September2004

2003-2004 Annual Report

Las Vegas Valley NPDES Municipal Stormwater Discharge Permit

Las Vegas Valley Stormwater Quality Management Committee

Clark County Regional Flood Control District

MWH

C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT

September 21, 2004

Mr. Cliff Lawson
State of Nevada
Bureau of Water Pollution Control
333 West Nye Lane, Room 129
Carson City, NV 89706-0851

2003-2004 NPDES Annual Report

Dear Mr. Lawson:

Please find enclosed a copy of the 2003-2004 Annual Report for the Las Vegas Valley NPDES storm water discharge permit. This report was prepared by MWH and is hereby submitted for you use. The report details NPDES compliance activities for the period from July 2003 through June 2004. These activities were performed in accordance with Permit Number NV0021911 and the Storm Water Management Plan prepared pursuant thereto and was conditionally accepted by your department by letter dated October 21, 2003.

If you should have any questions, please do not hesitate to call.

Sincerely,

Kevin Eubanks, P.E.
Assistant General Manager

Enclosure

KLE:mak

cc: Regional Administrator
Environmental Protection Agency
75 Hawthorn Street
San Francisco, CA 94105

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600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: *http://www.ccrfcd.org*

NPDES PERMIT NO. NV0021911

2003-2004 ANNUAL REPORT FOR

LAS VEGAS VALLEY NPDES MUNICIPAL STORMWATER DISCHARGE PERMIT

Prepared for

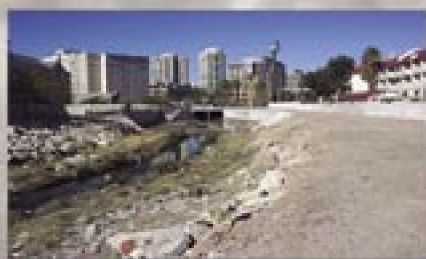
LAS VEGAS VALLEY
STORMWATER QUALITY MANAGEMENT COMMITTEE

Clark County Regional Flood Control District
Clark County
City of Las Vegas
City of North Las Vegas
City of Henderson

prepared by

MWH

SEPTEMBER 2004



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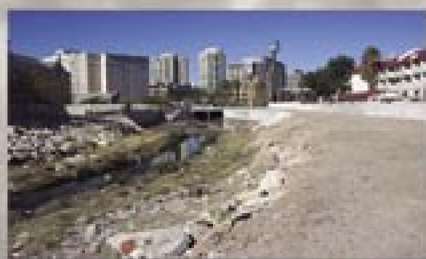


Executive Summary

ES.1 INTRODUCTION

The United States Environmental Protection Agency (EPA) has adopted regulations to control pollutants entering the environment through storm drainage facilities associated with Las Vegas Valley Municipal Separate Storm Sewer System (MS4). In compliance with these regulations, the Nevada Division of Environmental Protection (NDEP) issued National Pollutant Discharge Elimination System (NPDES) Permit No. NV0021911 jointly to Clark County Regional Flood Control District (CCRFCD); the Cities of Las Vegas (CLV), North Las Vegas (CNLV) and Henderson (COH); Clark County (County); and Nevada Department of Transportation (NDOT). This permit, which was issued on June 19, 2003, authorizes the permitted agencies to discharge from stormwater outfalls on Las Vegas Wash and its tributaries. This permit supersedes the stormwater permits issued in 1990 and 1997. A copy of the current permit is contained in **Appendix A**. This *2003-2004 Annual Report* covers the period from July 2003 to June 2004.

The permit designates CCRFCD as Lead Agency for permit implementation, with CCRFCD and the other five agencies identified together as permittees. The Lead Agency is responsible for general administration of the permit conditions, preparation of reports, coordination between permittees, and liaison with NDEP. NDOT obtained its own MS4 permit during the 2003-2004 permit year and, therefore, has withdrawn from the present MS4 permit. The consulting firm of MWH was contracted to assist the CCRFCD and permittees with preparation of information required to comply with the conditions of the permit.

