Las Vegas Wash Monitoring and Characterization Study:

Results for Water Quality in the Wash and Tributaries

Final Report

by

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INTRODUCTION

The Las Vegas Wash Monitoring and Characterization Study was a partnership between the Las Vegas Wash Coordination Committee (LVWCC), the Harry Reid Center (HRC) for Environmental Studies at the University of Nevada, Las Vegas (UNLV), the Southern Nevada Water Authority (SNWA) and the U.S. Environmental Protection Agency (EPA) Region 9 to support water quality monitoring in the Las Vegas Wash (Wash). The overall objective of the project was to collect chemical, biological and microbiological data that will allow researchers to evaluate and understand baseline and evolving conditions as the Wash is enhanced. The UNLV portion of the study focused on mercury (Hg) and selenium (Se). The UNLV results are summarized in a separate document "Las Vegas Wash Monitoring and Characterization Study: Results for Mercury and Selenium". The SNWA monitored selenium and mercury, as well as traditional water quality parameters in the Las Vegas Wash mainstream and its tributaries. The results of this study will be used to help evaluate the current state of health of the Wash, to monitor variations over time and to help manage the Wash as a whole in order to maximize environmental benefits.

The SNWA monitored eight sites in the mainstream Wash on a monthly basis for major ions, heavy metals (including mercury and selenium), nutrients (nitrogen and phosphorus), bacteria and perchlorate. Quarterly samples were collected at eight locations in six tributaries to the Wash and two shallow groundwater seeps adjacent to the Wash (Tributaries/Seeps). Samples were collected for major ions, nutrients, heavy metals (including mercury and selenium), bacteria, perchlorate, and organics. Field parameters, including temperature, pH, dissolved oxygen (DO), and electrical conductivity (EC), were measured monthly and quarterly.

SIGNIFICANCE OF THE STUDY

Environmental resources found in the Wash are some of the most unique in southern Nevada. Rarely does one find an oasis of water, wildlife and vegetation on the floor of a desert valley. The wetlands of the Wash provide a natural "polishing" of flows to Lake Mead, and provide habitat for a diverse community of plant and animal species. Over 125 species of birds have been identified in the Wash, in addition to foxes, coyotes, rabbits, snakes, lizards, and a variety of fish and insects.

The gradual, yet significant decline of environmental resources in the Wash has been of concern to local agencies and residents for many years. As urban flows have continued to increase as a result of increasing population in the Las Vegas valley, the Wash has experienced significant erosion and head cutting. Wetland acreage in 1975 was estimated to be as high as 2,000 acres. However, in just 25 years, these numbers decreased to about 300 acres in 1998 (LVWCC, 2000). Continuous decrease of wetland vegetation in the Wash has affected a variety of plant and animal species that depend on habitat in the Wash for their sustenance. In 1991, Nevada residents approved $13.3 million in bond funds to begin to re-establish and protect the wetlands in the Wash through erosion control and provide for the construction of a park and recreational area. Today, construction of erosion control structures and the Nature Preserve portion of the Wetlands Park are well underway. Wetlands are clearly a critical resource in southern Nevada because they offer many positive environmental benefits. The construction of erosion control structures in the Wash raised concerns over whether negative, unintended impacts are also possible. Selenium (Se) and mercury (Hg) are two elements that have a tendency to bioaccumulate in newly formed wetlands (e.g., Kesterson Wildlife Refuge in Northern California). Wetlands have also been shown to be sources of methyl mercury (MeHg) and may explain the high concentrations of Hg often found in fish in remote near-pristine regions (Mierle & Ingram 1991). Because of these concerns, the Lake Mead Water Quality Forum, a consortium of local, state and federal agencies, including EPA Region 9, established a Selenium/Mercury Subcommittee to examine these issues and determine how they may potentially impact the Las Vegas Wash and wetlands.

One of the early findings of the Subcommittee was that there was a lack of data on concentrations of Se and Hg in water, sediments and biota of the Wash ecoregion. At that time, there had been no measurements of Hg in Wash sediments, and those measurements of Hg in water had detection limits of 0.2 μg/L, which is an order of magnitude higher than the criteria for the protection of wildlife. Moreover, this earlier work was limited by technology available at that time, which has advanced substantially over the past few years. Measurements of Se, previous to this study had ranged from about 1 μg/L to 78 μg/L and were typically between 3 and 15 μg/L in the source water of the Nature Preserve portion of the Wetlands Park, which is composed primarily of re-surfacing shallow groundwater and urban run-off.

Although there have been no obvious impacts to wildlife inhabiting the Nature Preserve, these reported levels of selenium warrant additional research. Prior to this study, a dedicated monitoring program along the entire Wash did not exist for either Se or Hg. There are also concerns regarding the quality of the shallow groundwater and urban run-off inflow, which have arguably deteriorated over the years. This study was also developed to address these concerns.

This program was developed to fill data gaps by measuring and monitoring a range of chemical species in water at established sampling locations along the Wash and its tributaries. This study has provided data to the LVWCC to assist in addressing concerns regarding the Las Vegas Wash and will help the committee implement a practical, comprehensive approach for managing the Wash in a timely manner.

METHODS

Sampling Sites

Water quality monitoring has been ongoing in the mainstream Las Vegas Wash since August 2000 and in the Tributaries/Seeps that flow into the Las Vegas Wash since October 2000. This report summarizes all of the water quality data in the mainstream Las Vegas Wash from August 2000 to June 2003 and in the Tributaries/Seeps that impact the Las Vegas Wash from October 2000 to April 2003. Table 1 lists the eight sample sites for water quality monitoring in the mainstream Wash (Wash). Table 2 lists the eight sample sites used for water quality monitoring in the tributaries and seeps (Tributaries/Seeps) to the Wash. They are also shown on the sample location maps (Figure 1 and Figure 2).

Site Name	Location Description
LW10.75	Above City of Las Vegas Waste Water Pollution Control Facility
LW6.05	Upstream of the Pabco Road Erosion Control Structure
LW5.9	Downstream of the Pabco Road Erosion Control Structure
LW5.5	Upstream of the Historic Lateral Erosion Control Structure
LW5.3	Downstream of the Historic Lateral Erosion Control Structure
LW3.85	Upstream of the Demonstration Weir
LW3.75	Downstream of the Demonstration Weir
LW0.8	Downstream of the Lake Las Vegas

Table 1. Sample locations for water quality monitoring in the Mainstream Las Vegas Wash

Site Name	Location	Site Description
LVC_2	**Meadows Detention Basin**	Eastern outflow of Meadows Detention Basin from culvert
LW12.1	**Las Vegas Creek**	At Desert Rose Golf Course, just below golf cart bridge and above culvert
FW_0	**Flamingo Wash**	At Desert Rose Golf Course, outflow from culvert just above confluence with Las Vegas Creek
SC_1	**Sloan Channel**	At East Charleston bridge, south side
DC_1	**Duck Creek**	Downstream of Broadbent Boulevard crossing
MC_2	**Monson Channel**	Upper accessible end at east edge of development at Stephanie Road
LWC6.3	**Kerr-McGee Seeps**	Immediately above Kerr-McGee Perchlorate Treatment Facility north of Henderson Ponds
LWC3.7	**GCS-5 Groundwater Seeps**	Southwest Embankment - 200 m below Demonstration Weir

Table 2. Sample locations for water quality monitoring in the Tributary/Seep Locations

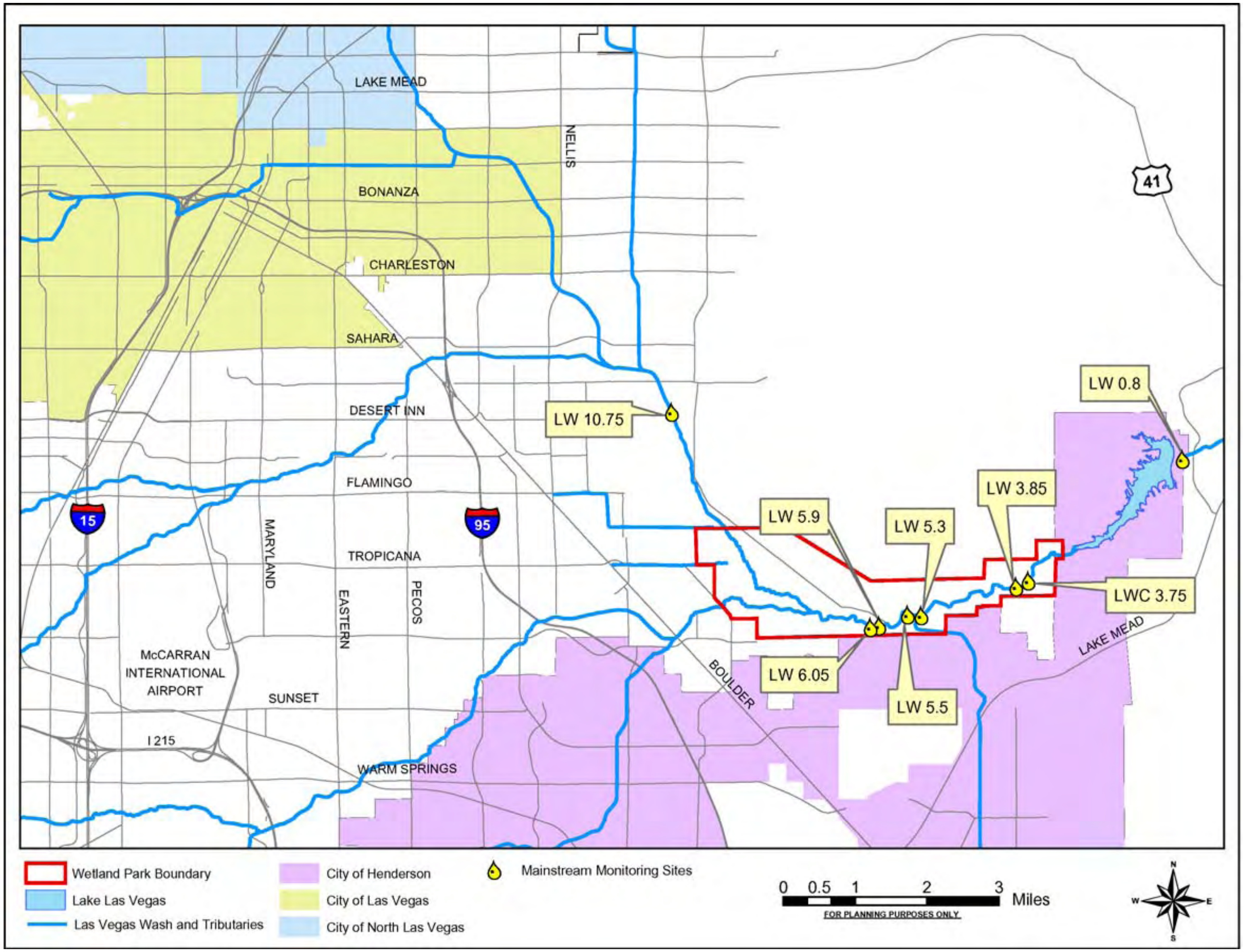

Figure 1. Location map showing sample sites in the Mainstream Las Vegas Wash

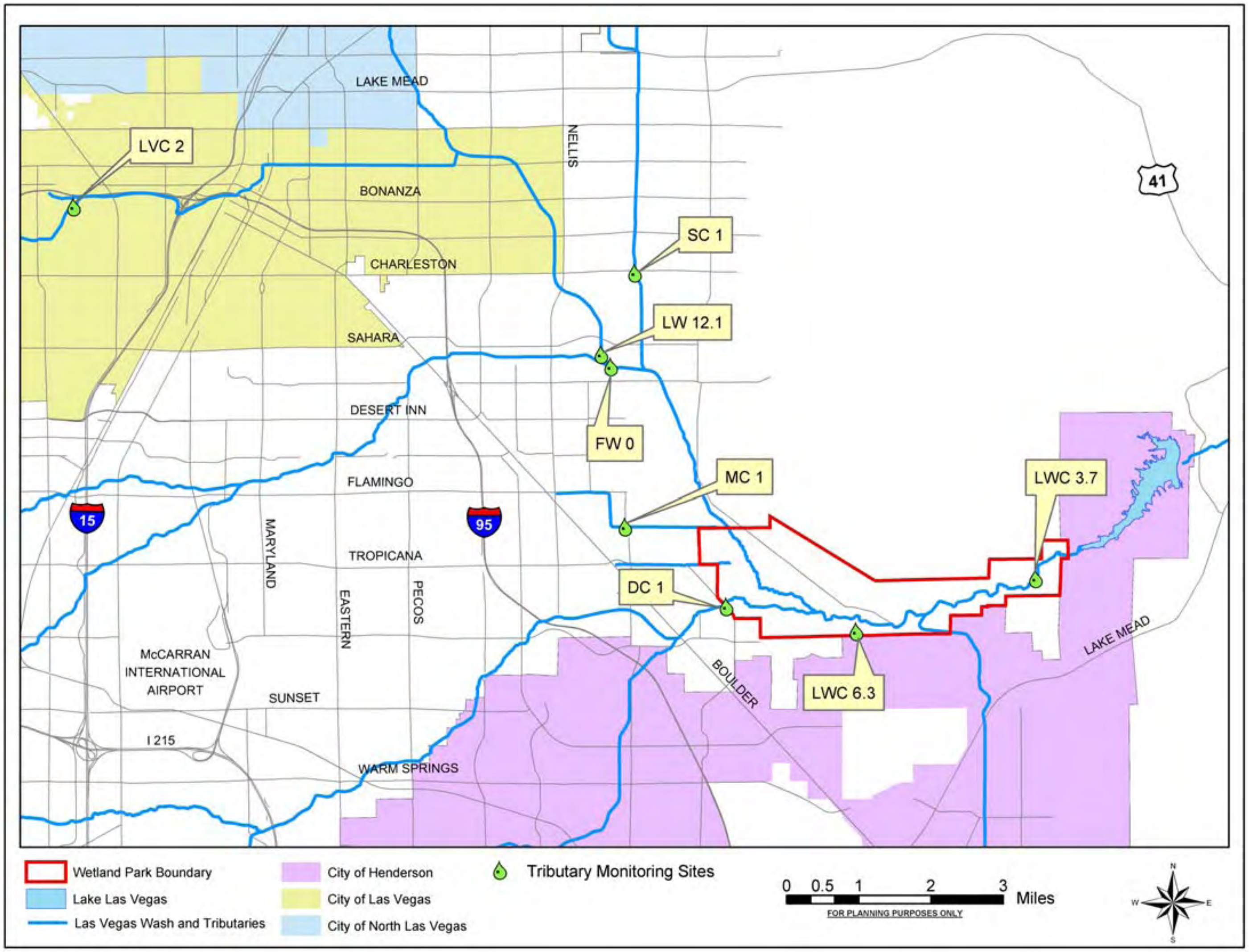

Figure 2. Location map showing sample sites in the Tributary/Seep Locations

Locations for the Wash monitoring program occurred upstream and downstream of three erosion control structures and includes two control sites. The three erosion control structures (Pabco Road, Historic Lateral, and Demonstration Weir) were constructed in the Las Vegas Wash before the water quality-monitoring program began. Two sample sites were designated at each erosion control structure, one upstream and one downstream, in order to compare water quality above and below the structure. Two control sites (LW10.75 and LW0.8) were also included in this sampling program. The first control site (LW10.75) is located above all three wastewater treatment plants, and represents urban run-off from the Las Vegas valley. The second control site (LW0.8) is located at Northshore Road. All components of flows from the valley are found at this point, including tertiary treated wastewater, urban run-off, shallow groundwater, and storm water.

Most urban run-off flows into Las Vegas Wash via small tributaries. As a result, water quality of tributaries to the Wash provides key information for non-point source contamination to the Wash and Lake Mead. In October 2000, the Tributary/Seep water quality program was implemented. The water quality of six major tributaries to the Wash was monitored on a quarterly basis. Two shallow groundwater seeps, the Kerr-McGee Seep and the GCS-5 Seep were also included in the tributary sample program because they discharge into the Wash and contribute contaminants (i.e., perchlorate) to the Wash.

Parameters

Field measurements, including water temperature, dissolved oxygen (DO), pH, specific electrical conductivity (EC), and turbidity, were collected at every site for both programs. Water samples were also collected for the following analyses: major cations and anions, heavy metals, plant nutrients, bacteria, and perchlorate. In addition, water samples from tributaries and seeps were analyzed for organic contaminants. Table 3 lists a description of the methods used for each analytical group and the laboratory that performed the analyses. A complete list of the individual parameters analyzed in the Wash and Tributary/Seep programs are found in Appendix I.

Sample Type	Description	Analytical Laboratory
Heavy Metals	17 metals obtained from ICP-MS instrumentation with special emphasis on selenium, arsenic, mercury, and copper	Montgomery Watson
Cation-Anion	Standard water chemistry analysis	Montgomery Watson
Perchlorate	At least one sample from each location.	SNWS
Nutrients	Filtered and unfiltered samples for analyses of organic and inorganic nitrogen and phosphorus (phosphorus, total and orth-phosphorus; nitrogen, total kjeldahl (TKN), ammonia, nitrate and nitrite)	CCSD (8/2000 to 4/2003) and NEL (5/2003 to present)
Bacteriological	Samples of water for analyses of bacterial counts of fecal coliforms and *E.coli*	SNWS
General	Hydrolab® multi parameter water quality probe	Watershed Division Staff
Organic Priority Pollutants	Individual pollutants are listed in Appendix I. Total of 161 primary pollutants analyzed.	Montgomery Watson

Table 3. Methods and analytical laboratories

Sampling Frequency and Duration

Water samples were collected and analyzed from eight mainstream Wash sites on a monthly basis beginning in August, 2000, and from eight tributary and seep sites on a quarterly basis beginning in October, 2000. To keep the sample date consistent for each sampling event, water samples were always collected during the last full week of each month for both monitoring programs. Table 4 lists all sample dates for both water quality monitoring programs between August 2000 and June 2003.

Sample Date	Mainstream	Tributary /Seeps
8/28/2000	X	
9/27/2000	X	
10/25/2000	X	X
11/20/2000	X	
12/20/2000	X	
1/18/2001	X	X
2/21/2001	X	
3/28/2001	X	
4/25/2001	X	X
5/30/2001	X	
6/27/2001	X	
7/30/2001	X	X
8/22/2001	X	
9/26/2001	X	
10/24/2001	X	X
11/28/2001	X	
12/19/2001	X	
1/23/2002	X	X
2/20/2002	X	
3/26/2002	X	
4/24/2002	X	X
5/22/2002	X	
6/26/2002	X	
7/24/2002	X	X
8/26/2002	X	
9/25/2002	X	
10/23/2002	X	X
11/20/2002	X	
12/18/2002	X	
1/22/2003	X	X
2/19/2003	X	
3/26/2003	X	
4/23/2003	X	X
5/28/2003	X	
6/25/2003	X	

Table 4. Sample dates for both Mainstream and Tributary/Seep Water Quality Sampling Programs

Sample Collection and Analyses

Sampling methodology was identical at each location and sampling event. Field staff used a field notebook, which includes the following information at all sample locations for each sample event.

- Sampling date
- Sampling time
- Weather condition (i.e., sunny, windy, cold, hot, etc.)
- Air temperature
- Meteorological conditions for sampling date and for the two days prior to sampling
- Flow rate by estimate
- Flow rate by USGS gauge or by field measurement
- Description of any and all factors that might influence the data set from each site

At each site, a multi-parameter probe (Hydrolab Corporation Model Surveyor® 4) was used to measure field water quality parameters, including water temperature, dissolved oxygen concentration, pH value, specific conductance and turbidity. The Hydrolab multi-parameter probe was calibrated using standard solutions (pH = 10, pH = 7, and EC = 5000 uS/cm or 2500 uS/cm) supplied by Desert Research Institute. Field measurements at each site were entered into the Southern Nevada Water System (SNWS) Laboratory Information Management Software (LIMS) database.

Where possible, samples were collected in the middle of the main channel with a pre-cleaned, large-mouth, four-liter plastic container. The large container allowed the sampling crew to collect a sufficient quantity of water for the numerous analyses conducted at each site. This large sample was then divided into the individual sample bottles for each analyses group. The original sample was shaken before each aliquot was dispensed which provided for a homogenous sample and prevented particle matter from settling.

Sample bottles were rinsed three times with sample water before final sample collection. All samples were labeled specifying site and location, analysis requested and date and time sampled. Sample bottles for organic pollutants, heavy metals and cations-anions were prepared and delivered for use in the field by Montgomery Watson Laboratories (MWL) in Pasadena, California. Sample bottles for nutrients, perchlorate, and bacteria were prepared and pre-labeled by the SNWS Laboratory Support Services personnel. Labels for perchlorate and bacteria were generated by the SNWS LIMS database and the Clark County Water Reclamation District (CCWRD) Laboratory generated labels for nutrient analyses until April 2003. Nevada Environmental Laboratories (NEL) has provided bottles and labels for nutrient analysis since April 2003. If needed, preservatives were added by MWL or by SNWS. Filtration of samples for some parameters (i.e., orthophosphate) was also performed at the sample collection site. After collection, all samples except bacteria were maintained in a cooler of ice to 4^{o}C. Bacteria samples were kept in a separate cooler of freezer packs to prevent the contamination by ice water. Samples were distributed immediately after the sampling event to designated laboratories for analysis. All samples were accompanied by chain of custody record.

Montgomery Watson Laboratory performed chemical analyses of water samples for organic compounds, heavy metals, cations, and anions. Samples were analyzed in accordance with EPA Methods 8081A; EPA-5 1613B; 18th and 19th Editions of Standard Methods for the Examination of Water and Wastewater and/or other appropriate EPA accepted Standard Methods. The SNWS Laboratory performed analyses of bacteria and perchlorate. Bacteria samples were analyzed in accordance with microbiological methodology described in Standard Methods for the Examination of Water and Wastewater, 19th Edition. The method for perchlorate analysis was EPA Method 314. The CCWRD Laboratory and NEL conducted nutrient analyses. Samples were collected and analyzed in accordance with methodology described in Standard Methods for the Examination of Water and Wastewater, 18th Edition. Strict QA/QC rules were followed by all field crews and laboratories for both sample collection and sample analyses. Extensive documentation of the QA/QC was attached with laboratory reports. A duplicate sample and a trip blank were also collected for nutrients at each sampling event. A trip blank was collected and analyzed for the Safe Drinking Water Act Volatile Organic Compounds (VOCs) and the Priority Pollutant VOCs for all compounds detected during analysis. Results of the field blanks and duplicates can be found in Appendix II for nutrient samples. Results of trip blanks for the Safe Drinking Water Act Volatile Organic Compounds (VOCs) and the Priority Pollutant VOCs were non-detect in all cases.

Table 5 summarizes the samples collected, sample volumes, whether samples were filtered or not filtered, container types, preservatives and preservative volume for all samples collected.
For sample filtration, a 0.45-micron membrane filter, filter support and associated tubing, were pre-rinsed with a deionized water and hydrochloric acid rinse before filtration. All samples were labeled specifying site, location and analysis requested. Date and time samples were collected was also noted.

Sample Type	Filtered	Sample Volume	Container Type	# of Containers	Preservative	Preservative Volume
Bacteria						
Fecal Coliforms and *E. coli*	No	1000 mL	Plastic	1	$Na_2S_2O_3$	1.5 mL
Nutrients						
Filtered	Yes	250 mL	Plastic	1	No	None
Non-Filtered	No	250 mL	Plastic	1	No	None
Preserved	No	250 mL	Plastic	1	H_2SO_4	1 drop
Inorganics						
TSS	No	500 mL	Plastic	1	No	None
Perchlorate	No	125 mL	Plastic	1	No	None

Table 5. Summary of sample handling requirement

Sample Type	Filtered	Sample Volume	Container Type	# of Containers	Preservative	Preservative Volume
SiO_2	No	250 mL	Plastic	1	No	None
Metals (Dissolved)	Yes	500 mL	Plastic	1	No	None
Organics (Tributary/Seep only)						
Base, Neutral, and Acid extractable	No	1 Liter	Amber glass	2	$Na_2S_2O_3$	80 mg
Captan and Trithion	No	1 Liter	Amber glass	2	$Na_2S_2O_3$	80 mg
Aldecarbs	No	40 mL	Amber vials	2	MCAA $Na_2S_2O_3$	1 mL 1 drop
THMs and HANs	No	40 mL	Clear vials	3	NH4Cl Phosphate Buffer	50 mg 400 mg
Chlorate, Chlorite, and Bromate	No	125 mL	Plastic	1	EDA	5 mg
Dioxin	No	1 Liter	Amber glass	2	No	None
Diquat	No	1 Liter	Amber plastic	1	$Na_2S_2O_3$	1 mL (8%)
Diuron	No	1 Liter	Amber glass	2	Cupric Sulfate Trizma	0.5 g 5 g
Ethylene di-bromide DBCP	No	40 mL	Amber glass vials	4	$Na_2S_2O_3$	1 drop (8%)
Endothal	No	250 mL	Amber glass	1	$Na_2S_2O_3$	0.25 mL (8%)
Organics (Tributary/Seep only)						
Herbicides	No	125 mL	Amber glass	2	$Na_2S_2O_3$	10 mg/L
Organophosphorus Pesticides	No	1 Liter	Amber glass	2	$Na_2S_2O_3$	80 mg
Organochlorine Pesticides	No	1 Liter	Amber glass	2	$Na_2S_2O_3$	80 mg
SOCs	No	1 Liter	Amber glass	2	$NaSO_3$ HCl	45 mg 1.5 ml (6N)
SDWA VOCs	No	40 mL 250 mL	Amber glass Amber glass	2 1	HCl $Na_2S_2O_3$	4drops (1:1) 6 mg
Priority Pollutant VOCs	No	40 mL	Amber glass vials	2	$Na_2S_2O_3$	1 drop (8%)
Total Organic Carbon	No	125 mL	Amber glass	1	H_2SO_4	0.5 mL (50%)

Table 5. Summary of sample handling requirements (continued)

RESULTS AND DISCUSSION

Water Quality in the Mainstream Las Vegas Wash

Field Measurements

Monthly sampling information and field measurements at eight sample locations in the Wash, including specific electrical conductance (EC), pH, temperature, and dissolved oxygen (DO), are described in Appendix IIIa. Average field measurements were calculated and compiled in Table 6. Average data is graphically displayed in Figure 3.

Sample Sites	Conductance µS/cm	DO mg/L	PH Units	Temp °C
LW10.75	3757	10.83	8.22	21.32
LW6.05	2269	8.73	7.69	23.55
LW5.9	2339	8.95	7.70	23.49
LW5.5	2410	9.26	7.79	22.60
LW5.3	2421	8.26	7.81	22.74
LW3.85	2465	8.60	7.87	21.60
LW3.75	2473	7.78	7.73	21.32
LW0.8	2411	8.75	7.88	20.95

Table 6. Average field measurement from the Las Vegas Wash Mainstream Sites

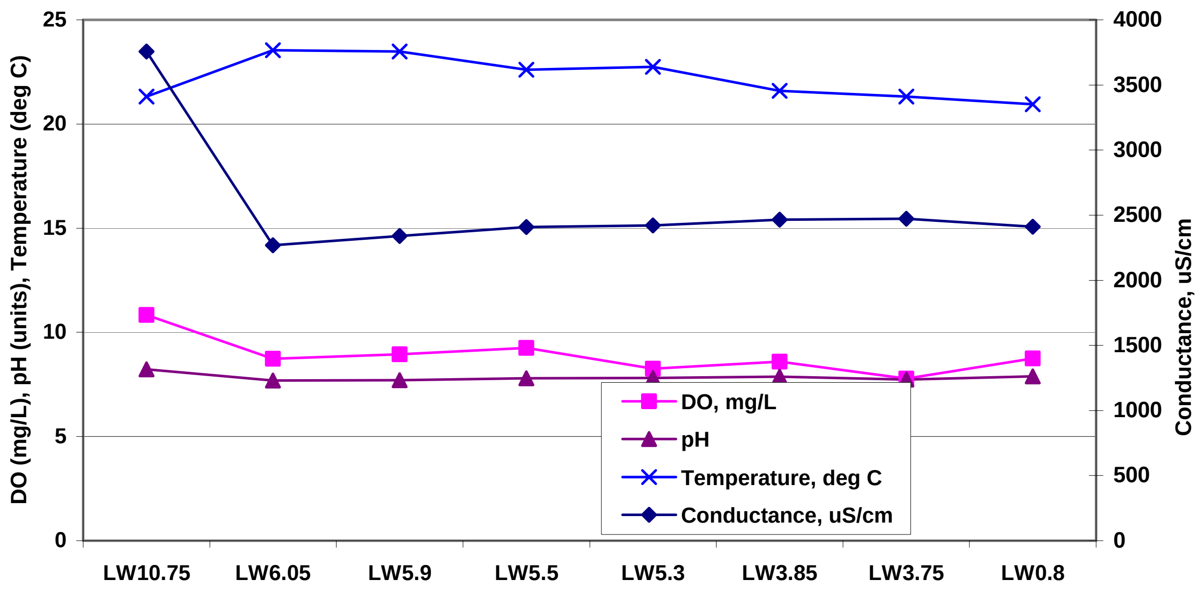

Figure 3. Average field measurement results from the Las Vegas Wash Mainstream Sites

Among the eight sample locations, LW10.75 is upstream from all three wastewater discharges and represents urban run-off from the Las Vegas Valley. This site has the highest average electrical conductance (3,757 µS/cm), DO (10.83 mg/L), and pH (8.22) values. From LW6.05 to LW0.8, the majority of flow comes from the three-wastewater treatment facilities. Specific conductance decreased at these locations, ranging from 2,269 to 2,465 µS/cm. The tertiary-treated wastewater treatment plant effluent of the three water reclamation plants dramatically dilutes the conductivity of urban run-off flows. Wastewater treatment plant effluents reduce urban run-off conductivity by more than 34%. DO and pH at these sample sites (LW 6.05 to LW0.8) were relatively consistent ranging from 7.69 to 7.88 for pH and from 7.78 to 9.26 mg/L for DO.

A review of the data in Appendix IIIa shows that temperature and dissolved oxygen concentrations vary seasonally. The highest water temperatures and dissolved oxygen concentrations were detected at LW10.75 in June 2003 and February 2001 respectively. The temperature was 30.18 ° C and the dissolved oxygen concentration was 14.46 mg/L. These results are not unexpected because this is the only sample location in this program not impacted by the large flow of treated wastewater. This site would be expected to experience the largest fluctuations in temperature and dissolved oxygen. The sites with the coolest water temperature were LW10.75 and LW3.85. Temperatures at these locations were 9.78 ° C and 9.67 ° C respectively. The lowest temperature at LW10.75 occurred on January 23, 2002 and the lowest temperature at LW3.85 was detected on December 20, 2000. The lowest dissolved oxygen concentration (4.43 mg/L) was found at LW5.3 on June 25, 2003. For a three year period, the average temperature at all sites ranged between 21 and 24 ° C.

Major Ion Chemistry

Monthly major ion (cation and anion) data from the eight sample sites are in Appendix IIIb. Total dissolved solid (TDS) and total suspended solid (TSS) data are also in Appendix IIIb. Average monthly major ions were calculated and compiled in Table 7. Data is displayed graphically in Figure 4.

Sample Sites	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Bicarbonate as HCO3 (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Bromide (mg/L)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)
LW10.75	**299**	**239**	**288**	**34.4**	**289**	**240**	**1734**	**0.7**	**0.7**	**176**	**3132**
LW6.05	**140**	**73**	**236**	**24.4**	**284**	**157**	**607**	**1.0**	**0.3**	**23**	**1567**
LW5.9	**140**	**71**	**245**	**23.7**	**308**	**158**	**603**	**0.9**	**0.3**	**18**	**1570**
LW5.5	**145**	**78**	**244**	**24.5**	**306**	**155**	**651**	**1.0**	**0.3**	**26**	**1652**
LW5.3	**151**	**78**	**245**	**25.0**	**297**	**156**	**628**	**1.0**	**0.3**	**24**	**1664**
LW3.85	**157**	**77**	**248**	**25.3**	**322**	**155**	**665**	**1.0**	**0.3**	**72**	**1686**
LW3.75	**158**	**76**	**250**	**25.6**	**322**	**153**	**656**	**1.0**	**0.3**	**42**	**1673**
LW0.8	**154**	**73**	**242**	**25.5**	**313**	**150**	**631**	**1.0**	**0.3**	**54**	**1633**

Table 7. Average major cation and anion data from the Las Vegas Wash Mainstream Sites

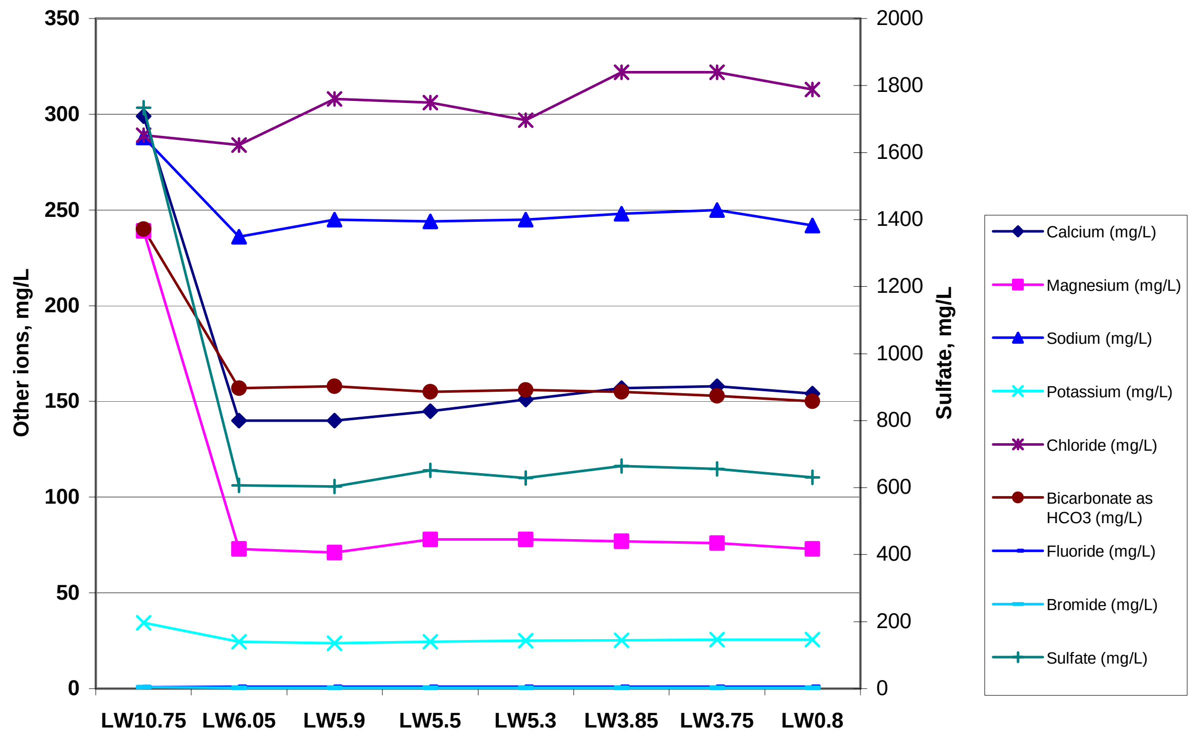

Figure 4. Average major cations and anions in the Las Vegas Wash Mainstream Sites

Calcium (Ca^{+2}), sodium (Na^{+}) and magnesium (Mg^{+2}) were the dominant cations at all sampling locations. Sulfate (SO_4^{-2}), chloride (Cl^{-}) and bicarbonate (HCO_3^{-}) were the dominant anions. The highest concentrations of calcium, magnesium, sodium, potassium, bicarbonate, sulfate, and consequently TDS, occurred at LW10.75. This sampling site consists entirely of urban run-off. In general, the average concentrations of the major ions at LW10.75 were two to three-times higher than the concentrations at other sample sites.

The high TDS concentrations in surface run-off water (LW10.75) is diluted by effluent from the three wastewater treatment facilities, resulting in a dramatic decrease in concentrations of most major ions below site LW6.05. An exception to this is chloride. Chloride enters the water cycle from the recharging of household water softener units prevalent throughout the valley. Brine from residential water softener makes its way to the wastewater treatment plants and passes through unchanged. Chloride was slightly higher from upstream to downstream, most likely resulting from residential water softener use.

The highest average TSS concentration was found at LW10.75 (176 mg/L). The TSS values of the other locations in the Wash ranged from 18 to 72 mg/L. The lower TSS values in the mainstream Wash are due to the recent installation of erosion control structures. These structures reduce flow velocity and result in the deposition of a significant amounts of TSS.

Nutrients

Monthly plant nutrient data, including ammonia (NH_4^+-N), nitrite (NO_2-N), nitrate (NO_3^--N), nitrate plus nitrite (NO_3^-+ NO_2^--N), total Kjeldahl nitrogen (TKN), orthophosphate (PO^4-P), and total phosphate (TP-P), from 8 sample sites are in Appendix IIIc. Average plant nutrient concentrations are summarized in Table 8. Figure 5 displays the average plant nutrient concentrations from the eight sample sites in the mainstream Las Vegas Wash.

For the purposes of the following discussion, one TKN data point was removed from the average. A TKN value of 32.1 mg/L was measured on July 24, 2002 at LW3.75. This site is downstream of an erosion control structure with large quantities of vegetation above the structure. Vegetation commonly breaks off and is transported downstream, especially during periods of increased flows. The sample may have contained plant debris and therefore an elevated TKN value was measured.

Sample Sites	NH4-N mg/L	NO3-N mg/L	NO2-N mg/L	NO3+NO2-N mg/L	TKN mg/L	OrthoPO4-P mg/L	Total P mg/L
LW10.75	0.10	3.75	0.08	3.80	1.13	0.02	0.18
LW6.05	0.14	13.39	0.08	13.49	0.96	0.26	0.45
LW5.9	0.12	12.19	0.08	12.24	0.95	0.27	0.43
LW5.5	0.14	13.90	0.08	13.96	0.96	0.18	0.34
LW5.3	0.13	13.70	0.08	13.75	0.84	0.16	0.31
LW3.85	0.12	13.61	0.08	13.61	0.82	0.16	0.34
LW3.75	0.11	14.01	0.08	14.00	0.92*	0.16	0.31
LW0.8	0.12	14.27	0.08	14.28	0.65	0.15	0.31

*Data point excluded for averaging purposes

Table 8. Average nutrient data from the Las Vegas Wash Mainstream Sites

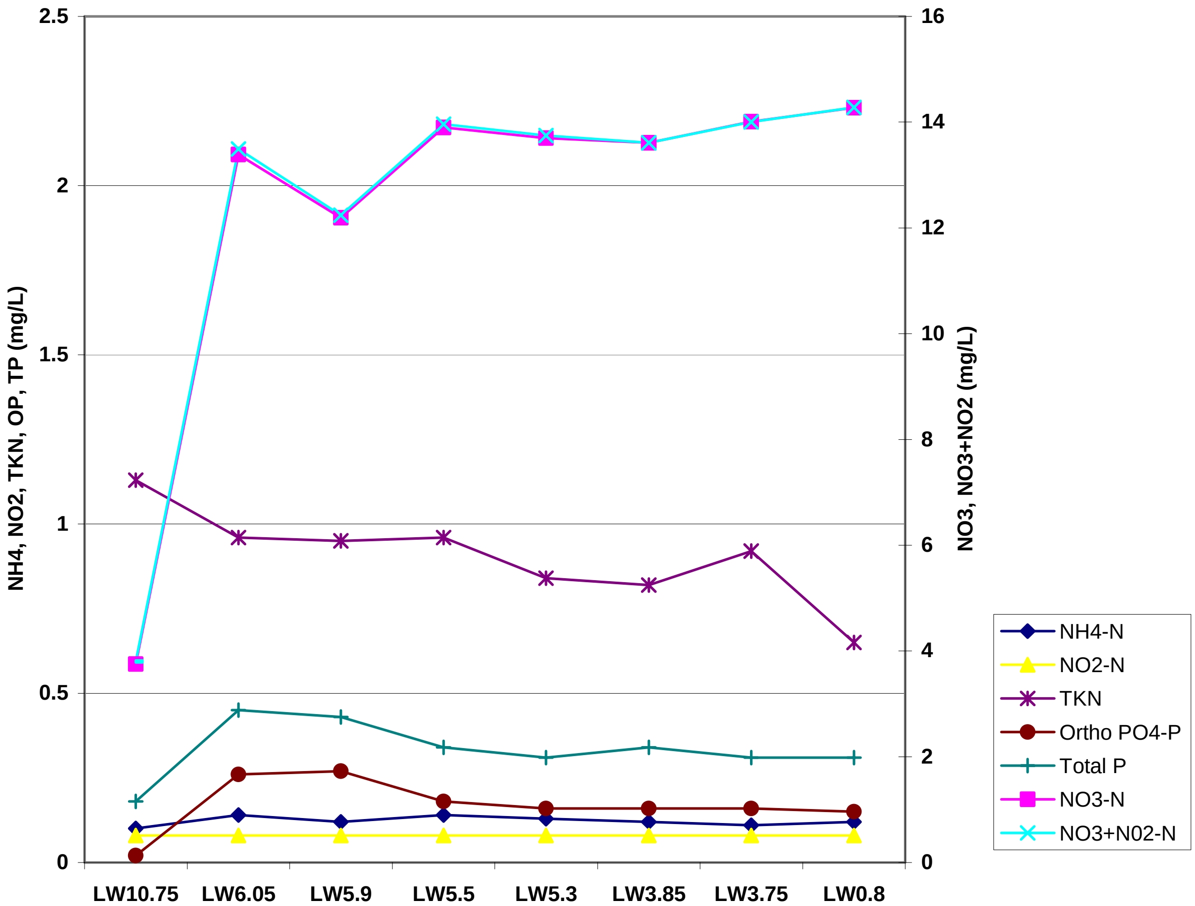

Figure 5. Average nutrient concentrations from the Las Vegas Wash Mainstream Sites

More than 90% of the concentration of the nitrogen in Las Vegas Wash is in the form of nitrate (NO_3-N). Very little of the nitrogen contribution is organic nitrogen from biological material. There is very little change in the average nitrogen concentration proceeding downstream indicating that nitrogen is not the limiting nutrient in this system.

