ND	ND
o-Xylene	µg/L	N/A	ND - 3.8	ND - 11	ND - 8.1	ND - 1.5	ND - 2.9	ND	ND
p/m-Xylene	µg/L	N/A	ND - 8.6	ND - 28	ND - 19	ND - 2.7	ND - 3.7	ND	ND
Tetrachloroethylene (PCE)	µg/L	N/A	ND	ND	ND - 0.92	ND	ND - 1.1	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	N/A	ND	ND	ND	ND - 0.55	ND	ND	ND
1,2,4-Trimethylbenzene	µg/L	N/A	ND - 4.3	ND - 10	ND - 4	ND - 1.5	ND - 0.83	ND	ND
1,3,5-Trimethylbenzene	µg/L	N/A	ND - 1.1	ND - 2.8	ND - 1.3	ND	ND	ND	ND
2-Butanone (Methylethyl ketone)	µg/L	N/A	5.2 - 14	5.4 - 32	ND	ND - 11	ND - 1.3	ND	ND
2-Hexanone	µg/L	N/A	ND	ND - 1.1	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	µg/L	N/A	ND - 4	ND - 21	ND	ND	ND - 10	ND	ND
Acetone	µg/L	N/A	20 - 79	19 - 190	ND - 4.4	ND - 34	ND - 37	ND - 16	ND
Carbon disulfide	µg/L	N/A	ND	ND	ND - 6.9	ND - 3.5	ND - 2	ND - 0.57	ND - 1.7
Dichlorodifluoromethane	µg/L	N/A	ND - 4.1	ND - 3.8	ND	ND	ND	ND	ND
Diethyl Ether	µg/L	N/A	ND	ND - 1.1	ND	ND - 1.7	ND	ND	ND
Ethanol	µg/L	N/A	160 - 1200	120-22000	ND	ND - 3200	ND	ND	ND
Methyl Chloride	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND - 0.62
Methyl Methacrylate	µg/L	N/A	ND - 3.9	ND - 2.3	ND	ND	ND	ND	ND
Methylene Chloride	µg/L	N/A	ND - 0.52	ND - 0.55	ND	ND - 1.1	ND - 0.54	ND - 1.3	ND - 0.67
Naphthalene	µg/L	N/A	ND - 1.7	0.51 - 8.6	ND	ND	ND	ND	ND
n-Propylbenzene	µg/L	N/A	ND	ND - 1.1	ND - 0.69	ND	ND	ND	ND
Styrene	µg/L	N/A	ND - 1.3	ND - 1.5	ND	ND	ND	ND	ND
Tert-Butyl Alcohol (TBA)	µg/L	N/A	ND - 15	ND - 22	ND - 11	ND - 17	ND - 24	ND	ND

			Monitoring Station[2]						
Constituent	**Units[1]**	**Fraction**	**M-SW-01**	**M-SW-02**	**M-LS-01**	**M-LS-02**	**M-LS-03**	**M-LS-04**	**M-MW-01**
Tetrahydrofuran	µg/L	N/A	ND	ND - 11	ND	ND	ND - 3.6	ND	ND
Trichlorofluoromethane	µg/L	N/A	ND - 4.2	ND - 28	ND - 1	ND - 1.8	ND - 1.4	ND - 0.7	ND
Semi-Volatile Organic Compounds									
4-Methylphenol (p-Cresol)	µg/L	N/A	ND - 11	ND - 24	--	--	--	--	ND
4-Nitrophenol	µg/L	N/A	ND - 11	ND - 19	--	--	--	--	ND
Benzoic acid	µg/L	N/A	ND - 770	ND - 560	--	--	--	--	ND
Benzyl alcohol	µg/L	N/A	ND	ND - 40	--	--	--	--	ND
Bis(2-Ethylhexyl) Phthalate	µg/L	N/A	ND - 72	23 - 26	--	--	--	--	ND
Butyl Benzyl Phthalate	µg/L	N/A	ND - 15	ND - 11	--	--	--	--	ND
Dimethyl Phthalate	µg/L	N/A	ND - 11	ND	--	--	--	--	ND
Isophorone	µg/L	N/A	ND - 31	ND	--	--	--	--	ND
Phenol	µg/L	N/A	ND - 19	ND - 62	--	--	--	--	ND
Biological Parameters									
Total Coliforms	MPN/100mL	N/A	2400	270	20	ND	ND	ND	ND
Fecal Coliform	MPN/100mL	N/A	230	40	ND	ND	ND	ND	ND
E. coli	MPN/100mL	N/A	310	10	ND	ND	ND	ND	ND

1. Units of measure: mg/L = milligrams per liter, µg/L = micrograms per liter, MPN/100 mL = most probable number per 100 milliliters.

2. "--" indicates the constituent was not analyzed. Analytes not detected are indicated by ND.