The MS4 permit requires that the permittees develop a Storm Water Management Plan (SWMP). On September 29, 2003, the permittees submitted the SWMP to NDEP. A copy of the SWMP is included in **Appendix B.** NDEP accepted the SWMP with comments. A copy of the approval letter is found in **Appendix B.**

This *2003-2004 Annual Report* covers the period from July 2003 to June 2004, which is the first year of the new MS4 permit. The *Annual Report* presents the information specifically required by the MS4 permit and further described in the SWMP, and is organized as follows:

Section 1	-	Legal Authority
Section 2	-	Source Identification
Section 3	-	Public Outreach and Education Program
Section 4	-	Structural and Source Control Measure Program
Section 5	-	Illicit Discharge Detection Program
Section 6	-	Industrial Facility Monitoring and Control Program
Section 7	-	Construction Site Program
Section 8	-	Stormwater Monitoring Program
Section 9	-	Stormwater Management Plan

ES.2 COORDINATION

As Lead Agency, CCRFCD has organized the project, encouraged coordination among the various permittees, and provided funding for a majority of the permit compliance efforts. A Stormwater Quality Management Committee (SQMC) was formed, comprised of representatives from the cities, County and NDOT. This committee conducted monthly progress meetings with MWH, and reviewed draft material prepared in compliance with the permit. In addition, the SQMC included other local agencies which have an interest in water quality issues, but which are not party to the NPDES permit. These agencies received copies of monthly meeting minutes and were invited to attend all meetings. The list of permittees and other interested parties and key contacts is presented in **Table ES-1**.

Table ES-1

NPDES Stormwater Discharge Permit Project List of Permittees and Interested Parties

Agency	Contact	Phone Number	Fax Number
Permittees			
Clark County Department of Air Quality and Environmental Management	Carrie Stowers Jodi Bechtel	455-4181 455-4181	385-8940 385-8940
Clark County Department of Public Works	Marty Manning Gil Suckow	455-7760 455-7540	455-7764 435-4702
Clark County Regional Flood Control District	Gale Fraser Kevin Eubanks Betty Hollister	455-3139 455-3139 455-3139	455-3870 455-3870 455-3870
Henderson, City of	Mark Calhoun Curt Chandler Brenda Pohlmann Janie Nihipali	565-2106 565-2329 565-5181 565-5181	565-5687 565-5687 565-0173 565-0173
Las Vegas, City of	Dick Goecke Randy Fultz Dan Fischer John Solvie Greg McDermott	229-2176 229-6276 229-2440 229-6547 229-2143	382-8551 385-7268 431-5133 641-9738 382-8551
Nevada Department of Transportation	Chris Ennes	775-888-7960	775-888-7104
North Las Vegas, City of	Jim Bell Tom Rura Jennifer Doody	633-1919 633-1261 633-2088	649-4696 399-7035 649-4696
Interested Parties			
Clark County Health District	No Representative	385-1291	384-5342
Conservation District of Southern Nevada	Wilisha Daniels	262-9047	736-7415
Clark County Regional Flood Control District Attorney	Larry Bazel	415-617-8900	415-676-3000
Clark County Water Reclamation District	Joe Boteilho David Paulson Steve Etzwiler	434-8178 434-6600 434-6600	435-5435
Las Vegas Valley Water District	Alec Hart Steve Ross	882-8349 258-7170	258-7178 258-3811
U.S. Geological Survey	John Wilson	897-4014	897-4055
National Park Service – Lake Mead National Recreation Area	Steven Spearman	293-8984	293-8967
Southern Nevada Water Authority	Kay Brothers Kim Zikmund Peggy Roefer	870-2011 258-3926 258-3939	258-3951 258-3951 258-3951
Nevada Division of Environmental Protection	Cliff Lawson Dan Tecca David Lloyd	775-687-4670 775-687-9440 486-2872	775-687-4684 775-687-4684 486-2863
Clark County Public Response Office	Joe Boteilho Al Dixon	455-8178 455-4191	455-2080 455-2080

ES.3 SUMMARY OF ANNUAL REPORT

This *Annual Report* was prepared to verify that the permittees have complied with the permit requirements and measurable goals identified in the SWMP for the 2003-2004 permit year.

Table ES-2, summarizes the 2003-2004 (Permit Year 1) measurable goals.

The following paragraphs summarize the activities performed to comply with each element of the SWMP.

ES.3.1 Legal Authority

The legal authority of the permittees was reviewed and is sufficient to regulate discharges to the municipal storm sewer system and enforce the SWMP.

ES.3.2 Source of Identification

A stormwater system map was created to assist permittees, regulatory agencies and others in determining where potential stormwater quality problems may exist or originate.

ES.3.3 Public Outreach and Education Program

Permittees participated in public outreach and education programs to inform and influence the general public about water quality issues and reducing the activities that have a negative impact on stormwater runoff.

Outreach and education program activities included attending community events and fairs; producing and airing public service announcements; making presentations to students and teachers at elementary schools; producing The Flood Channel documentaries; and maintaining a local stormwater management website.