With the exception of LW10.75, approximately 35% of the phosphorus concentration is soluble orthophosphate (PO_4-P) at the eight Wash sites. Orthophosphate makes up 12% of the phosphorus concentration at LW10.75. LW10.75 is not influenced by wastewater treatment plant effluent. These data indicate a larger portion of the total phosphorus concentration is dissolved phosphorus in the wastewater treatment plant effluent than the urban run-off. Soluble orthophosphate (PO_4-P) concentrations have been substantially reduced at most of the sampling sites during the last three years due to the voluntary removal of phosphorus by the three wastewater treatment facilities during the winter (Figure 6). There also is a near 60% reduction in orthophosphate from upstream of the Pabco Erosion Control Structure (LW6.05, PO_4-P = 0.26 mg/L) to the downstream of the Historic Lateral Weir (LW5.3, OP = 0.16 mg/L) and there is a slight reduction in the average concentration PO_4-P further downstream (LW0.8, PO_4-P = 0.15 mg/L).

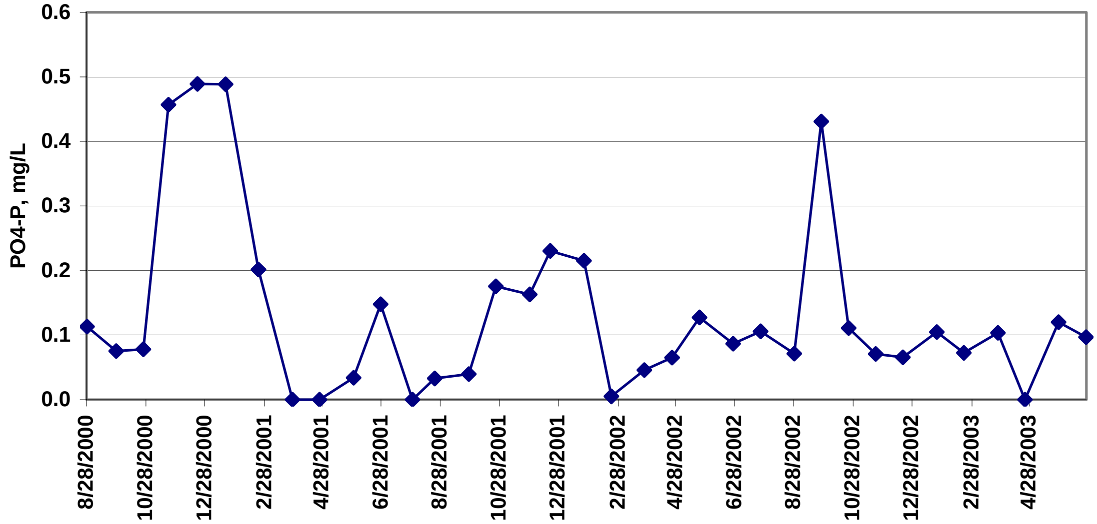

Figure 6. Monthly orthophosphate (PO_4-P) concentrations at LW0.8 between 8/2000 and 6/2003

The decrease of TP (particulate) may be due to the decline in TSS in the Wash that has been facilitated by the construction of erosion control structures in the Wash, as they slow the flow of the water allowing the TP to settle out. The TP is therefore being tied up with sediments in the wetlands that have been established behind the erosion control structures.

Phosphorus concentrations were consistent with expectations when the dominant flow in a stream is wastewater treatment plant effluent. TP concentrations were higher than PO_4-P concentrations and the concentration of PO_4-P increased after the discharge point of the treated wastewater into the Wash.

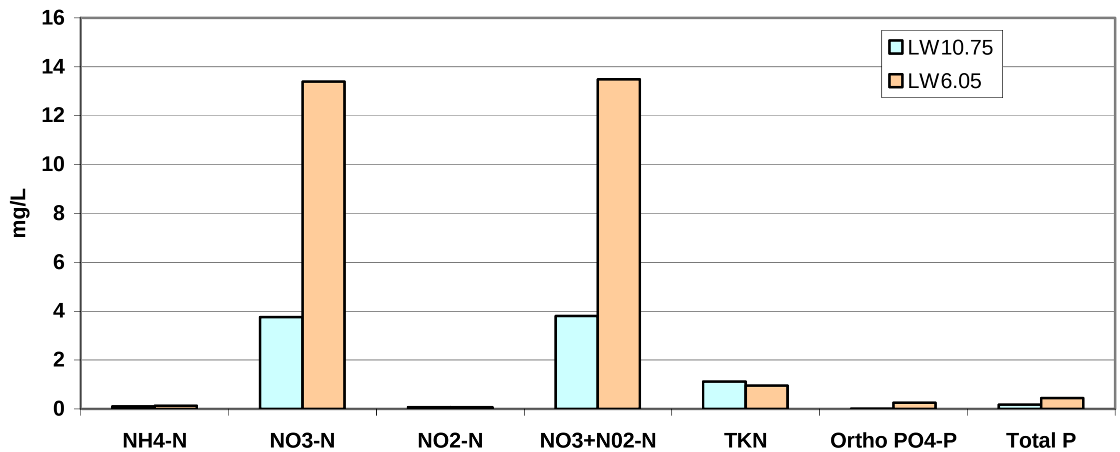

Figure 7. Average nutrient concentrations increase from the LW10.75 to LW6.05

With the exception of nitrite and TKN, all other nutrient (nitrogen and phosphate) species increased from LW10.75 to LW6.05. This was primarily due to the discharge of treated wastewater from the three wastewater treatment plants between LW10.75 and LW6.05. For example, average concentrations of ammonia nitrogen, nitrate as N, nitrate plus nitrite as N, orthophosphate as P, and total phosphate increased 38%, 256%, 973%, and 148% respectively, from LW10.75 to LW6.05. On the other hand, nitrite as N and TKN decreased 5% and 16%, respectively from LW10.75 to LW6.05 (Figure 7).

Other nutrient species, including TP, TKN and ammonia nitrogen generally showed similar decreasing patterns from LW6.05 to LW0.8 (Table 8 and Figure 5). The decrease in ammonia nitrogen and TKN (organic nitrogen plus ammonia nitrogen) from LW6.05 to LW0.8 may be attributable to the volatilization of these gaseous forms into the atmosphere as the water flows down the Wash. This phenomenon has been reported by Hem, (1992).

Metals

Appendix IIId lists the monthly metal data from the eight sample sites in the Wash between 10/2000 and 6/2003. The analysis included 17 different metals. Table 9 shows the average concentrations of the metals at the eight sampling locations and Figure 8 depicts the average concentrations of 12 common metals from those sample sites.

Sample Sites	Silver (µg/L)	Aluminum (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Iron (µg/L)	Mercury (µg/L)	Manganese (µg/L)	Lead (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silica (µg/L)	Thallium (µg/L)	Zinc (µg/L)
LW10.75	0.59	142	12.83	48.53	ND	ND	4.21	7.59	1360	ND	36.4	4.21	13.97	13.98	39000	ND	29
LW6.05	0.59	383	7.61	42.97	ND	ND	2.37	6.02	510	0.20	43.9	1.08	9.73	3.27	22000	ND	44
LW5.9	ND	255	8.47	47.91	ND	ND	2.77	6.20	460	ND	40.6	1.12	9.58	3.05	21000	ND	45
LW5.5	ND	174	8.59	40.45	ND	ND	2.07	5.59	300	ND	44.2	1.12	9.97	3.38	21000	ND	42
LW5.3	ND	222	9.11	43.06	ND	ND	2.14	6.04	340	ND	48.1	1.10	10.42	3.19	21000	ND	43
LW3.85	ND	516	10.21	49.28	ND	ND	2.49	6.26	640	ND	69.6	1.09	11.25	3.17	21000	ND	40
LW3.75	ND	523	11.25	50.18	ND	ND	3.10	6.10	590	ND	68.2	1.14	11.40	3.26	23000	ND	39
LW0.8	ND	633	10.52	53.58	ND	ND	2.60	6.23	840	ND	71.3	1.75	11.04	3.03	22000	24.38	39

Table 9. Average metal data from the Las Vegas Wash Mainstream Sites

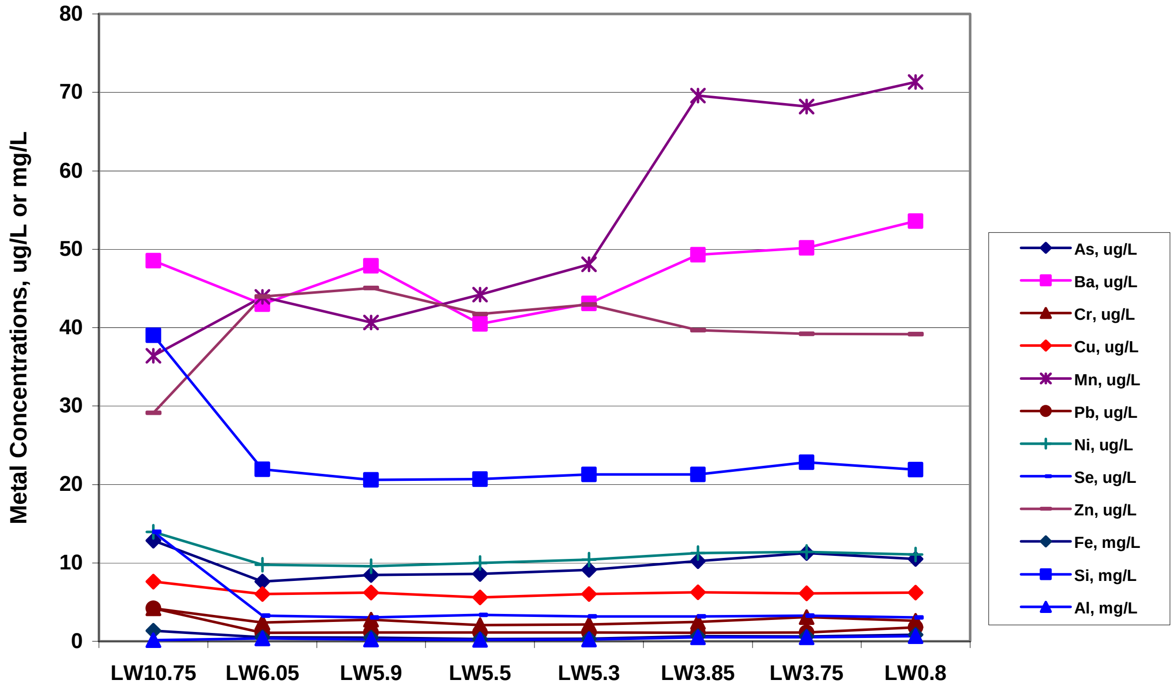

Figure 8. Average metal concentrations from the Las Vegas Wash Mainstream Sites

Results of metal analyses for silver, beryllium, cadmium, mercury and thallium for most sampling events were below the detection limit. Aluminum (Al), iron (Fe), manganese (Mn) and Silica (Si) had a wide average concentration range for all sites (Table 9).

Overall, heavy metal concentrations were fairly consistent during the sampling period from all sampling locations downstream of LW6.05. With the exception of zinc, barium, and manganese, most heavy metal concentrations were lower downstream of LW10.75 due to dilution effects of treated wastewater discharge. Zinc and manganese concentrations increased from site LW10.75 to LW6.05 and barium concentrations were elevated from LW10.75 to LW0.8 (Figure 8).

Bacteria

Fecal coliforms and *E. coli* were analyzed at the eight Mainstream Las Vegas Wash locations. Monthly data for fecal coliforms and *E. coli* from the eight locations are presented in Appendix IIIa. Samples were analyzed using membrane filtration. Three replicate samples were performed in order to provide for analytical validity. The results were averaged and can be found in Appendix IIIa. Results were reported as average colony-forming units (cfu) per 100 mililiters (mL). Subsequently, the *average* of the average concentrations of fecal coliforms and *E. coli* was then calculated. The results are presented two ways in Table 10, as a range of data and as the average of the average. Graphic depictions of the average of averaged data are in Figure 9. Analytical results that were lower than the detection limit were not included in the average and one result for LW10.75 was discarded due to the data being suspect. The discarded data point is highlighted in Appendix IIIa.

Location	Range Fecal Coliforms cfu/100mL	Average of the Average Fecal Coliforms cfu/100mL	Range of *E. coli* cfu/100mL	Average of the Average *E. coli* cfu/100mL
LW10.75	ND - 4200	508*	ND – 1000	225
LW6.05	ND - 2080	396	ND –1400	161
LW5.9	ND – 1180	265	ND – 370	98
LW5.5	ND - 1040	263	ND – 210	108
LW5.3	ND - 3000	345	ND – 320	125
LW3.85	ND – 1040	241	ND – 400	106
LW3.75	ND - 1340	257	ND – 390	111
LW0.8	ND - 1020	270	ND – 470	129

*Data point excluded for averaging purposes

Table 10. Average of the averaged bacteria data from the Las Vegas Wash Mainstream Sites

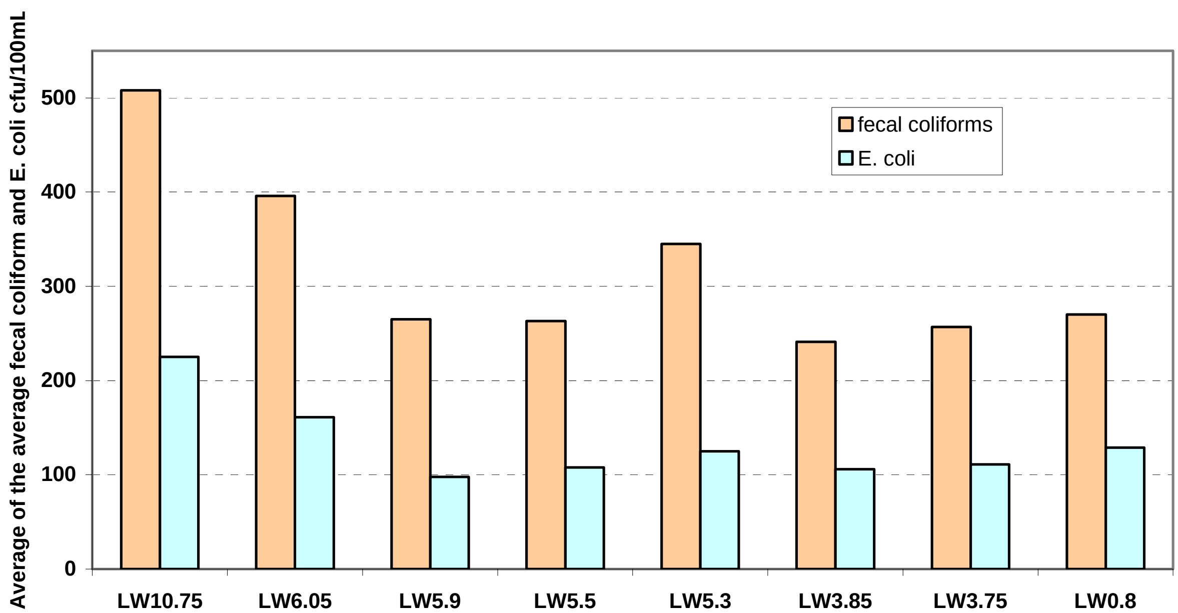

Figure 9. Average of the averaged bacteria counts from the Las Vegas Wash Mainstream Sites

The concentration of fecal coliforms and *E. coli* is highest at LW10.75. The water source for LW10.75 is comprised primarily of urban run-off. Once the wastewater treatment plant effluent is added to the Las Vegas Wash, above LW6.05 the number of fecal coliforms and *E. coli* decrease.

Average fecal coliform counts were higher than *E. coli* counts for all sampling events at all locations with one exception. The highest average fecal coliform counts were detected at LW10.75 at 11,991 cfu/100mL. The highest average *E. coli* counts were found at LW6.05 at 1400 cfu/100mL followed by LW10.75.

In general, more abundant bacteria were detected in the Las Vegas Wash during the hot and warm seasons, particularly summer and early fall. Fewer bacteria occurred during cold and cool seasons, of winter and early spring.

Perchlorate

Average perchlorate concentrations in the mainstream Wash sites ranged from 12.8 μg/L at site LW10.75 to 553.6 μg/L at site LW3.75 (Table 11). Figure 10 shows the average perchlorate concentrations from 8 sample sites in the Wash. Perchlorate data from August 2000 through November 2000 was questionable due to analytical method development and was therefore not included in the averages in Table 11. Data that was not included is highlighted in gray and can be found in Appendix IIIa. Generally, urban surface run-off has a relatively low perchlorate concentration (i.e., site LW10.75). Perchlorate concentrations were greatly elevated around the Pabco Erosion Control Structure (LW6.05) and the Demonstration Weirs (Figure 10) due to shallow groundwater discharges from the high-perchlorate-concentration plumes through Kerr-McGee Seep (LWC6.3) and GCS5 Seep (LWC3.7) respectively.

Sample Sites	Perchlorate μg/l
LW10.75	12.8
LW6.05	68.9
LW5.9	354.9
LW5.5	219.9
LW5.3	251.9
LW3.85	535.6
LW3.75	553.6
LW0.8	425.3

Table 11. Average perchlorate data from the Las Vegas Wash Mainstream Sites

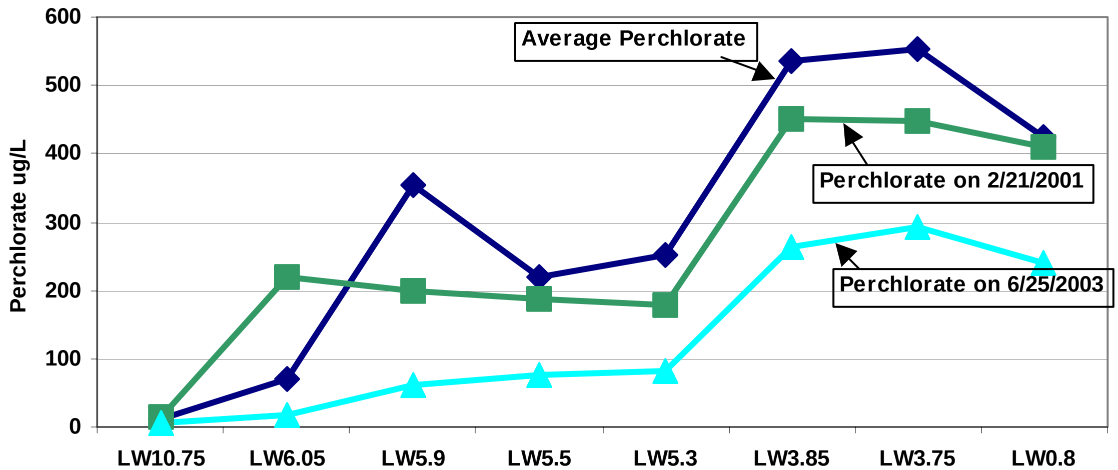

Figure 10. Average perchlorate, 2001 and 2003 perchlorate concentrations in the Las Vegas Wash Mainstream Sites

Perchlorate enters the Wash via a shallow groundwater plume originating in the vicinity of an industrial complex (Kerr-McGee) approximately 2 miles southwest of the Wash. As an oxygenate for rocket fuel and fireworks, perchlorate was manufactured at the Kerr-McGee site from the 1940's through the 1990's and by American Pacific from 1958 to 1988. Treatment to remove perchlorate from the shallow groundwater began in 1998. To monitor the concentration of perchlorate entering Lake Mead, this parameter was added to the comprehensive monitoring plan for the Wash. Monitoring for perchlorate was performed at the eight Wash Mainstream sample sites. Based on monthly perchlorate data, the remediation program implemented by Kerr-McGee to remove contaminated shallow groundwater at the closest point to the Las Vegas Wash possible has decreased overall perchlorate concentrations in the Wash (Figure 10). Perchlorate remediation at the Kerr-McGee Seep began in 1999. Prior to this date, perchlorate concentrations were much higher at all locations. The annual average perchlorate concentration at site LW0.8 has dropped from 454 μg/L in 2000 to 392 μg/L in 2003, or approximately 16% (Figure 11). Concentrations are predicted to continue to decline due to the remediation activities currently underway.

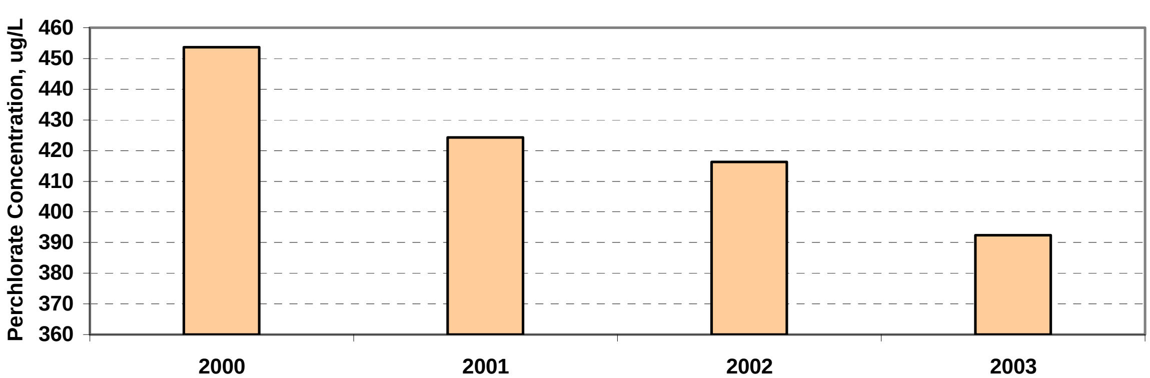

Figure 11. Annual Average Perchlorate Concentrations at Site LW0.8 (2000-2003)

Selenium

As a part of this project, Dr. James Cizdziel from UNLV and SNWA staff conducted a detailed study on low-concentration selenium and mercury in the Las Vegas Wash and its tributaries. Results of the selenium and mercury study are summarized in a separate document "Las Vegas Wash Monitoring and Characterization Study: Results for Mercury and Selenium." The selenium results in Appendix IIId are referenced in the UNLV study.

Due to the potential negative impact of elevated selenium levels on the environmental resources in the vicinity of the Las Vegas Wash and in the Clark County Wetlands Park, selenium samples were collected monthly at the eight Mainstream Las Vegas Wash locations for approximately nine months. Because the method used for the detection of low-level selenium is in the development phase, samples were sent to two additional laboratories for analysis. In order to ensure the most accurate and defensible results, samples were sent to Frontier Geoscience Laboratory (Frontier) and South Dakota State University (SDSU). Results of these analyses are presented in Table 12.

Sample ID	1/23/2002		2/20/2002	3/26/2002		4/24/2002		5/22/2002		6/26/2002		7/24/2002		8/26/2002	9/25/2002	
	SDSU	Frontier	Frontier	SDSU	Frontier	SDSU	Frontier	SDSU	Frontier	SDSU	Frontier	SDSU	Frontier	SDSU	SDSU	Frontier
LW10.75	16.50	15.56	15.00	13.80	11.10	14.00	12.70	13.80	12.10	12.60	13.60	12.70	12.40	13.60	13.40	11.70
LW6.05	5.75	5.18	1.88	3.69	3.57	3.72	3.25	2.95	2.56	2.86	2.90	3.22	2.83	2.86	3.39	2.88
LW5.9	4.10	3.62	1.82	2.69	2.69	3.72	3.15	3.14	2.52	2.94	3.13	2.85	2.61	2.94	3.52	2.80
LW5.5	5.36	4.54	1.95	3.56	3.17	3.43	3.09	3.22	2.57	2.92	2.88	3.28	3.07	2.49	3.66	3.28
LW5.3	3.85	3.06	1.78	3.42	3.11	3.40	2.61	3.06	2.48	2.88	3.14	3.36	2.66	2.44	3.10	2.57
LW3.85	3.45	3.03	1.79	3.38	3.31	2.96	2.36	2.91	2.82	2.68	3.16	2.94	2.66	2.98	2.88	2.42
LW3.75	4.01	3.08	1.72	3.26	3.36	2.84	2.55	2.88	2.27	2.62	2.58	2.94	2.30	3.41	2.86	2.46
LW0.8	3.31	3.16	1.72	3.10	3.09	2.74	2.23	2.84	2.15	2.42	2.63	2.78	2.23	2.76	2.83	2.19

Table 12. Selenium data from two laboratories for the Las Vegas Wash Mainstream Sites

There was very little variability in the low-level results from the two laboratories for the nine month period. Based on the cost of analysis, ease of submitting samples and experience with the low-level selenium analysis, SDSU was chosen to perform low-level selenium analyses for the remainder of the study. Selenium data from the eight locations are in Appendix Va. Average selenium values for each site are presented in Table 13 and in Figure 12. Averages were calculated using the SDSU data.

Location	Selenium μg/L
LW10.75	13.79
LW6.05	3.42
LW5.9	3.14
LW5.5	3.47
LW5.3	3.24
LW3.85	3.14
LW3.75	3.10
LW0.8	2.87

Table 13. Average selenium data from the Las Vegas Wash Mainstream Sites

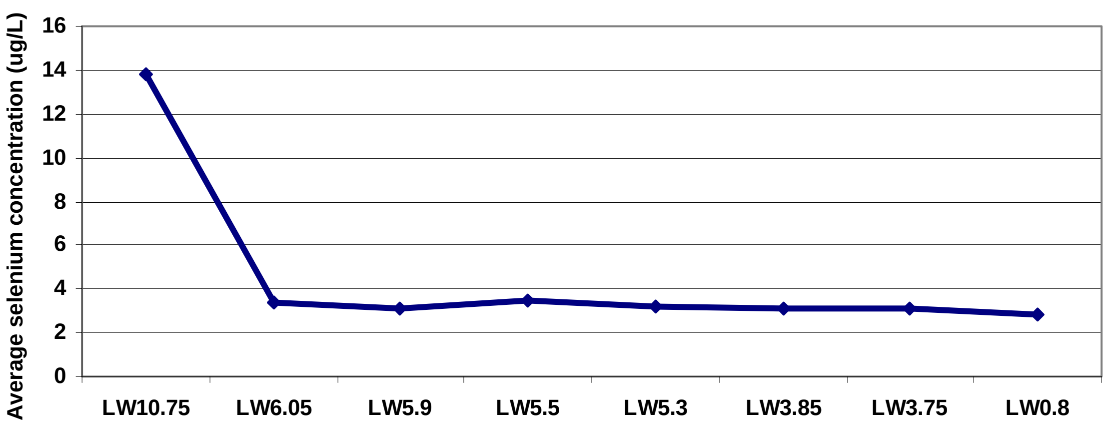

Figure 12. Average selenium data from the Las Vegas Wash Mainstream Sites

Figure 12 displays the effect of dilution by treated wastewater on selenium concentrations. As noted above, these wastewater flows enter the Wash below LW10.75. At LW10.75. the flow is comprised entirely of shallow groundwater and urban runoff. At LW6.05, roughly 80% of the flow is made up of treated wastewater.

Water Quality in Tributaries and Seeps in the Las Vegas Wash

Field Measurements

Tributary/Seep samples were collected on a quarterly basis from six tributaries to the Wash and two points where shallow groundwater surfaces are in close proximity to the Wash (Seeps). Sampling information, field measurements (EC, pH, temperature, and DO), and turbidity results are presented in Appendix Va. Average field measurements, DO, pH, temperature, specific conductance, and turbidity are presented in Table 14 and Figures 13 and 14.

Sample Site	Conductivity uS/cm	DO mg/L	pH Units	Temperature ^{0}C	Turbidity NTU
LVC_2	1901	11.64	8.63	15.8	3.67
LW12.1	3539	13.61	8.52	18.5	4.14
FW_0	3725	9.42	8.48	17.9	2.94
SC_1	2381	9.77	8.48	15.2	3.54
DC_1	5875	10.16	8.16	16.8	4.08
MC_2	4640	11.94	8.36	19.6	1.79
LWC6.3	8186	4.87	7.40	18.4	0.42
LWC3.7	3030	2.92	7.33	21.7	4.60

Table 14. Average field measurements of Tributary/Seep Locations

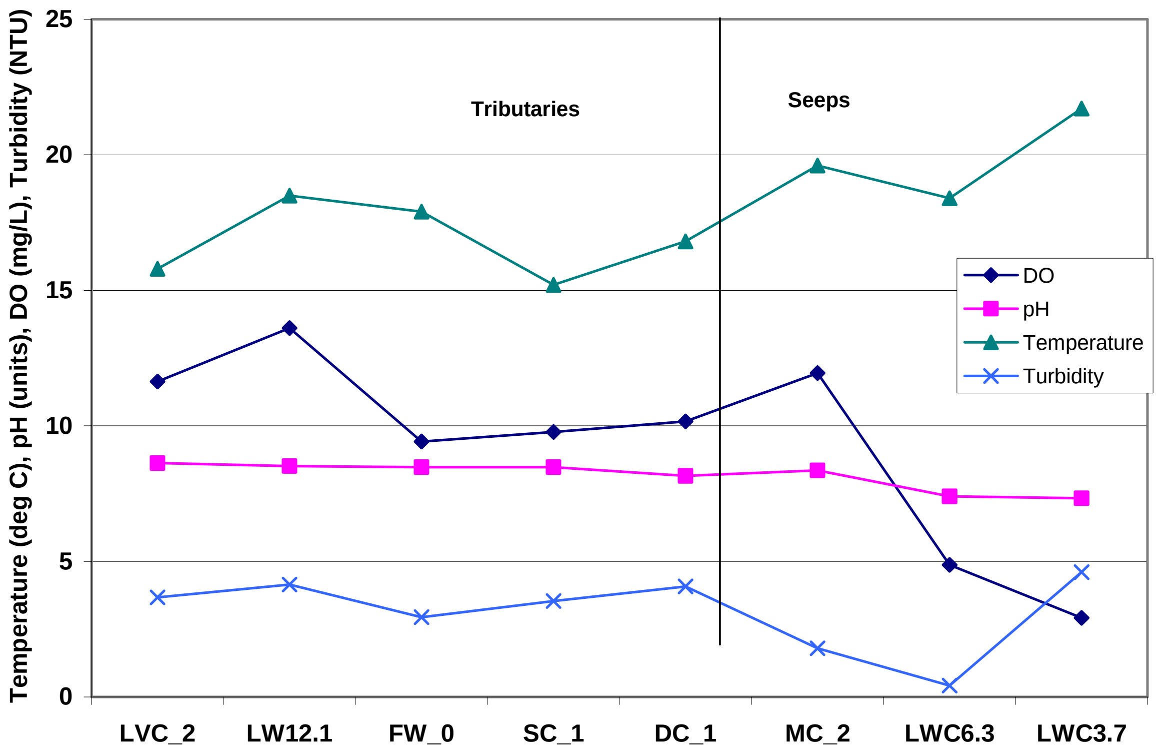

Figure 13. Average DO, pH, temperature, and turbidity measurements in Tributary/Seep Locations

Hydrogen ion or pH measured on different dates for the same site is consistent, ranging from 8.15 and 8.65 pH units in all tributaries and approximately 7.35 pH units at the two seeps. Water temperature in the tributaries reflects seasonal variability. Water temperature at the Kerr McGee Seep (LWC 6.3) also displayed seasonal variations. The temperature at the GCS5 Seep (LWC 3.7) remained near constant. Tributary water was saturated or supersaturated with dissolved oxygen on all sample dates, ranging from 9.42 mg/L to 13.61 mg/L. Water from the two seeps had relatively lower DO levels, 2.92 mg/L and 4.87 mg/L, respectively (Table 14, Figure 13). Turbidities at all sample sites were less than 5 NTU (Table 14, Figure 13).

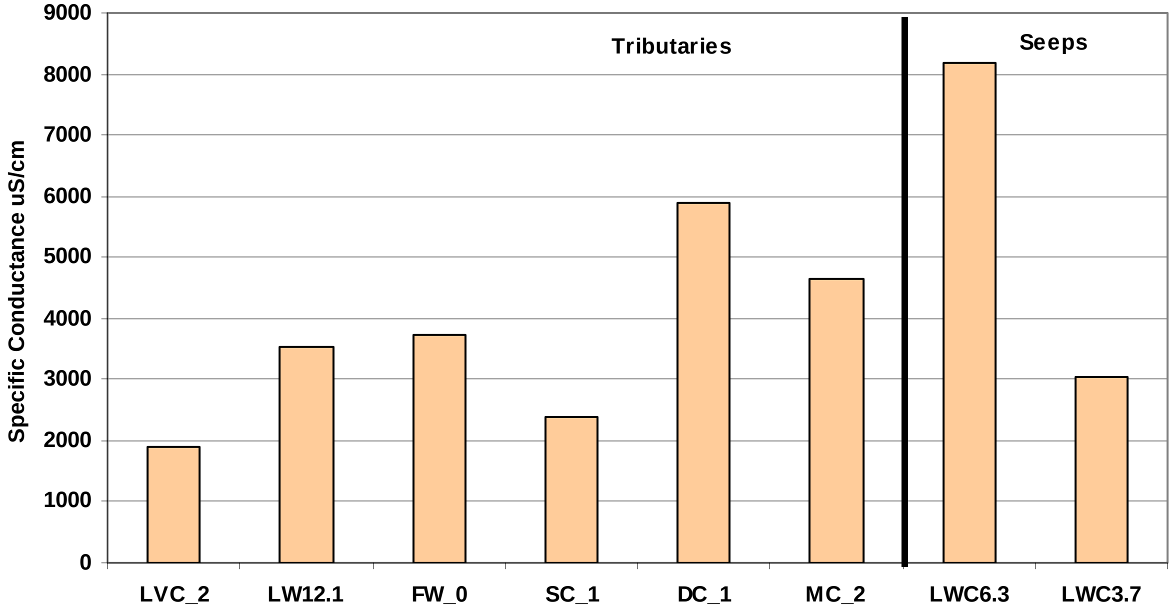

Figure 14. Average specific conductance at Tributary/Seep Locations

Average specific conductance at both Meadows Detention Basin (LVC_2) and Sloan Channel (SC_1) was lower than other tributaries (Figure 14). Average specific conductance values were 1901 µS/cm and 2381 µS/cm, respectively. Specific conductance was much higher at Duck Creek (DC_1), Monson Channel (MC_2), Flamingo Wash (FW_0) and Las Vegas Creek (LW12.1). In general, the tributaries with a longer flow path and/or shallow groundwater inputs had higher conductivities.

Comparing specific conductance for the two seeps, GCS5 Seep (LWC3.7) had a relatively lower conductivity (between 2340 µS/cm and 3300 µS/cm) with an average conductivity of 3030 µS/cm. The Kerr-McGee Seep (LWC6.3) had conductivity values as high as 10460 µS/cm with an average of 8186 µS/cm (Appendix Va, Table 14, and Figure 14).

Major Ion Chemistry

Major cation and anion data from the six tributaries and two seeps were collected quarterly and are presented in Appendix Vb. Average concentrations are in Table 15 and Figure 15. Average TDS values are in Figure 16, and average TOC results are presented in Figure 17.

Sample Sites	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Bicarbonate as HCO3 (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Bromide (mg/L)	Silicate (mg/L)	Carbonate (mg/L)	Total Dissolved Solids (mg/L)	Total Organic Carbon (mg/L)
LVC_2	122	103	157	18	160	282	608	0.0	0.0	21	10	1413	8.0
LW12.1	233	255	293	55	278	260	1715	0.5	0.7	31	4.8	3147	5.0
FW_0	328	225	289	32	303	236	1743	0.6	0.8	31	3.0	3246	3.5
SC_1	122	151	169	16	212	224	763	1.1	0.8	57	5.0	1720	5.2
DC_1	505	287	566	63	839	225	2469	1.3	1.0	53	1.9	5048	2.7
MC_2	435	321	425	32	414	227	2526	0.7	1.1	43	3.5	4505	3.7
LWC6.3	419	166	1255	37	1797	298	1603	1.4	0.7	69	0.9	5867	5.8
LWC3.7	227	97	309	47	400	186	930	1.0	0.4	39	0.5	2146	4.1

Table 15. Average major ion concentrations of water samples from Tributary/Seep Locations

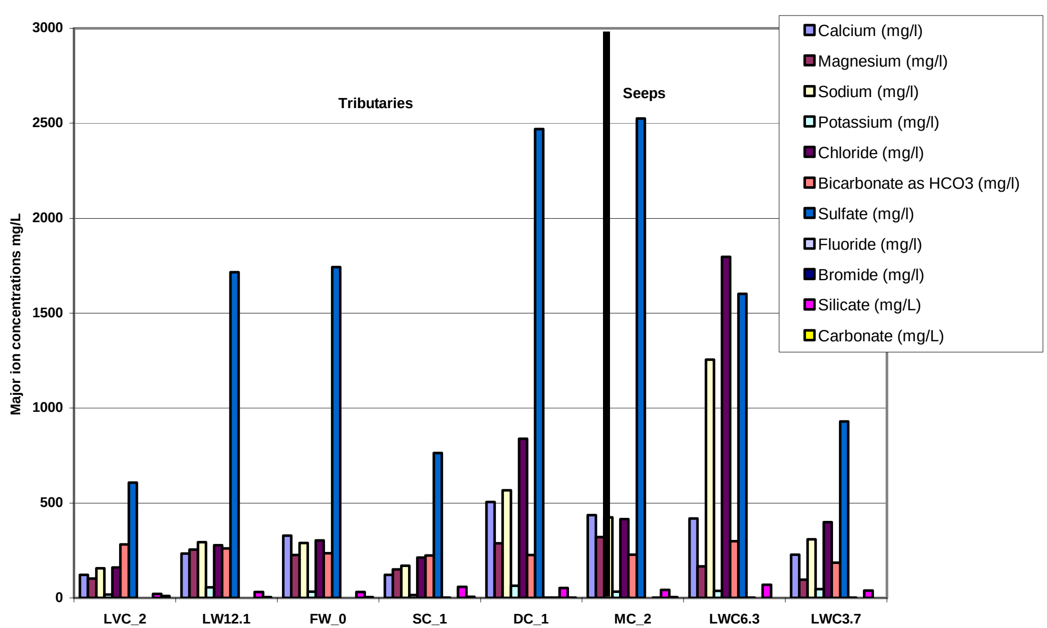

Figure 15. Average major ion concentrations from Tributary /Seep Locations

Cations in all Tributary /Seep samples were dominated by calcium (Ca^{+2}), magnesium (Mg^{+2}) and sodium (Na^{+}), whereas anions were dominated by sulfate (SO_4^{-2}), chloride (Cl^{-}) and bicarbonate (HCO_3^{-}) (Table 15, Figure 15). Sodium and chloride concentrations were noticeably highest at the Kerr-McGee Seep (LWC6.3). This is likely due to the fact that sodium chloride was used in manufacturing processes at the Basic Management Incorporated industrial site.