Table 8. Summary Results - Sun Valley

			Monitoring Station[2]								
Constituent	**Units[1]**	**Fraction**	**S-SW-01**	**S-SW-02**	**S-SW-03**	**S-LS-01**	**S-LS-02**	**S-LS-03**	**S-LS-04**	**S-LS-05**	**EV-10**
General Monitoring Parameters											
Nitrate (as N)	mg/L	N/A	ND-0.62	ND-0.63	ND-1.8	0.98-15	1-17	1.9-22	0.43-36	ND-7.5	1.7-2.1
Total Kjeldahl Nitrogen	mg/L	N/A	0.7-3.6	1.4-11	1.5-13	ND-1.4	ND-0.84	0.42-1.1	ND-0.56	ND-6.7	ND-0.14
Ammonia-Nitrogen	mg/L	N/A	ND-0.7	0.21-1.8	0.28-1.2	ND-0.64	ND	ND	ND-0.28	ND-0.28	ND
Total Dissolved Solids	mg/L	N/A	44-94	48-420	76-460	340-920	610-2200	350-1000	310-1300	590-4500	400-430
Total Suspended Solids	mg/L	N/A	9.5-290	41-930	31-780	--	--	--	--	--	ND-14
Chemical Oxygen Demand	mg/L	N/A	13-170	48-730	71-900	ND-53	ND-20	ND-180	ND-18	5-180	ND-5.1
Chloride	mg/L	N/A	ND-2.7	ND-21	3.5-18	10-28	9.1-38	ND-30	ND-35	9.7-81	25-26
Metals											
Aluminum	µg/L	Dissolved	ND	ND-97.3	ND-198	ND	ND	ND	ND	ND	ND
Aluminum	µg/L	Total	84.5-2530	514-3660	406-6570	ND	ND-50.3	ND	ND	ND	ND
Arsenic	µg/L	Dissolved	ND-1.05	ND-11.6	1.1-9.93	1.08-15.7	1.7-11.4	ND-5.16	0.765-6.97	0.91-31.2	ND-0.879
Arsenic	µg/L	Total	ND-1.65	0.809-13.9	1.44-13	0.941-13.3	1.93-13.4	ND-6.65	1.09-7.79	0.97-30.6	ND-0.949
Cadmium	µg/L	Dissolved	ND-0.244	ND-0.764	ND-0.614	ND-0.272	ND-0.501	ND	ND-0.23	ND-0.586	ND
Cadmium	µg/L	Total	ND-1.41	0.474-1.93	0.238-2.74	ND-0.365	ND-0.318	ND-0.218	ND-0.293	ND-0.672	ND
Chromium, Hexavalent	µg/L	Dissolved	ND-0.48	ND-0.98	0.37-1.3	ND-15	ND-31	11-26	1.3-11	ND-1	0.23-0.62
Copper	µg/L	Dissolved	6.54-13.5	7.35-43.7	11.3-23.3	1.78-8.76	ND-7.77	1.14-8.2	2.47-41.5	ND-5.19	1.03-2.67
Copper	µg/L	Total	8.63-42.2	19.3-83.5	19.2-86.2	2.01-13.8	1.03-8.23	2.35-8.98	3-33.7	1.24-5.99	4-5.25
Lead	µg/L	Dissolved	ND-0.603	ND-6.09	ND-58.2	ND-0.592	ND	ND-0.608	ND-1.68	ND-0.838	ND
Lead	µg/L	Total	3.66-63.6	19.4-108	10.6-956	ND-5.46	ND-4.48	ND-1.51	ND-1.48	0.582-3.57	0.652-1.35
Mercury	µg/L	Dissolved	ND	ND-0.168	ND-0.192	ND	ND	ND	ND	ND	ND