ES.3.4 Structural and Source Control Measure Program

The permittees adopted a structural and source control measure program with the following elements:

- Storm sewer system maintenance program
- Street sweeping maintenance program
- Pesticide, herbicide and fertilizer management program
- Flood control structure review program

Several best management practice (BMP) manuals were reviewed and recommendations for updating the CCRFCD manual were made.

This *Annual Report* contains documentation from each permittee on maintenance activities completed during the permit year. The report also contains documentation on potable water discharges to the stormwater system permitted by NDEP.

ES.3.5 Illicit Discharge Detection Program

The illicit discharge detection and elimination program consists of quarterly dry weather field screening, semi-annual channel inspections, municipal maintenance staff training, and response to public reporting of problems. The *Annual Report* contains the results of the dry weather monitoring and field inspections conducted during the permit year.

The program implemented by the permittees has been successful in detecting and eliminating significant illegal and illicit discharges to the stormwater system.

ES.3.6 Industrial Facility Monitoring and Control Program

An inventory was compiled of industrial sites that can be potential sources of urban pollutants. An industrial site management program was developed to address facilities regulated under Section 313 of SARA Title III; municipal landfills; hazardous waste treatment, disposal and recovery facilities; and any other industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system. Each permittee identified sites, procedures, and staffing assignment for its local industrial site management program.

Table ES-2
Summary of 2003 – 2004 (Permit Year 1) Measurable Goals

Program Category	Measurable Goal/Milestone		Status	Done
Legal Authority	1	Assemble and summarize existing ordinances	Prepared final Technical Memorandum	X
Stormwater System Map	1	Prepare regional stormwater system infrastructure map	Map completed	X
Monitoring Program	1	Review and analyze existing wet and dry weather data for stormwater system	Completed data analysis	X
	2	Develop proposed monitoring plan for remainder of permit	Completed draft monitoring plan	X
	3	Special sampling of sanitary sewer overflow – February 2004	Conducted multiple-day sampling and laboratory analyses	X
Public Outreach and Education Program	1	Attend three community events and distribute materials	CCRFCD presentation at Demonstration Gardens October 2003; Drought Ordinance public education activities target reduced landscape irrigation water use; CCRFCD printing updated mobile washing BMP brochure; CCDAQEM attended Petapalooza; CCRFCD, CCHD, Wash Team attended Earth Fair	X
	2	Produce Flood Channel Documentary	Produced by CCRFCD	X
	3	Produce or update a PSA	Fertilizer PSA aired in October-November 2003; household hazardous chemical disposal PSA aired March-April 2004	X
	4	Maintain Las Vegas Valley stormwater website	Ongoing – added links and local PSAs	X
	5	Make five presentations in public schools	Made over 40 presentations in public school classrooms	X

Table ES-2 (Continued)
Summary of 2003 – 2004 (Permit Year 1) Measurable Goals

Program Category		Measurable Goal/Milestone	Status	Done
Structural and Source Control Measures	1	Establish expected frequency of cleaning catch basins, inlets and storm drains	Established targets	X
	2	Establish procedures for tracking and reporting of storm drain system maintenance	Established procedures	X
	3	Establish expected frequency of street sweeping	Established targets	X
	4	Establish expected procedures for tracking and reporting of street sweeping	Established procedures	X
	5	Develop work plan to assess water quality benefits of existing regional flood control facilities and potential benefits of structural BMPs in areas of new development	Prepared as part of stormwater monitoring program	X
	6	Summarize available pesticide, herbicide and fertilizer monitoring data and existing management programs	Summarized data in Technical Memorandum	X
Illicit Discharge Detection and Elimination Program	1	Develop and conduct dry weather monitoring per Section 4	SNWA responsibility - summarized data	X
	2	Conduct semi-annual field inspections of open channels	Received Fall 2003 and Spring 2004 reports from all entities; prepared suggested standard format for future reports	X
	3	Develop training materials for municipal maintenance staffs	Prepared PowerPoint presentation	X
Industrial Facility Monitoring and Control Program	1	Identify (map and description) all industrial facilities covered under this section of the permit	Identified facilities and prepared map	X
	2	Identify existing industrial site inspection programs	All entities will use industrial pretreatment programs	X
	3	Develop program for tracking inspection reports and follow-up activities	Done for all	X
Construction Site BMP Program	1	Develop process for notifying developers in each community of construction site permit programs	Finalized tabular summary of existing and proposed practices	X
	2	Develop process for identifying high construction activity areas	Prepared Technical Memorandum on routine and post-storm inspections	X
	3	Develop program for post-storm inspections	Prepared Technical Memorandum and inspection checklist	X
	4	Review existing BMP manuals and modify for local conditions if necessary	Completed review of CCRFCD, Northern Nevada MS4s, and Caltrans manuals	X