Eight of the 13 major ions were lowest at Meadows Detention Basin (LVC_2, Table 16), while seven of the 13 were highest at the Kerr-McGee Seep (LWC6.3, Table 16). The Meadows Detention Basin (LVC_2) sampling location is the most upstream site. The Kerr-McGee Seep (LWC6.3) location is shallow groundwater that is known to have high specific conductance.

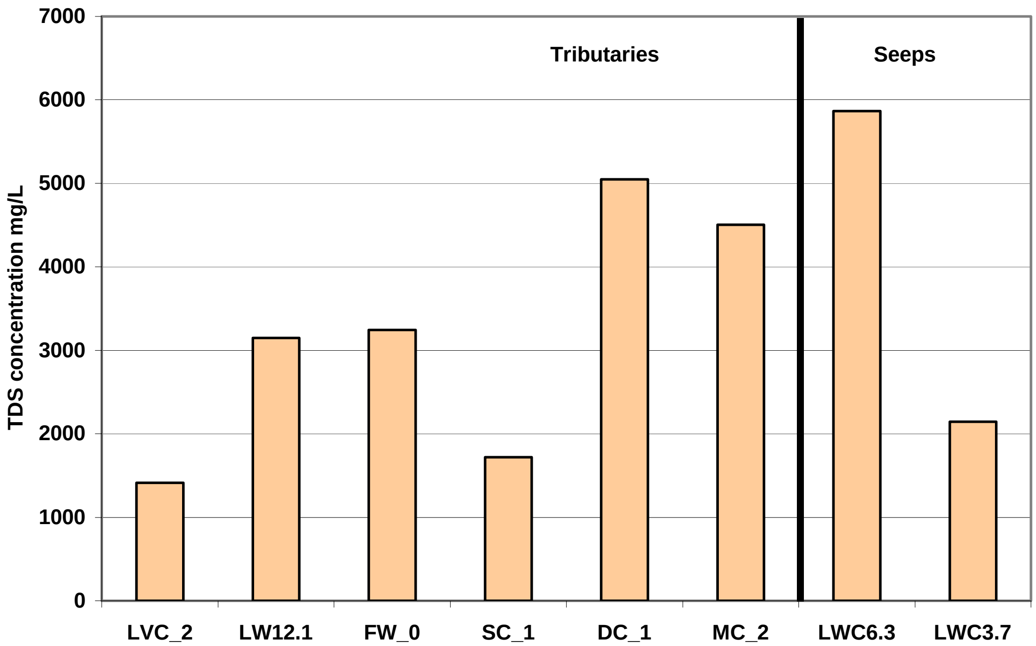

Figure 16. Average TDS concentrations from Tributary/Seep Locations

Total dissolved solids (TDS) are comprised of inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonate, carbonate, chloride and sulfate) and small amounts of organic matter that are dissolved in water (Hem, 1992). TDS in natural water originates from natural sources, such as rocks, sewage, urban runoff and industrial wastewater. Among the six tributaries, Duck Creek (DC_1), Flamingo Wash (FW_0), Las Vegas Creek (LW12.1) and Monson Channel (MC_2) have higher TDS concentrations, ranging from 3000 mg/L to 5000 mg/L. Sloan Channel (SC_1) and Meadows Detention Basin (LVC_2) have lower TDS concentrations, approximately 1700 mg/L and 1400 mg/L respectively (Table 15, Figure 16). Of two groundwater seeps, Kerr-McGee Seep (LWC6.3) had a much higher TDS concentration (5867 mg/L) than the GCS5 Seep (LWC3.7), which was detected at 2146 mg/L (Table 15, Figure 16).

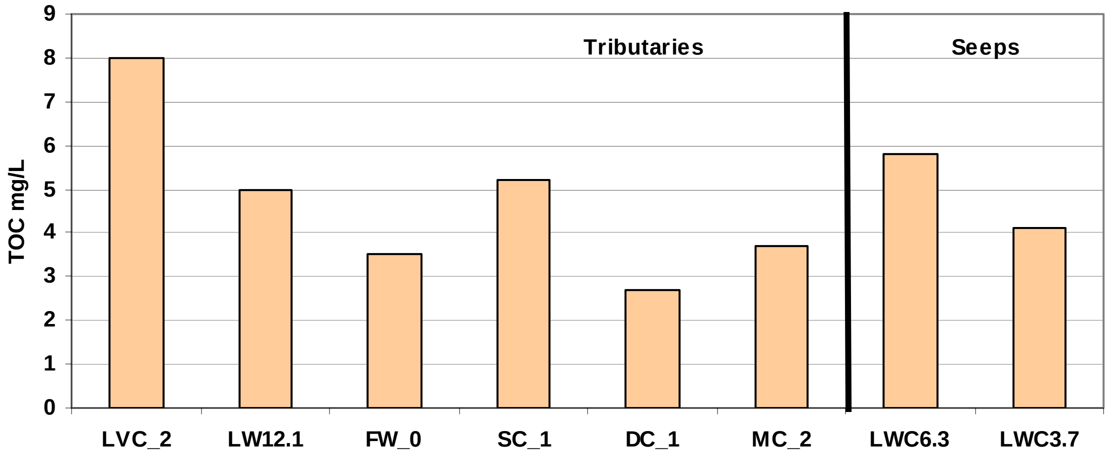

Figure 17. Average TOC concentrations from Tributary/Seep Locations

Average total organic carbon (TOC) concentrations were less than 6 mg/L for all sites with the exception of the Meadows Detention Basin (LVC_2). The highest average concentration of TOC was detected at Meadows Detention Basin of 8 mg/L (Table 15, Figure 17). The highest single TOC value was also seen at Meadows Detention Basin and was detected at 16.2 mg/L on April 24, 2002 (Appendix Vb).

Nutrients

Quarterly nutrient data from the Tributary/Seep locations, including ammonia nitrogen (NH_4^+-N), nitrite (NO_2-N), nitrate (NO_3^--N), nitrate plus Nitrite (NO_2^- + NO_3^--N), total Kjeldahl nitrogen (TKN), orthophosphate (PO_4-P) and total phosphate (TP), are presented in Appendix Vc. The average concentrations of nutrients are presented in Table 16 and in Figures 18 and 19.

Sample Site	NH4-N mg/L	NO2-N mg/L	NO3-N mg/L	NO3+NO2-N mg/L	TKN mg/L	PO_4-P mg/L	TP mg/L
LVC_2	0.22	0.09	2.35	2.49	1.82	0.07	0.14
LW12.1	0.09	0.12	2.98	3.03	0.98	0.07	0.08
FW_0	0.09	0.08	4.08	4.09	0.47	0.02	0.03
SC_1	0.19	0.09	2.45	2.50	0.98	0.04	0.05
DC_1	0.10	0.08	4.80	4.82	0.47	0.02	0.03
MC_2	0.09	0.10	4.33	4.37	0.83	0.02	0.02
LWC6.3	0.09	0.08	5.73	5.75	0.26	0.03	0.03
LWC3.7	0.20	0.08	11.64	11.72	0.73	0.07	0.08

Table 16. Average nutrient concentrations from Tributary/Seep Locations

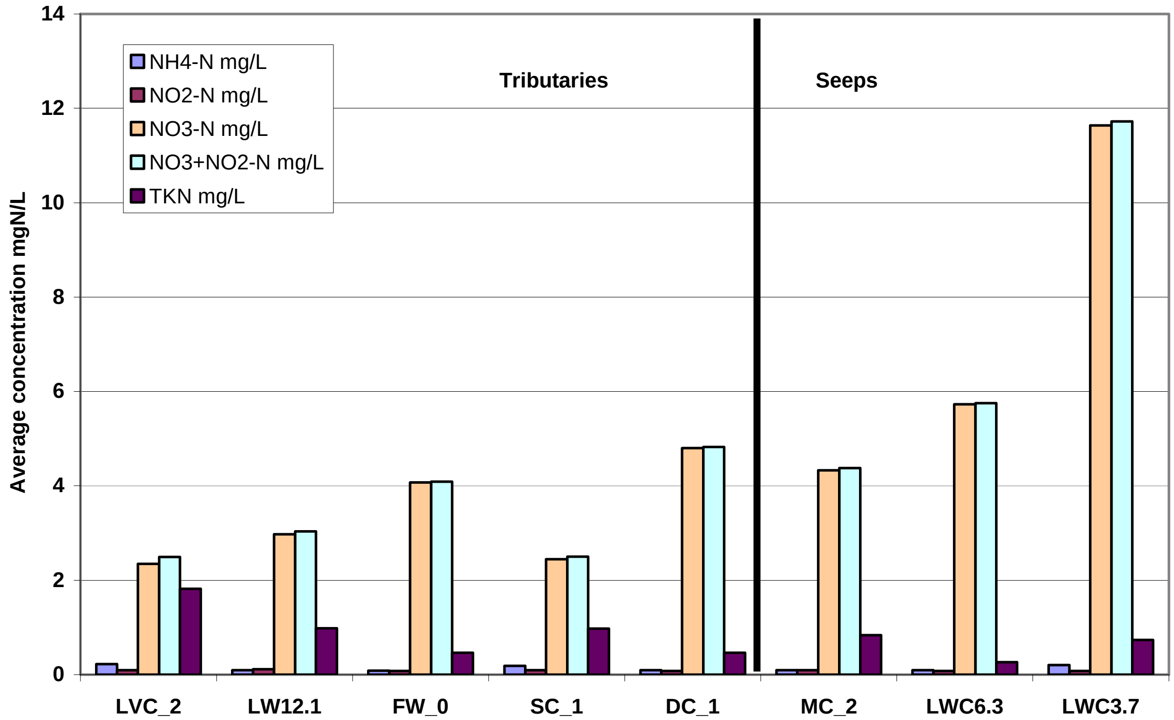

Figure 18. Average nitrogen nutrient concentrations from Tributary/Seep Locations

Ammonia nitrogen concentrations in Duck Creek (DC_1), Flamingo Wash (FW_0), Las Vegas Creek (LVC_2), Monson Channel (MC_2) and the Kerr-McGee Seep (LW6.3) were lower than the detection limit (0.08 mg/L) for most samples analyzed (Appendix Vc). Detections of ammonia nitrogen were found in Meadows Detention Basin (LVC_2) and Sloan Channel (SC_1). The average ammonia nitrogen concentrations were 0.22 and 0.19 mg N/L, respectively (Table 16). Unlike the Kerr-McGee Seep, which was below the detection limit for ammonia nitrogen (LWC6.3), concentrations at the GCS-5 Seep (LWC3.7) ranged from 0.08 mg N/L to 0.63 mg N/L, with an average concentration of 0.20 mg N/L.

As a chemically unstable species of nitrogen in aerated water, nitrite concentrations were generally not detected at all sites. In contrast, nitrate, the stable species in natural water, was detected in all tributaries and seeps. Nitrate concentrations in each tributary and seep were relatively consistent for different sample dates. The average nitrate concentrations ranged from 2 mg N/L to 6 mg N/L in the tributaries and from 5 mg N/L to 12 mg N/L in the seeps.

The average concentrations of Total Kjeldahl Nitrogen (TKN) varied from 0.26 mg N/L to 0.98 mg N/L with some high concentrations (1.00 mg N/L to 4.40 mg N/L) at Meadows Detention Basin (LVC_2), Monson Channel (MC_2), and Sloan Channel (SC_1) (Appendix Vc, Table 16, and Figure 18).

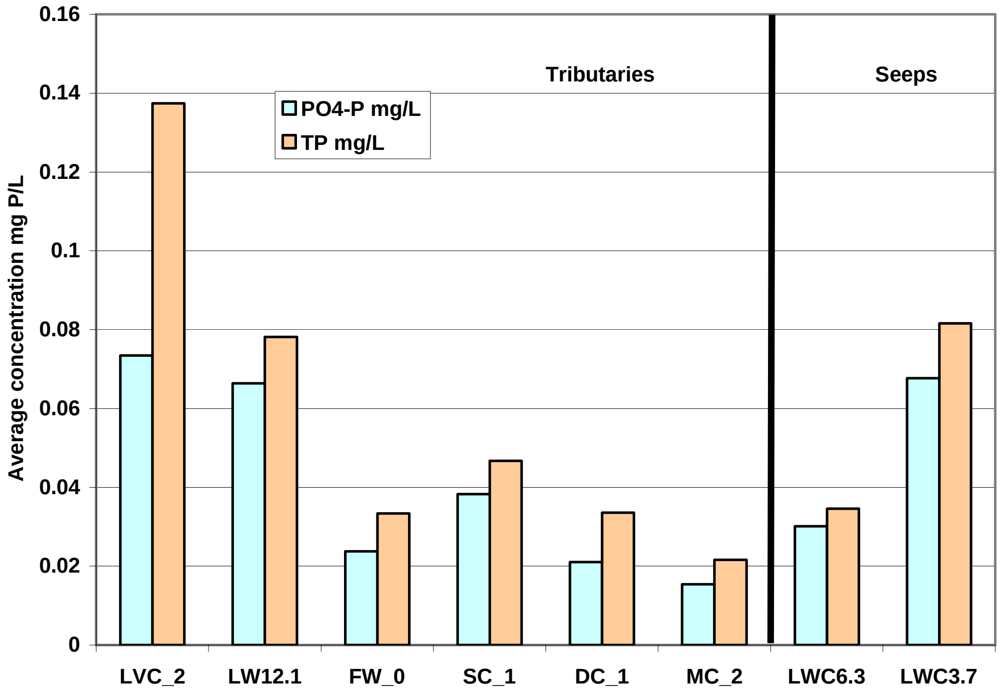

Figure 19. Average phosphorus nutrient concentrations from Tributary/Seep Locations

Average TP and PO_4-P concentrations for the tributary locations were highest at the Meadows Detention Basin (LVC_2). Average TP and PO_4-P concentrations were higher for the GCS-5 Seep (LWC3.7) than the Kerr-McGee Seep (LWC 6.3). Both orthophosphate (PO_4-P) and total phosphate concentrations in the tributaries and seeps were lower when compared to the Wash sample locations (Appendices IIIc and Vc). The average PO_4-P concentrations at the Tributary/Seep locations ranged from 0.02 mg P/L to 0.07 mg P/L and the average TP concentrations ranged from 0.02 mg P/L to 0.14 mg P/L (Table 16, Figure 19).

Metals

Seventeen metals were analyzed at the eight Tributary/Seep locations. Six metals were below the detection limit at all locations. Quarterly data for metals from the Tributary/Seep locations are in Appendix Vd. Average concentrations of metals were calculated and are presented in Table 17 and Figures 20 and 21. Metals that were not detected at any sampling location are not included in the graphs.

Sample Sites	Aluminum (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L	Chromium (µg/L)	Copper (µg/L)	Iron (µg/L)	Mercury (µg/L)	Manganese (µg/L)	Lead µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silica (µg/L)	Silver (µg/L)	Thallium (µg/L)	Zinc (µg/L)
LVC_2	105	3.7	44	ND	ND	2.3	6.9	260	ND	10.2	1.04	6.7	4.97	ND	ND	ND	20
LW12.1	77	5.5	37	ND	ND	2.3	7.3	263	ND	11.4	0.93	10.2	11	ND	ND	ND	19
FW_0	55	6.6	36	ND	ND	2.4	8.7	340	ND	8.7	0.78	12.6	15	ND	ND	ND	17
SC_1	167	21.4	62	ND	ND	4.5	5.5	387	ND	43.8	0.71	6.3	6.6	ND	ND	ND	12
DC_1	168	50.5	29	ND	ND	2	10.8	308	ND	31.7	0.57	21.1	23.31	ND	ND	ND	15
MC_2	75	16.8	26	ND	ND	2.3	8.7	250	ND	5.3	0.99	15.6	22.56	ND	ND	ND	14
LWC6.3	ND	117.3	20	ND	ND	4.6	10.2	ND	ND	865.5	N	32.5	5.9	ND	ND	ND	N
LWC3.7	518	43.5	31	ND	ND	3	10.2	1435	ND	304.7	3.64	18.3	3.82	ND	ND	ND	20

ND= Not Detected

Table 17. Average metal concentrations (µg/L) from Tributary/Seep Locations

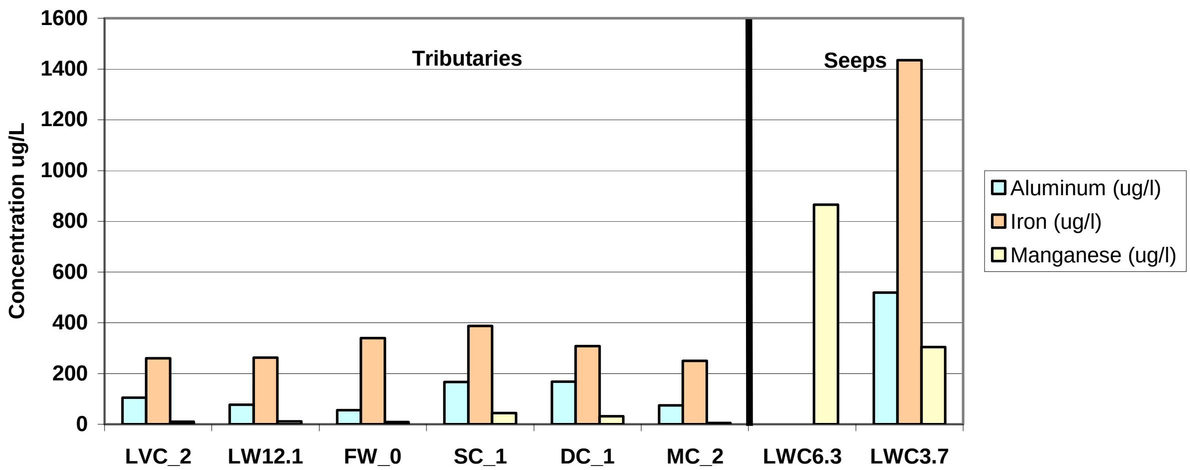

Figure 20. Average Al, Fe, and Mn concentrations from Tributary/Seep Locations

Al, Fe, and Mn have a wide range of concentrations for most Tributary/Seep locations (Appendix Vd). The concentration of manganese was much higher in both seeps than in the tributaries. It is interesting to note that manganese is used at the Basic Management Incorporated industrial site, and naturally occurring manganese can be found in close proximity to the Wash. Concentrations of iron and aluminum were much higher in the GCS-5 Seep (LWC3.7) than the tributary locations (Table 17, Figure 20). Analyses for iron and aluminum were not performed on the Kerr-McGee Seep (LWC6.3).

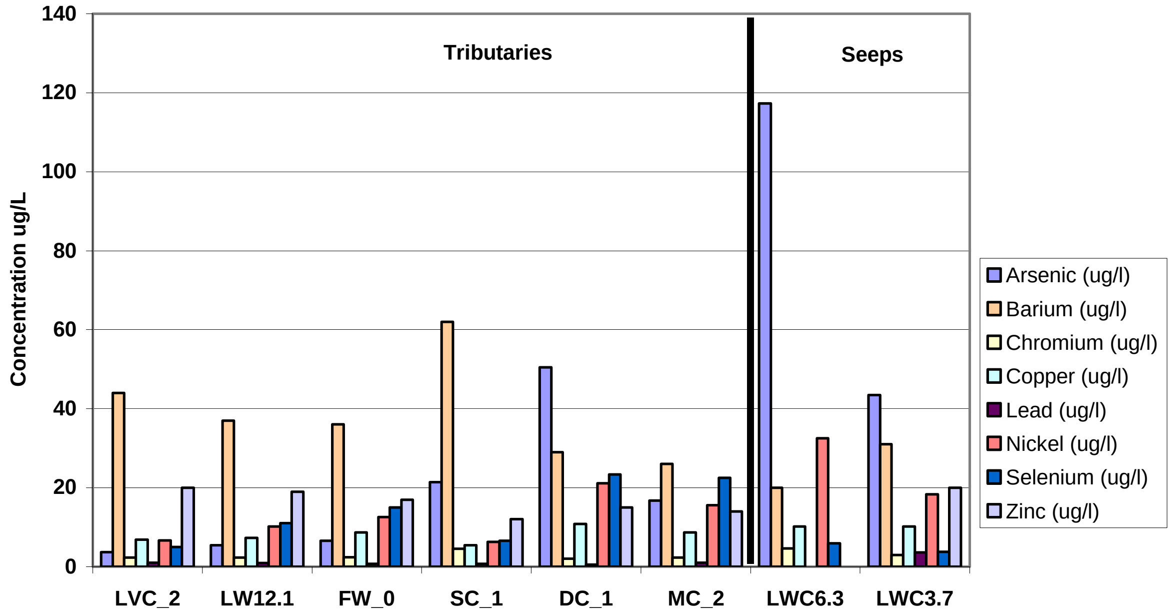

Figure 21. Average concentrations of other metals from Tributary/Seep Locations

The average concentration of arsenic was 50.5 μg/L for Duck Creek (DC_1), and ranged from 3.7 μg/L to 21.4 μg/L for the other tributaries. Arsenic concentrations for the two seeps, GCS-5 Seep (LWC3.7) and Kerr-McGee Seep (LWC6.3**)**, were 43.5 μg/L and 117.3 μg/L respectively (Table 15, Figure 21). Among the six tributaries, Duck Creek had relatively higher average concentrations of aluminum (168.0 μg/L), iron (308.0 μg/L), manganese (31.7 μg/L), arsenic (50.5 μg/L), nickel (21.1 μg/L) and selenium (23.31 μg/L). Monson Channel (MC_2) had an elevated average selenium concentration of 22.56 μg/L (Table 17, Figure 21).

Organic Compounds

A total of 161 priority organic compounds have been analyzed for all water samples collected from all Tributary/Seep locations. The complete list of priority organic compounds along with the method and detection limit is presented in Appendix Ia. Most of these organic compounds were below the analytical detection limits in the samples. Appendix Ve lists the detected organic compound concentrations found in the samples from the Tributary/Seep locations. Table 18 shows the average concentrations of the organic compounds that were detected from more than one sample location. Concentrations of the most common organic compounds detected are presented in Figure 22.

Trip blanks accompanied the Safe Drinking Water Act Volatile Organic Compounds (VOCs) and the Priority Pollutant VOCs. Analysis of the trip blanks were performed only on those samples with positive detections for Safe Drinking Water Act Volatile Organic Compounds (VOCs) and the Priority Pollutant VOCs. The trip blanks were non-detect in all cases.

Table 18. Average organic contaminant concentrations (μg/L) from Tributary/Seep Locations*

Location	2,4-D	Acetaldehyde	Beta-BHC	Butanal	Butylbenzylphthalate	Caffeine	Chloroform (Trichloromethane)	Delta-BHC	Di(2-Ethylhexyl)phthalate	Dichlorprop	Di-n-Butylphthalate	Formaldehyde	Glyoxal	Lindane	M-Glyoxal(Pyruvic Aldehyde)	Phenanthrene	Propanal	Tetrachloroethylene (PCE)	Tot DCPA Mono&Diacid Degradate	Total THM	Unknown (Total)	Unknown alcohol (Total)
LVC_2	0.31	3.73	ND	3.60	0.60	0.20	1.50	ND	0.85	1.29	0.70	13.25	3.89	ND	5.29	ND	5.29	0.90	ND	ND	11.56	ND
LW12.1	0.22	2.50	ND	ND	0.90	0.12	ND	ND	4.65	ND	ND	9.89	2.56	ND	2.63	ND	1.50	ND	ND	0.70	5.40	4.00
FW_0	0.26	2.88	ND	ND	0.70	0.11	ND	ND	0.70	ND	0.60	15.00	1.71	ND	1.50	ND	ND	ND	1.25	ND	30.70	ND
SC_1	2.25	4.50	ND	1.00	ND	0.66	ND	ND	0.90	1.63	0.60	12.33	3.25	ND	3.33	0.03	3.33	ND	0.21	ND	6.60	ND
DC_1	ND	2.00	ND	ND	ND	0.06	ND	ND	ND	ND	ND	8.71	1.33	ND	1.75	ND	ND	ND	0.36	ND	11.55	29.00
MC_2	0.15	2.29	ND	ND	ND	0.08	ND	ND	0.75	ND	ND	9.86	2.57	ND	2.00	ND	1.00	ND	0.31	ND	5.10	7.30
LWC6.3	ND	1.43	0.22	1.00	ND	ND	0.68	0.97	ND	ND	ND	7.50	1.71	0.18	1.71	0.06	1.00	0.70	0.44	0.65	406.28	167.95
LWC3.7	ND	2.00	0.03	ND	ND	ND	0.75	0.01	0.70	ND	0.60	8.17	2.00	0.04	2.00	ND	ND	ND	ND	0.55	20.15	4.20

ND = Not Detected
*Numbers in the chart reflects organic contaminants that were detected from more than one sample location.

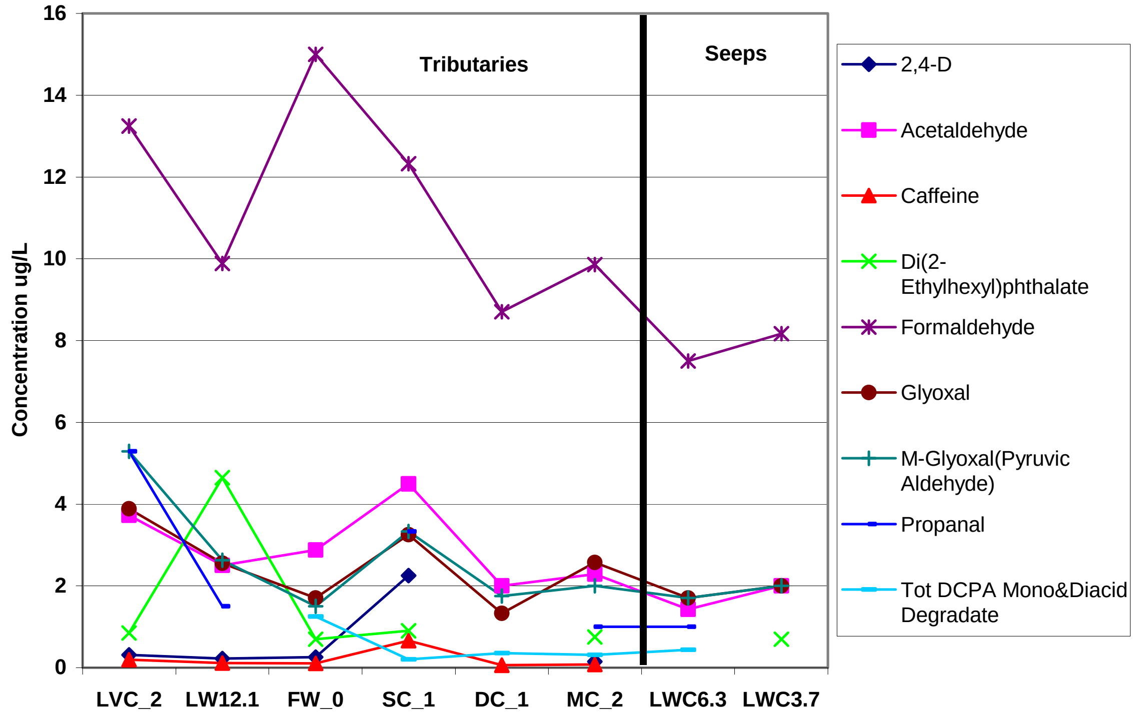

Figure 22. Average concentrations of several common organic compounds from Tributary/Seep locations

A total of 50 organic compounds were detected from at least one sampling location. There were 30 organic compounds detected at the Kerr-McGee Seep (LWC6.3), 20 at the Meadows Detention Basin (LVC_2), 20 at Sloan Channel (SC_1), 13 at Monson Channel (MC_2), 13 at the GCS-5 Seeps (LWC3.7), 12 at Flamingo Wash (FW_0), 12 at Las Vegas Creek (LW12.1), and 8 at Duck Creek (DC_1). Of the 50 total organic compounds, 60% were detected at the Kerr-McGee Seep (LWC6.3), 40% were detected at Meadows Detention Basin (LVC_2), 40% at Sloan Channel (SC_1), 26% at Monson Channel, 26% at GCS-5 Seeps (LWC3.7), 24% at Flamingo Wash (FW_0), 24% at Las Vegas Creek (LW12.1) and 16% at Duck Creek (DC_1). Four organic pollutants, including acetaldehyde, formaldehyde, glyoxal, and M-glyoxal (pyruvic aldehyde), were detected at all of the tributary and seep sites. Formaldehyde was the most common organic compound detected. The average concentration of formaldehyde ranged from 7.5 µg/L to 15.0 µg/L in all samples collected. Less common organic pollutants, such as 2,4-D, caffeine, di (2-ethylhexyl) phthalate, propanal and total DCPA were also found at very low (< 1 µg/L) or fairly low (< 15 µg/L) concentrations. Unknown organic compounds, some of which are unknown alcohol compounds, are presented as various unidentified organic pollutants (Appendix Ve). These compounds were found at higher concentrations (406.3 µg/L to 5.1 µg/L) due to the additive nature of the group. The Kerr-McGee Seep (LWC6.3) had notably higher concentrations of Unknown organic compounds than any other site (Table 18, Figure 22).

Bacteria

Fecal coliforms and *E. coli* were analyzed at the eight Tributary/Seep locations. Quarterly data for fecal coliforms and *E. coli* from the Tributary/Seep locations are included in Appendix Va. Using membrane filtration, three replicate samples were performed in order to provide for analytical validity. The results were averaged and can be found in Appendix Va. Results were reported as average colony forming units (CFU) per 100 milliliters (mL). Subsequently the average of the average concentrations of fecal coliforms and *E. coli* was then calculated. The results are presented two ways in Table 19, as a range of data and as the average of the average. Figures 23 and 24 show the average of the average fecal coliform and E. coli concentrations. Analytical results that were lower than the detection limit were graphed and averaged as zero.

Location	Range Fecal Coliforms cfu/100mL	Average of Fecal Coliforms cfu/100mL	Range of *E. coli* cfu/100mL	Average of *E. coli* cfu/100mL
LVC_2	ND - 16500	2560	10 - >2000	567
LW12.1	110 - 2180	829	60 –905	298
FW_0	ND – 3000	557	ND – 475	144
SC_1	60 – 5800	1506	75 – 1500	391
DC_1	ND - 5900	418	20 - 520	68
MC_2	15 - 2220	1069	ND – 210	114
LWC6.3	ND – 60	9	ND – 10	1
LWC3.7	ND - 6500	1251	ND – 525	73

Table 19. Average of the averaged fecal coliform and *E. coli* concentrations from Tributary/Seep Locations

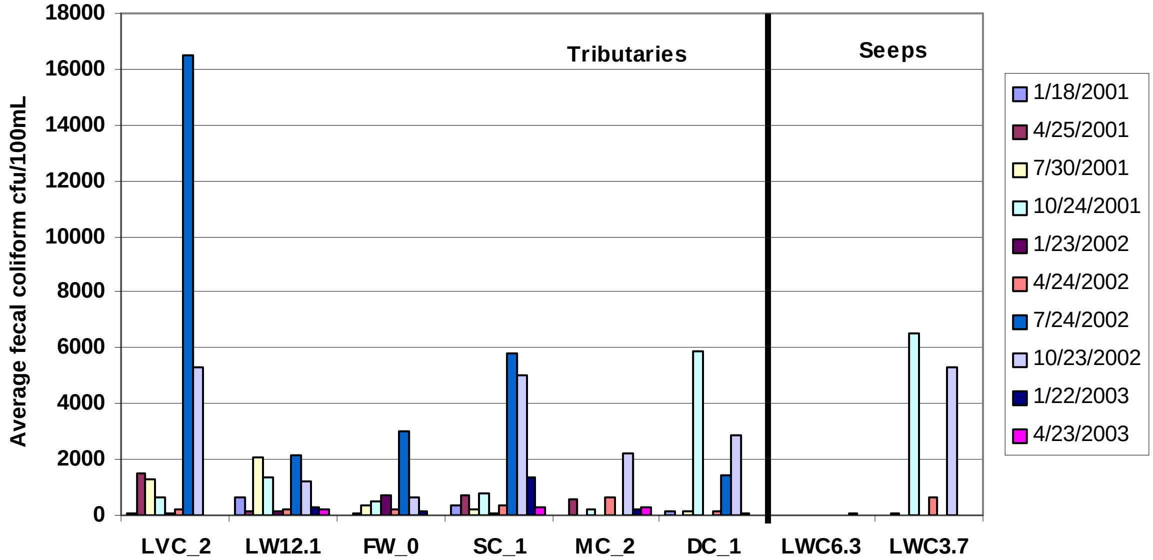

Figure 23. Fecal coliforms in Tributary/Seep Locations

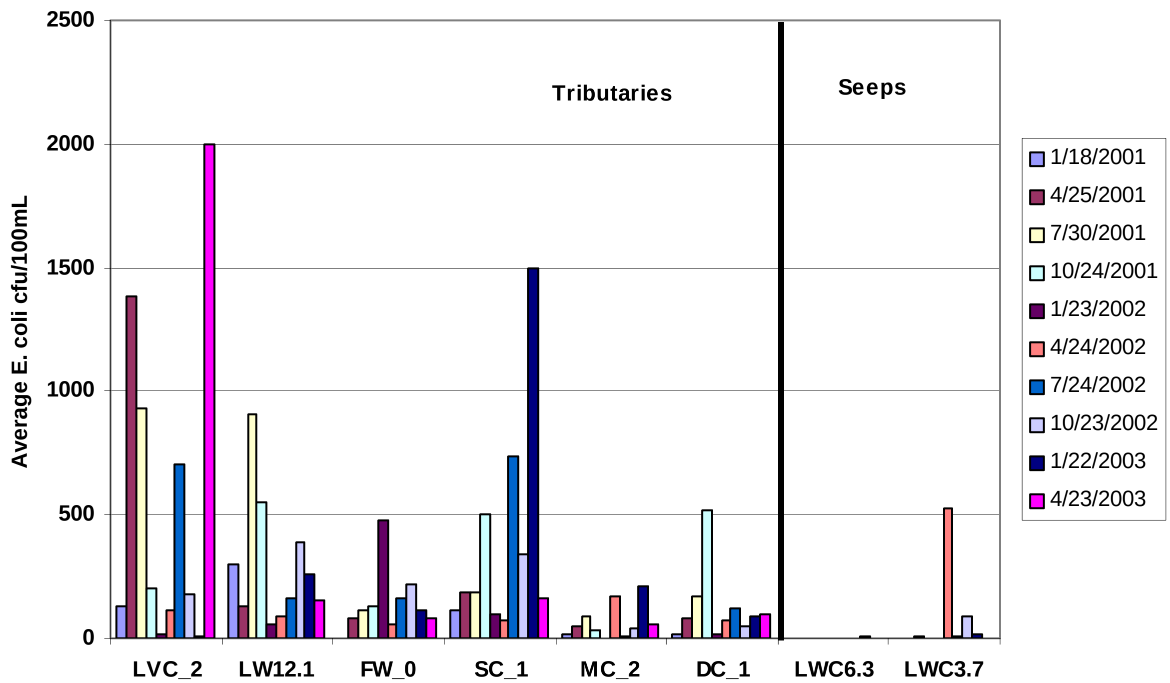

Figure 24. *E. coli* in Tributary/Seep Locations

More abundant bacteria were generally detected in the tributary water during the hot and warm seasons, particularly summer and early fall. Fewer bacteria occurred during cold and cool seasons, such as winter and spring. The highest concentrations of fecal coliforms, 10 to16,500 cfu/100mL, 60 to 5800 cfu/100mL, ND to 5,300 cfu/100mL, and ND to 6500 cfu/100mL, were found at the Meadows Detention Basin (LVC_2), Sloan Channel (SC_1), and the Duck Creek (DC_1) sites as well as the GCS5 Seep (LWC3.7) respectively. The highest concentrations of *E. coli*, 10 to 2000 cfu/100mL, 60 to 905 cfu/100mL, and 75 to 1500 cfu/100mL) were also found at the Meadows Detention Basin (LVC_2), Las Vegas Creek (LW12.1), and the Sloan Channel (SC_1) sites respectively (Table 19, Figures 23 and 24).

Meadows Detention Basin (LVC_2), Las Vegas Creek (LW12.1), and Flamingo Wash (FW_0) are strongly influenced by the commercial development along Las Vegas Boulevard (Montgomery Watson, 2000). These areas have the highest densities of hotels, tourists, impervious surfaces, traffic and transient populations in the monitoring area. Sites such as Duck Creek (DC_1), Sloan Channel (SC_1) and Monson Channel (MC_2) are more strongly influenced by residential areas, pets, urban wildlife and waterfowl. Residential versus commercial use of land surfaces does not seem to determine whether fecal coliform or *E. coli* counts will be elevated in the urban run-off from these areas. Bacteria data from all Tributary/Seep locations was highly variable indicating that a consistent source of bacteria is not present in the watershed.

There were very low to zero concentrations of bacteria found in the Kerr-McGee Seep (LWC6.3) due to the high concentration of TDS in this water. Bacteria have very strict salt requirements for growth. The TDS of this water was most likely too high to allow fecal coliform or *E. coli* growth.

Perchlorate

Perchlorate has been analyzed quarterly from six tributaries and two seeps to Las Vegas Wash since July of 2001. Quarterly perchlorate data from tributaries and seeps is presented in Appendix Va. Average perchlorate concentrations from these sites are presented in Table 20.

Sample Site	Perchlorate μg/L
LVC_2	11.1
LW12.1	11.1
FW_0	10.5
SC_1	8.6
DC_1	19.9
MC_2	17.0
LWC6.3	68087.8
LWC3.7	1413.0

Table 20. Average perchlorate concentrations in Tributary/Seep Locations

Normally the tributaries have fairly low concentrations of perchlorate (less than 15.0 µg/L) with some spikes (>25.0 µg/L) in Sloan Channel (SC_1), Duck Creek (DC_1) and Monson Channel (MC_2). Average perchlorate concentrations in the six tributaries ranged from 8.6 µg/L in Sloan Channel to 19.9 µg/L in Duck Creek (Table 20). With the exception of Duck Creek (DC_1), this concentration of perchlorate reflects the background perchlorate level in the drinking water supply, which is applied to lawns and returns via tributaries as urban run-off. The important sources of perchlorate to the Las Vegas Wash are the Kerr-McGee (LWC6.3) and GCS-5 (LWC3.7) Seeps. Both have much higher perchlorate concentrations, as they are located in the "plume" of perchlorate laden water that has been characterized by Kerr – McGee (Kerr – McGee, 2003 and Appendix Va). Average perchlorate concentrations were approximately 68,000 µg/L at the Kerr-McGee Seep (LWC6.3) and 1,400 µg/L at the GCS-5 Seep (LWC3.7), respectively (Table 20).