			Monitoring Station[2]								
Constituent	**Units[1]**	**Fraction**	**S-SW-01**	**S-SW-02**	**S-SW-03**	**S-LS-01**	**S-LS-02**	**S-LS-03**	**S-LS-04**	**S-LS-05**	**EV-10**
Mercury	µg/L	Total	ND-0.181	ND-0.929	ND-1.27	ND	ND	ND	ND	ND	ND
Zinc	µg/L	Dissolved	23.4-74	38.5-174	43.6-350	ND-26.7	9.4-62.7	ND-20.2	18.7-49.9	7.37-28.6	14.2-61.6
Zinc	µg/L	Total	98.4-284	99-387	83.2-669	ND-46.2	12-128	8.37-59.8	17.7-89.3	10.2-95.2	40.8-67.9
Other Constituents											
MBAS (Surfactants)	mg/L	N/A	0.24-0.42	0.32-4.1	0.32-3.9	--	--	--	--	--	ND
Oil and Grease	mg/L	N/A	ND-5.7	2.2-48	2-54	--	--	--	--	--	ND
Perchlorate	µg/L	N/A	ND	ND-6.1	ND-6.5	ND-5.2	ND-1.9	ND-7.2	ND-4.2	ND-0.74	ND
Volatile Organic Compounds											
Methyl-t-Butyl Ether (MtBE)	µg/L	N/A	ND	ND	ND	ND	ND-7.3	ND	ND-1.3	ND	ND
Toluene	µg/L	N/A	ND	ND-0.59	ND-11	ND	ND	ND	ND	ND	ND
Trichloroethylene (TCE)	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND	ND	1.2-8.4
Tetrachloroethylene (PCE)	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND	ND	2.6-4.9
1,1,1-Trichloroethane	µg/L	N/A	ND	ND	ND	2-18	2.2-17	3.6-18	3.3-17	ND-1.6	ND
1,1-Dichloroethane	µg/L	N/A	ND	ND	ND	ND-1.6	ND-2.1	ND-1.4	ND-1.3	ND	0.96-3.6
1,1-Dichloroethylene	µg/L	N/A	ND	ND	ND	ND-3.7	ND-4.4	0.59-4.1	ND-4.4	ND-0.61	ND
1,2-Dichloroethane	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND-0.64
1,4-Dichlorobenzene	µg/L	N/A	ND	ND-4.7	ND-1.3	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	µg/L	N/A	ND	ND	ND	ND	ND	ND-0.97	ND	ND	ND
2-Butanone (Methylethyl ketone)	µg/L	N/A	ND-3.7	1.7-6.1	1-12	ND	ND-1.2	ND	ND	ND-670	ND
2-Hexanone	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND	ND-11	ND
4-Methyl-2-pentanone (MIBK)	µg/L	N/A	ND	ND-7.2	ND-64	ND	ND	ND	ND	ND	ND
Acetone	µg/L	N/A	4-40	16-70	12-130	ND-7.3	6.4-30	ND-4.4	ND-5.5	35-2200	ND-2.5
Carbon disulfide	µg/L	N/A	ND	ND	ND	ND-54	ND-10	ND-76	ND-2.2	ND-1.8	ND
Chloroform	µg/L	N/A	ND	ND	ND	ND-0.62	ND	ND	ND	ND-2.1	ND
Dichlorodifluoromethane	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND	ND	4.1-5.8
Diethyl Ether	µg/L	N/A	ND	ND-0.94	ND-0.78	ND	ND	ND	ND	ND	ND
Ethanol	µg/L	N/A	ND-290	130-1900	ND-840	ND	ND	ND	ND	ND	ND

			Monitoring Station[2]								
Constituent	**Units[1]**	**Fraction**	**S-SW-01**	**S-SW-02**	**S-SW-03**	**S-LS-01**	**S-LS-02**	**S-LS-03**	**S-LS-04**	**S-LS-05**	**EV-10**
Methyl Chloride	µg/L	N/A	ND-0.56	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	µg/L	N/A	ND	ND-1.3	ND	ND	ND	ND	ND	ND-47	0.73-0.81
Tert-Butyl Alcohol (TBA)	µg/L	N/A	ND	ND	ND	ND-24	ND-23	ND	ND-54	ND-10	ND
Trichlorofluoromethane	µg/L	N/A	ND	ND	ND	ND	ND	ND	ND	ND	0.75-1.1
Semi-Volatile Organic Compounds											
2-Methylphenol (o-Cresol)	µg/L	N/A	ND	ND-12	ND-19	--	--	--	--	--	ND
Benzoic acid	µg/L	N/A	ND	ND	150-280	--	--	--	--	--	ND
Benzyl alcohol	µg/L	N/A	ND	ND	ND-12	--	--	--	--	--	ND
Bis(2-Ethylhexyl) Phthalate	µg/L	N/A	ND	ND	13-32	--	--	--	--	--	ND
Butyl Benzyl Phthalate	µg/L	N/A	ND	ND	ND-10	--	--	--	--	--	ND
Diethyl Phthalate	µg/L	N/A	ND	ND-12	18-21	--	--	--	--	--	ND
Di-n-Butyl Phthalate	µg/L	N/A	ND	ND	ND-16	--	--	--	--	--	ND
Biological Parameters											
Total Coliforms	MPN/100mL	N/A	2300	> 160000	> 160000	ND	ND	ND	--	--	--
Fecal Coliform	MPN/100mL	N/A	2300	90000	160000	ND	ND	ND	--	--	--
E. coli	MPN/100mL	N/A	5040	73800	18500	ND	ND	ND	--	--	--

1. Units of measure: mg/L = milligrams per liter, µg/L = micrograms per liter, MPN/100 mL = most probable number per 100 milliliters.

2. "--" indicates the constituent was not analyzed. Analytes not detected are indicated by ND.