ES.3.7 Construction Site Program

The permittees developed and adopted a program for managing the quality of runoff from construction sites. This program has the following elements:

- Process for notifying developers of the requirements of the NDEP construction site permitting program
- Improvements to current CCRFCD BMP Manual
- Routine inspection of active construction sites
- Post-storm inspection of active construction sites and regional detention basins
- Contractor education and training program

The various elements of this program will be implemented in the coming permit year.

ES.3.8 Stormwater Monitoring Program

A stormwater monitoring program was conducted in Las Vegas Valley for wet and dry weather conditions based on a previously approved monitoring program. Data from samples collected during the current permit year was analyzed and summarized. In addition, data collected during the entire 13-year Las Vegas Valley MS4 monitoring program was summarized to assess overall stormwater quality characteristics. Based on review of all available data, recommendations for a modified monitoring program were made that include less general characterization monitoring and more focused monitoring to answer specific questions related to local stormwater quality conditions.

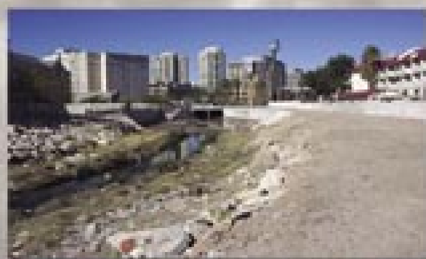
ES.3.9 Stormwater Management Plan

The permittees have developed, implemented and enforced a SWMP to reduce the discharge of pollutants as required in permit paragraph 4.1. The current SWMP will be updated to incorporate comments received from NDEP and will include the management plans developed during the first year of the new MS4 permit. An overall monitoring program was prepared for the SWMP.

ES.4 CONCLUSION

This report summarizes the activities of the permittees during the period from July 2003 to June 2004. Ongoing programs continue to be effective in minimizing the impact of urban runoff on downstream water quality.

A new SWMP has been developed and this report outlines the activities during Year 1 of the 5-year period. The permittees are committed to continuing their compliance with the stormwater permit, and have the resources available to satisfy this commitment.



Section 1

Legal Authority

SECTION 1
LEGAL AUTHORITY

1.1 INTRODUCTION

The purpose of this section is to provide an update on the status of the legal authority of the Las Vegas Valley Municipal Separate Storm Sewer System (MS4) permittees. The permittees are Clark County Regional Flood Control District (CCRFCD), Clark County (County), City of Las Vegas (CLV), City of North Las Vegas (CNLV), and City of Henderson (COH). This section will summarize the legal authority of each permittee to implement the various aspects of the Storm Water Management Plan (SWMP) and other requirements of the permit including:

- Prohibit illicit discharges to the municipal separate storm sewer system.
- Control spills, dumping or disposal of materials other than stormwater to the storm sewer system.
- Require compliance with conditions in ordinances related to stormwater discharges.
- Carry out inspection and monitoring procedures necessary to determine compliance with the prohibition on illicit discharges to the storm sewer system.

Copies of current ordinances are included in **Appendix C**. This section addresses the MS4 permit requirements in paragraph 4.2 and the SWMP requirements in paragraph 2.2.

1.2 ORDINANCES AND REGULATIONS

1.2.1 City of Henderson

Chapter 13.16 of the Henderson Municipal Code deals with the regulation of industrial wastewater and pretreatment program.

- Section 13.16.020 (A) lists waste and numerous other substances that *"shall, under no conditions, be discharged into or be allowed to enter the wastewater system, the stormwater system, or the waters of the state."* See **Appendix C** for a complete list. Section 13.16.015 defines stormwater system as *"a conveyance for carrying storm and surface waters and drainage waters excluding sewage. It includes but is not limited to storm drains, catch basins, flood control channels, streets and natural washes."* Section 13.16.015 defines waters of the state as *"watercourses and bodies of water subject to regulation by state or federal statutes."*
- Section 13.16.020 (B) states that *"no discharge shall be made to the storm drain system or the waters of the state that would cause a violation of the NPDES stormwater permit."* The COH will soon be proposing changes to strengthen the language of Section 13.16.020 (B).