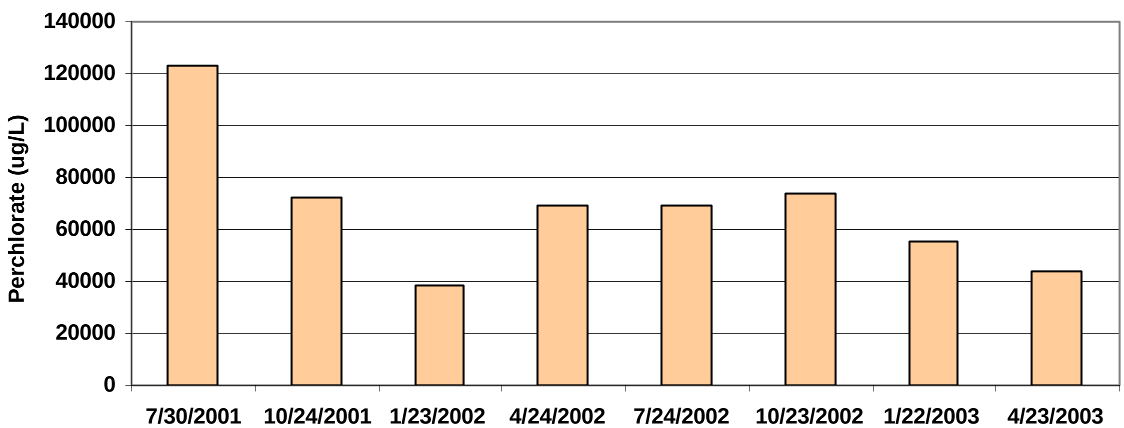

Figure 25. Perchlorate concentrations at the Kerr-McGee Seep (LWC 6.3)

Due to the remediation efforts of Kerr-McGee, perchlorate concentrations have decreased over time at the Kerr-McGee Seep (LWC6.3). The perchlorate concentration at the beginning of the sampling program was 122,934 µg/L. The concentration has decreased 36%, to 43,844 µg/L (Figure 25).

Selenium and Mercury

Selenium (Se) and mercury (Hg) are two elements that have a tendency to bioaccumulate in wetland systems. Although traditional water quality parameters have been intensively monitored in the Wash and its tributaries since 2000, a dedicated monitoring program for Se and Hg with low detection limits had not been done.

As previously mentioned, water samples were collected and preserved using ultra-clean sampling and preservation techniques. Pre-cleaned (ultra-clean) sample bottles were used. Sample bottles were rinsed three times with sample water before final sample collection. Samples were immediately acidified to pH<2 with ultra pure HNO_3. After collection, all samples were cooled to 4°C on ice and shipped overnight to SDSU.

Results from sample collections at tributary and seep sites are presented in Table 21. Additional data collection has allowed for the identification of zones of elevated Se concentrations in the tributaries and for the Se mass balance calculations within the system.

Sample Date	LVC_2	SC_1	FW_0	LW12.1	MC_1	DC_1	LWC6.3	LWC3.7
1/23/2002	7.32	8.75	17.50	12.40	22.80	23.50	4.39	4.63
4/24/2002	2.28	7.70	16.70	10.90	20.20	22.00	5.47	4.20
7/24/2002	2.92	6.59	14.40	9.68	22.00	22.00	6.54	3.33
10/23/2002	5.44	7.47	14.40	10.60	22.60	23.30	6.99	3.90
1/22/2003	6.32	7.76	15.20	11.00	23.40	23.00	5.56	3.56
4/23/2003	5.54	5.95	14.80	11.40	23.90	22.40	5.36	5.12
7/23/2003	3.55	6.73	13.50	9.05	21.60	23.40	8.02	5.56
Average	4.77	7.28	15.21	10.72	22.36	22.80	6.05	4.33

Table 21. Se concentrations (μg/L) in Tributary/Seep Locations

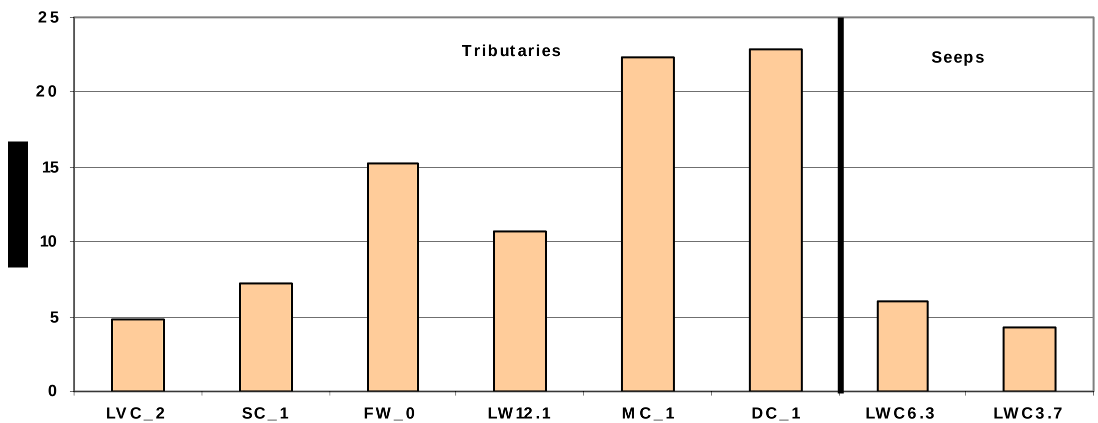

Figure 26. Average selenium concentrations in Tributary/Seep Locations

Se concentrations were fairly consistent at each sample site. Among the six tributaries, Meadows Detention Basin at Alta Channel (LVC_2) and Sloan Channel (SC_1) had lower Se concentrations, ranging from 2.28 μg/L to 8.75 μg/L. Flamingo Wash (FW_0) and Las Vegas Creek (LW12.1) had higher Se concentrations, ranging from 9.05 μg/L to 17.50 μg/L. Tributaries with large localized shallow groundwater contributions, such as Monson Channel (MC_1) and Duck Creek (DC_1), have the highest Se concentrations, between 20 μg/L and 24 μg/L. However, the two seeps to the Wash, which come from the regional shallow groundwater aquifer, have fairly low Se concentrations (Table 21). The average Se concentrations from these tributaries and seeps range from 4 μg/L to 23 μg/L (Figure 26).

Additional selenium data collection will be conducted in 2004 to determine if there are any specific locations where selenium is occurring at elevated levels in the watershed. Samples will be collected at set intervals along the tributaries to determine if the selenium contribution is localized or distributed equally in the watershed.

CONCLUSIONS

Water samples have been collected and analyzed from eight sample sites in the mainstream Las Vegas Wash on a monthly basis and from six tributaries and two seeps to the Las Vegas Wash on a quarterly basis. This report summarized the results of two water quality monitoring programs between August 2000 and June 2003. These two long-term monitoring programs have helped to establish baseline information on water quality in the Las Vegas Wash and its tributaries, quantify the water quality effects of urban runoff from the Las Vegas valley on the Wash and are beginning to help determine the impacts of the newly developed wetland systems behind recently constructed erosion control structures on water quality in the Wash.

Water quality in the mainstream Las Vegas Wash is mainly dominated by the water quality of the treated effluent from three wastewater treatment facilities. Downstream from the effluent discharges (below LW6.05), urban runoff has been dramatically diluted for most water quality parameters, such as TDS, major ions and some trace metals. However, nutrients, including nitrate nitrogen and phosphorus (TP and PO_4-P), are increase downstream of the effluent discharges.

As one of four flow components in the Las Vegas Wash, urban runoff from the Las Vegas valley contributes approximately 13,000 acre-ft/yr (LVWCC, 2003) of flow to the Wash, approximately 7% of the total Wash flow. The Wash accounts for 1.8% of the total water inflow to Lake Mead. Therefore, flows from tributaries are equivalent to 0.13% of the total water inflow to Lake Mead.

Generally, tributary and seep water have high TDS due to high evaporation rates in the Las Vegas watershed and groundwater inputs. Comparisons of concentrations of parameters in the six urban tributaries showed that Duck Creek (DC_1) and Flamingo Wash (FW_0) are the two major sources of TDS, heavy metals, organic compounds and nutrients to the Wash (LVWCC, 2003). Las Vegas Creek (LW12.1) contributes the third greatest portion of each variable. All tributary waters have varying concentrations of bacteria, including fecal coliform and *E. coli*, but the values vary greatly over time indicating there is no consistent source of bacteria. The shallow groundwater discharges from the GCS-5 Seep (LWC3.7), and in particular the Kerr-McGee Seep (LWC 6.3), have a negative effect on water quality of the Wash. They are not only the major sources for perchlorate but also contribute other inorganic and organic constituents.

A baseline dataset of Se analyses of samples collected from the Wash and its tributaries and seeps suggest that resurfacing shallow groundwater, which enters the Las Vegas Wash through tributaries, is the major source of Se.

The data generated for this report will be used by the LVWCC to help evaluate the current state of heath of the Wash, to monitor variations over time in water quality and to help manage the Wash as a whole to maximize environmental benefits.

ACKNOWLEDGEMENT

Staff of the Southern Nevada Water Authority's Las Vegas Wash Team and Southern Nevada Water System (SNWS) has been carrying out this investigation. Staff of the SNWS Laboratory Support Services and the Las Vegas Wash Team performed field sampling. The SNWS Microbiology Laboratory analyzed biological samples, Montgomery Watson Laboratories have been contracted to analyze inorganic and organic chemical constituents, and the Clark County Sanitation District Laboratory and NEL Laboratory analyzed nutrients of the samples. United States Environmental Protection Agency Region 9 provided funding for the project.

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Appendix I

Individual Parameters to be Analyzed for the Water Quality Monitoring Programs in the Mainstream Las Vegas Wash and the Tributary/Seep Locations

Ia. Organic Group and Detection Limits (Tributary/Seep only)

Ib. Heavy Metals Group

Ic. Cation-Anion Group

Id. Bacteriological Group

Ie. Nutrient Group

Ia. Organic Group

Organic Contaminant	Detection Limit (µg/L)	Organic Contaminant	Detection Limit (µg/L)
Diazinon (Basudin, Neocidol)	0.10	2-Chloronaphthalene	5.00
Methyl bromide (bromomethane)	0.50	2-Chlorophenol	5.00
1,1,1,2-Tetrachloroethane	0.50	2-Chlorotoluene	0.50
1,1,2,2-Tetrachloroethane	0.50	2-Nitrophenol	5.00
1,1,2-Benzofluoranthene (benzo(b)fluoranthene)	0.02	3,4-Benzofluoranthene (benzo(b)fluoranthene)	0.02
1,1,2-Benzoperylene (benzo(ghi)perylene)	0.05	3-Hydroxycarbofuran	2.00
1,1-Dichloroethane	0.50	4,4-DDD (p,p-TDE)	0.01
1,1-Dichloroethylene	0.50	4,4-DDT	0.01
1,1-Dichloropropanone	0.50	4,6-Dinitro-o-cresol	50.00
1,1-Dichloropropene	0.50	4-Bromophenyl phenyl ether	5.00
1,2,5,6-Dibenzanthracene Dibenzo(h)anthracene)	0.05	4-Chlorophenyl phenyl ether	5.00
1,2-Benzanthracene (benzo(a) anthracene)	0.05	4-Chlorotoluene	0.50
1,2-Dibromo-3-chloropropane (DBCP)	0.01	4-Nitrophenol	1.00
1,2-Dichlorobenzene	0.50	a-Benzene Hexachloride (a-BHC)	0.01
1,2-Dichloroethane	0.50	Acenaphthene	5.00
1,2-Dichloropropane	0.50	Acenaphthylene	0.10
1,2-Diphenylhydrazine	10.00	Acrolein	50.00
1,3-Dichlorobenzene	0.50	Acrylonitrile	50.00
1,3-Dichloropropane	0.50	Alachlor (Alanex)	0.05
1,4-Dichlorobenzene	0.50	Aldicarb (Temik)	0.50
1-Phenylpropane	0.50	Aldicarb sulfone	0.70
2,2-Dichloropropane	0.50	Aldicarb sulfoxide	0.50
2,4,5-TP (Silvex)	0.20	Aldrin	0.01
2,4-D	0.10	Alpha-endosulfan	0.01
2,4-Dichlorophenol	5.00	Anthracene	0.02

2,4-Dimethylphenol	5.00	Atrazine (Aatrex)	0.05
2,4-Dinitrophenol	50.00	Baygon	2.00
2,4-Dinitrotoluene	0.10	b-Benzene Hexachloride (b-BHC)	0.01
2,6-Dinitrotoluene	5.00	Bentazon (Basagran)	0.50
2-Chloroethyl vinyl ether (mixed)	0.50	Benzene	0.50
Benzidine	50.00	Dibromoacetonitrile	0.50
Benzo(a)pyrene	0.02	Dibromochloromethane	0.50
Beta-endosulfan	0.01	Dibromomethane	0.50
Bis(2-chloroethoxy) methane	10.00	Dicamba (Banax, Banvel, Dianat)	0.08
Bis(2-chloroethyl) ether	10.00	Dichloroacetonitrile	0.50
Bis(2-chloroisopropyl) ether	10.00	Dichlorobromomethane	0.50
Bromacil (Hyvar X, Hyvar XL)	0.20	Dichlorodifluoromethane	0.50
Bromoacetic Acid	0.50	Dichloromethane (Methylene chloride)	0.50
Bromochloroacetonitrile	0.50	Dieldrin	0.01
Bromochloromethane (Chlorobromomethane)	0.50	Diethyl phthalate	0.50
Bromodichloromethane (Dichlorobromomethane)	0.50	Difluorodichloromethane	0.50
Bromoform (Tribromomethane)	0.50	Dimethoate (Cygon)	10.00
Bromomethane (Methyl bromide)	0.50	Dimethyl phthalate	0.50
Butachlor (Butanex, Lambast, Machete)	0.05	Di-N-Butyl phthalate	10.00
Butyl benzyl phthalate	0.50	Di-n-octyl phthalate	10.00
Carbaryl (Sevin)	2.00	Dinoseb	0.20
Carbofuran (Furadan)	0.90	Diquat	0.40
Carbon tetrachloride	0.50	Diuron (Karmex, Krovar)	1.00
Chlordane	0.10	Endosulfan sulfate	0.01
Chlorobenzene (Monochlorobenzene)	0.50	Endothal	1.00
Chlorodibromomethane	0.50	Endrin	0.01
Chloroethane	0.50	Endrin aldehyde	0.01
Chloroform	0.50	Ethion	0.50

Chloromethane	0.50	Ethylbenzene	0.50
Chloropicrin	0.50	Ethylene dibromide (EDB)	0.01
Chlorothalonil (Bravo)	0.01	Fluoranthene	0.10
Chrysene	0.02	Fluorene	0.05
Cis-1,2-Dichloroethylene	0.50	Formaldehyde	5.00
Dalapon	1.00	Glyphosate	6.00
Di(2-ethylhexyl)adipate	0.60	Heptachlor	0.01
Di(2-ethylhexyl)phthalate (DEHP)	4.00	Heptachlor epoxide	0.01
Hexachlorobenzene	0.05	Oxamyl	2.00
Hexachlorobutadiene	0.50	Parathion	0.50
Hexachlorocyclopentadiene	0.05	Pentachlorophenol	0.04
Hexachloroethane	5.00	Phenanthrene	0.02
Indeno(1,2,3-cd)pyrene(2,3-o-phenylene pyrene)	0.05	Phenol	5.00
Isophorone	0.50	Picloram	0.10
Isopropylbenzene (Cumene)	0.50	p-Isopropyltoluene (p-Cymene)	0.50
Lindane (gamma-BHC)	0.01	Polychlorinated biphenyls (PCBs)	0.10
Malathion	0.50	Prometryn (Caparol)	0.50
Methoxychlor (Lannate)	0.05	Propachlor (Albrass, Ramrod)	0.05
Methyl Isobutyl Ketone (MIBK)	5.00	Pyrene	0.05
Methyl-tert-butyl ether (MTBE)	3.00	sec-Butylbenzene (2-Phenylbutane)	0.50
Metribuzin (Lexone, Sencor, Sencoral)	0.05	Simazine (Princep)	0.05
Molinate (Ordam)	0.20	Styrene	0.50
Naphthalene (Naphthalin)	0.50	tert-Butylbenzene (2-Methyl-2-phenylpropane)	0.50
n-Butylbenzene	0.50	Tetrachloroethylene	0.50
Nitrobenzene	5.00	Thiobencarb (Bolero)	0.20
N-Nitrosodimethylamine	5.00	Toluene	0.50
N-Nitrosodi-n-propylamin	5.00	Trans-1,2-Dichloroethylene	0.50
N-Nitrosodiphenylamine	5.00		

Ib. Heavy Metals Group
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Copper
Chromium
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

Ic. Cation-Anion Group

Sodium
Potassium
Calcium
Magnesium
Bicarbonate
Chloride
Fluoride
Sulfate
Chlorate
Bromide
Silica (SiO_2)
Total Dissolved Solids (TDS)
Total suspended Solids (TSS)
Total Organic Carbon (TOC)

Id. Bacteriological Group

Fecal coliforms
E. coli

Ie. Nutrient Group

Nitrate Nitrogen (NO_3-N)
Nitrite Nitrogen (NO_2-N)
Total Kjeldahl Nitrogen (TKN)
Ammonia Nitrogen (NH_3-N)
Total Phosphorus (TP)
Ortho-Phosphorus (PO_4-P)

Appendix II

Nutrient Results – Travel Blanks and Duplicates

Appendix II. Nutrient Results - Travel Blanks and Duplicates

Programs	Blanks or Duplicates	Identifier	Sample Date	NH4		NO2		NO3		NO3+NO2		Total P		OrthoPO4		TKN
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Mainstream Sampling Program	Blanks	LW BLN	2000/08/28		NA*	<	0.08	<	0.08	<	0.08		0.03		0.04	0.20
		LW BLN	2000/09/27		NA	<	0.08	<	0.08	<	0.08		0.04		0.02	0.40
		LW BLN	2000/10/25		NA	<	0.08	<	0.08	<	0.08	<	0.01		0.03	NA
		LW BLN	2000/11/20		NA	<	0.08	<	0.08	<	0.08		0.04	<	0.01	0.10
		LW BLN	2000/12/20		NA	<	0.08	<	0.08	<	0.08		0.04		0.01	0.10
		LW BLN	2001/01/18		NA	<	0.08	<	0.08	<	0.08		0.02	<	0.01	NA
		LW BLN	2001/02/21		NA	<	0.08	<	0.08	<	0.08		0.02		0.02	0.20
		LW BLN	2001/03/28		NA	<	0.08	<	0.08	<	0.08		NA		NA	NA
		LW BLN	2001/04/25		NA	<	0.08	<	0.08	<	0.08		0.03		NA	0.10
		LW BLN	2001/05/30		NA	<	0.08	<	0.08	<	0.08		0.03		0.01	0.30
		LW BLN	2001/06/27		NA	<	0.08	<	0.08	<	0.08		0.02	<	0.01	0.20
		LW BLN	2001/07/30		NA	<	0.08	<	0.08	<	0.08		0.02		NA	NA
		LW BLN	2001/08/22		NA	<	0.08	<	0.08	<	0.08		0.01	<	0.01	NA
		LW BLN	2001/09/26		NA	<	0.08	<	0.08	<	0.08		0.02		0.01	NA
		LW BLN	2001/10/24		NA	<	0.08	<	0.08	<	0.08		0.01		0.05	NA
		LW BLN	2001/11/28		NA	<	0.08	<	0.08	<	0.08		0.01		0.03	0.70
		LW BLN	2001/12/18		NA	<	0.08	<	0.08	<	0.08	<	0.01		0.01	1.60
		LW BLN	2002/01/23	<	0.08	<	0.08	<	0.08	<	0.08	<	0.01	<	0.01	NA
		LW BLN	2002/02/20	<	0.08	<	0.08	<	0.08	<	0.08		0.01		0.02	NA
		LW BLN	2002/03/26	<	0.08	<	0.08	<	0.08	<	0.08		0.02		0.01	0.10
		LW BLN	2002/04/24	<	0.08	<	0.08	<	0.08	<	0.08		0.02		0.02	0.60
		LW BLN	2002/05/22	<	0.08	<	0.08	<	0.08	<	0.08		0.05		0.04	1.00
		LW BLN	2002/06/26	<	0.08	<	0.08	<	0.08	<	0.08		0.06		0.05	1.10
		LW BLN	2002/07/24	<	0.08	<	0.08	<	0.08	<	0.08		0.02	<	0.01	0.90
		LW BLN	2002/08/26	<	0.08	<	0.08	<	0.08	<	0.08		0.07		NA	NA
		LW BLN	2002/09/25	<	0.08	<	0.08	<	0.08	<	0.08		0.04		0.05	0.40
		LW BLN	2002/10/23		0.10	<	0.08	<	0.08		0.18		0.03		0.02	0.10
		LW BLN	2002/11/20	<	0.08	<	0.08	<	0.08	<	0.08		0.04		0.03	NA
		LW BLN	2002/12/18	<	0.08	<	0.08	<	0.08	<	0.08		0.04		0.04	NA
		LW BLN	2003/01/22	<	0.08	<	0.08	<	0.08	<	0.08		0.05		0.04	NA
		LW BLN	2003/02/19	<	0.08	<	0.08	<	0.08	<	0.08		0.05	<	0.03	0.10
		LW BLN	2003/03/26	<	0.08	<	0.08	<	0.08	<	0.08		0.02		0.04	NA
		LW BLN	2003/04/23	<	0.08	<	0.08	<	0.08	<	0.08		0.01		NA	NA
	Duplicates	LW3.85D	2000/08/28		NA	<	0.08		7.92		7.92		0.29		0.12	0.30
		LW3.85D	2000/09/27		NA	<	0.08		14.06		14.06		0.19		0.10	0.90
		LW3.85D	2000/10/25		NA	<	0.08		13.17		13.17		0.18		0.07	0.60
		LW3.85D	2000/11/20		NA		0.16		13.95		13.95		0.58		0.44	0.90
		LW3.85D	2000/12/20		NA	<	0.08		13.50		13.50		0.59		0.51	0.70
		LW3.85D	2001/01/18		NA	<	0.08		15.27		15.27		1.05		0.45	1.10
		LW3.85D	2001/02/21		NA	<	0.08		13.88		13.88		0.26		0.22	0.30
		LW3.85D	2001/03/28		NA	<	0.08		14.78		14.78		NA		NA	NA
		LW3.85D	2001/04/25		NA	<	0.08		14.28		14.28		0.24		NA	0.60
		LW3.85D	2001/05/30		NA	<	0.08		13.92		13.92		0.09		0.04	0.40
		LW3.85D	2001/06/27		NA	<	0.08		13.79		13.79		0.18		0.15	0.50
		LW3.85D	2001/07/30		NA	<	0.08		13.42		13.42		0.16		NA	NA
		LW3.85D	2001/08/22		NA	<	0.08		14.27		14.27		0.10		0.04	NA
		LW3.85D	2001/09/26		NA	<	0.08		14.67		14.67		0.08		0.04	NA
		LW3.85D	2001/10/24		NA	<	0.08		15.59		15.59		NA		0.11	NA
		LW3.85D	2001/11/28		NA	<	0.08		14.27		14.27		0.42		0.13	1.30
		LW3.85D	2001/12/18		NA	<	0.08		13.54		13.54		0.20		0.19	NA
		LW3.85D	2002/01/23	<	0.08	<	0.08		14.15		14.15		0.20		0.19	NA
		LW3.85D	2002/02/20	<	0.08	<	0.08		14.17		14.17		0.34		0.22	0.90
		LW3.85D	2002/03/26	<	0.08	<	0.08		14.87		14.87		0.08		0.05	1.20
		LW3.85D	2002/04/24	<	0.08		0.08		11.54		11.54		0.15		0.08	0.70
		LW3.85D	2002/05/22	<	0.08	<	0.08		15.00		15.00		0.22		0.15	1.10
		LW3.85D	2002/06/26	<	0.08	<	0.08		16.11		16.11		0.13		0.09	NA
		LW3.85D	2002/07/24	<	0.08	<	0.08		12.66		12.66		0.14		0.15	1.20
		LW3.85D	2002/08/26	<	0.08	<	0.08		13.49		13.49		0.09		0.06	NA
		LW3.85D	2002/09/25		0.48	<	0.08		9.11		9.59		0.82		0.52	1.70
		LW3.85D	2002/10/23		0.22	<	0.08		14.88		15.10		0.22		0.12	0.70
		LW3.85D	2002/11/20	<	0.08	<	0.08		14.96		14.96		0.11		0.07	0.80
		LW3.85D	2002/12/18		0.36	<	0.08		15.29		15.64		0.08		0.06	1.00
		LW3.85D	2003/01/22	<	0.08	<	0.08		14.63		14.63		0.16		0.12	NA
		LW3.85D	2003/02/19		0.09	<	0.08		14.32		14.41		0.13		0.08	0.50
		LW3.85D	2003/03/26	<	0.08	<	0.08		14.26		14.26		3.26		0.10	1.00
		LW3.85D	2003/04/23	<	0.08	<	0.08		15.02		15.02		0.08		NA	NA

Appendix II. Nutrient Results - Travel Blanks and Duplicates

Programs	Blanks or Duplicates	Identifier	Sample Date	NH4		NO2		NO3		NO3+NO2		Total P		OrthoPO4		TKN
				mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L
Tributary & Seep Sample Program	Blanks	LWTRIB BLN	2000/10/25		NA	<	0.08	<	0.08	<	0.08	<	0.01		0.03	0.80
		LWTRIB BLN	2001/01/18		NA	<	0.08	<	0.08	<	0.08	<	0.01	<	0.01	0.10
		LWTRIB BLN	2001/04/25		NA	<	0.08	<	0.08	<	0.08	<	0.01		NA	0.10
		LWTRIB BLN	2001/07/30		NA	<	0.08	<	0.08	<	0.08	<	0.01		NA	NA
		LWTRIB BLN	2001/10/24		NA	<	0.08	<	0.08	<	0.08		0.01		0.01	NA
		LWTRIB BLN	2002/01/23	<	0.08	<	0.08	<	0.08	<	0.08	<	0.01	<	0.01	NA
		LWTRIB BLN	2002/04/24	<	0.08	<	0.08	<	0.08	<	0.08	<	0.01		0.01	0.40
		LWTRIB BLN	2002/07/24	<	0.08	<	0.08	<	0.08	<	0.08		0.02	<	0.01	0.90
		LWTRIB BLN	2002/10/23		0.18	<	0.08	<	0.08		0.26		0.02		0.02	0.10
		LWTRIB BLN	2003/01/22	<	0.08	<	0.08	<	0.08	<	0.08		NA		NA	NA
		LWTRIB BLN	2003/04/23	<	0.08	<	0.08	<	0.08	<	0.08		NA		0.02	NA
	Duplicates	FW 0D	2000/10/25		NA	<	0.08		0.81		0.81		0.10		0.08	0.70
		FW 0D	2001/01/18		NA	<	0.08		6.02		6.02		0.02		0.02	0.30
		FW 0D	2001/04/25		NA	<	0.08		4.03		4.03		0.01		NA	0.10
		FW 0D	2001/07/30		NA	<	0.08		3.64		3.64		0.01		NA	NA
		FW 0D	2001/10/24		NA	<	0.08		3.82		3.82		0.02		0.02	NA
		FW 0D	2002/01/23	<	0.08	<	0.08		5.41		5.41		0.01	<	0.01	NA
		FW 0D	2002/04/24	<	0.08	<	0.08		4.62		4.62	<	0.01		0.01	0.10
		FW 0D	2002/07/24	<	0.08	<	0.08		2.96		2.96		0.06	<	0.01	1.30
		FW 0D	2002/10/23		0.19	<	0.08		4.09		4.28		0.04		0.02	0.40
		FW 0D	2003/01/22	<	0.08	<	0.08		4.42		4.42		0.05		0.03	NA
		FW 0D	2003/04/23	<	0.08	<	0.08		4.30		4.30		NA		0.02	NA

NA: Not Analyzed

Appendix III

Monthly Water Quality Data from Eight Sample Sites in the Mainstream Las Vegas Wash

IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

IIId. Monthly Heavy Metal Data from the Las Vegas Wash Mainstream Sites

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance	DO	PH	Temp	CLO4	Ave # FC	Ave # E. coli
			us/cm	mg/l	Units	Deg.C	ug/l	/100 mL	/100 mL
Upstream City of Las Vegas	**LW10.75**	8/28/2000	4090	7.58	7.87	22.76	64	NA	NA
		9/27/2000	NS	NS	NS	NS	NS	NA	NA
		10/25/2000	3850	9.77	8.27	23.37	76	NA	NA
		11/20/2000	3940	13.20	8.27	15.15	72	NA	NA
		12/20/2000	3840	13.20	8.21	13.31	18	NA	NA
		1/18/2001	3820	10.44	8.41	13.65	21	40	70
		2/21/2001	3700	14.46	8.40	18.80	16	10	0
		3/28/2001	3490	10.31	8.32	25.10	13	30	0
		4/25/2001	3760	10.19	8.31	26.24	10	25	20
		5/30/2001	3820	9.15	8.14	28.98	4	290	175
		6/27/2001	3710	9.54	8.25	28.74	12	320	90
		7/30/2001	3800	9.19	8.13	27.92	8	1125	360
		8/22/2001	3740	9.16	8.29	29.08	13	1100	35
		9/26/2001	3790	9.22	9.27	27.82	10	520	0
		10/24/2001	NS	NS	NS	NS	NS	NS	NS
		11/28/2001	3705	11.49	8.30	11.75	13	450	125
		12/19/2001	3710	13.39	8.27	11.95	12	120	14
		1/23/2002	3770	12.64	8.30	9.78	14	20	0
		2/20/2002	3650	11.71	8.11	15.05	12	75	30
		3/26/2002	3570	12.06	8.18	19.71	14	450	280
		4/24/2002	3668	11.76	8.20	23.10	13	60	30
		5/22/2002	3743	9.92	8.25	25.38	NA	85	25
		6/26/2002	3600	10.68	7.97	26.40	13	333000	690
		7/24/2002	3587	9.79	7.94	27.28	11	3400	1000
		8/26/2002	3828	9.69	7.98	27.04	10	470	180
		9/25/2002	3734	9.17	7.98	24.27	11	4200	900
		10/23/2002	3687	12.12	7.99	18.99	15	465	70
		11/20/2002	3843	12.90	8.03	15.84	15	70	0
		12/18/2002	3790	13.32	7.98	9.95	17	190	100
		1/22/2003	3778	13.58	8.26	13.00	15	46	36
		2/19/2003	3846	8.26	7.91	16.05	10	>400	>533
		3/26/2003	4137	14.00	8.28	23.42	15	216	142
Shaded data - Questionalbe, not used in calculations		4/23/2003	3718	10.13	8.73	21.06	13	204	52
NS = Not Sampled		5/28/2003	3850	7.38	8.27	32.57	4	220	<400
NA = Not Analyzed		6/25/2003	3403	7.91	8.34	30.18	7	140	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance us/cm	DO mg/l	PH Units	Temp Deg.C	CLO4 ug/l	Ave # FC /100 mL	Ave # E. coli /100 mL
Upstream Pabco Weir	**LW6.05**	8/28/2000	2080	7.68	7.72	26.28	87	NA	NA
		9/27/2000	3020	9.19	7.95	25.74	63	NA	NA
		10/25/2000	2450	10.19	7.99	24.72	589	NA	NA
		11/20/2000	2180	8.60	7.14	21.27	1086	NA	NA
		12/20/2000	2180	8.21	7.00	19.48	130	NA	NA
		1/18/2001	2180	8.43	7.61	19.68	34	70	40
		2/21/2001	2070	8.05	6.87	19.61	220	30	0
		3/28/2001	1910	8.98	7.48	22.82	376	10	10
		4/25/2001	2350	8.52	7.72	23.78	29	35	25
		5/30/2001	2430	9.53	7.83	26.39	29	75	75
		6/27/2001	2240	9.36	7.90	27.38	21	80	30
		7/30/2001	2170	7.86	7.70	27.62	16	550	160
		8/22/2001	1760	9.79	8.29	27.41	20	770	25
		9/26/2001	1680	9.32	8.04	27.90	18	460	0
		10/24/2001	1458	9.82	8.25	23.10	20	1430	180
		11/28/2001	2383	8.82	7.78	19.96	84	460	135
		12/19/2001	2610	8.69	7.20	18.65	126	78	50
		1/23/2002	2840	9.36	7.72	15.99	138	110	75
		2/20/2002	2160	9.53	7.62	20.04	28	150	80
		3/26/2002	2350	9.06	7.79	21.75	45	230	115
		4/24/2002	2396	9.97	7.99	23.24	49	185	30
		5/22/2002	2148	9.45	7.99	25.22	NA	330	105
		6/26/2002	2155	7.65	7.58	27.43	39	305	190
		7/24/2002	2157	7.43	7.62	28.52	31	2080	1400
		8/26/2002	2002	7.96	7.60	28.71	14	380	120
		9/25/2002	2108	6.75	7.60	27.09	18	1870	560
		10/23/2002	2335	8.20	7.54	24.51	56	165	60
		11/20/2002	2330	8.49	7.41	22.41	58	400	80
		12/18/2002	2309	10.98	7.48	19.11	58	420	230
		1/22/2003	2989	8.69	7.51	17.81	140	20	50
		2/19/2003	2363	8.37	7.53	20.54	54	330	213
		3/26/2003	2494	8.18	7.59	23.19	45	115	88
Shaded data - Questionalbe, not used in calculations		4/23/2003	2473	8.27	8.22	22.08	63	204	68
NS = Not Sampled		5/28/2003	2552	8.07	7.88	27.64	20	<400	<400
NA = Not Analyzed		6/25/2003	2113	8.13	7.97	27.15	19	140	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance	DO	PH	Temp	CLO4	Ave # FC	Ave # E. coli
			us/cm	mg/l	Units	Deg.C	ug/l	/100 mL	/100 mL
Downstream Pabco Weir	**LW5.9**	8/28/2000	2230	7.81	7.77	27.55	102	NA	NA
		9/27/2000	2960	9.65	8.00	25.09	139	NA	NA
		10/25/2000	2570	8.82	7.85	24.52	769	NA	NA
		11/20/2000	2340	9.53	7.40	21.21	1310	NA	NA
		12/20/2000	2250	8.86	7.12	19.54	250	NA	NA
		1/18/2001	2190	8.89	7.34	18.60	N	10	20
		2/21/2001	2310	9.72	7.74	20.62	198	50	0
		3/28/2001	2340	8.57	7.63	23.09	311	40	10
		4/25/2001	2440	8.66	7.83	23.27	320	20	30
		5/30/2001	2380	9.40	7.86	25.85	276	90	40
		6/27/2001	2260	9.48	8.00	26.89	191	120	80
		7/30/2001	2200	8.03	7.81	27.32	353	270	210
		8/22/2001	1970	8.35	8.03	28.13	419	555	50
		9/26/2001	1940	8.82	8.06	27.52	193	500	0
		10/24/2001	2440	9.14	7.94	23.70	880	510	140
		11/28/2001	2645	12.77	7.84	19.33	335	580	60
		12/19/2001	2500	8.68	7.51	18.88	937	104	30
		1/23/2002	2410	9.29	7.58	17.27	755	70	55
		2/20/2002	2160	9.76	7.76	19.42	287	85	40
		3/26/2002	1930	9.45	7.83	20.71	421	80	60
		4/24/2002	2456	10.44	8.10	23.24	289	85	40
		5/22/2002	2211	9.74	8.17	24.80	NA	250	60
		6/26/2002	2273	8.05	7.72	27.20	176	820	190
		7/24/2002	2282	8.07	7.71	28.38	54	860	370
		8/26/2002	2111	8.78	7.69	28.36	175	370	190
		9/25/2002	2433	7.36	7.70	26.67	268	1180	280
		10/23/2002	2262	8.36	7.41	24.56	811	165	55
		11/20/2002	2227	8.65	7.32	21.86	651	80	40
		12/18/2002	2182	9.10	6.92	20.05	291	140	180
		1/22/2003	2669	7.94	7.06	19.53	611	70	40
		2/19/2003	2465	8.82	7.44	19.77	187	75	<133
		3/26/2003	2528	8.74	7.55	22.72	100	132	72
Shaded data - Questionalbe, not used in calculations		4/23/2003	2321	8.60	7.89	22.20	69	<80	<80
NS = Not Sampled		5/28/2003	2691	8.42	7.90	27.63	67	<400	<400
NA = Not Analyzed		6/25/2003	2293	8.51	8.10	26.52	61	115	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance	DO	PH	Temp	CLO4	Ave # FC	Ave # E. coli
			us/cm	mg/l	Units	Deg.C	ug/l	/100 mL	/100 mL
Upstream Historic Lateral Weir	**LW5.5**	8/28/2000	NS	NS	NS	NS	NS	NS	NS
		9/27/2000	NS	NS	NS	NS	NS	NS	NS
		10/25/2000	2500	8.04	7.66	23.76	417	NA	NA
		11/20/2000	2400	10.36	7.84	20.33	411	NA	NA
		12/20/2000	2430	10.45	7.61	18.03	180	NA	NA
		1/18/2001	2340	8.70	7.74	17.71	N	100	115
		2/21/2001	2420	10.86	7.71	19.84	186	50	0
		3/28/2001	2540	8.48	7.66	22.37	215	80	30
		4/25/2001	2400	9.32	7.94	22.50	172	40	35
		5/30/2001	2340	9.77	7.83	26.39	135	125	25
		6/27/2001	2150	8.18	7.88	25.61	145	190	50
		7/30/2001	2210	7.89	7.79	26.82	164	350	200
		8/22/2001	2190	8.46	7.96	28.13	147	645	155
		9/26/2001	2240	8.65	7.97	22.58	190	300	0
		10/24/2001	2310	9.13	7.96	24.03	270	1040	230
		11/28/2001	2682	10.45	7.82	18.85	426	510	40
		12/19/2001	2340	8.30	7.55	18.55	239	34	72
		1/23/2002	2700	9.80	7.82	16.37	368	100	40
		2/20/2002	2300	10.19	7.83	19.53	208	170	70
		3/26/2002	2330	9.57	7.85	20.78	226	115	115
		4/24/2002	2411	10.84	8.08	23.18	251	105	100
		5/22/2002	2264	10.18	8.22	23.98	NA	140	55
		6/26/2002	2274	9.41	7.85	26.46	215	190	80
		7/24/2002	2289	8.12	7.70	28.25	244	920	220
		8/26/2002	2070	10.21	7.75	27.97	137	380	160
		9/25/2002	2316	7.28	7.66	26.31	234	620	210
		10/23/2002	2334	8.36	7.58	23.98	332	150	60
		11/20/2002	2398	8.75	7.46	21.44	259	380	0
		12/18/2002	2496	9.60	7.46	18.75	260	300	170
		1/22/2003	2910	9.11	7.51	17.72	340	40	55
		2/19/2003	2723	8.61	7.68	18.84	208	75	<133
		3/26/2003	2615	8.90	7.64	22.28	120	280	187
Shaded data - Questionalbe, not used in calculations		4/23/2003	2647	9.53	8.09	20.96	131	100	<80
NS = Not Sampled		5/28/2003	2723	8.90	8.03	27.04	80	<400	<400
NA = Not Analyzed		6/25/2003	2229	11.16	8.07	26.54	75	105	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance us/cm	DO mg/l	PH Units	Temp Deg.C	CLO4 ug/l	Ave # FC /100 mL	Ave # E. coli /100 mL
Downstream Historic Lateral Weir	**LW5.3**	8/28/2000	1980	7.80	7.91	29.54	190	NA	NA
		9/27/2000	2530	7.39	7.78	25.45	42	NA	NA
		10/25/2000	2560	8.24	7.84	23.68	439	NA	NA
		11/20/2000	2360	9.15	7.90	20.64	361	NA	NA
		12/20/2000	2400	9.24	7.62	18.88	170	NA	NA
		1/18/2001	2340	8.89	7.81	18.24	N	80	0
		2/21/2001	2450	10.09	7.92	20.04	179	90	0
		3/28/2001	2540	8.65	7.79	22.64	199	60	20
		4/25/2001	2460	8.33	7.91	21.82	183	45	50
		5/30/2001	2380	8.82	7.86	24.64	154	120	85
		6/27/2001	2150	8.18	7.88	25.61	138	180	80
		7/30/2001	2240	7.15	7.76	26.01	172	500	220
		8/22/2001	2280	7.63	7.96	26.98	205	430	10
		9/26/2001	2360	7.71	7.93	26.68	249	3000	0
		10/24/2001	2320	7.89	7.85	23.42	307	1060	260
		11/28/2001	2838	8.73	7.90	18.90	712	360	50
		12/19/2001	NS	NS	NS	NS	NS	NS	NS
		1/23/2002	2520	8.16	7.65	16.74	479	45	140
		2/20/2002	2360	9.26	7.74	18.75	222	75	95
		3/26/2002	2360	8.53	7.84	19.96	209	145	65
		4/24/2002	2365	9.64	8.04	22.70	249	130	80
		5/22/2002	2287	9.35	8.24	23.71	N	195	65
		6/26/2002	2276	8.06	7.74	25.81	248	380	90
		7/24/2002	2274	7.43	7.68	28.02	243	900	720
		8/26/2002	2158	8.03	7.77	27.42	183	480	180
		9/25/2002	2040	9.93	7.74	22.21	226	660	320
		10/23/2002	2353	8.21	7.63	23.49	375	240	65
		11/20/2002	2497	7.82	7.43	20.95	237	160	80
		12/18/2002	2565	8.80	7.47	18.41	304	120	100
		1/22/2003	2900	9.14	7.65	17.23	387	46	36
		2/19/2003	2642	8.19	7.71	18.93	232	230	<133
		3/26/2003	2793	8.72	7.70	21.74	182	88	68
Shaded data - Questionalbe, not used in calculations		4/23/2003	2637	7.91	8.18	20.54	155	84	<80
NS = Not Sampled		5/28/2003	2896	5.35	8.05	27.65	120	<400	<400
NA = Not Analyzed		6/25/2003	2216	4.43	7.70	25.75	83	115	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance	DO	PH	Temp	CLO4	Ave # FC	Ave # E. coli
			us/cm	mg/l	Units	Deg.C	ug/l	/100 mL	/100 mL
Upstream Demonstration Weir	**LW3.85**	8/28/2000	2360	8.53	7.97	27.63	408	NA	NA
		9/27/2000	2550	7.06	7.77	24.28	476	NA	NA
		10/25/2000	2640	7.38	7.78	22.61	596	NA	NA
		11/20/2000	2380	9.12	7.59	10.55	421	NA	NA
		12/20/2000	2340	9.43	7.57	9.67	270	NA	NA
		1/18/2001	2420	8.24	7.83	16.77	NA	140	20
		2/21/2001	2490	9.45	7.75	18.70	450	80	10
		3/28/2001	2600	8.59	7.83	21.45	543	30	30
		4/25/2001	2470	10.05	8.33	24.86	334	45	20
		5/30/2001	2470	12.23	8.56	27.33	377	55	15
		6/27/2001	2330	11.24	8.50	28.11	332	190	30
		7/30/2001	2300	8.25	8.07	28.34	407	430	320
		8/22/2001	2200	8.06	8.28	30.04	313	425	50
		9/26/2001	2350	7.81	7.97	25.29	499	560	0
		10/24/2001	2370	8.24	7.89	22.40	571	760	260
		11/28/2001	2664	8.18	7.84	18.72	1324	180	10
		12/18/2001	2600	8.96	7.78	17.72	828	48	34
		1/23/2002	2580	8.30	7.73	16.44	814	200	75
		2/20/2002	2357	7.96	7.84	17.82	483	30	170
		3/26/2002	2390	7.77	8.17	19.20	488	200	65
		4/24/2002	2192	8.76	7.89	19.61	408	70	95
		5/22/2002	2329	8.57	8.00	22.36	NA	230	75
		6/26/2002	2326	7.57	7.67	24.85	575	330	135
		7/24/2002	2231	7.10	7.61	25.86	453	1040	400
		8/26/2002	2361	8.49	7.73	25.82	574	240	90
		9/25/2002	1991	10.59	7.68	21.95	398	640	140
		10/23/2002	2491	7.74	7.57	22.45	756	240	220
		11/20/2002	2508	8.30	7.52	20.43	523	160	0
		12/18/2002	2616	8.93	7.48	18.09	600	60	100
		1/22/2003	2889	8.35	7.52	17.10	764	82	80
		2/19/2003	2804	8.16	7.65	18.17	573	150	<133
		3/26/2003	2852	8.73	7.81	21.07	398	60	<80
Shaded data - Questionalbe, not used in calculations		4/23/2003	2687	8.03	8.17	19.83	304	100	<80
NS = Not Sampled		5/28/2003	2804	8.18	7.92	25.62	374	<400	<400
NA = Not Analyzed		6/25/2003	2322	8.62	8.02	24.77	263	210	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance us/cm	DO mg/l	PH Units	Temp Deg.C	CLO4 ug/l	Ave # FC /100 mL	Ave # E. coli /100 mL
Downstream Demonstration Weir	**LW3.75**	8/28/2000	2320	7.48	7.95	27.34	441	NA	NA
		9/27/2000	2430	7.33	7.77	24.03	434	NA	NA
		10/25/2000	2530	7.63	7.78	21.95	604	NA	NA
		11/20/2000	2450	8.56	7.73	18.52	558	NA	NA
		12/20/2000	2470	8.52	7.57	16.45	310	NA	NA
		1/18/2001	2390	8.53	7.84	15.88	NA	160	60
		2/21/2001	2490	8.05	7.65	17.98	447	60	30
		3/28/2001	2590	7.30	7.57	19.91	522	480	170
		4/25/2001	2490	6.92	7.75	20.83	417	55	20
		5/30/2001	2440	7.93	7.79	23.72	398	65	60
		6/27/2001	2280	7.45	7.81	24.67	343	85	50
		7/30/2001	2320	6.84	7.71	25.17	380	300	390
		8/22/2001	2380	6.78	7.83	25.36	424	390	50
		9/26/2001	2510	5.91	7.60	24.55	474	240	0
		10/24/2001	2420	7.46	7.77	22.46	576	540	100
		11/28/2001	2626	7.01	7.66	19.25	1088	310	75
		12/18/2001	2660	6.89	7.57	18.25	863	120	74
		1/23/2002	2470	8.05	7.70	16.15	786	190	70
		2/20/2002	2428	8.30	7.92	18.17	591	45	55
		3/26/2002	2430	8.16	7.86	19.31	562	220	80
		4/24/2002	2179	8.76	7.83	18.93	460	80	40
		5/22/2002	2341	8.05	7.90	21.83	N	185	50
		6/26/2002	2272	7.55	7.63	24.62	569	510	185
		7/24/2002	2257	7.23	7.61	25.85	524	1340	270
		8/26/2002	2358	7.63	7.66	25.22	618	320	80
		9/25/2002	2044	7.47	7.68	22.38	365	480	350
		10/23/2002	2520	8.23	7.58	22.24	740	310	75
		11/20/2002	2530	7.87	7.48	20.40	501	100	0
		12/18/2002	2602	9.73	7.53	18.36	591	100	230
		1/22/2003	2864	8.17	7.47	17.54	818	78	52
		2/19/2003	2764	8.64	7.50	18.09	617	325	<133
		3/26/2003	2834	8.28	7.78	20.74	423	120	120
Shaded data - Questionalbe, not used in calculations		4/23/2003	2737	8.35	8.26	20.01	369	64	48
NS = Not Sampled		5/28/2003	2794	7.60	7.95	25.30	432	<400	<400
NA = Not Analyzed		6/25/2003	2342	7.67	8.02	24.58	292	170	<100