Table 9. Summary Results - Veterans Park

			Monitoring Station[2]							
Constituent	**Units[1]**	**Fraction**	**V-SW-01**	**V-SW-02**	**V-LS-01**	**V-LS-02**	**V-MW-01**	**V-MW-02**	**V-MW-03**	**V-MW-04**
General Monitoring Parameters										
Nitrate (as N)	mg/L	N/A	0.11 - 0.95	ND - 1.9	ND - 4.4	ND - 8.9	2.1 - 4.7	0.56 - 3.9	1.8 - 6	7.8 - 44
Total Kjeldahl Nitrogen	mg/L	N/A	2.5 - 10	4.2 - 6.6	ND - 1.4	0.56 - 3.4	0.42 - 1.1	ND - 1.3	ND - 0.98	0.7 - 2.5
Ammonia-Nitrogen	mg/L	N/A	0.6 - 1.6	0.21 - 1.8	ND - 0.56	ND - 0.56	ND	ND	ND	ND
Total Dissolved Solids	mg/L	N/A	20 - 290	130 - 470	610 - 2700	1640 - 4000	4200 - 7590	1020 - 2900	1200 - 2100	1970 - 6600
Total Suspended Solids	mg/L	N/A	20 - 390	42 - 210	--	--	3 - 43	ND - 54	ND - 110	ND - 230
Chemical Oxygen Demand	mg/L	N/A	53 - 530	150 - 690	ND - 160	41 - 250	61 - 110	ND - 75	ND - 94	15 - 160
Chloride	mg/L	N/A	1.6 - 26	5.2 - 31	12 - 240	82 - 440	1000 - 1700	64 - 290	100 - 180	230 - 1400
Metals										
Aluminum	µg/L	Dissolved	ND - 67.7	ND - 120	ND	ND	ND - 65.3	ND	ND - 141	ND - 218
Aluminum	µg/L	Total	302 - 2140	491 - 2740	ND	ND	96.4 - 612	ND - 805	ND - 1440	ND - 2440
Arsenic	µg/L	Dissolved	ND - 1.03	ND - 1.94	15.8 - 29	4.7 - 8.16	2.41 - 21.6	1.87 - 10.6	1.45 - 5.83	5.17 - 17.7
Arsenic	µg/L	Total	ND - 1.79	0.584 - 2.54	15.3 - 29.3	4.55 - 9.28	3.6 - 22.5	1.95 - 12.1	1.89 - 6.03	5.1 - 17.5
Cadmium	µg/L	Dissolved	ND	ND-0.316	0.23 - 0.401	ND- 0.306	ND- 0.361	ND	ND	ND
Cadmium	µg/L	Total	ND-0.513	ND-0.608	0.247-0.435	ND- 0.364	ND- 0.363	ND	ND	ND
Chromium, Hexavalent	µg/L	Dissolved	ND - 0.67	0.29 - 1.4	ND - 1.3	ND	ND - 0.27	0.26 - 2.9	ND - 2.7	ND - 0.52
Copper	µg/L	Dissolved	7.37 -24.1	8.77 -33.8	3.26 - 6.49	9.03 - 20.7	2.93 - 7.25	1.37 - 28.5	1.79 - 3.57	3.54 - 200
Copper	µg/L	Total	11.4 -45.9	23 - 52.3	3.18 - 7.76	9.41 - 23.6	2.72 - 7.73	1.68 - 53.5	2.13 - 5.39	4.18 - 228
Lead	µg/L	Dissolved	ND - 3.41	0.954- 3.3	ND - 0.631	ND	ND	ND	ND	ND- 0.536
Lead	µg/L	Total	3.96 -27.8	4.59 -22.6	ND - 0.816	ND	ND -0.682	ND - 1.45	ND - 1.89	ND - 2.4
Mercury	µg/L	Dissolved	ND -0.11	ND-0.117	ND - 0.119	ND	ND	ND- 0.105	ND- 0.164	ND- 0.149
Mercury	µg/L	Total	ND-0.138	ND-0.161	ND - 0.113	ND	ND	ND -0.195	ND - 0.2	ND - 0.16
Zinc	µg/L	Dissolved	38.2 - 114	34.5 - 207	ND - 30.5	ND - 36.3	ND - 38.4	ND - 30.3	ND - 11.4	ND - 59.7
Zinc	µg/L	Total	59.4 - 221	73.5 - 157	ND - 72	13.1 - 36.7	ND - 80.4	ND - 25.9	ND - 59.1	ND - 66

			Monitoring Station[2]							
Constituent	**Units[1]**	**Fraction**	**V-SW-01**	**V-SW-02**	**V-LS-01**	**V-LS-02**	**V-MW-01**	**V-MW-02**	**V-MW-03**	**V-MW-04**
Other Constituents										
MBAS (Surfactants)	mg/L	N/A	0.24 - 1.1	0.11- 0.77	--	--	ND - 0.73	ND - 0.16	ND - 0.15	ND - 0.63
Oil and Grease	mg/L	N/A	1.5 - 15	2.1 - 6.1	--	--	ND - 1.6	ND - 3.5	ND - 7.4	ND - 19.6
Perchlorate	µg/L	N/A	ND	ND	ND	ND - 5.8	ND - 9	ND - 0.87	ND - 4.5	ND - 8.3
Glyphosate	µg/L	N/A	ND - 16.2	ND	ND	ND	ND	ND	ND	ND
Volatile Organic Compounds										
2-Butanone (Methylethyl ketone)	µg/L	N/A	ND - 2.9	ND - 4.3	ND	ND	ND	ND	ND	ND
Acetone	µg/L	N/A	5.8 - 19	2.6 - 18	ND - 2.5	ND	ND	ND - 2.7	ND	ND - 4.1
Chloroform	µg/L	N/A	ND	ND	ND - 1.7	ND - 0.95	ND	ND - 0.74	ND - 0.61	ND
Dibromochloromethane	µg/L	N/A	ND	ND - 0.69	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	µg/L	N/A	ND	ND - 0.51	ND	ND	ND	ND	ND	ND
Diethyl Ether	µg/L	N/A	ND - 0.97	ND - 0.71	ND	ND	ND	ND	ND	ND
Ethanol	µg/L	N/A	ND	ND - 250	ND	ND	ND	ND	ND	ND
Methyl Chloride	µg/L	N/A	ND	ND	ND - 0.6	ND - 0.72	ND	ND	ND	ND
Methylene Chloride	µg/L	N/A	ND	ND	ND	ND	ND - 0.64	ND - 0.73	ND - 0.65	ND - 0.63
Semi-Volatile Organic Compounds										
Bis(2-Ethylhexyl) Phthalate	µg/L	N/A	ND - 18	ND - 20	--	--	ND	ND	ND	ND
Biological Parameters										
Total Coliforms	MPN/100mL	N/A	30000	30000	ND	ND	ND	ND	ND	--
Fecal Coliform	MPN/100mL	N/A	ND	700	ND	ND	ND	ND	ND	--
E. coli	MPN/100mL	N/A	200	100	ND	ND	ND	ND	ND	--

1. Units of measure: mg/L = milligrams per liter, µg/L = micrograms per liter, MPN/100 mL = most probable number per 100 milliliters.

2. "--" indicates the constituent was not analyzed. Analytes not detected are indicated by ND.