Appendix IIIa. Monthly Field Measurement, Perchlorate, and Bacteria Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Conductance	DO	PH	Temp	CLO4	Ave # FC	Ave # E. coli
			us/cm	mg/l	Units	Deg.C	ug/l	/100 mL	/100 mL
Downstream Lake Las Vegas	**LW0.8**	8/28/2000	2350	7.98	8.09	27.76	405	NA	NA
		9/27/2000	2470	8.22	7.97	23.58	458	NA	NA
		10/25/2000	2560	8.32	7.98	21.69	595	NA	NA
		11/20/2000	2500	8.85	7.93	16.68	500	NA	NA
		12/20/2000	2510	9.19	7.69	15.75	310	NA	NA
		1/18/2001	2400	9.59	8.00	15.67	NA	200	80
		2/21/2001	2440	9.24	7.77	17.37	411	80	30
		3/28/2001	2550	8.98	7.86	19.88	517	160	80
		4/25/2001	2460	8.73	7.97	20.54	372	45	30
		5/30/2001	2390	8.51	7.92	23.71	333	65	70
		6/27/2001	2300	8.50	8.00	24.69	295	160	40
		7/30/2001	2240	7.65	7.93	25.50	345	500	400
		8/22/2001	2310	7.86	8.04	24.86	300	560	115
		9/26/2001	2490	5.94	7.63	24.53	410	300	0
		10/24/2001	2310	8.84	7.95	22.01	499	780	90
		11/28/2001	2342	9.47	8.01	17.98	645	360	180
		12/18/2001	2430	9.50	7.80	16.52	539	92	58
		1/23/2002	2370	9.25	8.03	15.77	562	165	95
		2/20/2002	2351	9.38	7.94	17.28	467	50	100
		3/26/2002	2380	8.93	7.91	18.70	462	180	130
		4/24/2002	2115	9.37	7.92	19.08	357	90	90
		5/22/2002	2302	8.70	7.95	21.16	N	190	30
		6/26/2002	2193	8.24	7.78	24.73	404	210	180
		7/24/2002	2175	8.02	7.76	26.25	376	1020	320
		8/26/2002	2250	8.78	7.79	24.95	49	560	190
		9/25/2002	2004	8.27	7.83	22.63	321	660	470
		10/23/2002	2429	9.48	7.76	21.95	663	350	145
		11/20/2002	2426	9.02	7.67	20.03	388	180	120
		12/18/2002	2553	10.11	7.68	18.03	529	180	130
		1/22/2003	2697	9.40	7.51	17.57	630	73	60
		2/19/2003	2649	9.29	7.73	17.77	470	200	<133
		3/26/2003	2779	9.14	7.75	19.98	360	150	48
Shaded data - Questionalbe, not used in calculations		4/23/2003	2645	8.98	8.16	19.68	302	156	<80
NS = Not Sampled		5/28/2003	2725	8.19	8.02	24.84	354	<400	<400
NA = Not Analyzed		6/25/2003	2275	8.44	8.10	24.19	239	125	85

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Upstream City of Las Vegas	**LW10.75**	10/25/2000	330	271	249	0.72	NA	43	240	290	1810	26	N
		11/20/2000	330	279	209	0.71	NA	40	260	310	1830	24	3540
		12/20/2000	310	256	215	0.67	NA	41	270	310	1820	12	3450
		1/18/2001	330	258	248	0.66	NA	36	250	280	1750	54	3440
		2/21/2001	290	266	165	0.50	NA	32	240	300	1740	13	3220
		3/28/2001	260	260	198	0.63	NA	31	210	270	1600	19	2970
		4/25/2001	280	292	208	0.59	NA	32	230	290	1800	12	3310
		5/30/2001	270	292	232	0.64	NA	32	230	280	1770	16	2400
		6/27/2001	300	290	206	0.68	NA	30	230	260	1680	NA	3230
		7/30/2001	300	275	226	0.65	NA	32	240	300	1700	NA	3230
		8/22/2001	300	280	217	0.64	NA	32	240	300	1600	NA	3130
		9/26/2001	280	260	217	0.62	NA	32	230	290	1600	NA	1390
		10/24/2001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		11/28/2001	300	260	267	0.66	NA	34	240	290	1700	10	3210
		12/19/2001	290	270	252	0.59	NA	38	230	300	1700	29	3250
		1/23/2002	290	310	269	0.65	NA	33	240	300	1800	NA	3330
		2/20/2002	310	270	264	0.62	NA	36	260	290	1800	NA	3220
		3/27/2002	290	300	263	0.75	NA	36	230	300	1800	NA	3070
		4/24/2002	290	270	239	0.68	NA	36	250	290	1600	NA	2750
		5/22/2002	290	310	237	0.72	NA	37	260	290	1800	NA	3200
		6/26/2002	280	310	251	0.74	NA	36	240	290	1800	NA	3160
		7/24/2002	290	290	252	0.71	NA	37	250	300	1700	NA	3150
		8/28/2002	300	350	252	0.79	NA	34	240	320	1800	NA	3200
		9/25/2002	310	340	252	0.78	NA	33	240	300	1700	NA	3180
		10/23/2002	320	260	254	0.73	NA	36	260	300	1600	NA	3230
		11/20/2002	320	350	259	0.73	NA	35	260	300	1800	NA	3300
		12/18/2002	270	300	266	0.74	NA	33	210	270	1900	NA	3280
		1/22/2003	270	290	265	0.71	0.79	31	210	270	1700	NA	3260
		2/19/2003	610	310	281	0.76	0.70	40	270	290	1800	2150	3320
		3/26/2003	260	320	206	0.66	0.74	34	220	270	1900	75	3400
		4/23/2003	250	280	255	0.65	0.72	30	210	250	1600	10	3080
NS = Not Sampled		5/28/2003	210	270	269	0.89	0.81	29	260	280	1700	NA	3070
NA = Not Analyzed		6/25/2003	250	300	237	0.60	0.70	30	190	250	1600	11	3130

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Upstream Pabco Weir	**LW6.05**	10/25/2000	140	270	152	1.20	NA	23	80	240	650	NA	1730
		11/20/2000	120	302	184	0.88	NA	26	45	270	384	NA	1380
		12/20/2000	120	272	175	1.10	NA	24	60	250	459	NA	1450
		1/18/2001	130	227	154	1.30	NA	23	68	220	506	16	1480
		2/21/2001	130	264	156	1.10	NA	22	68	230	558	NA	1540
		3/28/2001	120	300	163	0.61	NA	18	50	210	480	NA	1290
		4/25/2001	150	292	158	0.90	NA	25	79	240	685	47	1650
		5/30/2001	150	306	151	1.10	NA	23	78	220	697	NA	1680
		6/27/2001	140	276	161	1.00	NA	23	71	210	605	NA	1540
		7/30/2001	130	255	155	0.91	NA	22	67	210	547	NA	1440
		8/22/2001	130	260	147	0.96	NA	23	71	220	520	11	1410
		9/26/2001	120	240	146	0.98	NA	21	62	200	480	NA	1310
		10/24/2001	120	260	144	1.10	NA	22	60	210	510	15	1370
		11/28/2001	140	300	163	1.20	NA	28	83	260	690	35	1640
		12/19/2001	150	320	153	0.88	NA	32	82	310	700	NA	1770
		1/23/2002	190	370	181	1.20	NA	29	110	290	930	NA	2160
		2/20/2002	140	270	155	0.98	NA	24	77	230	600	NA	1530
		3/27/2002	150	310	156	0.99	NA	26	80	260	660	NA	1600
		4/24/2002	160	320	146	0.97	NA	29	85	270	690	NA	1600
		5/22/2002	140	260	153	1.10	NA	25	74	230	580	NA	1470
		6/26/2002	180	270	184	1.00	NA	27	81	220	570	NA	1530
		7/24/2002	140	290	156	0.97	NA	27	75	240	590	NA	1480
		8/28/2002	130	250	149	1.00	NA	22	68	200	540	NA	1390
		9/25/2002	140	270	158	0.94	NA	23	72	220	570	NA	1440
		10/23/2002	160	260	153	1.00	NA	26	87	250	640	NA	1670
		11/20/2002	150	300	135	1.00	NA	26	81	250	670	NA	1620
		12/18/2002	130	270	152	1.00	NA	24	73	230	600	NA	1580
		1/22/2003	150	370	155	0.97	0.30	26	81	280	740	NA	1900
		2/19/2003	130	230	164	1.00	0.31	22	71	230	510	29	1620
		3/26/2003	140	290	152	0.98	0.30	25	79	230	670	11	1650
		4/23/2003	140	330	157	0.98	0.30	23	75	220	730	31	1630
NS = Not Sampled		5/28/2003	140	310	171	0.99	0.40	24	79	230	700	18	1620
NA = Not Analyzed		6/25/2003	120	270	157	0.95	0.33	21	43	200	580	12	1540

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Downstream Pabco Weir	**LW5.9**	10/25/2000	160	301	158	1.20	NA	24	87	250	709	12	1790
		11/20/2000	130	300	178	1.00	NA	25	57	270	462	NA	1510
		12/20/2000	120	282	188	1.00	NA	25	55	270	434	NA	1440
		1/18/2001	120	274	151	1.10	NA	23	53	240	437	NA	1430
		2/21/2001	140	266	156	1.10	NA	23	75	240	601	NA	1620
		3/28/2001	160	300	178	0.89	NA	24	78	240	660	38	1600
		4/25/2001	150	332	156	0.92	NA	26	76	270	664	23	1680
		5/30/2001	140	319	148	0.96	NA	22	67	230	639	NA	1580
		6/27/2001	140	296	160	1.00	NA	23	71	210	609	10	1540
		7/30/2001	140	279	157	0.90	NA	23	70	220	572	NA	1460
		8/22/2001	140	270	146	0.93	NA	23	76	230	550	NA	1450
		9/26/2001	120	220	149	0.80	NA	18	64	190	490	NA	1260
		10/24/2001	140	300	152	0.93	NA	22	67	240	580	15	1470
		11/28/2001	150	300	164	1.00	NA	24	87	240	680	18	1680
		12/19/2001	140	350	151	0.86	NA	29	75	290	690	NA	1720
		1/23/2002	150	370	164	0.88	NA	26	82	290	730	NA	1760
		2/20/2002	130	280	157	0.90	NA	22	71	230	590	NA	1470
		3/27/2002	120	260	164	0.64	NA	21	52	230	440	NA	1230
		4/24/2002	160	320	147	0.96	NA	29	84	280	660	NA	1600
		5/22/2002	140	300	152	1.10	NA	24	74	230	640	NA	1530
		6/26/2002	170	290	173	1.00	NA	26	81	220	600	NA	1560
		7/24/2002	140	290	153	0.99	NA	27	74	240	600	NA	1490
		8/28/2002	140	280	149	1.00	NA	23	71	220	600	NA	1470
		9/25/2002	150	320	156	0.95	NA	24	78	240	630	NA	1560
		10/23/2002	140	350	151	0.80	NA	23	65	250	580	NA	1520
		11/20/2002	130	340	139	0.73	NA	23	60	260	530	NA	1430
		12/18/2002	120	300	149	0.90	NA	24	63	240	560	NA	1580
		1/22/2003	170	400	161	1.10	0.35	28	95	310	830	NA	2100
		2/19/2003	140	350	157	0.92	0.27	23	71	260	680	16	1710
		3/26/2003	140	320	155	0.97	0.33	24	75	230	700	24	1680
		4/23/2003	110	360	160	0.72	0.26	20	54	240	560	NA	1520
NS = Not Sampled		5/28/2003	140	350	170	0.91	0.35	23	74	260	630	10	1680
NA = Not Analyzed		6/25/2003	130	310	160	0.89	0.33	19	69	240	560	NA	1680

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Upstream Historic Lateral Weir	**LW5.5**	10/25/2000	150	294	146	1.20	NA	22	78	230	681	16	1760
		11/20/2000	150	268	162	1.10	NA	23	79	240	612	NA	1670
		12/20/2000	150	278	163	1.10	NA	25	82	260	632	NA	1710
		1/18/2001	140	260	152	1.20	NA	24	74	230	571	10	1630
		2/21/2001	150	287	155	1.00	NA	26	81	260	635	NA	1670
		3/28/2001	180	320	189	0.98	NA	26	89	250	750	97	1780
		4/25/2001	150	320	154	1.00	NA	25	75	250	672	18	1670
		5/30/2001	130	303	142	1.10	NA	22	68	220	622	NA	1550
		6/27/2001	130	268	158	1.00	NA	22	67	200	543	NA	1520
		7/30/2001	130	273	151	0.91	NA	22	68	220	553	NA	1460
		8/22/2001	130	270	143	0.92	NA	22	71	220	540	NA	1440
		9/26/2001	140	280	146	0.95	NA	22	74	220	600	NA	1490
		10/24/2001	140	310	147	1.10	NA	23	75	220	650	NA	1570
		11/28/2001	170	340	169	1.10	NA	29	99	270	820	21	1890
		12/19/2001	130	290	144	0.90	NA	27	73	270	610	10	1600
		1/23/2002	150	340	174	1.10	NA	25	88	250	820	NA	1910
		2/20/2002	150	310	154	0.97	NA	25	81	250	660	NA	1590
		3/27/2002	140	280	157	0.94	NA	25	75	260	570	NA	1560
		4/24/2002	150	300	148	0.93	NA	27	77	270	620	NA	1600
		5/22/2002	140	310	152	1.00	NA	24	75	230	650	NA	1560
		6/26/2002	150	300	151	1.00	NA	26	79	240	600	NA	1580
		7/24/2002	140	310	153	0.98	NA	27	76	260	600	NA	1580
		8/28/2002	140	260	146	1.00	NA	23	71	220	520	NA	1400
		9/25/2002	150	320	156	0.99	NA	27	82	260	630	NA	1640
		10/23/2002	150	290	151	0.98	NA	25	76	250	580	NA	1600
		11/20/2002	150	330	136	0.98	NA	25	79	250	650	NA	1630
		12/18/2002	140	340	151	1.00	NA	25	73	240	690	NA	1720
		1/22/2003	160	390	158	1.00	0.35	27	86	290	780	NA	1990
		2/19/2003	160	360	166	1.00	0.32	25	89	280	830	18	1890
		3/26/2003	140	310	163	0.97	0.32	25	81	230	700	34	1710
		4/23/2003	140	360	158	0.93	0.33	24	76	240	760	NA	1760
NS = Not Sampled		5/28/2003	150	340	172	1.00	0.40	25	83	250	740	11	1730
NA = Not Analyzed		6/25/2003	130	290	157	0.96	0.34	20	71	220	590	NA	1640

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Downstream Historic Lateral Weir	**LW5.3**	10/25/2000	160	281	164	1.20	NA	22	83	230	687	19	1790
		11/20/2000	160	264	163	1.10	NA	25	84	260	621	NA	1670
		12/20/2000	150	265	165	1.20	NA	26	83	260	604	NA	1650
		1/18/2001	150	250	156	1.20	NA	24	77	240	562	NA	1610
		2/21/2001	150	276	155	1.10	NA	25	82	250	651	NA	1700
		3/28/2001	180	310	187	0.99	NA	27	90	250	740	82	1770
		4/25/2001	150	294	157	1.00	NA	26	76	250	633	38	1690
		5/30/2001	130	301	147	1.10	NA	22	67	210	617	NA	1610
		6/27/2001	130	273	155	0.95	NA	24	66	210	538	NA	1480
		7/30/2001	130	285	151	0.92	NA	23	68	220	575	NA	1450
		8/22/2001	140	280	143	0.93	NA	23	72	220	550	NA	1480
		9/26/2001	140	280	148	0.95	NA	23	73	220	600	13	1530
		10/24/2001	150	310	147	1.00	NA	26	74	250	640	NA	1550
		11/28/2001	200	370	167	1.00	NA	30	110	280	840	14	2010
		12/19/2001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		1/23/2002	160	320	158	0.94	NA	26	79	260	670	NA	1700
		2/20/2002	150	310	158	0.94	NA	26	80	250	630	NA	1610
		3/27/2002	150	280	156	0.95	NA	26	77	250	570	NA	1580
		4/24/2002	140	300	147	0.90	NA	27	74	260	600	NA	1600
		5/22/2002	140	310	151	1.00	NA	24	73	240	610	NA	1550
		6/26/2002	160	320	151	0.99	NA	27	77	240	650	NA	1610
		7/24/2002	150	300	153	0.96	NA	26	74	250	570	NA	1550
		8/28/2002	140	280	143	1.00	NA	23	71	220	560	NA	1490
		9/25/2002	160	280	158	0.83	NA	20	67	210	610	NA	1480
		10/23/2002	150	320	148	0.99	NA	25	76	250	630	NA	1610
		11/20/2002	160	360	139	0.97	NA	28	80	270	720	NA	1700
		12/18/2002	150	310	151	1.00	NA	26	74	250	640	NA	1730
		1/22/2003	160	38	158	1.10	0.32	27	88	290	76	NA	2050
		2/19/2003	150	350	159	0.99	0.31	24	78	260	731	18	1830
		3/26/2003	150	360	166	0.98	0.36	26	84	250	790	17	1860
		4/23/2003	140	360	157	0.94	0.32	24	76	240	750	11	1750
NS = Not Sampled		5/28/2003	160	360	175	1.00	0.41	26	93	260	790	20	1870
NA = Not Analyzed		6/25/2003	140	310	157	0.99	0.34	23	75	230	640	12	1690

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Upstream Demonstration Weir	**LW3.85**	10/25/2000	180	306	160	1.20	NA	25	86	250	733	74	1850
		11/20/2000	150	279	152	1.20	NA	24	75	250	590	NA	1670
		12/20/2000	140	271	168	1.20	NA	26	77	260	582	44	1620
		1/18/2001	180	266	146	1.20	NA	26	80	250	565	400	1670
		2/21/2001	150	296	155	1.10	NA	27	79	270	639	NA	1720
		3/28/2001	170	330	168	0.98	NA	25	84	250	740	11	1790
		4/25/2001	170	318	162	0.90	NA	26	83	250	704	53	1740
		5/30/2001	150	320	151	1.00	NA	23	73	220	695	11	1720
		6/27/2001	150	314	158	0.96	NA	24	74	220	663	NA	1600
		7/30/2001	140	294	159	0.91	NA	24	71	220	616	36	1520
		8/22/2001	140	280	147	0.96	NA	24	73	230	540	13	1440
		9/26/2001	140	290	148	0.95	NA	24	73	230	590	NA	1550
		10/24/2001	150	320	146	1.00	NA	24	72	230	620	10	1620
		11/28/2001	190	370	159	0.93	NA	25	90	240	730	310	1860
		12/19/2001	160	360	156	0.92	NA	30	85	300	730	21	1880
		1/23/2002	160	330	155	0.95	NA	27	78	260	670	NA	1720
		2/20/2002	150	320	155	0.96	NA	26	77	250	650	NA	1610
		3/27/2002	150	340	153	0.96	NA	28	75	270	660	NA	1580
		4/24/2002	170	260	154	0.78	NA	25	70	240	590	NA	1400
		5/22/2002	150	320	151	1.00	NA	26	75	250	630	NA	1610
		6/26/2002	150	300	151	0.97	NA	27	74	240	580	NA	1580
		7/24/2002	160	300	153	0.87	NA	25	68	230	650	NA	1540
		8/28/2002	150	320	150	1.00	NA	25	76	240	640	NA	1610
		9/25/2002	160	240	160	0.76	NA	19	61	190	580	NA	1390
		10/23/2002	160	340	150	0.99	NA	27	80	270	650	NA	1710
		11/20/2002	160	360	139	0.97	NA	27	81	260	690	NA	1700
		12/18/2002	150	370	151	1.00	NA	26	74	250	730	NA	1790
		1/22/2003	170	410	157	1.10	0.32	27	85	290	810	NA	2040
		2/19/2003	160	390	162	1.00	0.31	25	83	280	800	33	1970
		3/26/2003	160	370	158	0.98	0.32	26	82	250	800	11	1880
		4/23/2003	150	360	153	0.95	0.33	24	75	250	740	21	1770
NS = Not Sampled		5/28/2003	160	350	168	0.99	0.36	26	81	260	710	22	1760
NA = Not Analyzed		6/25/2003	150	320	157	0.97	0.34	22	73	230	620	79	1720

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Downstream Demonstration Weir	**LW3.75**	10/25/2000	170	297	159	1.20	NA	24	80	240	677	160	1790
		11/20/2000	160	275	158	1.20	NA	25	81	260	615	16	1720
		12/20/2000	150	279	150	1.20	NA	26	83	270	618	NA	1700
		1/18/2001	170	272	142	1.20	NA	26	77	240	568	140	1650
		2/21/2001	160	295	155	1.10	NA	27	81	270	631	NA	1700
		3/28/2001	170	330	162	0.99	NA	26	86	250	720	43	1750
		4/25/2001	170	332	158	0.97	NA	28	81	270	681	62	1700
		5/30/2001	150	303	147	1.10	NA	26	72	250	620	13	1620
		6/27/2001	140	292	153	0.97	NA	24	68	220	564	16	1540
		7/30/2001	140	301	151	0.93	NA	25	71	240	593	NA	1500
		8/22/2001	140	290	146	0.95	NA	25	74	240	560	15	1510
		9/26/2001	150	310	148	0.94	NA	24	73	230	610	NA	1530
		10/24/2001	150	320	127	1.00	NA	24	71	230	610	13	1610
		11/28/2001	180	330	156	0.97	NA	29	83	260	660	96	1730
		12/19/2001	160	350	156	0.87	NA	29	80	290	700	15	1810
		1/23/2002	160	340	155	0.95	NA	26	78	250	690	NA	1700
		2/20/2002	160	320	155	0.96	NA	26	78	250	650	NA	1650
		3/27/2002	160	350	157	0.96	NA	27	78	260	680	NA	1640
		4/24/2002	170	270	156	0.77	NA	24	67	230	620	NA	1400
		5/22/2002	160	310	152	1.00	NA	26	74	250	600	NA	1610
		6/26/2002	150	300	146	0.97	NA	26	72	240	570	NA	1560
		7/24/2002	170	310	156	0.88	NA	25	68	230	650	NA	1550
		8/28/2002	160	320	152	1.00	NA	25	75	230	650	NA	1630
		9/25/2002	170	260	159	0.77	NA	20	63	200	620	NA	1390
		10/23/2002	160	350	151	1.00	NA	27	76	260	680	NA	1730
		11/20/2002	170	350	141	0.98	NA	29	82	280	670	NA	1710
		12/18/2002	150	350	152	1.00	NA	26	73	250	690	NA	1770
		1/22/2003	170	390	158	1.10	0.29	27	82	280	770	10	1990
		2/19/2003	160	400	161	1.00	0.28	25	81	280	810	37	1900
		3/26/2003	160	370	158	0.98	0.32	26	81	250	780	17	1830
		4/23/2003	150	370	157	0.95	0.34	25	77	250	750	19	1820
NS = Not Sampled		5/28/2003	150	360	168	0.99	0.37	25	80	250	710	15	1760
NA = Not Analyzed		6/25/2003	140	330	157	0.96	0.33	22	72	240	640	33	1700

Appendix IIIb. Monthly Major Cation and Anion Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Calcium (mg/l)	Chloride (mg/l)	Biocarbonate as HCO3 (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Potassium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	Total Suspended Solids	Total Dissolved Solids (mg/l)
Downstream Lake Las Vegas	**LW0.8**	10/25/2000	180	303	150	1.20	NA	26	82	250	702	160	1810
		11/20/2000	180	282	157	1.20	NA	25	81	250	661	80	1760
		12/20/2000	190	284	157	1.20	NA	29	87	270	630	300	1740
		1/18/2001	160	274	147	1.20	NA	25	74	240	570	63	1650
		2/21/2001	150	286	151	1.10	NA	26	75	250	611	26	1690
		3/28/2001	170	340	165	0.99	NA	25	83	240	740	32	1810
		4/25/2001	170	312	155	0.90	NA	27	79	260	654	69	1680
		5/30/2001	140	316	143	1.10	NA	26	69	240	638	14	1590
		6/27/2001	160	304	148	0.96	NA	24	70	210	628	70	1560
		7/30/2001	140	304	150	0.93	NA	25	70	240	585	18	1480
		8/22/2001	140	290	145	0.96	NA	24	66	230	550	36	1500
		9/26/2001	140	280	145	0.95	NA	23	69	220	560	19	1490
		10/24/2001	140	320	140	1.00	NA	24	67	230	600	28	1580
		11/28/2001	150	300	147	0.96	NA	27	73	240	600	25	1580
		12/19/2001	150	340	146	0.93	NA	27	76	260	660	14	1670
		1/23/2002	150	310	152	0.98	NA	35	73	250	630	NA	1620
		2/20/2002	150	280	152	0.99	NA	26	75	250	560	NA	1600
		3/27/2002	150	330	152	0.97	NA	28	75	260	630	NA	1620
		4/24/2002	160	270	151	0.78	NA	23	63	220	580	NA	1400
		5/22/2002	150	300	147	1.10	NA	26	72	240	570	NA	1550
		6/26/2002	150	280	141	0.98	NA	26	70	230	520	NA	1500
		7/24/2002	160	290	150	0.88	NA	24	64	220	580	NA	1480
		8/28/2002	150	310	146	1.00	NA	25	70	230	590	NA	1540
		9/25/2002	160	250	158	0.79	NA	19	59	190	580	NA	1380
		10/23/2002	150	330	146	0.99	NA	26	72	250	630	NA	1660
		11/20/2002	150	340	134	0.98	NA	27	74	270	630	NA	1640
		12/18/2002	140	360	147	1.00	NA	25	69	240	690	NA	1740
		1/22/2003	150	380	152	1.00	0.31	25	75	270	730	NA	1840
		2/19/2003	160	370	157	1.00	0.31	25	77	270	740	35	1810
		3/26/2003	160	370	152	0.99	0.31	26	80	250	770	19	1810
		4/23/2003	140	360	151	0.97	0.32	24	73	240	720	22	1770
NS = Not Sampled		5/28/2003	150	360	164	0.98	0.38	25	77	240	700	15	1700
NA = Not Analyzed		6/25/2003	140	310	153	0.95	0.32	22	69	220	600	34	1630

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date		NH4		NO3		NO2	NO3+NO2	TKN		OrthoPO4		Total P
				mg/L		mg/L		mg/L	mg/L	mg/L		mg/L		mg/L
Upstream City of Las Vegas	**LW10.75**	8/28/2000	<	0.08		3.37	<	0.08	3.37	1.60		0.02		0.60
		9/27/2000		NS		NS		NS	NS	NS		NS		NS
		10/25/2000		0.15		3.73	<	0.08	3.73	1.00		0.04		0.09
		11/20/2000	<	0.08		4.38	<	0.08	4.38	0.20	<	0.01		0.06
		12/20/2000	<	0.08		4.68	<	0.08	4.68	1.20	<	0.01		0.04
		1/18/2001	<	0.08		5.28	<	0.08	5.28	0.50		0.01		0.07
		2/21/2001	<	0.08		4.22	<	0.08	4.22	0.10		0.03		0.02
		3/28/2001	<	0.08		3.89	<	0.08	3.89	NA		NA		NA
		4/25/2001	<	0.08		4.03	<	0.08	4.03	0.40		NA		0.02
		5/30/2001	<	0.08		3.30		0.09	3.30	0.50		0.02		0.03
		6/27/2001	<	0.08		3.07	<	0.08	3.07	0.20		0.01		0.04
		7/30/2001	<	0.08		3.17	<	0.08	3.17	NA		N		0.02
		8/22/2001	<	0.08		3.55	<	0.08	3.55	NA		0.01		0.02
		9/26/2001	<	0.08		3.63	<	0.08	3.63	NA		0.01		0.06
		10/24/2001		NS		NS		NS	NS	NS		NS		NS
		11/28/2001	<	0.08		4.31	<	0.08	4.31	0.80		0.02	<	0.03
		12/19/2001	<	0.08		4.27	<	0.08	4.27	NA		0.01		0.02
		1/23/2002	<	0.08		4.61	<	0.08	4.61	NA	<	0.01	<	0.01
		2/20/2002	<	0.08		3.95	<	0.08	3.95	0.40		0.03		0.02
		3/26/2002	<	0.08		3.39	<	0.08	3.39	0.90		0.01		0.04
		4/24/2002		0.12		3.70		NA	3.81	0.90		0.02		0.03
		5/22/2002	<	0.08		3.58	<	0.08	3.58	1.20		0.04		0.07
		6/26/2002	<	0.08		3.28		0.09	3.28	0.40		0.05		0.07
		7/24/2002	<	0.08		2.66		0.16	2.66	0.50		0.01		0.07
		8/26/2002	<	0.08		3.08	<	0.08	3.08	NA		0.06		0.06
		9/25/2002	<	0.08		2.83	<	0.08	2.83	1.20		0.03		0.02
		10/23/2002		0.14		3.89	<	0.08	4.02	0.50		0.02		0.04
		11/20/2002	<	0.08		4.00	<	0.08	4.00	NA		0.03		0.05
		12/18/2002		0.26		4.45	<	0.08	4.72	0.70		0.04		0.04
		1/22/2003	<	0.08		4.09	<	0.08	4.09	NA		0.04		0.05
		2/19/2003		0.48		3.82		0.10	4.30	11.30		0.06		0.64
		3/26/2003	<	0.08		3.72	<	0.08	3.72	0.70		0.04		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003	<	0.08		3.64	<	0.08	3.64	NA		NA		NA
NS = Not Samples		5/28/2003	<	0.10		2.90	<	0.10	2.90	0.40		0.01		0.05
NA = Not Analyzed		6/25/2003	<	0.10		3.30	<	0.10	NA	0.46		NA		0.04

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4		NO3		NO2		NO3+NO2	TKN	OrthoPO4		Total P	
				mg/L		mg/L		mg/L	mg/L	mg/L		mg/L		mg/L
Upstream Pabco Weir	**LW6.05**	8/28/2000	<	0.08		10.73	<	0.08	10.73	1.20		0.09		0.24
		9/27/2000	<	0.08		11.60	<	0.08	11.60	0.80		0.07		0.09
		10/25/2000		0.12		11.81	<	0.08	11.81	0.40		0.05		0.11
		11/20/2000		0.43		3.01	<	0.08	3.01	1.80		2.21		2.84
		12/20/2000		0.13		7.14	<	0.08	7.14	0.90		1.33		1.38
		1/18/2001	<	0.08		15.56	<	0.08	15.56	0.70		0.39		0.40
		2/21/2001	<	0.08		14.67	<	0.08	14.67	1.30		0.20		0.29
		3/28/2001	<	0.08		8.19	<	0.08	8.19	NA		NA		NA
		4/25/2001	<	0.08		14.51	<	0.08	14.51	0.60		NA		0.27
		5/30/2001		0.10		13.71	<	0.08	13.71	0.40		0.05		0.08
		6/27/2001	<	0.08		14.22	<	0.08	14.22	0.10		0.16		0.20
		7/30/2001	<	0.08		13.06	<	0.08	13.06	NA		NA		0.12
		8/22/2001	<	0.08		14.70	<	0.08	14.70	NA		0.04		0.08
		9/26/2001	<	0.08		15.17	<	0.08	15.17	NA		0.04		0.09
		10/24/2001	<	0.08		16.52	<	0.08	16.52	NA		0.19		0.26
		11/28/2001	<	0.08		15.22	<	0.08	15.22	1.10		0.36		0.64
		12/19/2001	<	0.08		12.21	<	0.08	12.21	NA		0.19		0.22
		1/23/2002	<	0.08		12.28	<	0.08	12.28	NA		0.27		0.28
		2/20/2002	<	0.08		14.63	<	0.08	14.63	1.50		0.23		0.34
		3/26/2002	<	0.08		14.61	<	0.08	14.61	1.10		0.06		0.07
		4/24/2002	<	0.08		15.37	<	0.08	15.37	0.80		0.09		0.15
		5/22/2002	<	0.08		14.57	<	0.08	14.57	1.20		0.14		0.20
		6/26/2002	<	0.08		15.71	<	0.08	15.71	NA		0.10		0.38
		7/24/2002	<	0.08		14.84	<	0.08	14.84	1.30		0.16		0.17
		8/26/2002	<	0.08		12.86	<	0.08	12.86	NA		0.04		0.09
		9/25/2002		0.33		14.16	<	0.08	14.49	0.90		0.70		2.06
		10/23/2002		0.17		14.84	<	0.08	15.02	0.80		0.17		0.21
		11/20/2002	<	0.08		15.50	<	0.08	15.50	0.80	<	0.01		0.11
		12/18/2002		0.15		15.92	<	0.08	16.06	1.10		0.06		0.07
		1/22/2003	<	0.08		11.80	<	0.08	11.80	NA		0.11		0.15
		2/19/2003		1.28		13.72	<	0.08	15.00	2.10		0.08		0.14
		3/26/2003		0.10		14.92	<	0.08	15.02	0.40		0.10		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003	<	0.08		17.05	<	0.08	17.05	NA		NA		0.09
NS = Not Samples		5/28/2003	<	0.10		12.00	<	0.10	12.00	0.84		0.14		0.17
NA = Not Analyzed		6/25/2003	<	0.10		12.00	<	0.10	NA	0.80		0.10		0.16