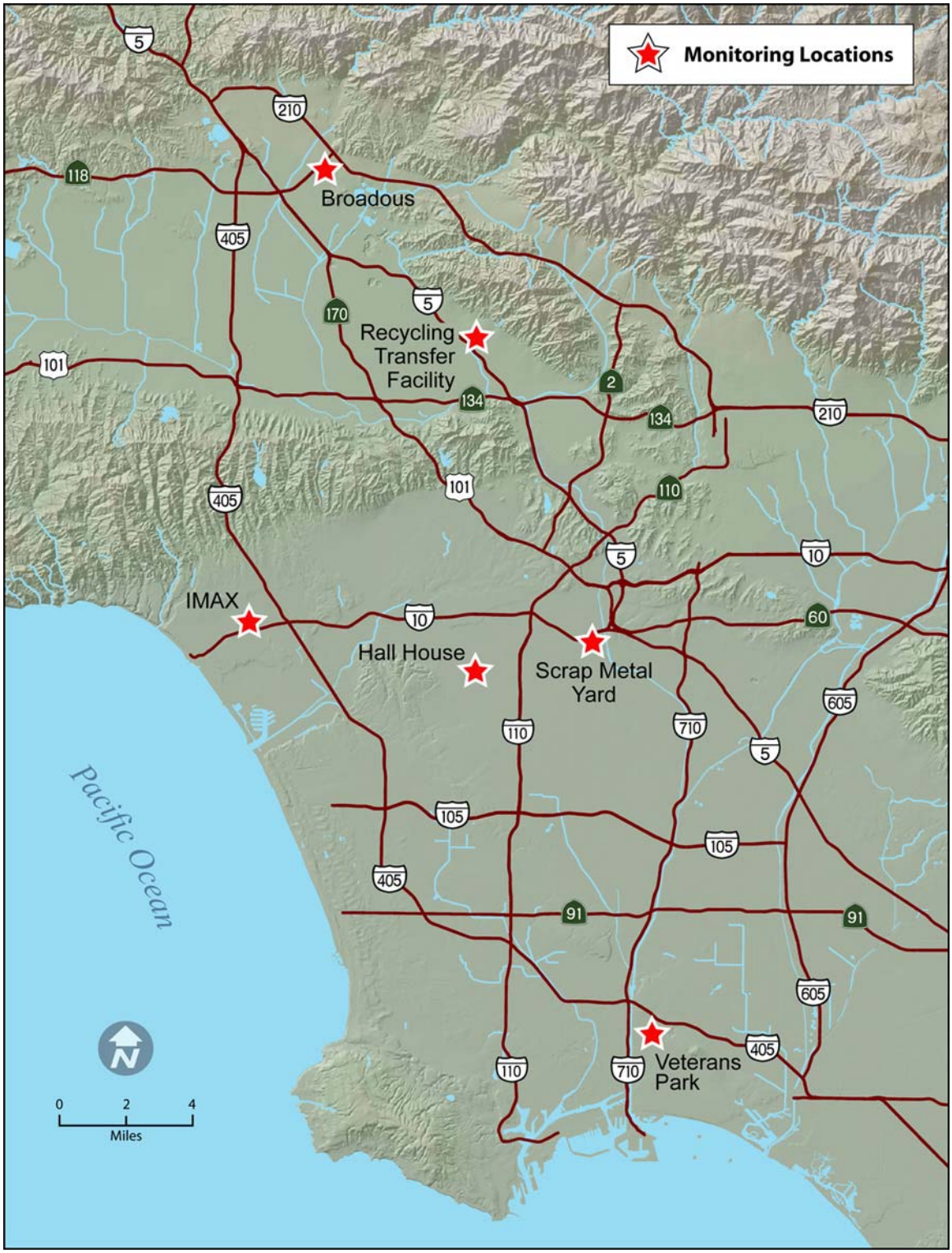

Figure 1. Monitoring Site Locations

Broadous School play yard, Pacoima

IMAX site, Santa Monica

Hall House front yard, Los Angeles

Metal Recycler detention basin, Los Angeles

Sun Valley recycling facility detention basin

Veterans Park parking lot, Long Beach

Figure 2. Monitoring Sites

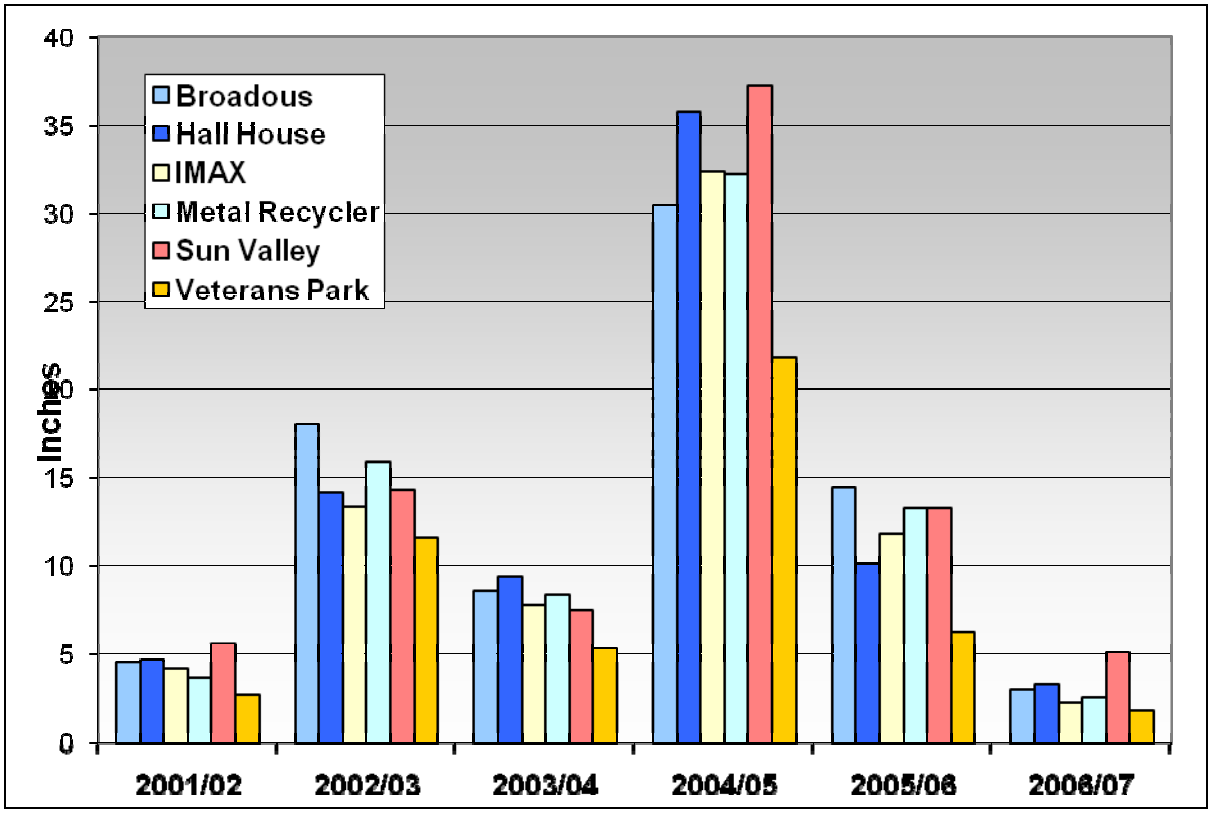

Figure 3. Annual Rainfall by Monitoring Site

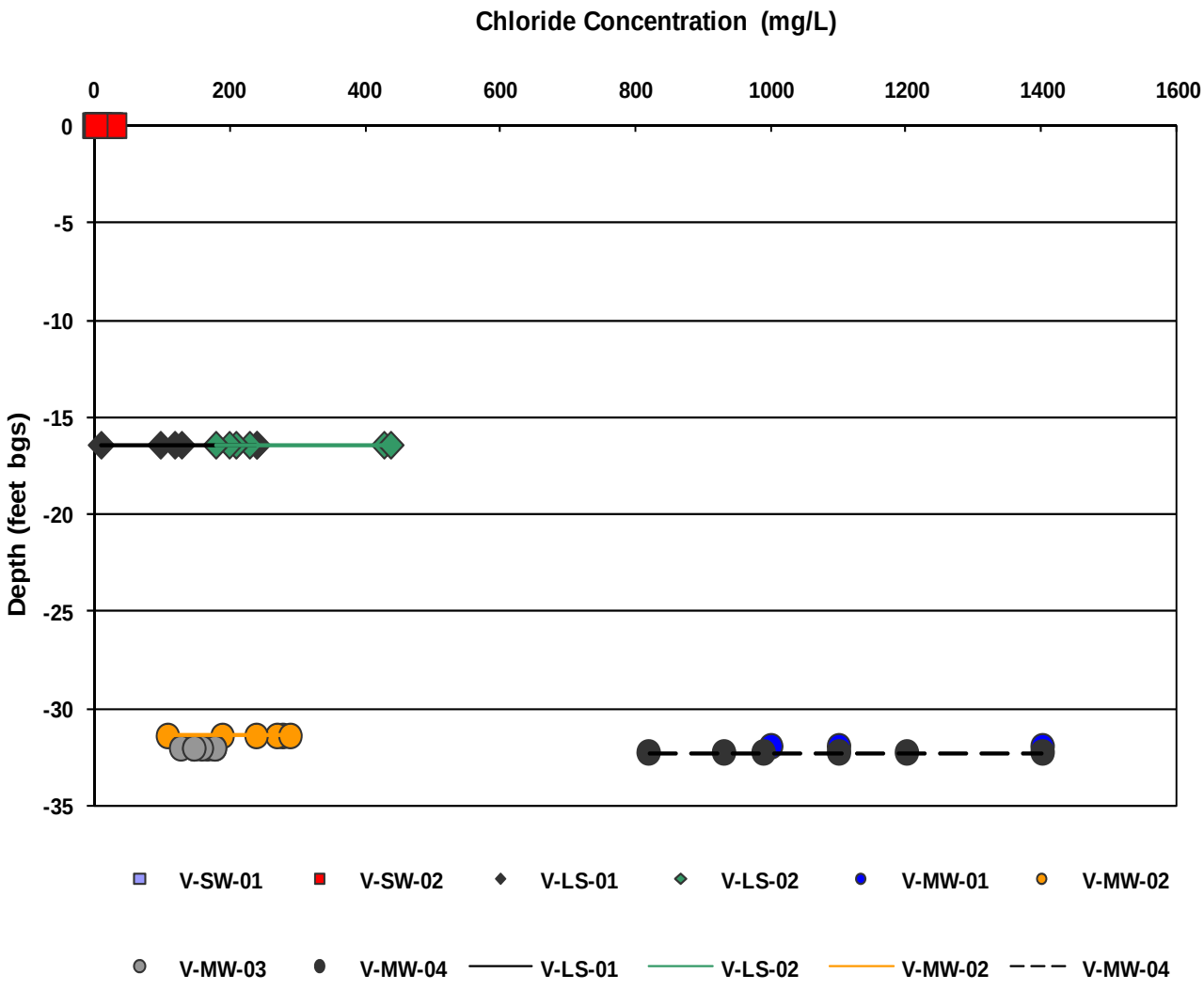