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4		NO3		NO2		NO3+NO2	TKN	OrthoPO4		Total P	
			mg/L		mg/L		mg/L		mg/L	mg/L	mg/L		mg/L	
Downstream Pabco Weir	**LW5.9**	8/28/2000	<	0.08		12.62	<	0.08	12.62	NA		0.13		NA
		9/27/2000	<	0.08		11.15	<	0.08	11.15	0.90		0.05		0.10
		10/25/2000		0.11		12.44	<	0.08	12.44	0.80		0.06		0.12
		11/20/2000		0.32		5.55	<	0.08	5.55	1.20		1.61		2.11
		12/20/2000		0.24		4.69	<	0.08	4.69	1.30		1.71		1.77
		1/18/2001		0.18		13.72	<	0.08	13.72	1.70		1.59		1.36
		2/21/2001	<	0.08		13.24	<	0.08	13.24	1.50		0.18		0.30
		3/28/2001	<	0.08		12.52	<	0.08	12.52	NA		NA		NA
		4/25/2001	<	0.08		14.33	<	0.08	14.33	0.60		NA		0.21
		5/30/2001	<	0.08		13.38	<	0.08	13.38	0.50		0.05		0.07
		6/27/2001	<	0.08		14.12	<	0.08	14.12	0.50		0.17		0.21
		7/30/2001	<	0.08		12.93	<	0.08	12.93	NA		NA		0.12
		8/22/2001	<	0.08		14.19	<	0.08	14.19	NA		0.03		0.09
		9/26/2001	<	0.08		11.00	<	0.08	11.00	NA		0.03		0.07
		10/24/2001	<	0.08		12.42	<	0.08	12.42	NA		0.12		0.15
		11/28/2001	<	0.08		13.95	<	0.08	13.95	1.00	<	0.01		0.42
		12/19/2001	<	0.08		12.51	<	0.08	12.51	NA		0.19		0.24
		1/23/2002		0.08		10.10	<	0.08	10.18	NA		0.15		0.16
		2/20/2002	<	0.08		12.09	<	0.08	12.09	1.00		0.21		0.29
		3/26/2002	<	0.08		7.71	<	0.08	7.71	1.00		0.04		0.06
		4/24/2002	<	0.08		15.27	<	0.08	15.27	0.90		0.09		0.16
		5/22/2002	<	0.08		14.16	<	0.08	14.16	1.20		0.16		0.22
		6/26/2002	<	0.08		15.54	<	0.08	15.54	0.10		0.10		0.28
		7/24/2002	<	0.08		14.52	<	0.08	14.52	1.40		0.16		0.17
		8/26/2002	<	0.08		12.53	<	0.08	12.53	NA		0.04		0.09
		9/25/2002		0.29		13.91	<	0.08	14.20	0.90		0.58		1.12
		10/23/2002		0.22		11.50	<	0.08	11.72	0.40		0.14		0.21
		11/20/2002	<	0.08		10.69	<	0.08	10.69	0.80		0.06		0.09
		12/18/2002		0.35		13.17	<	0.08	13.52	1.30		0.06		0.07
		1/22/2003	<	0.08		12.76	<	0.08	12.76	NA		0.12		0.17
		2/19/2003		0.13		13.25	<	0.08	13.38	0.90		0.08		0.12
		3/26/2003		0.29		14.06	<	0.08	14.35	1.40		0.10		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003	<	0.08		8.61	<	0.08	8.61	NA		NA		0.11
NS = Not Samples		5/28/2003	<	0.10		10.00	<	0.10	10.00	0.76		0.18		0.24
NA = Not Analyzed		6/25/2003	<	0.10		12.00	<	0.10	NA	0.64		0.08		0.14

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4		NO3		NO2		NO3+NO2	TKN	OrthoPO4		Total P	
			mg/L		mg/L		mg/L		mg/L	mg/L	mg/L		mg/L	
Upstream Historic Lateral Weir	**LW5.5**	8/28/2000		NS		NS		NS	NS	NS		NS		NS
		9/27/2000		NS		NS		NS	NS	NS		NS		NS
		10/25/2000		0.15		13.68	<	0.08	13.68	0.60		0.06		0.12
		11/20/2000	<	0.08		11.09	<	0.08	11.09	0.70		0.52		0.64
		12/20/2000	<	0.08		12.80	<	0.08	12.80	1.60		0.49		0.55
		1/18/2001	<	0.08		14.94	<	0.08	14.94	0.80		0.46		0.49
		2/21/2001	<	0.08		13.65	<	0.08	13.65	1.80		0.17		0.31
		3/28/2001	<	0.08		14.17	<	0.08	14.17	NA		NA		NA
		4/25/2001	<	0.08		15.46	<	0.08	15.46	0.60		NA		0.14
		5/30/2001	<	0.08		14.76	<	0.08	14.76	0.50		0.05		0.09
		6/27/2001	<	0.08		14.75	<	0.08	14.75	0.50		0.21		0.19
		7/30/2001	<	0.08		13.87	<	0.08	13.87	NA		NA		0.11
		8/22/2001	<	0.08		14.52	<	0.08	14.52	NA		0.03		0.09
		9/26/2001	<	0.08		13.84	<	0.08	13.84	NA		0.03		0.08
		10/24/2001	<	0.08		15.24	<	0.08	15.24	NA		0.14		0.20
		11/28/2001		0.09		13.77	<	0.08	13.77	1.00		0.24		0.40
		12/19/2001	<	0.08		14.04	<	0.08	14.04	NA		0.26		0.29
		1/23/2002	<	0.08		11.85	<	0.08	11.85	NA		0.25		0.26
		2/20/2002	<	0.08		14.19	<	0.08	14.19	0.90		0.22		0.32
		3/26/2002	<	0.08		14.00	<	0.08	14.00	0.90		0.06		0.09
		4/24/2002	<	0.08		14.51	<	0.08	14.51	0.80		0.08		0.15
		5/22/2002	<	0.08		14.41	<	0.08	14.41	1.00		0.15		0.20
		6/26/2002	<	0.08		15.41	<	0.08	15.41	NA		0.10		0.13
		7/24/2002	<	0.08		14.27	<	0.08	14.27	1.30		0.15		0.18
		8/26/2002	<	0.08		12.92	<	0.08	12.92	NA		0.05		0.08
		9/25/2002		0.42		13.80	<	0.08	14.22	1.30		0.65		1.28
		10/23/2002		0.23		14.68	<	0.08	14.91	0.40		0.17		0.25
		11/20/2002	<	0.08		14.56	<	0.08	14.56	0.70		0.09		0.08
		12/18/2002		0.32		14.72	<	0.08	15.04	0.90		0.06		0.08
		1/22/2003	<	0.08		12.77	<	0.08	12.77	NA		0.12		0.16
		2/19/2003	<	0.08		13.49	<	0.08	13.49	0.70		0.08		0.11
		3/26/2003		1.07		13.00	<	0.08	14.08	2.90		0.11		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003	<	0.08		13.61	<	0.08	13.61	NA		NA		0.09
NS = Not Samples		5/28/2003	<	0.10		12.00	<	0.10	12.00	0.66		0.15		0.18
NA = Not Analyzed		6/25/2003	<	0.10		14.00	<	0.10	NA	0.63		0.09		0.17

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4	NO3	NO2	NO3+NO2	TKN	OrthoPO4	Total P
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Downstream Historic Lateral Weir	**LW5.3**	8/28/2000	< 0.08	12.02	< 0.08	12.02	0.20	0.06	0.20
		9/27/2000	< 0.08	13.26	< 0.08	13.26	1.20	0.09	0.15
		10/25/2000	0.10	11.98	< 0.08	11.98	0.50	0.05	0.06
		11/20/2000	< 0.08	11.25	< 0.08	11.25	0.70	0.43	0.58
		12/20/2000	< 0.08	12.22	< 0.08	12.22	0.50	0.53	0.58
		1/18/2001	< 0.08	14.76	< 0.08	14.76	0.70	0.48	0.50
		2/21/2001	< 0.08	13.53	< 0.08	13.53	NA	0.18	0.26
		3/28/2001	< 0.08	14.07	< 0.08	14.07	NA	NA	NA
		4/25/2001	< 0.08	14.71	< 0.08	14.71	0.60	NA	0.24
		5/30/2001	< 0.08	14.43	< 0.08	14.43	0.30	0.05	0.09
		6/27/2001	< 0.08	15.24	< 0.08	15.24	0.50	0.17	0.19
		7/30/2001	< 0.08	13.61	< 0.08	13.61	NA	NA	0.13
		8/22/2001	< 0.08	14.67	< 0.08	14.67	NA	0.04	0.09
		9/26/2001	< 0.08	14.33	< 0.08	14.33	NA	0.03	0.11
		10/24/2001	< 0.08	14.70	< 0.08	14.70	NA	0.11	0.14
		11/28/2001	< 0.08	13.79	< 0.08	13.79	1.30	0.20	0.32
		12/19/2001	NS	NS	NS	NS	NS	NS	NS
		1/23/2002	< 0.08	13.07	< 0.08	13.07	NA	0.19	0.21
		2/20/2002	< 0.08	13.62	< 0.08	13.62	0.90	0.21	0.31
		3/26/2002	< 0.08	14.32	< 0.08	14.32	1.00	0.06	0.08
		4/24/2002	< 0.08	14.57	< 0.08	14.57	1.10	0.08	0.14
		5/22/2002	< 0.08	14.39	< 0.08	14.39	1.20	0.16	0.22
		6/26/2002	< 0.08	15.54	< 0.08	15.54	NA	0.10	0.15
		7/24/2002	< 0.08	14.45	< 0.08	14.45	1.10	0.15	0.16
		8/26/2002	< 0.08	13.03	< 0.08	13.03	NA	0.05	0.09
		9/25/2002	0.44	9.95	< 0.08	10.40	0.80	0.57	0.99
		10/23/2002	0.19	14.77	< 0.08	14.96	0.40	0.15	0.24
		11/20/2002	< 0.08	14.69	< 0.08	14.69	0.80	0.07	0.12
		12/18/2002	0.31	14.96	< 0.08	15.27	1.20	0.05	0.08
		1/22/2003	< 0.08	13.44	< 0.08	13.44	NA	0.12	0.17
		2/19/2003	< 0.08	14.16	< 0.08	14.16	1.00	0.08	0.12
		3/26/2003	1.08	12.36	< 0.08	13.45	1.90	0.10	3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003	< 0.08	13.76	< 0.08	13.76	NA	NA	0.09
NS = Not Samples		5/28/2003	< 0.10	12.00	< 0.10	12.00	0.66	0.14	0.17
NA = Not Analyzed		6/25/2003	< 0.10	14.00	< 0.10	NA	0.73	0.09	0.15

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4		NO3		NO2		NO3+NO2	TKN	OrthoPO4		Total P	
			mg/L		mg/L		mg/L		mg/L	mg/L	mg/L		mg/L	
Upstream Demonstration Weir	**LW3.85**	8/28/2000	<	0.08		11.58	<	0.08	11.58	0.60		NA		0.28
		9/27/2000	<	0.08		14.06	<	0.08	14.06	0.80		0.10		0.19
		10/25/2000		0.17		13.12	<	0.08	13.12	0.50		0.07		0.18
		11/20/2000		0.52		13.96		0.16	13.96	0.80		0.44		0.58
		12/20/2000		0.10		13.07	<	0.08	13.07	0.70		0.51		0.75
		1/18/2001		0.09		14.99	<	0.08	14.99	0.70		0.44		0.69
		2/21/2001	<	0.08		13.83	<	0.08	13.83	0.70		0.22		0.30
		3/28/2001	<	0.08		14.36	<	0.08	14.36	NA		NA		NA
		4/25/2001	<	0.08		14.28	<	0.08	14.28	0.60		NA		0.23
		5/30/2001	<	0.08		13.48	<	0.08	13.48	0.50		0.04		0.09
		6/27/2001	<	0.08		13.82	<	0.08	13.82	0.50		0.14		0.18
		7/30/2001	<	0.08		12.71	<	0.08	12.71	NA		NA		0.13
		8/22/2001	<	0.08		14.21	<	0.08	14.21	NA		0.04		0.09
		9/26/2001	<	0.08		14.81	<	0.08	14.81	NA		0.03		0.08
		10/24/2001	<	0.08		15.53	<	0.08	15.59	NA		0.14		0.15
		11/28/2001		0.11		14.20	<	0.08	14.20	1.30		0.13		0.40
		12/19/2001		0.15		13.57	<	0.08	13.57	NA		0.20		0.20
		1/23/2002	<	0.08		13.58		0.08	13.58	NA		0.19		0.21
		2/20/2002	<	0.08		14.17	<	0.08	14.17	0.90		0.21		0.40
		3/26/2002	<	0.08		14.87	<	0.08	14.87	1.10		0.05		0.08
		4/24/2002	<	0.08		11.46		0.08	11.46	0.90		0.07		0.14
		5/22/2002	<	0.08		15.11	<	0.08	15.11	1.40		0.15		0.20
		6/26/2002	<	0.08		16.44	<	0.08	16.44	NA		0.09		0.13
		7/24/2002	<	0.08		12.64	<	0.08	12.64	1.20		0.11		0.16
		8/26/2002	<	0.08		13.55	<	0.08	13.55	NA		0.07		0.09
		9/25/2002		0.49		9.17	<	0.08	9.66	1.40		0.53		1.10
		10/23/2002		0.16		14.78	<	0.08	14.93	0.40		0.12		0.18
		11/20/2002	<	0.08		15.07	<	0.08	15.07	0.70		0.07		0.11
		12/18/2002	<	0.29		15.32	<	0.08	15.61	1.10		0.03		0.08
		1/22/2003	<	0.08		14.46	<	0.08	14.46	NA		0.11		0.16
		2/19/2003		0.09		1.78	<	0.08	1.87	0.50		0.08		0.13
		3/26/2003		0.10		14.21	<	0.08	14.30	1.20		0.10		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003	<	0.08		15.26	<	0.08	15.26	NA		NA		0.09
NS = Not Samples		5/28/2003	<	0.10		14.00	<	0.10	14.00	0.51		0.12		0.16
NA = Not Analyzed		6/25/2003	<	0.10		15.00	<	0.10	NA	0.73		0.20		0.30

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4		NO3		NO2		NO3+NO2	TKN	OrthoPO4		Total P	
			mg/L		mg/L		mg/L		mg/L	mg/L	mg/L		mg/L	
Downstream Demonstration Weir	**LW3.75**	8/28/2000	<	0.08		14.10	<	0.08	14.10	0.20		0.12		0.27
		9/27/2000	<	0.08		15.04	<	0.08	15.04	0.90		0.09		0.13
		10/25/2000		0.13		13.81	<	0.08	13.81	0.50		0.09		0.23
		11/20/2000		0.13		12.34	<	0.08	12.34	0.80		0.47		0.61
		12/20/2000	<	0.08		13.94	<	0.08	13.94	0.60		0.61		0.51
		1/18/2001	<	0.08		15.61	<	0.08	15.61	0.70		0.48		0.56
		2/21/2001	<	0.08		14.26	<	0.08	14.26	0.40		0.20		0.28
		3/28/2001	<	0.08		15.26	<	0.08	15.26	NA		NA		NA
		4/25/2001	<	0.08		15.50	<	0.08	15.50	0.80		NA		0.19
		5/30/2001	<	0.08		14.72	<	0.08	15.38	3.50		0.04		0.08
		6/27/2001	<	0.08		15.38	<	0.08	14.66	0.60		0.15		0.17
		7/30/2001	<	0.08		14.66	<	0.08	14.94	NA		NA		0.17
		8/22/2001	<	0.08		14.94	<	0.08	14.95	NA		0.04		0.09
		9/26/2001		N		14.95	<	0.08	NA	NA		0.04		0.09
		10/24/2001	<	0.08		15.84	<	0.08	15.84	NA		0.15		0.17
		11/28/2001	<	0.08		15.23	<	0.08	15.23	2.60		0.14		0.30
		12/19/2001		0.12		14.14	<	0.08	14.14	NA		0.17		0.22
		1/23/2002	<	0.08		13.84	<	0.08	13.84	NA		0.19		0.21
		2/20/2002	<	0.08		13.96	<	0.08	13.96	0.70		0.18		0.29
		3/26/2002	<	0.08		14.59	<	0.08	14.59	0.70		0.05		0.07
		4/24/2002	<	0.08		11.45	<	0.08	11.45	0.60		0.06		0.14
		5/22/2002	<	0.08		15.03	<	0.08	15.03	1.00		0.14		0.21
		6/26/2002	<	0.08		16.74	<	0.08	16.74	NA		0.09		0.13
		7/24/2002	<	0.08		12.57	<	0.08	12.57	32.10		0.11		0.13
		8/26/2002	<	0.08		13.45	<	0.08	13.45	NA		0.06		0.11
		9/25/2002		0.54		9.49	<	0.08	10.03	1.50		0.52		0.80
		10/23/2002		0.25		14.49	<	0.08	14.75	0.60		0.11		0.17
		11/20/2002	<	0.08		14.91	<	0.08	14.91	0.80		0.07		0.10
		12/18/2002		0.34		15.10	<	0.08	15.44	1.00		0.07		0.07
		1/22/2003	<	0.08		14.31	<	0.08	14.31	NA		0.11		0.15
		2/19/2003		0.09		1.81	<	0.08	1.90	0.70		0.08		0.11
		3/26/2003	<	0.08		14.34	<	0.08	14.34	0.50		0.10		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003		0.09		15.60	<	0.08	15.69	NA		NA		0.08
NS = Not Samples		5/28/2003	<	0.10		14.00	<	0.10	14.00	0.73		0.12		0.15
NA = Not Analyzed		6/25/2003	<	0.10		15.00	<	0.10	NA	0.69		0.12		0.19

Appendix IIIc. Monthly Nutrient Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	NH4		NO3		NO2		NO3+NO2	TKN	OrthoPO4		Total P	
				mg/L		mg/L		mg/L	mg/L	mg/L		mg/L		mg/L
Downstream Lake Las Vegas	**LW0.8**	8/28/2000		0.08		12.40	<	0.08	12.40	0.50		0.11		0.25
		9/27/2000		0.08		14.33	<	0.08	14.33	0.80		0.08		0.15
		10/25/2000		0.13		13.28	<	0.08	13.28	0.50		0.08		0.03
		11/20/2000		0.26		13.06		0.08	13.06	0.80		0.46		0.67
		12/20/2000		0.16		13.56		0.12	13.56	0.60		0.49		0.74
		1/18/2001		0.09		15.61	<	0.08	15.61	0.90		0.49		0.67
		2/21/2001		0.08		14.93	<	0.08	14.93	0.30		0.20		0.31
		3/28/2001		0.08		15.28	<	0.08	15.28	NA		NA		NA
		4/25/2001		0.08		15.60	<	0.08	15.60	0.30		NA		0.18
		5/30/2001		0.08		15.27	<	0.08	15.27	0.30		0.03		0.07
		6/27/2001		0.08		15.38	<	0.08	15.38	0.20		0.15		0.21
		7/30/2001		0.08		15.22	<	0.08	15.22	NA		NA		0.17
		8/22/2001		0.08		15.46	<	0.08	15.46	NA		0.03		0.12
		9/26/2001		0.08		16.01	<	0.08	16.01	NA		0.04		0.07
		10/24/2001		0.08		16.78	<	0.08	16.78	NA		0.18		0.23
		11/28/2001		0.08		16.02	<	0.08	16.02	1.30		0.16		0.24
		12/19/2001		0.20		14.62	<	0.08	14.62	NA		0.23		0.24
		1/23/2002	<	0.08		14.99	<	0.08	14.99	NA		0.22		0.24
		2/20/2002	<	0.08		14.56	<	0.08	14.56	0.70	<	0.01		0.32
		3/26/2002	<	0.08		15.85	<	0.08	15.85	0.40		0.05		0.07
		4/24/2002	<	0.08		12.67	<	0.08	12.67	0.70		0.06		0.15
		5/22/2002	<	0.08		15.82	<	0.08	15.82	1.10		0.13		0.23
		6/26/2002	<	0.08		17.27	<	0.08	17.27	0.40		0.09		0.14
		7/24/2002	<	0.08		13.57	<	0.08	13.57	1.20		0.11		0.14
		8/28/2002	<	0.08		14.97	<	0.08	14.97	NA		0.07		0.10
		9/25/2002		0.56	>	2.50	<	0.08	3.06	1.10		0.43		0.64
		10/23/2002		0.21		15.51	<	0.08	15.73	0.50		0.11		0.19
		11/20/2002	<	0.08		16.02	<	0.08	16.02	0.60		0.07		0.10
		12/18/2002		0.28	>	2.50	<	0.08	2.78	0.80		0.07		0.07
		1/22/2003	<	0.08		14.58	<	0.08	14.58	NA		0.10		0.15
		2/19/2003	<	0.08		15.29	<	0.08	15.29	0.50		0.07		0.12
		3/26/2003	<	0.08		15.39	<	0.08	15.39	0.20		0.10		3.26
Shaded data - Questionalbe, not used in calculations		4/23/2003		0.08		16.18	<	0.08	16.26	NA		NA		0.11
NS = Not Samples		5/28/2003	<	0.10		14.00	<	0.10	14.00	0.73		0.12		0.16
NA = Not Analyzed		6/25/2003	<	0.10		15.00	<	0.10	NA	0.70		0.10		0.16

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Upstream City of Las Vegas	**LW10.75**	10/25/2000	ND	350	12.0	51	ND	ND	2.6	12.0	0.52	ND	33	1.6	12.0	ND	44	ND	34
		11/20/2000	ND	215	13.0	35	ND	ND	2.6	9.4	0.25	ND	18	1.0	17.0	ND	42	ND	17
		12/20/2000	ND	ND	13.0	25	ND	ND	2.4	12.0	ND	ND	14	ND	ND	ND	44	ND	22
		1/18/2001	ND	36	12.0	41	ND	ND	3.3	12.0	0.44	ND	24	1.5	18.0	ND	48	ND	24
		2/21/2001	ND	100	9.7	31	ND	ND	3.0	12.0	0.11	ND	6.6	ND	18.0	ND	41	ND	18
		3/28/2001	ND	63	11.0	43	ND	ND	3.0	11.0	0.13	ND	6.5	2.6	11.0	ND	35	ND	20
		4/25/2001	ND	130	ND	32	ND	ND	2.3	12.0	0.12	ND	6.9	ND	13.0	ND	40	ND	31
		5/30/2001	ND	ND	9.9	30	ND	ND	ND	11.0	0.13	ND	11	0.9	12.0	ND	41	ND	14
		6/27/2001	ND	64	11.0	33	ND	ND	2.4	10.0	0.12	ND	8.8	ND	8.4	ND	36	ND	15
		7/30/2001	0.59	45	NS	39	ND	ND	1.7	11.0	ND	ND	7.1	ND	11.0	ND	32	ND	12
		8/22/2001	ND	92	11.0	36	ND	ND	3.1	6.5	0.11	ND	8.3	0.8	10.0	20.00	39	ND	13
		9/26/2001	ND	31	NS	30	ND	ND	2.0	10.0	ND	ND	6.3	0.8	13.0	ND	41	ND	13
		10/24/2001	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS
		11/28/2001	ND	190	11.0	36	ND	ND	2.7	11.0	0.21	ND	19	0.9	12.0	ND	53	ND	21
		12/19/2001	ND	120	10.0	32	ND	ND	1.7	9.4	ND	ND	13	0.5	12.0	ND	48	ND	15
		1/23/2002	ND	50	ND	29	ND	ND	4.2	5.2	ND	ND	8.5	0.7	17.0	15.60	45	ND	18
		2/20/2002	ND	100	12.0	31	ND	ND	3.7	4.5	0.13	ND	11	0.9	20.0	15.00	42	ND	14
		3/27/2002	ND	100	14.0	43	ND	ND	2.8	4.1	ND	ND	23	2.0	15.0	11.10	21	ND	8
		4/24/2002	ND	130	12.0	35	ND	ND	ND	ND	0.17	ND	12	ND	ND	12.70	38	ND	34
		5/22/2002	ND	260	14.0	41	ND	ND	5.8	3.6	0.46	ND	23	1.0	11.0	12.10	42	ND	38
		6/26/2002	ND	200	12.0	47	ND	ND	1.7	3.4	0.26	ND	20	0.7	10.0	13.60	41	ND	8
		7/24/2002	ND	110	12.0	44	ND	ND	3.0	2.9	0.16	ND	29	0.5	14.0	12.40	46	ND	10
		8/28/2002	ND	ND	13.0	40	ND	ND	ND	ND	ND	ND	14	ND	ND	11.20	41	ND	36
		9/25/2002	ND	130	13.0	42	ND	ND	ND	ND	ND	ND	20	ND	12.0	11.70	43	ND	24
		10/23/2002	ND	56	13.0	34	ND	ND	2.9	ND	ND	ND	14	ND	14.0	13.70	16	ND	18
		11/20/2002	ND	ND	13.0	34	ND	ND	3.8	3.3	ND	ND	12	ND	15.0	14.20	30	ND	6
		12/18/2002	ND	170	14.0	34	ND	ND	5.1	ND	0.16	ND	20	ND	ND	14.50	38	ND	ND
		1/22/2003	ND	ND	15.0	32	ND	ND	1.4	2.3	ND	ND	15	ND	7.3	14.40	ND	ND	7
		2/19/2003	ND	ND	30.0	420	ND	ND	41.0	ND	20.00	ND	660	57.0	49.0	19.20	24	ND	350
		3/26/2003	ND	790	12.0	51	ND	ND	4.0	4.8	0.95	ND	54	1.9	16.0	14.60	37	ND	25
		4/23/2003	ND	57	9.7	38	ND	ND	1.8	3.8	ND	ND	30	0.5	7.1	13.80	33	ND	9
ND = Not Detected		5/28/2003	ND	39	20.0	33	ND	ND	2.4	2.5	ND	ND	9.8	ND	10.0	12.80	66	ND	16
NS = Not Sampled		6/25/2003	ND	56	7.0	31	ND	ND	1.6	ND	ND	ND	7.4	ND	6.4	13.00	23	ND	14

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Upstream Pabco Weir	**LW6.05**	10/25/2000	ND	235	9.1	45	ND	ND	ND	8.1	0.32	ND	46	0.6	11.0	ND	24	ND	36
		11/20/2000	ND	35	7.1	70	ND	ND	ND	7.8	ND	ND	18	0.5	7.9	ND	16	ND	74
		12/20/2000	ND	46	7.8	54	ND	ND	ND	9.4	0.31	ND	23	ND	8.8	ND	17	ND	71
		1/18/2001	ND	98	7.2	33	ND	ND	ND	7.9	0.36	ND	39	ND	11.0	ND	22	ND	60
		2/21/2001	ND	240	8.9	37	ND	ND	ND	6.6	0.21	ND	33	1.0	13.0	ND	20	ND	41
		3/28/2001	ND	190	8.2	64	ND	ND	2.2	7.1	0.20	ND	28	0.9	6.3	ND	18	ND	42
		4/25/2001	ND	1400	ND	ND	ND	ND	ND	ND	1.30	ND	62	ND	ND	ND	26	ND	45
		5/30/2001	ND	120	7.9	38	ND	ND	1.3	6.1	0.18	ND	38	0.8	10.0	ND	25	ND	38
		6/27/2001	ND	140	7.1	34	ND	ND	4.3	6.9	0.15	ND	32	ND	7.1	ND	24	ND	39
		7/30/2001	ND	140	6.4	41	ND	ND	1.3	6.8	0.18	0.2	31	ND	8.9	ND	21	ND	33
		8/22/2001	ND	230	5.2	34	ND	ND	1.5	5.9	0.29	ND	39	1.0	9.9	ND	20	ND	39
		9/26/2001	ND	97	5.6	33	ND	ND	1.2	8.6	0.14	ND	27	0.9	9.2	ND	22	ND	36
		10/24/2001	ND	140	5.8	33	ND	ND	1.4	8.4	0.30	ND	37	0.9	7.0	ND	21	ND	42
		11/28/2001	ND	480	10.0	35	ND	ND	2.5	11.0	0.86	ND	73	0.7	10.0	ND	28	ND	44
		12/19/2001	ND	91	9.5	39	ND	ND	1.3	10.0	ND	ND	54	ND	11.0	ND	26	ND	49
		1/23/2002	ND	94	15.0	29	ND	ND	3.0	5.1	ND	ND	78	0.8	15.0	5.18	33	ND	43
		2/20/2002	ND	84	7.6	34	ND	ND	2.4	3.0	0.21	ND	36	0.7	12.0	1.88	23	ND	42
		3/27/2002	ND	120	9.0	37	ND	ND	1.7	2.9	0.12	ND	40	1.9	11.0	3.57	23	ND	37
		4/24/2002	ND	190	8.0	33	ND	ND	2.1	6.0	0.15	ND	46	0.6	9.8	3.25	20	ND	38
		5/22/2002	ND	150	5.7	33	ND	ND	1.5	3.1	0.24	ND	32	ND	6.4	2.56	20	ND	36
		6/26/2002	ND	6000	9.3	130	ND	ND	9.7	12.0	6.10	ND	140	4.7	14.0	2.90	22	ND	57
		7/24/2002	ND	110	8.6	36	ND	ND	2.3	3.9	0.15	ND	41	ND	9.9	2.83	22	ND	33
		8/28/2002	ND	190	4.9	36	ND	ND	3.2	6.8	0.32	ND	30	ND	9.1	1.85	21	ND	43
		9/25/2002	ND	160	7.4	32	ND	ND	1.4	5.1	0.20	ND	33	ND	9.0	2.88	22	ND	45
		10/23/2002	ND	130	6.6	45	ND	ND	ND	3.5	0.21	ND	33	ND	11.0	3.62	14	ND	33
		11/20/2002	ND	91	6.7	34	ND	ND	2.6	4.1	ND	ND	39	ND	11.0	3.69	18	ND	32
		12/18/2002	ND	200	6.9	39	ND	ND	3.1	4.8	0.24	ND	40	ND	9.3	3.63	18	ND	46
		1/22/2003	ND	100	13.0	47	ND	ND	ND	4.3	ND	ND	56	ND	7.8	4.02	ND	ND	49
		2/19/2003	ND	510	6.7	48	ND	ND	1.9	4.4	0.54	ND	57	1.1	9.5	3.56	26	ND	47
		3/26/2003	0.59	270	4.5	44	ND	ND	1.6	4.4	0.28	ND	39	0.8	9.8	3.34	31	ND	43
		4/23/2003	ND	130	5.9	43	ND	ND	ND	3.1	0.13	ND	47	0.6	ND	3.78	19	ND	31
ND = Not Detected		5/28/2003	ND	160	6.5	44	ND	ND	1.5	2.9	0.20	ND	40	0.9	8.6	3.58	22	ND	34
NS = Not Sampled		6/25/2003	ND	270	5.3	41	ND	ND	1.8	2.5	ND	ND	43	ND	7.4	2.80	18	ND	73

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Downstream Pabco Weir	**LW5.9**	10/25/2000	ND	210	9.1	41	ND	ND	ND	8.4	0.28	ND	46	0.6	11.0	ND	25	ND	42
		11/20/2000	ND	61	8.5	60	ND	ND	ND	7.4	ND	ND	24	ND	9.5	ND	18	ND	65
		12/20/2000	ND	29	7.4	58	ND	ND	ND	7.4	ND	ND	19	ND	7.8	ND	17	ND	75
		1/18/2001	ND	33	8.0	46	ND	ND	ND	8.7	0.22	ND	26	ND	13.0	ND	20	ND	82
		2/21/2001	ND	220	8.7	38	ND	ND	2.3	6.7	0.17	ND	34	ND	14.0	ND	21	ND	40
		3/28/2001	ND	590	9.7	57	ND	ND	7.8	7.9	1.40	ND	59	2.4	9.6	ND	22	ND	44
		4/25/2001	ND	510	9.0	53	ND	ND	2.0	8.3	0.61	ND	49	0.8	12.0	ND	24	ND	45
		5/30/2001	ND	90	7.1	43	ND	ND	1.5	7.1	0.13	ND	36	1.0	9.7	ND	23	ND	40
		6/27/2001	ND	96	7.0	37	ND	ND	1.4	6.1	0.15	ND	29	ND	6.6	ND	23	ND	36
		7/30/2001	ND	71	7.2	41	ND	ND	1.1	6.1	0.12	ND	32	ND	8.7	ND	22	ND	29
		8/22/2001	ND	120	5.9	35	ND	ND	1.4	5.5	0.20	ND	34	0.8	9.7	ND	21	ND	37
		9/26/2001	ND	51	6.0	52	ND	ND	ND	8.0	ND	ND	23	ND	7.4	ND	20	ND	22
		10/24/2001	ND	84	8.4	48	ND	ND	1.9	9.9	0.20	ND	35	0.7	7.0	ND	21	ND	33
		11/28/2001	ND	310	9.2	40	ND	ND	2.0	10.0	0.51	ND	58	0.5	9.2	ND	27	ND	45
		12/19/2001	ND	92	8.9	41	ND	ND	1.3	8.2	ND	ND	48	ND	11.0	ND	26	ND	52
		1/23/2002	ND	100	12.0	46	ND	ND	3.1	6.6	ND	ND	56	0.9	13.0	3.62	25	ND	50
		2/20/2002	ND	59	9.0	43	ND	ND	2.6	4.1	0.14	ND	33	0.8	12.0	1.82	21	ND	39
		3/27/2002	ND	85	7.8	65	ND	ND	2.0	4.7	ND	ND	22	0.7	8.2	2.69	17	ND	33
		4/24/2002	ND	130	8.8	32	ND	ND	2.1	2.7	0.16	ND	50	ND	9.4	3.15	20	ND	39
		5/22/2002	ND	160	6.7	35	ND	ND	4.2	2.9	0.25	ND	35	ND	6.9	2.52	21	ND	41
		6/26/2002	ND	3400	11.0	100	ND	ND	9.5	11.0	4.00	ND	120	4.4	13.0	3.13	22	ND	58
		7/24/2002	ND	96	7.9	33	ND	ND	2.3	3.4	0.15	ND	40	ND	9.5	2.61	22	ND	31
		8/28/2002	ND	130	6.0	41	ND	ND	3.7	7.2	0.24	ND	33	0.6	9.8	2.30	22	ND	54
		9/25/2002	ND	120	9.7	34	ND	ND	1.8	4.9	0.16	ND	36	ND	9.7	2.80	23	ND	41
		10/23/2002	ND	73	7.5	53	ND	ND	3.2	4.5	0.10	ND	33	ND	9.6	2.96	12	ND	44
		11/20/2002	ND	67	8.2	56	ND	ND	3.3	4.9	ND	ND	26	ND	8.5	2.97	11	ND	41
		12/18/2002	ND	160	7.7	48	ND	ND	3.2	5.1	0.15	ND	35	ND	9.7	3.12	18	ND	66
		1/22/2003	ND	170	16.0	41	ND	ND	ND	4.5	ND	ND	67	ND	8.9	4.62	ND	ND	46
		2/19/2003	ND	390	8.8	57	ND	ND	2.3	5.0	0.37	ND	50	1.0	9.5	3.63	20	ND	52
		3/26/2003	ND	370	5.5	48	ND	ND	1.9	4.9	0.37	ND	47	1.0	10.0	3.52	17	ND	47
		4/23/2003	ND	80	7.6	57	ND	ND	2.4	4.5	ND	ND	28	ND	6.0	3.04	17	ND	43
ND = Not Detected		5/28/2003	ND	120	9.9	53	ND	ND	2.1	4.7	ND	ND	36	0.6	8.8	3.34	22	ND	44
NS = Not Sampled		6/25/2003	ND	150	9.3	49	ND	ND	2.4	3.2	ND	ND	42	ND	7.5	3.00	19	ND	31

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Upstream Historic Lateral Weir	**LW5.5**	10/25/2000	ND	135	8.8	45	ND	ND	ND	7.0	0.21	ND	33	ND	12.0	ND	26	ND	37
		11/20/2000	ND	56	8.3	39	ND	ND	ND	6.0	0.12	ND	30	ND	12.0	ND	22	ND	44
		12/20/2000	ND	135	8.9	40	ND	ND	ND	7.4	0.25	ND	45	0.7	7.2	ND	21	ND	46
		1/18/2001	ND	54	8.5	36	ND	ND	ND	6.9	0.21	ND	39	ND	12.0	ND	24	ND	58
		2/21/2001	ND	170	8.8	41	ND	ND	ND	6.4	0.13	ND	34	ND	13.0	ND	21	ND	43
		3/28/2001	ND	690	11.0	57	ND	ND	4.4	7.2	2.00	ND	92	2.8	11.0	ND	25	ND	43
		4/25/2001	ND	440	8.9	49	ND	ND	2.0	6.1	0.46	ND	51	0.8	14.0	ND	23	ND	37
		5/30/2001	ND	88	6.5	37	ND	ND	1.2	5.5	0.14	ND	31	0.6	8.9	ND	22	ND	34
		6/27/2001	ND	89	6.8	36	ND	ND	1.5	7.2	0.14	ND	26	ND	6.9	ND	22	ND	39
		7/30/2001	ND	87	7.5	43	ND	ND	1.3	6.3	0.12	ND	33	ND	8.8	ND	21	ND	32
		8/22/2001	ND	75	5.4	33	ND	ND	1.3	5.1	0.14	ND	31	0.6	9.4	ND	19	ND	35
		9/26/2001	ND	85	6.4	37	ND	ND	1.3	7.5	0.10	ND	31	0.7	9.7	ND	24	ND	35
		10/24/2001	ND	34	8.4	36	ND	ND	ND	7.4	0.11	ND	43	ND	7.1	ND	23	ND	41
		11/28/2001	ND	360	12.0	40	ND	ND	2.0	10.0	0.57	ND	77	1.1	11.0	ND	29	ND	51
		12/19/2001	ND	87	7.0	37	ND	ND	1.4	8.1	ND	ND	41	ND	10.0	ND	24	ND	53
		1/23/2002	ND	100	12.0	32	ND	ND	3.1	5.8	ND	ND	58	1.1	13.0	4.54	30	ND	44
		2/20/2002	ND	67	8.8	37	ND	ND	2.5	3.7	0.16	ND	37	2.4	14.0	1.95	22	ND	42
		3/27/2002	ND	130	9.0	40	ND	ND	1.9	3.3	0.15	ND	41	0.9	10.0	3.17	10	ND	53
		4/24/2002	ND	110	8.0	35	ND	ND	1.8	2.5	0.14	ND	40	ND	8.9	3.09	20	ND	34
		5/22/2002	ND	170	7.7	38	ND	ND	1.6	3.3	0.29	ND	43	ND	6.8	2.57	21	ND	34
		6/26/2002	ND	540	8.3	42	ND	ND	ND	ND	0.74	ND	58	ND	ND	2.88	20	ND	42
		7/24/2002	ND	97	9.6	39	ND	ND	2.7	3.9	0.15	ND	46	ND	11.0	3.07	24	ND	33
		8/28/2002	ND	120	7.0	38	ND	ND	3.9	10.0	0.23	ND	35	0.7	10.0	2.05	21	ND	43
		9/25/2002	ND	110	11.0	34	ND	ND	1.6	5.0	0.14	ND	43	ND	10.0	3.28	16	ND	46
		10/23/2002	ND	67	8.0	38	ND	ND	2.4	4.3	0.12	ND	33	ND	9.7	3.26	13	ND	38
		11/20/2002	ND	66	8.9	36	ND	ND	ND	3.2	ND	ND	38	ND	9.6	3.68	17	ND	32
		12/18/2002	ND	140	9.2	43	ND	ND	2.8	5.1	0.15	ND	45	ND	9.9	3.68	19	ND	58
		1/22/2003	ND	160	14.0	44	ND	ND	ND	4.3	ND	ND	59	ND	8.8	4.25	ND	ND	50
		2/19/2003	ND	400	9.8	53	ND	ND	2.0	4.8	0.42	ND	64	1.2	11.0	4.66	19	ND	47
		3/26/2003	ND	470	6.5	51	ND	ND	2.4	6.0	0.57	ND	52	1.4	11.0	3.99	13	ND	49
		4/23/2003	ND	95	7.5	43	ND	ND	1.1	3.2	ND	ND	45	ND	5.8	3.90	11	ND	36
ND = Not Detected		5/28/2003	ND	160	8.6	47	ND	ND	1.7	3.5	0.18	ND	45	0.7	9.4	3.78	23	ND	37
NS = Not Sampled		6/25/2003	ND	140	6.5	39	ND	ND	1.8	2.8	ND	ND	40	ND	7.1	3.04	16	ND	31

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Downstream Historic Lateral Weir	**LW5.3**	10/25/2000	ND	285	8.7	46	ND	ND	ND	8.9	0.40	ND	43	0.9	12.0	ND	27	ND	45
		11/20/2000	ND	125	9.2	42	ND	ND	ND	6.5	0.19	ND	32	ND	12.0	ND	22	ND	44
		12/20/2000	ND	115	9.2	41	ND	ND	ND	7.9	0.14	ND	43	0.5	11.0	ND	20	ND	53
		1/18/2001	ND	48	8.2	35	ND	ND	ND	7.1	0.20	ND	36	ND	12.0	ND	22	ND	58
		2/21/2001	ND	190	9.0	40	ND	ND	ND	7.0	0.15	ND	32	0.8	13.0	ND	22	ND	41
		3/28/2001	ND	710	11.0	61	ND	ND	3.5	7.6	1.80	ND	84	3.1	11.0	ND	25	ND	43
		4/25/2001	ND	750	10.0	58	ND	ND	2.5	6.7	0.78	ND	61	1.3	14.0	ND	25	ND	39
		5/30/2001	ND	150	7.4	39	ND	ND	1.1	5.5	0.18	ND	39	ND	9.1	ND	22	ND	32
		6/27/2001	ND	130	7.1	37	ND	ND	2.0	6.5	0.21	ND	33	ND	7.2	ND	22	ND	36
		7/30/2001	ND	120	7.7	41	ND	ND	1.2	5.9	0.18	ND	37	ND	8.7	ND	22	ND	29
		8/22/2001	ND	130	7.0	35	ND	ND	1.5	5.2	0.19	ND	43	0.7	9.6	ND	21	ND	34
		9/26/2001	ND	220	7.6	42	ND	ND	1.8	7.3	0.35	ND	39	1.1	9.9	ND	26	ND	32
		10/24/2001	ND	82	8.5	36	ND	ND	1.4	9.3	0.16	ND	51	1.0	8.0	ND	24	ND	37
		11/28/2001	ND	240	14.0	43	ND	ND	2.2	9.9	0.39	ND	77	1.1	12.0	ND	32	ND	47
		12/19/2001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		1/23/2002	ND	65	11.0	35	ND	ND	3.1	5.6	ND	ND	57	0.7	14.0	3.06	28	ND	48
		2/20/2002	ND	80	10.0	36	ND	ND	2.6	4.0	0.17	ND	48	0.6	15.0	1.78	22	ND	44
		3/27/2002	ND	180	10.0	41	ND	ND	2.2	8.2	0.19	ND	55	1.3	12.0	3.11	10	ND	82
		4/24/2002	ND	100	7.7	35	ND	ND	1.7	2.8	0.13	ND	41	ND	8.8	2.61	18	ND	37
		5/22/2002	ND	83	7.7	37	ND	ND	1.5	3.1	0.15	ND	38	ND	6.8	2.48	20	ND	43
		6/26/2002	ND	390	10.0	42	ND	ND	ND	ND	0.54	ND	59	ND	ND	3.14	23	ND	36
		7/24/2002	ND	160	9.1	43	ND	ND	2.8	3.9	0.21	ND	44	ND	10.0	2.66	20	ND	34
		8/28/2002	ND	110	8.2	37	ND	ND	3.4	5.9	0.24	ND	41	ND	10.0	1.95	22	ND	43
		9/25/2002	ND	1100	9.4	81	ND	ND	2.4	4.9	1.10	ND	56	1.4	9.6	2.57	7	ND	62
		10/23/2002	ND	68	8.7	40	ND	ND	2.5	3.6	0.12	ND	33	ND	10.0	3.23	25	ND	37
		11/20/2002	ND	66	11.0	36	ND	ND	2.7	3.8	ND	ND	44	ND	11.0	3.46	16	ND	29
		12/18/2002	ND	150	9.9	41	ND	ND	2.8	5.1	0.16	ND	44	ND	10.0	3.17	21	ND	53
		1/22/2003	ND	150	14.0	41	ND	ND	ND	4.8	ND	ND	57	ND	8.7	4.38	ND	ND	44
		2/19/2003	ND	330	9.9	51	ND	ND	1.9	13.0	0.36	ND	58	2.1	11.0	4.02	24	ND	46
		3/26/2003	ND	280	8.9	52	ND	ND	1.9	6.5	0.28	ND	57	1.1	12.0	4.72	9	ND	54
		4/23/2003	ND	110	8.0	45	ND	ND	1.0	3.9	ND	ND	45	0.6	5.8	3.80	16	ND	36
ND = Not Detected		5/28/2003	ND	190	6.2	48	ND	ND	1.8	3.9	0.25	ND	56	0.6	11.0	4.05	27	ND	34
NS = Not Sampled		6/25/2003	ND	210	7.3	41	ND	ND	1.9	2.9	ND	ND	55	ND	7.8	3.14	19	ND	42

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Upstream Demonstration Weir	**LW3.85**	10/25/2000	ND	1300	12.0	85	ND	ND	3.8	9.4	2.10	ND	100	1.9	14.0	ND	30	ND	39
		11/20/2000	ND	100	9.2	41	ND	ND	ND	6.7	0.17	ND	36	ND	13.0	ND	22	ND	41
		12/20/2000	ND	170	8.7	39	ND	ND	ND	7.6	0.65	ND	54	0.7	9.9	ND	10	ND	46
		1/18/2001	ND	2200	12.0	81	ND	ND	4.0	9.5	2.10	ND	130	1.9	16.0	ND	27	ND	51
		2/21/2001	ND	145	11.0	42	ND	ND	ND	7.6	0.13	ND	48	ND	13.0	ND	22	ND	41
		3/28/2001	ND	200	5.9	47	ND	ND	2.1	6.0	0.33	ND	58	1.1	10.0	ND	26	ND	36
		4/25/2001	ND	1300	ND	ND	ND	ND	ND	ND	1.30	ND	84	ND	ND	ND	26	ND	41
		5/30/2001	ND	210	9.2	39	ND	ND	1.6	6.5	0.25	ND	51	0.9	10.0	ND	23	ND	33
		6/27/2001	ND	280	9.6	41	ND	ND	2.1	7.9	0.35	ND	52	ND	8.6	ND	24	ND	34
		7/30/2001	ND	470	9.9	46	ND	ND	1.6	7.1	0.52	ND	53	0.5	9.8	ND	23	ND	30
		8/22/2001	ND	300	7.5	37	ND	ND	1.8	6.3	0.47	ND	55	1.0	10.0	ND	20	ND	34
		9/26/2001	ND	140	NS	41	ND	ND	1.5	8.6	0.21	ND	44	1.0	11.0	ND	26	ND	31
		10/24/2001	ND	130	9.8	38	ND	ND	1.7	8.3	0.26	ND	53	0.8	8.7	ND	25	ND	38
		11/28/2001	ND	1900	14.0	73	ND	ND	4.6	12.0	2.80	ND	150	2.4	14.0	ND	29	ND	54
		12/19/2001	ND	150	12.0	36	ND	ND	1.8	8.6	ND	ND	69	ND	13.0	ND	28	ND	44
		1/23/2002	ND	230	11.0	42	ND	ND	3.1	6.4	ND	ND	69	1.0	14.0	3.03	27	ND	45
		2/20/2002	ND	290	10.0	40	ND	ND	3.1	4.7	0.40	ND	59	0.9	15.0	1.79	21	ND	44
		3/27/2002	ND	230	11.0	43	ND	ND	2.1	3.7	0.24	ND	59	0.8	11.0	3.31	10	ND	34
		4/24/2002	ND	1100	8.9	76	ND	ND	2.8	3.9	1.30	ND	75	1.2	10.0	2.36	18	ND	30
		5/22/2002	ND	190	9.2	38	ND	ND	ND	ND	0.27	ND	56	ND	ND	2.91	20	ND	50
		6/26/2002	ND	440	9.9	40	ND	ND	1.8	4.7	0.51	ND	72	0.5	8.7	3.16	21	ND	29
		7/24/2002	ND	350	7.6	54	ND	ND	3.1	3.9	0.40	ND	64	0.6	11.0	2.66	21	ND	27
		8/28/2002	ND	56	11.0	36	ND	ND	3.7	5.4	0.13	ND	68	ND	11.0	2.51	25	ND	35
		9/25/2002	ND	1600	10.0	94	ND	ND	2.7	5.4	1.30	ND	80	1.9	11.0	2.42	7	ND	72
		10/23/2002	ND	120	11.0	41	ND	ND	2.6	4.7	0.19	ND	58	ND	12.0	3.35	14	ND	34
		11/20/2002	ND	68	11.0	36	ND	ND	2.8	5.0	ND	ND	53	ND	12.0	3.58	19	ND	35
		12/18/2002	ND	200	11.0	40	ND	ND	2.8	5.2	0.22	ND	63	ND	10.0	3.60	24	ND	49
		1/22/2003	ND	180	16.0	40	ND	ND	ND	4.9	ND	ND	90	ND	9.7	3.97	ND	ND	40
		2/19/2003	ND	720	12.0	56	ND	ND	2.5	5.1	0.67	ND	110	1.2	12.0	3.99	22	ND	45
		3/26/2003	ND	210	9.8	52	ND	ND	1.9	4.4	0.20	ND	74	0.8	12.0	4.14	15	ND	41
		4/23/2003	ND	110	8.7	45	ND	ND	1.1	3.6	ND	ND	56	ND	6.1	3.59	16	ND	32
ND = Not Detected		5/28/2003	ND	230	7.6	51	ND	ND	2.1	4.6	0.32	ND	56	0.7	11.0	3.54	21	ND	34
NS = Not Sampled		6/25/2003	ND	1700	10.0	67	ND	ND	ND	ND	0.23	ND	98	ND	ND	3.07	19	ND	ND

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Downstream Demonstration Weir	**LW3.75**	10/25/2000	ND	1600	12.0	76	ND	ND	3.2	8.8	1.20	ND	87	1.6	13.0	ND	29	ND	39
		11/20/2000	ND	225	11.0	42	ND	ND	ND	6.7	0.27	ND	49	ND	13.0	ND	23	ND	42
		12/20/2000	ND	68	9.9	68	ND	ND	ND	8.7	0.27	ND	49	0.6	11.0	ND	24	ND	47
		1/18/2001	ND	2500	12.0	88	ND	ND	4.7	10.0	2.80	ND	125	2.0	16.0	ND	27	ND	54
		2/21/2001	ND	190	11.0	41	ND	ND	ND	6.8	0.18	ND	45	ND	14.0	ND	22	ND	40
		3/28/2001	ND	300	13.0	51	ND	ND	ND	6.5	0.78	ND	69	1.7	11.0	ND	25	ND	35
		4/25/2001	ND	1300	11.0	65	ND	ND	3.3	6.9	1.50	ND	87	1.9	14.0	6.90	25	ND	37
		5/30/2001	ND	250	9.2	39	ND	ND	1.7	6.9	0.33	ND	53	0.9	11.0	ND	20	ND	34
		6/27/2001	ND	320	9.1	40	ND	ND	1.7	7.6	0.42	ND	53	ND	8.2	ND	22	ND	34
		7/30/2001	ND	280	10.0	43	ND	ND	1.6	6.4	0.34	ND	53	ND	9.4	ND	23	ND	26
		8/22/2001	ND	210	9.0	38	ND	ND	1.9	5.7	0.32	ND	55	0.8	11.0	ND	21	ND	33
		9/26/2001	ND	230	10.0	42	ND	ND	1.6	7.5	0.27	ND	48	0.8	11.0	ND	26	ND	29
		10/24/2001	ND	140	10.0	38	ND	ND	3.0	8.5	0.27	ND	52	1.1	8.7	ND	25	ND	37
		11/28/2001	ND	1400	14.0	59	ND	ND	3.8	11.0	1.90	ND	120	1.8	12.0	ND	29	ND	51
		12/19/2001	ND	180	12.0	37	ND	ND	1.9	9.0	ND	ND	68	0.7	13.0	ND	27	ND	46
		1/23/2002	ND	320	11.0	46	ND	ND	3.5	6.3	0.62	ND	69	0.9	14.0	3.08	27	ND	54
		2/20/2002	ND	240	22.0	38	ND	ND	3.1	4.3	0.34	ND	56	1.2	16.0	1.72	23	ND	43
		3/27/2002	ND	300	12.0	43	ND	ND	14.0	4.4	0.33	ND	61	1.1	14.0	3.36	22	ND	38
		4/24/2002	ND	1400	9.4	84	ND	ND	3.1	4.0	0.42	ND	82	1.4	10.0	2.55	18	ND	29
		5/22/2002	ND	330	10.0	40	ND	ND	2.0	3.3	0.57	ND	64	ND	8.0	2.27	22	ND	37
		6/26/2002	ND	640	8.1	44	ND	ND	2.2	5.3	0.70	ND	75	0.7	9.2	2.58	22	ND	33
		7/24/2002	ND	400	9.0	55	ND	ND	3.1	4.1	0.49	ND	63	0.6	11.0	2.30	22	ND	28
		8/28/2002	ND	120	12.0	36	ND	ND	3.7	5.6	0.22	ND	65	ND	11.0	2.43	26	ND	45
		9/25/2002	ND	1600	11.0	86	ND	ND	3.6	5.6	1.20	ND	76	1.7	11.0	2.46	22	ND	67
		10/23/2002	ND	130	12.0	40	ND	ND	2.8	4.2	0.20	ND	54	ND	11.0	3.26	14	ND	32
		11/20/2002	ND	67	10.0	36	ND	ND	3.0	4.4	ND	ND	49	ND	12.0	3.53	19	ND	26
		12/18/2002	ND	200	14.0	49	ND	ND	3.2	6.3	0.20	ND	69	ND	12.0	3.46	23	ND	57
		1/22/2003	ND	160	17.0	41	ND	ND	ND	4.5	ND	ND	86	ND	10.0	3.68	ND	ND	39
		2/19/2003	ND	770	13.0	56	ND	ND	2.9	5.3	0.75	ND	110	1.2	12.0	3.92	21	ND	44
		3/26/2003	ND	300	11.0	53	ND	ND	2.4	5.2	0.32	ND	77	0.9	13.0	3.86	14	ND	45
		4/23/2003	ND	120	9.7	45	ND	ND	1.2	4.0	0.11	ND	63	0.6	6.3	3.94	25	ND	32
ND = Not Detected		5/28/2003	ND	220	7.5	48	ND	ND	2.1	4.0	0.26	ND	53	1.2	11.0	3.54	22	ND	30
NS = Not Sampled		6/25/2003	ND	750	9.4	49	ND	ND	2.4	3.5	0.10	ND	65	0.8	8.3	3.05	21	ND	31

Appendix IIId. Monthly Metal Data from the Las Vegas Wash Mainstream Sites

Sampling Location	Identifier	Date	Silver (ug/l)	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (mg/l)	Mercury (ug/l)	Manganese (ug/l)	Lead (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Silica (mg/l)	Thallium (ug/l)	Zinc (ug/l)
Downstream Lake Las Vegas	**LW0.8**	10/25/2000	ND	1700	14.0	97	ND	ND	4.3	10.0	2.70	ND	120	3.1	10.0	ND	30	29	39
		11/20/2000	ND	1600	14.0	86	ND	ND	3.5	9.2	1.40	ND	120	5.0	16.0	ND	25	23	42
		12/20/2000	ND	2200	14.0	115	ND	ND	3.0	11.0	4.20	ND	165	5.9	14.0	ND	31	24	47
		1/18/2001	ND	670	12.0	54	ND	ND	2.1	8.5	1.10	ND	84	1.4	14.0	ND	25	27	54
		2/21/2001	ND	660	11.0	50	ND	ND	2.2	7.5	0.72	ND	66	3.2	13.0	ND	24	22	40
		3/28/2001	ND	260	13.0	49	ND	ND	2.2	6.2	0.47	ND	59	1.6	10.0	ND	26	25	35
		4/25/2001	ND	1500	11.0	65	ND	ND	3.2	7.2	1.50	ND	84	2.1	13.0	6.70	24	25	37
		5/30/2001	ND	220	8.3	38	ND	ND	1.3	6.0	0.31	ND	51	1.4	9.5	ND	19	20	34
		6/27/2001	ND	990	9.5	50	ND	ND	2.4	8.7	1.40	ND	87	3.5	9.2	ND	23	ND	70
		7/30/2001	ND	360	9.7	43	ND	ND	1.8	6.2	0.47	ND	52	0.6	9.1	ND	23	ND	18
		8/22/2001	ND	710	9.3	50	ND	ND	2.4	7.2	0.96	ND	72	3.1	11.0	ND	21	ND	36
		9/26/2001	ND	280	9.7	42	ND	ND	1.7	7.6	0.27	ND	48	1.2	11.0	ND	25	ND	19
		10/24/2001	ND	250	9.9	41	ND	ND	2.1	9.3	0.36	ND	58	1.5	8.9	ND	23	ND	28
		11/28/2001	ND	420	9.4	45	ND	ND	2.4	8.7	0.65	ND	64	1.2	10.0	ND	25	ND	25
		12/19/2001	ND	160	11.0	35	ND	ND	1.8	8.4	0.40	ND	56	0.6	12.0	ND	25	ND	47
		1/23/2002	ND	370	11.0	48	ND	ND	3.6	6.3	0.67	ND	69	1.4	14.0	3.16	25	ND	52
		2/20/2002	ND	260	11.0	39	ND	ND	3.0	4.1	0.35	ND	52	1.0	16.0	1.72	21	ND	45
		3/27/2002	ND	390	11.0	46	ND	ND	2.3	4.0	0.36	ND	63	1.3	12.0	3.09	21	ND	30
		4/24/2002	ND	1800	8.6	85	ND	ND	3.5	4.4	1.90	ND	89	2.1	10.0	2.23	16	ND	32
		5/22/2002	ND	720	9.7	50	ND	ND	4.0	4.6	1.10	ND	89	3.0	8.5	2.15	20	ND	41
		6/26/2002	ND	700	9.5	46	ND	ND	2.4	5.3	0.79	ND	69	1.3	9.1	2.63	20	ND	33
		7/24/2002	ND	370	9.3	56	ND	ND	3.0	3.8	0.49	ND	54	0.7	11.0	2.23	21	ND	27
		8/28/2002	ND	180	8.3	40	ND	ND	3.9	5.8	0.32	ND	57	0.7	11.0	1.91	24	ND	60
		9/25/2002	ND	1400	11.0	81	ND	ND	2.6	5.2	1.10	ND	75	1.8	11.0	2.19	21	ND	62
		10/23/2002	ND	240	12.0	46	ND	ND	2.9	4.4	0.13	ND	57	0.7	11.0	3.10	12	ND	36
		11/20/2002	ND	86	10.0	37	ND	ND	2.8	4.7	ND	ND	46	0.5	11.0	3.39	18	ND	31
		12/18/2002	ND	220	11.0	41	ND	ND	2.8	5.5	0.23	ND	53	0.6	11.0	3.38	22	ND	49
		1/22/2003	ND	140	14.0	43	ND	ND	ND	4.2	ND	ND	68	ND	9.4	3.31	ND	ND	41
		2/19/2003	ND	860	11.0	57	ND	ND	2.8	5.4	0.83	ND	100	1.9	12.0	3.58	19	ND	47
		3/26/2003	ND	330	9.3	53	ND	ND	2.1	5.1	0.38	ND	69	1.2	12.0	3.56	13	ND	40
		4/23/2003	ND	140	8.7	46	ND	ND	1.0	3.5	0.13	ND	56	0.8	6.0	3.17	20	ND	32
ND = Not Detected		5/28/2003	ND	230	7.8	48	ND	ND	2.0	4.4	0.32	ND	48	0.9	11.0	3.36	20	ND	35
NS = Not Sampled		6/25/2003	ND	480	8.0	46	ND	ND	2.1	3.2	0.11	ND	53	0.7	7.6	2.70	18	ND	28

Appendix IV

Selenium Results and Flow Data from Eight Sample Sites in the Mainstream Las Vegas Wash and Six Tributaries and Two Seeps to the Las Vegas Wash

IVa. Monthly Selenium Results from South Dakota State University and Frontier Geoscience Laboratory for Mainstream Las Vegas Wash

IVb. Quarterly Selenium Results from South Dakota State University for Six Tributaries and Two Seeps to the Las Vegas Wash

Appendix IVa. Monthly Selenium Results from South Dakota State University and Frontier Geoscience Laboratory for mainstream Las Vegas Wash

Sample Date	Lab	LW10.75	LW6.05	LW5.9	LW5.5	LW5.3	LW3.85	LW3.75	LW0.8
1/23/2002	SDSU	16.50	5.75	4.10	5.36	3.85	3.45	4.01	3.31
	Frontier	15.56	5.18	3.62	4.54	3.06	3.03	3.08	3.16
2/20/2002	Frontier	15.00	1.88	1.82	1.95	1.78	1.79	1.72	1.72
3/26/2002	SDSU	13.80	3.69	2.69	3.56	3.42	3.38	3.26	3.10
	Frontier	11.10	3.57	2.69	3.17	3.11	3.31	3.36	3.09
4/24/2002	SDSU	14.00	3.72	3.72	3.43	3.40	2.96	2.84	2.74
	Frontier	12.70	3.25	3.15	3.09	2.61	2.36	2.55	2.23
5/22/2002	SDSU	13.80	2.95	3.14	3.22	3.06	2.91	2.88	2.84
	Frontier	12.10	2.56	2.52	2.57	2.48	2.82	2.27	2.15
6/26/2002	SDSU	12.60	2.86	2.94	2.92	2.88	2.68	2.62	2.42
	Frontier	13.60	2.90	3.13	2.88	3.14	3.16	2.58	2.63
7/24/2002	SDSU	12.70	3.22	2.85	3.28	3.36	2.94	2.94	2.78
	Frontier	12.40	2.83	2.61	3.07	2.66	2.66	2.30	2.23
8/26/2002	SDSU	13.60	2.86	2.94	2.49	2.44	2.98	3.41	2.76
9/25/2002	SDSU	13.40	3.39	3.52	3.66	3.10	2.88	2.86	2.83
	Frontier	11.70	2.88	2.80	3.28	2.57	2.42	2.46	2.19
10/23/2002	SDSU	13.70	3.62	2.96	3.26	3.23	3.35	3.26	3.10
11/20/2002	SDSU	14.20	3.69	2.97	3.68	3.46	3.58	3.53	3.39
12/18/2002	SDSU	14.50	3.63	3.12	3.68	3.17	3.60	3.46	3.38
1/22/2003	SDSU	14.40	4.02	4.62	4.25	4.38	3.97	3.68	3.31
2/19/2003	SDSU	19.20	3.56	3.63	4.66	4.02	3.99	3.92	3.58
3/26/2003	SDSU	14.60	3.34	3.52	3.99	4.72	4.14	3.86	3.56
4/23/2003	SDSU	13.80	3.78	3.04	3.90	3.80	3.59	3.94	3.17
5/28/2003	SDSU	12.80	3.58	3.34	3.78	4.05	3.54	3.54	3.36
6/25/2003	SDSU	13.00	2.80	3.00	3.04	3.14	3.07	3.05	2.70

Appendix IVb. Quarterly Selenium Results (ug/L) from South Dakota State University for Six Tributaries and Two Seeps to the Las Vegas Wash

Sample Date	Tributaries						Seeps	
	LVC_2	SC_1	FW_0	LW12.1	MC_1	DC_1	LWC6.3	LWC3.7
1/23/2002	7.32	8.75	17.50	12.40	22.80	23.50	4.39	4.63
4/24/2002	2.28	7.70	16.70	10.90	20.20	22.00	5.47	4.20
7/24/2002	2.92	6.59	14.40	9.68	22.00	22.00	6.54	3.33
10/23/2002	5.44	7.47	14.40	10.60	22.60	23.30	6.99	3.90
1/22/2003	6.32	7.76	15.20	11.00	23.40	23.00	5.56	3.56
4/23/2003	5.54	5.95	14.80	11.40	23.90	22.40	5.36	5.12

Appendix V

Quarterly Water Quality Data from Six Tributaries and Two Seeps to the Las Vegas Wash

Va. Quarterly Field Measurements, Perchlorate, and Bacteria Concentrations in Tributary/Seep Locations

Vb. Quarterly Major Ion Chemistry of Water Samples from Tributary/Seep Locations

Vc. Quarterly Nutrient Concentrations of Water Samples from Tributary/Seep Locations

Vd. Quarterly Heavy Metal Concentrations (μg/L) from Tributary/Seep Locations

Ve. Quarterly Organic Pollutant Concentrations (μg/L) of Water Samples from Tributary/Seep Locations

Appendix Va. Field Measurements, Bacteriological Compositions, and Perchlorate Concentrations of Tributary/Seep Locations

Location	ID	Date	Conductivity	DO	pH	Temperature	Turbidity	Perchlorate	Ave # FC	Ave # E. coli
			uS/cm	mg/L	Units	^{0}C	NTU	ug/L	/100 mL	/100 mL
Meadows Detention	LVC_2	10/25/2000	1929	7.93	8.20	14.2	1.52	NA	NA	NA
Basin		1/18/2001	2490	12.79	8.44	1.0	0.50	NA	95	130
		4/25/2001	1851	7.71	8.29	15.0	3.45	NA	1490	1380
		7/30/2001	1530	12.05	9.00	24.0	8.02	10	1300	930
		10/24/2001	2200	12.25	8.32	20.1	8.35	13	665	200
		1/23/2002	2330	13.03	9.01	5.5	3.53	16	50	20
		4/24/2002	1038	4.80	8.30	17.5	7.30	4	190	115
		7/24/2002	1366	18.49	9.33	29.6	4.05	9	16500	700
		10/23/2002	1630	15.90	9.27	22.8	2.08	11	5300	180
		1/22/2003	2370	10.12	8.41	8.8	0.75	14	10	10
		4/23/2003	2180	13.02	8.32	15.5	0.83	11	<400	>2000
Las Vegas Creek	LW12.1	10/25/2000	4390	10.86	8.23	19.5	16.10	NA	NA	NA
		1/18/2001	3810	14.28	8.64	10.5	7.90	NA	610	300
		4/25/2001	3740	13.18	8.61	23.7	2.26	NA	110	130
		7/30/2001	3780	15.47	8.67	29.0	4.98	15	2050	905
		10/24/2001	2280	10.47	8.24	18.1	1.32	10	1350	550
		1/23/2002	3620	17.84	8.57	7.5	3.83	13	110	60
		4/24/2002	3660	12.21	8.67	22.7	1.23	10	180	85
		7/24/2002	3380	19.82	8.49	29.2	1.82	9	2180	160
		10/23/2002	2970	8.97	8.33	13.9	2.13	12	1200	385
		1/22/2003	3470	10.76	8.72	10.7	2.42	8	260	255
		4/23/2003	3830	15.90	8.52	19.0	1.58	12	240	150
Flamingo Wash	FW_0	10/25/2000	4370	9.57	8.20	20.7	12.00	NA	NA	NA
		1/18/2001	4030	11.24	8.38	9.0	1.84	NA	25	0
		4/25/2001	3470	8.99	8.43	24.5	1.96	NA	40	80
		7/30/2001	3770	9.29	8.60	26.8	1.14	16	330	110
		10/24/2001	3770	10.02	9.21	14.9	2.57	13	475	130
		1/23/2002	3970	11.84	8.37	8.0	3.23	4	730	475
		4/24/2002	3750	7.80	8.62	21.7	0.88	10	190	60
		7/24/2002	3740	9.43	8.53	29.2	2.19	9	3000	165
		10/23/2002	2990	7.85	8.31	15.0	2.21	11	670	220
		1/22/2003	3690	8.13	8.35	10.4	1.11	13	110	115
NA = Not Analyzed		4/23/2003	3430	9.42	8.23	16.4	3.21	8	<400	80

Appendix Va. Field Measurements, Bacteriological Compositions, and Perchlorate Concentrations of Tributary/Seep Locations

Location	ID	Date	Conductivity	DO	pH	Temperature	Turbidity	Perchlorate	Ave # FC	Ave # E. coli
			uS/cm	mg/L	Units	^{0}C	NTU	ug/L	/100 mL	/100 mL
Sloan Channel	SC_1	10/25/2000	1011	11.53	8.64	13.8	4.92	NA	NA	NA
		1/18/2001	2530	8.53	8.05	7.0	1.35	NA	385	110
		4/25/2001	2550	10.22	8.12	18.2	3.26	NA	720	185
		7/30/2001	2710	7.21	7.98	22.9	3.18	4	240	190
		10/24/2001	3950	9.68	8.46	15.0	2.57	6	805	505
		1/23/2002	2390	13.85	8.54	1.2	0.75	8	60	100
		4/24/2002	2380	8.87	8.96	22.7	15.50	4	355	75
		7/24/2002	2200	10.80	8.87	29.3	3.09	4	5800	740
		10/23/2002	1858	8.85	9.08	17.5	1.30	4	5000	340
		1/22/2003	2350	12.01	8.57	7.5	0.76	7	1390	1500
		4/23/2003	2260	5.94	8.06	11.9	2.29	32	300	160
Monson Channel	MC_2	10/25/2000	4420	13.27	8.45	21.3	0.13	NA	NA	NA
		1/18/2001	5180	17.24	8.58	12.1	0.37	NA	20	20
		4/25/2001	5030	16.98	8.35	21.0	1.20	NA	545	50
		7/30/2001	5010	12.60	8.05	27.8	2.26	16	20	90
		10/24/2001	5010	15.67	8.57	23.3	2.27	12	230	30
		1/23/2002	5800	12.42	8.31	6.3	2.95	31	20	0
		4/24/2002	5650	9.84	8.14	21.3	0.96	12	660	170
		7/24/2002	4740	10.09	8.29	27.6	3.10	16	15	10
		10/23/2002	3960	7.88	8.53	23.5	1.20	19	2220	40
		1/22/2003	4970	10.24	8.18	10.8	4.56	15	185	210
		4/23/2003	1269	5.06	8.53	20.2	0.72	14	260	60
Duck Creek	DC_1	10/25/2000	6130	9.34	8.09	17.0	2.17	NA	NA	NA
		1/18/2001	6120	11.05	8.23	9.0	13.80	NA	120	20
		4/25/2001	6020	10.11	8.30	21.0	2.41	NA	0	80
		7/30/2001	6070	10.18	8.06	25.9	1.36	14	150	170
		10/24/2001	6010	11.12	8.51	18.7	0.53	20	5900	520
		1/23/2002	6070	11.49	8.21	9.3	1.97	21	15	20
		4/24/2002	6130	10.74	8.19	21.0	1.97	26	130	70
		7/24/2002	6070	8.35	7.98	26.8	1.30	21	1440	120
		10/23/2002	4980	9.29	8.24	20.9	0.95	25	2850	50
		1/22/2003	4970	10.46	8.00	10.4	5.74	20	80	90
NA = Not Analyzed		4/23/2003	6050	9.60	7.98	4.6	12.69	11	<400	100

Appendix Va. Field Measurements, Bacteriological Compositions, and Perchlorate Concentrations of Tributary/Seep Locations

Location	ID	Date	Conductivity	DO	pH	Temperature	Turbidity	Perchlorate	Ave # FC	Ave # E. coli
			uS/cm	mg/L	Units	^{0}C	NTU	ug/L	/100 mL	/100 mL
Kerr-McGee Seep	LWC6.3	10/25/2000	10460	3.84	7.36	18.5	0.41	NA	NA	NA
		1/18/2001	7280	4.12	7.31	12.6	0.12	NA	0	0
		4/25/2001	8250	3.84	7.34	19.6	0.12	NA	0	0
		7/30/2001	9550	3.28	7.26	22.9	0.25	122934	0	0
		10/24/2001	9200	3.72	7.35	19.4	1.13	72438	0	0
		1/23/2002	7530	4.02	7.43	14.4	0.17	38338	0	0
		4/24/2002	8030	3.97	7.39	19.7	1.14	69130	0	0
		7/24/2002	8080	6.70	7.39	24.3	0.29	69209	0	0
		10/23/2002	7390	6.65	7.37	19.0	0.25	73700	30	0
		1/22/2003	7380	6.17	7.55	15.2	0.11	55109	60	10
		4/23/2003	6900	7.27	7.70	16.6	0.61	43844	<400	<400
GCS5 Seep	LWC3.7	10/25/2000	3300	1.27	7.24	22.8	0.79	NA	NA	NA
		1/18/2001	3190	2.83	7.22	20.1	0.11	NA	0	0
		4/25/2001	3100	2.55	7.29	20.3	0.09	NA	50	0
		7/30/2001	3040	1.86	7.34	24.2	0.08	967	10	10
		10/24/2001	3050	2.76	7.27	23.2	29.60	2041	6500	NA
		1/23/2002	3210	3.70	7.33	20.0	0.25	1982	10	0
		4/24/2002	3150	1.95	7.28	20.8	4.74	1693	630	525
		7/24/2002	2900	2.85	7.35	23.6	0.10	1295	10	10
		10/23/2002	2340	3.65	7.20	23.5	13.20	1580	5300	90
		1/22/2003	2930	3.87	7.55	20.9	0.79	1377	0	20
NA = Not Analyzed		4/23/2003	3120	4.83	7.51	19.3	0.81	369	<400	<400

Appendix Vb. Quarterly Major Ion Chemistry of Water Samples from Tributary/Seep Locations

Location	Date	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Biocarbonate as HCO3 (mg/l)	Carbonate CaCO3 (mg/L)	Sulfate (mg/l)	Chloride (mg/l)	Bromide (mg/l)	Fluoride (mg/l)	Silica (mg/L)	Total Dissolved Solids (mg/l)	TOC (mg/L)
LVC_2	10/25/2000	130	91	140	16	297	3.9	572	146	0.5	0.5	24	1380	5.5
	1/18/2001	160	140	200	23	363	3.7	734	186	0.4	0.3	25	1870	3.0
	4/25/2001	120	87	150	16	280	0.9	525	150	0.2	0.6	22	1280	6.9
	7/30/2001	110	90	140	16	255	6.6	555	145	0.2	0.5	25	1220	13.6
	10/24/2001	120	120	220	24	229	11.8	720	190	0.4	0.5	28	1640	7.2
	1/23/2002	130	140	190	21	266	8.7	770	190	0.4	0.3	22	1730	5.1
	4/24/2002	70	57	52	9	277	2.3	230	52	0.1	0.4	20	650	16.2
	7/24/2002	110	65	110	13	191	39.3	470	130	0.2	0.6	19	930	11.1
	10/23/2002	120	110	180	21	252	20.6	600	160	0.3	0.4	15	1450	6.7
	1/22/2003	150	130	190	21	366	3.0	790	210	0.4	0.3	17	1770	4.1
	4/23/2003	120	107	160	17	321	5.2	720	200	0.3	0.5	17	1620	6.0
LW12.1	10/25/2000	280	270	350	79	249	2.6	2090	305	0.8	0.8	43	3810	5.5
	1/18/2001	260	270	290	57	257	4.2	1620	238	0.8	0.4	40	3210	2.4
	4/25/2001	220	260	320	51	234	4.8	1700	281	0.6	0.4	36	3200	3.9
	7/30/2001	230	260	300	54	216	2.8	1750	285	0.7	0.5	32	3200	5.9
	10/24/2001	240	260	320	58	291	3.8	1700	280	0.6	0.5	30	3230	5.2
	1/23/2002	230	250	270	49	247	4.0	1700	270	0.7	0.4	38	3040	5.0
	4/24/2002	230	260	290	57	263	6.8	1600	270	0.6	0.5	30	2800	5.8
	7/24/2002	210	230	280	49	237	7.7	1600	300	0.6	0.6	30	2800	6.9
	10/23/2002	250	270	290	53	294	3.8	1700	270	0.6	0.5	13	3130	4.8
	1/22/2003	210	220	250	46	281	4.6	1600	260	0.7	0.5	16	2990	4.8
	4/23/2003	200	250	260	48	296	7.7	1800	300	0.7	0.5	33	3210	5.1
FW_0	10/25/2000	290	270	350	79	242	3.1	2100	305	0.7	0.7	44	3800	5.5
	1/18/2001	380	240	300	27	255	2.6	1720	266	0.9	0.5	38	3470	2.1
	4/25/2001	310	200	270	24	177	1.8	1700	295	0.8	0.5	31	3010	3.0
	7/30/2001	330	210	290	26	205	3.4	1850	332	0.8	0.6	19	3250	4.4
	10/24/2001	360	220	320	29	245	3.2	1800	360	0.9	0.6	32	3400	4.0
	1/23/2002	350	210	300	27	245	2.5	1800	340	0.7	0.6	38	3410	3.4
	4/24/2002	350	220	280	27	207	3.4	1700	300	0.8	0.5	29	3000	3.0
	7/24/2002	340	210	290	27	215	3.5	1600	280	0.7	0.6	39	3060	4.0
	10/23/2002	330	230	280	35	278	2.9	1600	270	0.8	0.6	15	3200	3.2
	1/22/2003	300	200	270	29	276	2.8	1700	300	0.8	0.5	17	3200	3.0
	4/23/2003	270	260	230	20	255	3.3	1600	290	0.6	0.6	34	2910	3.4

Appendix Vb. Quarterly Major Ion Chemistry of Water Samples from Tributary/Seep Locations