Figure 4. Depth Concentrations for Chloride - Veterans Park

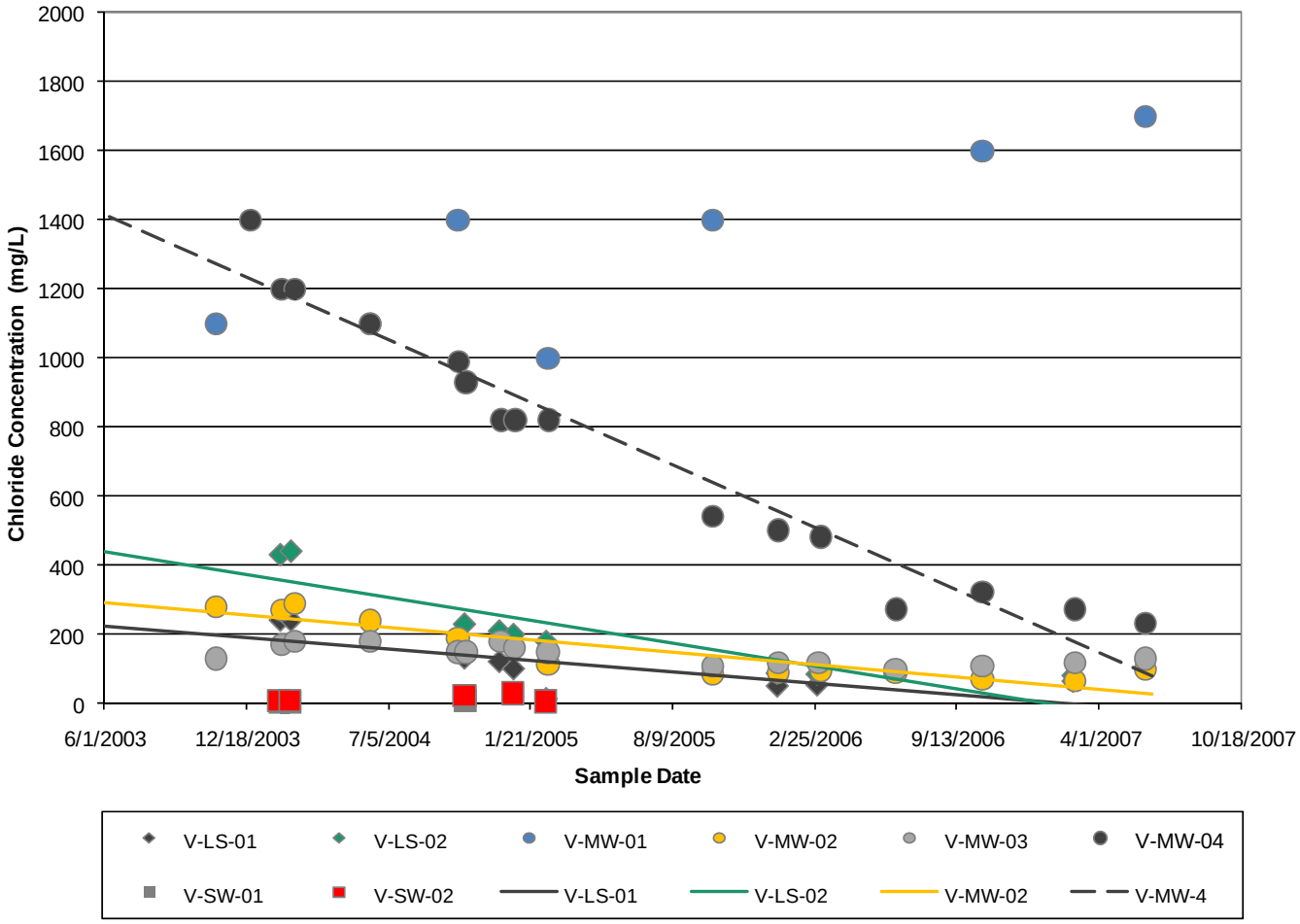

Figure 5. Chloride Concentrations Over Time - Veterans Park

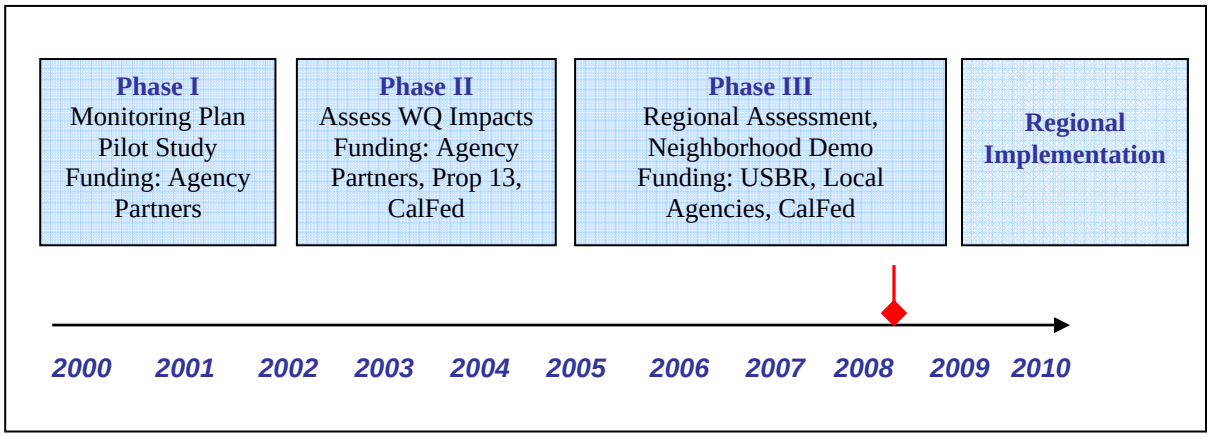

Figure 6. WAS Project Timeline