Location	Date	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Biocarbonate as HCO3 (mg/l)	Carbonate CaCO3 (mg/L)	Sulfate (mg/l)	Chloride (mg/l)	Bromide (mg/l)	Fluoride (mg/l)	Silica (mg/L)	Total Dissolved Solids (mg/l)	TOC (mg/L)
SC_1	10/25/2000	80	26	80	6.9	179	3.7	233	74.8	0.0	0.9	17	660	9.0
	1/18/2001	160	170	170	14	259	1.7	787	226	0.9	1.0	62	1880	4.5
	4/25/2001	120	170	190	28	303	3.1	941	217	0.8	1.1	82	1970	3.5
	7/30/2001	120	190	200	29	321	1.7	937	201	0.8	1.1	84	2150	4.9
	10/24/2001	120	150	180	14	196	8.0	800	230	1.0	1.1	82	1770	5.4
	1/23/2002	120	170	160	12	222	2.9	650	205	1.0	1.1	89	1860	1.9
	4/24/2002	130	160	180	15	158	8.2	830	240	0.9	1.2	59	1700	4.8
	7/24/2002	130	140	200	16	175	11.4	770	240	0.7	1.1	63	1660	11.7
	10/23/2002	120	160	170	13	170	8.8	820	250	1.0	1.1	28	1750	4.3
	1/22/2003	130	180	180	13	222	3.6	840	240	1.1	1.1	17	1810	2.1
	4/23/2003	110	140	150	19	258	1.7	780	210	0.8	0.9	47	1710	5.1
MC_2	10/25/2000	380	260	340	26	228	7.4	2120	331	1.0	0.6	46	3920	3.3
	1/18/2001	480	350	420	30	255	5.2	2450	387	1.1	0.6	52	4660	2.2
	4/25/2001	430	330	420	29	237	3.1	2500	427	1.1	0.6	47	4590	3.1
	7/30/2001	440	330	420	31	216	2.2	2320	411	1.1	0.7	54	4580	4.8
	10/24/2001	440	320	370	29	192	4.0	2300	350	1.1	0.6	53	4540	3.5
	1/23/2002	450	350	550	40	244	2.5	3100	570	1.1	0.9	61	5250	4.4
	4/24/2002	480	350	550	42	203	1.7	2900	500	1.1	0.9	36	4300	5.0
	7/24/2002	430	310	430	34	202	2.1	2400	370	1.0	0.7	52	4230	4.4
	10/23/2002	430	320	390	31	197	4.1	2400	370	1.1	0.7	30	4360	3.3
	1/22/2003	400	280	370	28	268	2.2	2700	430	1.1	0.7	13	4570	3.1
	4/23/2003	430	330	410	31	250	4.1	2600	410	1.1	0.6	33	4560	3.2
DC_1	10/25/2000	510	260	520	56	233	2.4	2390	845	1.0	1.2	54	5010	3.0
	1/18/2001	540	290	560	61	230	1.9	2240	795	1.0	1.2	55	5060	2.3
	4/25/2001	520	300	610	64	209	1.7	2200	799	1.0	1.3	52	5140	2.4
	7/30/2001	500	290	570	64	228	1.5	2330	772	1.1	1.3	59	5160	3.5
	10/24/2001	500	270	600	68	216	2.8	2100	710	1.0	1.3	55	5050	4.3
	1/23/2002	530	310	580	64	241	2.0	2600	830	1.0	1.3	65	5100	2.3
	4/24/2002	510	310	570	66	216	2.2	2700	890	1.0	1.3	58	4700	2.9
	7/24/2002	530	300	590	71	202	1.7	3100	1100	1.0	1.3	61	5020	1.3
	10/23/2002	510	300	580	67	210	2.2	2400	800	1.1	1.4	23	5140	2.3
	1/22/2003	480	270	540	60	247	1.3	2500	830	1.0	1.4	41	5150	2.3
	4/23/2003	430	260	510	54	247	1.3	2600	860	1.1	1.3	64	5000	3.0

Appendix Vb. Quarterly Major Ion Chemistry of Water Samples from Tributary/Seep Locations

Location	Date	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Biocarbonate as HCO3 (mg/l)	Carbonate CaCO3 (mg/L)	Sulfate (mg/l)	Chloride (mg/l)	Bromide (mg/l)	Fluoride (mg/l)	Silica (mg/L)	Total Dissolved Solids (mg/l)	TOC (mg/L)
LWC6.3	10/25/2000	570	230	1500	42	290	1.5	2020	2560	0.8	1.5	73	7600	6.8
	1/18/2001	350	140	1100	31	287	1.2	1390	1440	0.4	1.5	70	4980	4.5
	4/25/2001	440	180	1100	35	264	1.1	1400	1700	0.4	1.5	82	5900	4.3
	7/30/2001	520	210	1300	40	272	0.4	1720	2070	1.0	1.3	85	6820	6.0
	10/24/2001	500	190	1400	42	310	0.5	1600	1800	0.8	1.4	82	6700	7.2
	1/23/2002	360	140	1200	32	316	1.0	1600	1700	0.7	1.5	79	5370	6.5
	4/24/2002	390	150	1300	40	284	0.7	1700	1800	0.8	1.5	81	5400	5.2
	7/24/2002	380	150	1300	41	288	0.7	1500	1800	0.8	1.4	85	5540	4.0
	10/23/2002	470	180	1300	38	324	0.7	1900	1800	1.0	1.4	22	6360	7.0
	1/22/2003	350	150	1200	34	312	1.0	1500	1600	0.7	1.5	53	5260	5.5
	4/23/2003	280	110	1100	29	336	1.1	1300	1500	0.6	1.4	46	4610	6.3
LWC3.7	10/25/2000	230	97	320	45	189	1.0	974	408	0.3	1.0	43	2370	2.2
	1/18/2001	240	100	330	43	202	1.0	873	365	0.4	1.0	43	2280	2.3
	4/25/2001	240	110	290	39	177	0.7	913	397	0.4	1.0	45	2280	2.6
	7/30/2001	210	93	300	43	184	0.4	853	384	0.3	1.0	50	2180	3.3
	10/24/2001	240	98	350	71	211	0.2	970	470	0.3	1.0	48	2370	14.1
	1/23/2002	230	100	310	43	178	0.5	930	440	0.4	0.9	43	2280	3.2
	4/24/2002	240	100	310	42	179	0.4	970	460	0.4	0.9	41	1300	2.9
	7/24/2002	200	89	320	48	183	0.5	880	380	0.3	1.0	44	2060	2.4
	10/23/2002	220	97	310	57	188	0.2	840	360	0.4	1.0	21	2100	6.8
	1/22/2003	200	85	280	37	181	0.7	930	380	0.3	0.9	24	2100	2.6
	4/23/2003	250	100	280	45	173	0.4	1100	360	0.4	0.9	22	2290	2.8

Appendix Vc. Nutrient Concentrations of Water Samples from Tributary/Seeps Locations

LOCATION	SITE NAME	SAMPLE DATE	NH4 mg N/L	NO2 mg N/L	NO3 mg N/L	NO3NO2 mg N/L	TKN mg N/L	OP mg P/L	TP mg P/L
Meadows Detention	LVC_2	10/25/2000	0.16	< 0.08	1.28	1.28	0.60	0.10	0.13
Basin		1/18/2001	< 0.08	< 0.08	4.38	4.38	0.50	0.03	0.03
		4/25/2001	0.30	0.18	1.37	1.55	1.30	NA	0.05
		7/30/2001	< 0.08	< 0.08	0.70	0.70	NA	NA	0.23
		10/24/2001	< 0.08	< 0.08	4.40	4.40	NA	0.02	0.02
		1/23/2002	< 0.08	< 0.08	4.30	4.30	NA	0.01	0.01
		4/24/2002	1.24	< 0.08	< 0.08	1.32	4.40	0.28	0.55
		7/24/2002	< 0.08	< 0.08	< 0.08	0.08	2.90	0.09	0.22
		10/23/2002	0.18	< 0.08	2.38	2.56	1.20	0.05	0.08
		1/22/2003	< 0.08	< 0.08	3.94	3.94	NA	0.03	0.06
		4/23/2003	< 0.08	< 0.08	2.90	2.90	NA	0.04	NA
Las Vegas Creek	LW12.1	10/25/2000	0.09	< 0.08	0.82	0.82	0.60	0.41	0.47
		1/18/2001	< 0.08	< 0.08	4.71	4.71	0.40	0.02	0.03
		4/25/2001	< 0.08	0.12	3.64	3.76	0.50	NA	0.01
		7/30/2001	< 0.08	0.18	1.97	2.15	NA	NA	0.03
		10/24/2001	< 0.08	< 0.08	2.26	2.26	NA	0.03	0.06
		1/23/2002	< 0.08	< 0.08	4.19	4.19	NA	< 0.01	0.01
		4/24/2002	0.14	0.12	2.78	2.92	0.60	0.05	0.03
		7/24/2002	< 0.08	0.33	2.46	2.46	2.60	0.02	0.05
		10/23/2002	0.17	< 0.08	3.45	3.62	1.20	0.02	0.04
		1/22/2003	< 0.08	< 0.08	3.29	3.29	NA	0.03	0.05
		4/23/2003	< 0.08	< 0.08	3.17	3.17	NA	0.01	NA
Flamingo Wash	FW_0	10/25/2000	< 0.08	< 0.08	0.91	0.91	0.70	0.08	0.10
		1/18/2001	< 0.08	< 0.08	6.13	6.13	0.10	0.02	0.03
		4/25/2001	< 0.08	< 0.08	3.94	3.94	0.10	NA	0.01
		7/30/2001	< 0.08	< 0.08	3.61	3.61	NA	NA	0.01
		10/24/2001	< 0.08	< 0.08	4.42	4.42	NA	0.02	0.02
		1/23/2002	< 0.08	< 0.08	5.50	5.50	NA	0.01	0.01
		4/24/2002	< 0.08	< 0.08	4.57	4.57	0.10	< 0.01	0.01
		7/24/2002	< 0.08	< 0.08	2.88	2.88	1.30	0.01	0.08
		10/23/2002	0.17	< 0.08	4.25	4.43	0.50	0.02	0.03
		1/22/2003	< 0.08	< 0.08	4.39	4.39	NA	0.03	0.04
NA = Not Analyzed		4/23/2003	< 0.08	< 0.08	4.24	4.24	NA	0.02	NA

Appendix Vc. Nutrient Concentrations of Water Samples from Tributary/Seeps Locations

LOCATION	SITE NAME	SAMPLE DATE	NH4 mg N/L	NO2 mg N/L	NO3 mg N/L	NO3NO2 mg N/L	TKN mg N/L	OP mg P/L	TP mg P/L
Sloan Channel	SC_1	10/25/2000	< 0.08	< 0.08	< 0.08	< 0.08	0.60	0.10	0.14
		1/18/2001	0.96	< 0.08	2.97	2.97	1.60	0.09	0.08
		4/25/2001	0.16	< 0.08	2.45	2.45	0.90	NA	0.01
		7/30/2001	0.11	0.21	1.33	1.53	NA	NA	0.03
		10/24/2001	< 0.08	< 0.08	2.96	2.96	NA	0.00	NA
		1/23/2002	< 0.08	< 0.08	4.25	4.25	NA	0.05	< 0.01
		4/24/2002	< 0.08	< 0.08	2.85	2.85	NA	0.02	0.04
		7/24/2002	< 0.08	< 0.08	1.12	1.12	NA	0.01	0.06
		10/23/2002	0.17	< 0.08	2.85	3.02	0.80	0.01	0.02
		1/22/2003	< 0.08	< 0.08	3.72	3.72	NA	0.03	0.05
		4/23/2003	0.19	0.09	2.35	2.54	NA	0.04	NA
Monson Channel	MC_2	10/25/2000	< 0.08	< 0.08	1.11	1.11	0.80	0.04	0.04
		1/18/2001	< 0.08	< 0.08	5.05	5.05	0.60	0.01	0.01
		4/25/2001	< 0.08	0.14	3.77	3.91	1.20	NA	0.01
		7/30/2001	< 0.08	0.11	3.57	3.68	NA	NA	0.02
		10/24/2001	< 0.08	< 0.08	4.16	4.16	NA	0.01	0.01
		1/23/2002	< 0.08	0.09	8.12	8.12	NA	< 0.01	0.01
		4/24/2002	0.12	0.14	5.46	5.58	1.00	0.02	0.01
		7/24/2002	< 0.08	< 0.08	2.81	2.81	1.20	0.01	0.03
		10/23/2002	0.17	< 0.08	4.20	4.37	0.20	0.01	0.03
		1/22/2003	< 0.08	< 0.08	4.80	4.80	NA	0.03	0.05
		4/23/2003	< 0.08	< 0.08	4.53	4.53	NA	0.02	NA
Duck Creek	DC_1	10/25/2000	< 0.08	< 0.08	0.99	0.99	0.40	0.03	0.03
		1/18/2001	< 0.08	< 0.08	6.20	6.20	0.30	0.01	0.12
		4/25/2001	< 0.08	< 0.08	4.69	4.69	0.20	NA	0.02
		7/30/2001	< 0.08	< 0.08	4.24	4.24	NA	NA	0.02
		10/24/2001	< 0.08	< 0.08	5.43	5.43	NA	0.03	0.02
		1/23/2002	< 0.08	< 0.08	5.84	5.84	NA	< 0.01	0.01
		4/24/2002	< 0.08	< 0.08	5.07	5.07	0.30	0.01	0.01
		7/24/2002	< 0.08	< 0.08	3.89	3.89	0.90	0.02	NA
		10/23/2002	0.26	< 0.08	5.39	5.65	0.70	0.02	0.03
		1/22/2003	< 0.08	< 0.08	5.77	5.77	NA	0.04	0.05
NA = Not Analyzed		4/23/2003	< 0.08	< 0.08	5.28	5.28	NA	0.02	NA

Appendix Vc. Nutrient Concentrations of Water Samples from Tributary/Seeps Locations

LOCATION	SITE NAME	SAMPLE	NH4		NO2		NO3	NO3NO2	TKN	OP	TP
		DATE	mg N/L		mg N/L		mg N/L	mg N/L	mg N/L	mg P/L	mg P/L
Kerr-McGee Seep	LWC6.3	10/25/2000	<	0.08	<	0.08	1.63	1.63	0.10	0.06	0.05
		1/18/2001	<	0.08	<	0.08	5.69	5.69	0.10	0.03	0.02
		4/25/2001	<	0.08	<	0.08	6.23	6.23	0.10	NA	0.03
		7/30/2001	<	0.08	<	0.08	7.53	7.53	NA	NA	0.04
		10/24/2001	<	0.08	<	0.08	8.67	8.67	NA	0.02	0.02
		1/23/2002	<	0.08	<	0.08	6.38	6.38	NA	0.02	0.03
		4/24/2002	<	0.08	<	0.08	6.94	6.94	0.40	0.03	0.03
		7/24/2002	<	0.08	<	0.08	6.37	6.37	0.60	0.02	NA
		10/23/2002		0.21	<	0.08	4.19	4.41	NA	0.03	0.04
		1/22/2003	<	0.08	<	0.08	5.85	5.85	NA	0.04	0.05
		4/23/2003	<	0.08	<	0.08	3.58	3.58	NA	0.02	NA
GCS-5 Seep	LWC3.7	10/25/2000		0.53	<	0.08	11.92	11.92	0.10	0.04	0.04
		1/18/2001		0.16	<	0.08	11.41	11.41	0.30	0.01	0.03
		4/25/2001		0.19	<	0.08	12.11	12.11	0.10	NA	0.01
		7/30/2001		0.16	<	0.08	10.65	10.65	NA	NA	0.01
		10/24/2001		0.09	<	0.08	12.60	12.60	NA	0.26	0.38
		1/23/2002		0.08	<	0.08	12.81	12.89	NA	0.01	0.01
		4/24/2002		0.09	<	0.08	12.28	12.37	0.40	0.03	0.04
		7/24/2002	<	0.08	<	0.08	10.86	10.86	1.30	0.01	0.03
		10/23/2002		0.63	<	0.08	10.79	11.42	2.20	0.20	0.22
NA = Not Analyzed		1/22/2003	<	0.08	<	0.08	11.15	11.15	NA	0.03	0.05
		4/23/2003		0.09	<	0.08	11.47	11.56	NA	0.02	NA

Appendix Vd. Quarterly Heavy Metal Concentrations (ug/L) from Tributary/Seep Locations

Sampling Location	Date	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Manganese (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Zinc (ug/l)
LVC_2	10/25/2000	NA	ND	50.0	ND	4.9	NA	0.5	9.1	7.2	5.0	21.0
	1/18/2001	25.0	2.1	33.0	2.9	5.3	NA	ND	5.1	7.6	ND	11.0
	4/25/2001	90.0	4.1	57.0	2.4	7.0	NA	0.7	17.0	6.3	ND	29.0
	7/30/2001	140.0	3.9	47.0	1.8	8.4	210.0	2.4	7.5	6.7	ND	24.0
	10/24/2001	240.0	5.0	43.0	ND	9.7	NA	1.6	5.8	5.5	ND	29.0
	1/24/2002	110.0	ND	29.0	2.9	6.1	NA	1.2	5.3	9.3	7.3	21.0
	4/25/2002	25.0	5.6	52.0	2.1	7.7	310.0	0.6	29.0	5.4	2.3	19.0
	7/25/2002	NA	2.7	64.0	2.3	7.0	NA	0.7	3.1	6.2	2.9	23.0
	10/24/2002	NA	4.1	42.0	2.5	3.9	NA	ND	NA	6.7	5.4	12.0
	2003/01/22	NA	2.8	26.0	1.3	6.4	NA	ND	NA	5.9	6.3	15.0
	2003/04/23	NA	2.7	40.0	ND	10.0	NA	0.7	NA	ND	5.5	13.0
LW12.1	10/25/2000	200.0	2.6	44.0	2.2	10.0	410.0	1.3	34.0	15.0	11.0	52.0
	1/18/2001	39.0	4.4	38.0	3.2	10.0	250.0	0.7	10.0	13.0	ND	19.0
	4/25/2001	100.0	6.7	32.0	2.5	14.0	NA	ND	4.4	10.0	ND	21.0
	7/30/2001	74.0	6.2	38.0	1.9	10.0	130.0	ND	9.6	11.0	ND	13.0
	10/24/2001	NA	7.2	38.0	2.0	12.0	NA	1.1	9.0	8.0	ND	26.0
	1/24/2002	85.0	6.2	28.0	3.5	4.4	NA	1.2	7.5	11.0	12.4	17.0
	4/25/2002	43.0	6.9	46.0	2.1	3.2	NA	ND	8.8	9.2	10.9	15.0
	7/25/2002	71.0	ND	44.0	2.4	3.8	NA	0.6	12.0	11.0	9.7	12.0
	10/24/2002	36.0	5.7	35.0	2.7	3.0	NA	0.7	10.0	11.0	10.6	12.0
	2003/01/22	45.0	4.7	25.0	1.8	5.4	NA	ND	8.3	7.0	11.0	13.0
	2003/04/23	N	4.6	37.0	1.1	4.4	NA	ND	NA	6.4	11.4	5.7
FW_0	10/25/2000	NA	2.6	45.0	2.3	8.9	340.0	1.1	29.0	14.0	12.0	52.0
	1/18/2001	31.0	6.4	31.0	4.6	7.8	NA	ND	3.8	16.0	ND	17.0
	4/25/2001	NA	7.5	33.0	2.0	14.0	NA	ND	2.1	14.0	ND	15.0
	7/30/2001	NA	6.2	36.0	1.8	12.0	NA	ND	3.3	15.0	ND	11.0
	10/24/2001	NA	8.8	36.0	ND	8.6	NA	ND	3.7	7.5	ND	11.0
	1/24/2002	98.0	8.1	35.0	3.2	4.9	NA	0.7	6.2	16.0	17.5	14.0
	4/25/2002	NA	7.2	30.0	1.2	ND	NA	ND	NA	8.2	16.7	NA
	7/25/2002	68.0	9.2	43.0	3.0	3.4	NA	ND	24.0	16.0	14.4	7.9
	10/24/2002	34.0	6.7	38.0	3.0	5.3	NA	0.6	6.3	15.0	14.4	11.0
NA = Not Analyzed	2003/01/22	43.0	5.2	29.0	1.9	8.9	NA	ND	4.1	10.0	15.2	12.0
ND= Not Detected	2003/04/23	NA	4.8	39.0	1.3	13.0	NA	ND	4.6	7.0	14.8	15.0

Appendix Vd. Quarterly Heavy Metal Concentrations (ug/L) from Tributary/Seep Locations

Sampling Location	Date	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Manganese (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Zinc (ug/l)
SC_1	10/25/2000	NA	ND	78.0	ND	7.9	120.0	0.8	5.0	5.5	2.0	27.0
	1/18/2001	87.0	32.0	105.0	3.5	4.0	NA	ND	155.0	8.6	ND	6.0
	4/25/2001	59.0	34.0	54.0	3.4	8.3	130.0	ND	55.0	6.0	ND	12.0
	7/30/2001	40.0	33.0	50.0	2.8	6.6	NA	ND	67.0	6.0	ND	8.4
	10/24/2001	NA	18.0	52.0	5.4	6.6	NA	0.6	NA	ND	ND	12.0
	1/24/2002	54.0	16.0	48.0	5.5	3.4	NA	0.7	2.8	5.5	8.8	9.6
	4/25/2002	780.0	17.0	79.0	6.0	5.6	910.0	0.9	24.0	6.0	7.7	20.0
	7/25/2002	110.0	14.0	72.0	4.9	5.6	NA	0.6	5.9	7.1	6.6	11.0
	10/24/2002	40.0	14.0	45.0	6.3	2.7	NA	ND	2.1	5.6	7.5	NA
	2003/01/22	NA	19.0	40.0	4.9	ND	NA	ND	NA	ND	7.8	NA
	2003/04/23	NA	17.0	56.0	2.4	3.9	NA	ND	77.0	ND	6.0	5.4
MC_2	10/25/2000	NA	8.9	39.0	ND	9.2	NA	0.5	7.5	16.0	23.0	22.0
	1/18/2001	26.0	12.0	21.0	2.6	9.6	NA	ND	2.7	18.0	ND	11.0
	4/25/2001	200.0	16.0	24.0	ND	17.0	NA	ND	2.3	18.0	ND	17.0
	7/30/2001	47.0	15.0	31.0	2.2	15.0	250.0	0.9	7.6	17.0	ND	16.0
	10/24/2001	66.0	12.0	26.0	1.9	13.0	NA	2.2	2.4	12.0	ND	19.0
	1/24/2002	NA	26.0	16.0	ND	ND	NA	ND	NA	ND	22.8	NA
	4/25/2002	NA	30.0	28.0	ND	ND	NA	ND	14.0	ND	20.2	NA
	7/25/2002	74.0	13.0	34.0	2.7	2.6	NA	0.6	5.9	19.0	22.0	8.4
	10/24/2002	33.0	20.0	26.0	2.7	4.0	NA	ND	2.5	18.0	22.6	6.0
	2003/01/22	78.0	18.0	21.0	1.7	4.5	NA	0.7	5.2	14.0	23.4	9.6
	2003/04/23	NA	14.0	21.0	ND	3.6	NA	ND	2.6	8.2	23.9	NA
DC_1	10/25/2000	360.0	53.0	34.0	ND	12.0	140.0	ND	32.0	ND	27.0	32.0
	1/18/2001	92.0	51.0	33.0	2.6	13.0	610.0	0.6	45.0	28.0	ND	22.0
	4/25/2001	41.0	52.0	29.0	2.0	17.0	120.0	ND	21.0	22.0	ND	19.0
	7/30/2001	NA	54.0	36.0	1.8	14.0	NA	ND	52.0	22.0	ND	13.0
	10/24/2001	175.0	41.0	28.0	ND	12.0	NA	ND	34.0	ND	ND	NA
	1/24/2002	NA	51.0	21.0	ND	ND	NA	ND	27.0	ND	23.5	NA
	4/25/2002	280.0	59.0	33.0	ND	ND	360.0	ND	26.0	ND	22.0	NA
	7/25/2002	260.0	43.0	31.0	ND	ND	NA	ND	30.0	30.0	22.0	NA
	10/24/2002	N	55.0	24.0	2.8	3.4	NA	ND	15.0	21.0	23.3	6.1
NA = Not Analyzed	2003/01/22	76.0	50.0	21.0	1.8	6.7	NA	ND	33.0	14.0	23.0	8.3
ND= Not Detected	2003/04/23	59.0	46.0	28.0	1.2	8.1	NA	ND	34.0	11.0	22.4	6.3

Appendix Vd. Quarterly Heavy Metal Concentrations (ug/L) from Tributary/Seep Locations

Sampling Location	Date	Aluminum (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Iron (ug/l)	Lead (ug/l)	Manganese (ug/l)	Nickel (ug/l)	Selenium (ug/l)	Zinc (ug/l)
LWC6.3	10/25/2000	NA	125.0	24.0	ND	11.0	NA	ND	1400.0	44.0	7.0	NA
	1/18/2001	NA	110.0	17.0	ND	11.0	NA	ND	320.0	32.0	ND	NA
	4/25/2001	NA	120.0	18.0	ND	13.0	NA	ND	820.0	35.0	ND	NA
	7/30/2001	NA	110.0	22.0	ND	12.0	NA	ND	1800.0	37.0	ND	NA
	10/24/2001	NA	100.0	20.0	ND	13.0	NA	ND	1300.0	31.0	ND	NA
	1/24/2002	NA	120.0	16.0	ND	10.0	NA	ND	340.0	29.0	4.4	NA
	4/25/2002	NA	130.0	23.0	ND	ND	NA	ND	750.0	31.0	5.5	NA
	7/25/2002	NA	100.0	18.0	ND	ND	NA	ND	970.0	30.0	6.5	NA
	10/24/2002	NA	120.0	23.0	ND	ND	NA	ND	1000.0	41.0	7.0	NA
	2003/01/22	NA	150.0	19.0	4.6	4.2	NA	ND	500.0	27.0	5.6	NA
	2003/04/23	NA	105.0	16.0	ND	7.1	NA	ND	320.0	21.0	5.4	NA
LWC3.7	10/25/2000	27.0	43.0	24.0	3.3	8.2	NA	ND	210.0	18.0	2.0	6.8
	1/18/2001	NA	42.0	27.0	ND	9.6	NA	ND	165.0	19.0	ND	NA
	4/25/2001	NA	49.0	19.0	2.1	11.0	NA	ND	130.0	18.0	ND	NA
	7/30/2001	2100.0	37.0	24.0	1.8	9.5	NA	ND	120.0	15.0	ND	NA
	10/24/2001	NA	61.0	79.0	5.4	23.0	2700.0	2.7	380.0	22.0	ND	33.0
	1/24/2002	NA	35.0	22.0	2.4	8.5	NA	ND	110.0	16.0	4.6	NA
	4/25/2002	NA	39.0	21.0	2.5	5.5	NA	ND	82.0	13.0	4.2	NA
	7/25/2002	230.0	44.0	34.0	ND	13.0	NA	ND	35.0	27.0	3.3	33.0
	10/24/2002	140.0	41.0	38.0	4.8	9.1	170.0	7.4	1700.0	24.0	3.9	6.8
NA = Not Analyzed	2003/01/22	92.0	38.0	39.0	3.6	8.3	NA	0.8	410.0	18.0	3.6	NA
ND= Not Detected	2003/04/23	NA	50.0	17.0	1.1	6.8	NA	N	9.7	11.0	5.1	NA

Appendix Ve. Organic Compound Concentrations (ug/L) of Water Samples from Tributary/Seep Locations

Location	Sample Date	1,1,2,2-Tetrachloroethane	1,1,1-Trichloropropanone	1,1-Dichloroethane	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2,4,-Trimethylbenzene	2-(2-(2-butoxyethoxy)ethoxy)ethoxyeth	2,4-D	2-Butoxyethanol phosphate (3:1	3,6,9,12-tetraoxahexadecan-1-o	Acetaldehyde	Aldrin	Benzo (k) Fluoranthene	Beta-BHC	Butanal	Butylbenzylphthalate
LWC6.3	10/25/2000	ND	ND	1.8	ND	0.8	ND	ND	ND	ND	ND	ND	ND	ND	0.33	ND	ND
	1/18/2001	11.7	ND	1.2	ND	0.9	ND	ND	ND	ND	ND	ND	ND	ND	0.27	ND	ND
	4/25/2001	9.6	ND	2	ND	0.9	ND	ND	ND	ND	ND	1	ND	ND	0.25	ND	ND
	7/30/2001	ND	ND	3.7	ND	0.7	ND	ND	ND	ND	ND	2	ND	ND	0.21	ND	ND
	10/24/2001	ND	ND	2.7	ND	1.1	ND	ND	ND	ND	ND	2	ND	ND	0.15	ND	ND
	1/23/2002	ND	ND	2.1	ND	1.4	ND	ND	ND	ND	ND	1	ND	ND	0.12	ND	ND
	4/24/2002	ND	ND	2.4	0.6	1.5	ND	ND	ND	ND	ND	2	ND	ND	0.19	1	ND
	7/24/2002	ND	ND	3.2	ND	ND	1.2	ND	ND	ND	ND	1	ND	ND	0.31	ND	ND
	10/23/2002	ND	ND	2.1	ND	1.5	ND	ND	ND	ND	ND	1	0.3	ND	0.2	ND	ND
	1/22/2003	ND	ND	2.8	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	0.18	ND	ND
	4/23/2003	ND	ND	1.6	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	0.26	ND	ND
LVC_2	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	0.5	ND	ND	4	ND	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	0.32	5.9	ND	8	ND	ND	ND	1	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	10	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	0.1	ND	ND	5	ND	ND	ND	2	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	ND	4	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	1	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	0.6
DC_1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FW_0	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND	ND	ND	ND	0.7
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	0.26	ND	ND	1	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	0.9	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND

ND = Not Detected

Appendix Ve. Organic Compound Concentrations (ug/L) of Water Samples from Tributary/Seep Locations

Location	Sample Date	1,1,2,2-Tetrachloroethane	1,1,1-Trichloropropanone	1,1-Dichloroethane	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2,4,-Trimethylbenzene	2-(2-(2-butoxyethoxy)ethoxyeth	2,4-D	2-Butoxyethanol phosphate (3:1	3,6,9,12-tetraoxahexadecan-1-o	Acetaldehyde	Aldrin	Benzo (k) Fluoranthene	Beta-BHC	Butanal	Butylbenzylphthalate
LW12.1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	0.22	ND	ND	4	ND	ND	ND	ND	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	0.9
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
LWC3.7	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	0.04	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	0.02	ND	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	0.04	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	0.02	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND
MC_2	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	0.15	ND	ND	4	ND	ND	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.137	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SC_1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	4.3	ND	ND	2	ND	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	0.26	ND	ND	2	ND	ND	ND	1	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	17	2.2	ND	4.1	ND	ND	ND	ND	ND	ND

ND = Not Detected

Appendix Ve. Organic Compound Concentrations (ug/L) of Water Samples from Tributary/Seep Locations

Location	Sample Date	Caffeine	Chloroform (Trichloromethane)	Dieldrin	Delta-BHC	Di(2-Ethylhexyl)phthalate	Dichloroiodomethane	Dichlorprop	Diethylphthalate	Dicamba	Di-n-Butylphthalate	Diuron	Formaldehyde	Glyoxal	Hexadecanoic acid	Lindane	Lindane (gamma-BHC)
LWC6.3	10/25/2000	ND	ND	ND	1.04	ND	ND	ND	ND	ND	ND	ND	9	ND	ND	ND	ND
	1/18/2001	ND	0.6	ND	0.96	ND	8.7	ND	ND	ND	ND	ND	5	2	ND	ND	ND
	4/25/2001	ND	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	9	2	ND	ND	ND
	7/30/2001	ND	0.8	ND	1.1	ND	ND	ND	ND	ND	ND	ND	9	1	ND	ND	0.03
	10/24/2001	ND	0.8	ND	0.91	ND	ND	ND	ND	ND	ND	ND	9	2	ND	ND	0.2
	1/23/2002	ND	0.7	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.188	0.03
	4/24/2002	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	7	1	ND	0.02	ND
	7/24/2002	ND	0.52	0.03	1.3	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	0.3	0.03
	10/23/2002	ND	ND	ND	0.85	ND	ND	ND	ND	ND	ND	ND	7	2	ND	0.2	ND
	1/22/2003	ND	ND	ND	0.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	0.93	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	0.21	0.03
LVC_2	10/25/2000	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	1	ND	ND	ND
	1/18/2001	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	2	ND	ND	ND
	7/30/2001	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	21	6	12	ND	ND
	10/24/2001	ND	2	ND	ND	0.8	ND	ND	ND	ND	ND	ND	15	4	ND	ND	ND
	1/23/2002	0.063	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	6	ND	ND	ND
	7/24/2002	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20	9	ND	ND	ND
	10/23/2002	0.36	ND	ND	ND	ND	ND	1.29	ND	ND	ND	ND	10	4	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND	1	ND	ND	ND
	4/23/2003	0.14	ND	ND	ND	0.9	ND	ND	ND	ND	ND	ND	5	2	ND	ND	ND
DC_1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12	2	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	1	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	1	ND	ND	ND
	7/24/2002	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	2	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	1	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
FW_0	10/25/2000	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	3	ND	ND	ND
	1/18/2001	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	14	2	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12	1	ND	ND	ND
	7/24/2002	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12	3	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND
	4/23/2003	0.16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	40	1	ND	ND	ND

ND = Not Detected

Appendix Ve. Organic Compound Concentrations (ug/L) of Water Samples from Tributary/Seep Locations

Location	Sample Date	Caffeine	Chloroform (Trichloromethane)	Dieldrin	Delta-BHC	Di(2-Ethylhexyl)phthalate	Dichloroiodomethane	Dichlorprop	Diethylphthalate	Dicamba	Di-n-Butylphthalate	Diuron	Formaldehyde	Glyoxal	Hexadecanoic acid	Lindane	Lindane (gamma-BHC)
LW12.1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	3	ND	ND	ND
	1/18/2001	0.1	ND	ND	ND	6.2	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	ND
	4/25/2001	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	1	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	15	3	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	2	ND	ND	ND
	1/23/2002	0.079	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	0.8	ND	ND	ND	ND	ND	ND	14	3	ND	ND	ND
	7/24/2002	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	5	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	7	2	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	2	ND	ND	ND
LWC3.7	10/25/2000	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	ND	ND	ND	ND
	7/30/2001	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	12	ND	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	2	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	ND
	7/24/2002	ND	0.54	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND	ND
	10/23/2002	ND	0.6	ND	ND	0.7	ND	ND	ND	ND	ND	ND	6	2	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND
MC_2	10/25/2000	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	6	ND	ND	ND
	1/18/2001	0.06	ND	ND	ND	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND	ND	ND	ND
	7/30/2001	0.06	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	15	2	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	2	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	2	ND	ND	ND
	7/24/2002	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	3	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	2	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
SC_1	10/25/2000	2.3	ND	ND	ND	1.4	ND	ND	0.5	ND	ND	ND	20	3	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	1	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	1.63	ND	ND	ND	8.5	21	1	ND	ND	ND
	7/30/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	4	ND	ND	ND
	10/24/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	2	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.6	ND	ND	ND	ND	ND
	4/24/2002	0.1	ND	ND	ND	0.8	ND	ND	ND	ND	ND	1.2	11	3	ND	ND	ND
	7/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	0.1	ND	ND	14	6	ND	ND	ND
	10/23/2002	0.09	ND	ND	ND	0.5	ND	ND	ND	ND	ND	ND	9	6	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	5	ND	ND	ND	ND
	4/23/2003	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not Detected

Appendix Ve. Organic Compound Concentrations (ug/L) of Water Samples from Tributary/Seep Locations

Location	Sample Date	Methyl Tert-butyl ether (MTBE)	M-Glyoxal(Pyruvic Aldehyde)	p-Dichlorobenzene (1,4-DCB)	Pentanal	Propanal	Tetrachloroethylene (PCE)	Simazine	Toluene	Tot DCPA Mono&Diacid Degradate	Total THM	Tri(2-chloroethyl)phosphate	Trichloroethylene (TCE)	Unknown (Total)	Unknown alcohol (Total)
LWC6.3	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	ND	775.5	40.5
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	802.9	221.2
	7/30/2001	3.7	2	ND	ND	ND	ND	ND	ND	0.5	ND	ND	0.7	22.4	167
	10/24/2001	ND	2	0.5	ND	ND	ND	ND	ND	ND	0.8	ND	0.5	24.3	243.1
	1/23/2002	ND	2	0.5	ND	1	ND	ND	ND	0.27	0.7	ND	ND	ND	ND
	4/24/2002	ND	2	0.6	ND	ND	ND	ND	ND	0.53	ND	ND	ND	ND	ND
	7/24/2002	ND	1	0.62	ND	ND	ND	ND	ND	0.41	0.5	ND	0.59	ND	ND
	10/23/2002	ND	2	0.7	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	0.5	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND	ND
	4/23/2003	ND	1	0.6	ND	ND	ND	ND	ND	0.48	ND	ND	ND	ND	ND
LVC_2	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.8	ND
	4/25/2001	ND	2	ND	ND	1	ND	ND	0.6	ND	ND	ND	ND	6.7	ND
	7/30/2001	ND	9	ND	1	4	ND	ND	ND	ND	ND	ND	ND	22.8	ND
	10/24/2001	ND	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.4	ND
	1/23/2002	ND	ND	ND	ND	8	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	7	ND	ND	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/24/2002	ND	8	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/23/2002	ND	4	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	0.8	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	2	ND	ND	2	1	ND	ND	ND	ND	4.9	ND	11.1	ND
DC_1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	0.45	ND	ND	ND	23.8	14.3
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	0.51	ND	ND	ND	5.9	23.7
	7/30/2001	ND	3	ND	ND	ND	ND	ND	ND	0.33	ND	ND	ND	12	49
	10/24/2001	ND	1	ND	ND	ND	ND	ND	ND	0.36	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	0.25	ND	ND	ND	ND	ND
	4/24/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/24/2002	ND	2	ND	ND	ND	ND	ND	ND	0.34	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	0.34	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	0.36	ND	ND	ND	ND	ND
	4/23/2003	ND	1	ND	ND	ND	ND	ND	ND	0.33	ND	ND	ND	4.5	ND
FW_0	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	75.3	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	1.44	ND	ND	ND	ND	ND
	7/30/2001	ND	3	ND	ND	ND	ND	ND	ND	1.29	ND	ND	ND	10.3	ND
	10/24/2001	ND	1	ND	ND	ND	ND	ND	ND	1.15	ND	ND	ND	ND	ND
	1/23/2002	ND	1	ND	ND	ND	ND	ND	ND	1.11	ND	ND	ND	ND	ND
	4/24/2002	ND	1	ND	ND	ND	ND	ND	ND	1.16	ND	ND	ND	ND	ND
	7/24/2002	ND	2	ND	ND	ND	ND	ND	ND	1.57	ND	ND	ND	ND	ND
	10/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	1.09	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	1.12	ND	ND	ND	ND	ND
	4/23/2003	ND	1	ND	ND	ND	ND	ND	ND	1.3	ND	ND	ND	6.5	ND

ND = Not Detected

Appendix Ve. Organic Compound Concentrations (ug/L) of Water Samples from Tributary/Seep Locations

Location	Sample Date	Methyl Tert-butyl ether (MTBE)	M-Glyoxal(Pyruvic Aldehyde)	p-Dichlorobenzene (1,4-DCB)	Pentanal	Propanal	Tetrachloroethylene (PCE)	Simazine	Toluene	Tot DCPA Mono&Diacid Degradate	Total THM	Tri(2-chloroethyl)phosphate	Trichloroethylene (TCE)	Unknown (Total)	Unknown alcohol (Total)
LW12.1	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/30/2001	ND	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/24/2001	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4
	1/23/2002	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	3	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/24/2002	ND	4	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND
	10/23/2002	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/22/2003	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	2	ND	ND	2	ND	ND	ND	ND	ND	ND	ND	5.4	ND
LWC3.7	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	33.9	4.2
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.9	ND
	7/30/2001	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.8	ND
	10/24/2001	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/24/2002	ND	1	ND	ND	ND	ND	ND	ND	ND	0.5	ND	ND	ND	ND
	10/23/2002	ND	3	ND	ND	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MC_2	10/25/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	ND	ND	0.48	ND	ND	ND	4.9	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	ND	ND	0.34	ND	ND	ND	ND	ND
	7/30/2001	ND	4	ND	ND	ND	ND	ND	ND	0.25	ND	ND	ND	5.3	7.3
	10/24/2001	ND	2	ND	ND	1	ND	ND	ND	0.34	ND	ND	ND	ND	ND
	1/23/2002	ND	1	ND	ND	ND	ND	ND	ND	0.18	ND	ND	ND	ND	ND
	4/24/2002	ND	2	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/24/2002	ND	2	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND
	10/23/2002	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND
	4/23/2003	ND	1	ND	ND	ND	ND	ND	ND	0.35	ND	ND	ND	ND	ND
SC_1	10/25/2000	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/18/2001	ND	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND
	4/25/2001	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND	ND
	7/30/2001	ND	4	ND	ND	ND	ND	ND	ND	0.11	ND	ND	ND	ND	ND
	10/24/2001	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/23/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/24/2002	ND	3	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/24/2002	ND	6	ND	ND	2	ND	ND	ND	0.22	ND	ND	ND	ND	ND
	10/23/2002	ND	3	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	0.27	ND	ND	ND	ND	ND
	4/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	0.24	ND	ND	ND	6.6	ND

ND = Not Detected