1.2.2 City of Las Vegas

Chapter 14.17 of the Las Vegas Municipal Code addresses wastewater collection and treatment.

- Section 14.17.120 (D) states that *"it is unlawful for any person to discharge wastewater in any form, other than stormwater, into the storm drains of the City of Las Vegas."* Section 14.17.025 (67) defines stormwater as *"uncontaminated water resulting from precipitation; irrigation with drinking water; or clean groundwater."* Section 14.17.025 (66) defines a storm drain as *"a conveyance structure for carrying storm and surface waters and drainage water excluding wastewater."*
- Section 14.17.120 (E) states that *"it is unlawful for any person to discharge any pollutant, as defined in the Act, into surface waters within the City of Las Vegas without first obtaining an NPDES permit from the State of Nevada or the U.S. Environmental Protection Agency."*

1.2.3 City of North Las Vegas

Chapter 13.28 of the North Las Vegas Municipal Code deals with wastewater collection and treatment.

- Section 13.28.120 (D) states that *"it is unlawful for any person to discharge any waste water in any form, other than stormwater, into the storm drains of the city."* Section 13.28.025 defines stormwater as *"uncontaminated water resulting* *from precipitation; irrigation with drinking water; or clean groundwater."* Section 13.28.025 defines storm drain as *"a conveyance structure for carrying storm and surface waters and drainage water excluding wastewater."*

- Section 13.28.120 (E) states that *"it is unlawful for any person to discharge any pollutant, as defined in the Act, into surface waters within the city without first obtaining an NPDES permit from the state of Nevada or the U.S. Environmental Protection Agency."*

1.2.4 Clark County

Chapter 24.40 of the Clark County Code addresses stormwater system discharge.

- Section 24.40.020 states that *"it shall be unlawful for any person to discharge or cause to be discharged any wastewater in any form, other than stormwater, into the stormwater system, stormwater facilities, storm sewer, or, onto the curb, gutter, highway, or other area which may drain to the stormwater system, within the county without first obtaining a discharge permit from the state of Nevada."*
- Section 24.40.030 states that *"it shall be unlawful for any person to discharge or cause to be discharged any pollutant, as defined in NRS 445A.400, into the stormwater system, stormwater facilities, or storm sewer, or, onto the curb, gutter, highway, or other area which may drain to the stormwater system within the county, without first obtaining a discharge permit from the state of Nevada."*
- Section 24.40.040 states that *"it shall be unlawful for any person to discharge or cause to be discharged any solid or viscous material which could cause an obstruction to the flow, or cause an interference to the operation of the stormwater system, stormwater facilities, or storm sewer; or any waste which is capable of damage or hazard to the stormwater facilities, including structures, equipment; or personnel of the county."*

1.3 COMPLIANCE

Each entity requires compliance with its stormwater ordinances and regulations, as it does with all its ordinances. The public and the business community are made aware of local stormwater regulations through a variety of outreach measures, including the MS4 public outreach and education activities described in **Section 3** of this *Annual Report*. The Municipal Code of each entity describes enforcement measures (fines and other penalties) that could be used against violators of stormwater ordinances and regulations. Law enforcement officers and Clark County Public Response Office staff have the authority to enforce stormwater ordinances and regulations.

1.4 INSPECTION AND MONITORING PROCEDURES

Inspection and monitoring procedures used by the entities to track compliance with stormwater ordinances are described in **Section 5 - Illegal Discharge Detection Program.**

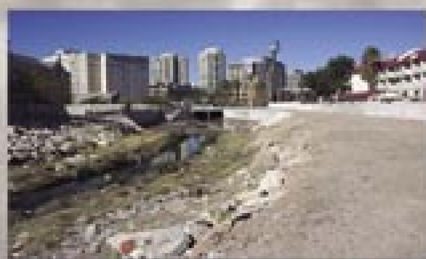
1.5 ADDITIONAL REQUIRED LEGAL AUTHORITY

A goal for Permit Year 2 (July 2004 to June 2005) was to develop, if necessary, a plan to address deficiencies in current legal authority. The existing ordinances are adequate, so this is not necessary.

1.6 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Existing legal authority is adequate to prohibit illegal discharges to the stormwater system, control spills, require compliance, and determine compliance. Adequate penalties (including imprisonment, fines or both) are in place for violation of ordinances.

Measurable Goal/ Milestone	Status
• Assemble and summarize existing legal authority	Completed



Section 2

Source Identification

SECTION 2
SOURCE IDENTIFICATION

2.1 INTRODUCTION

This section describes the effort, as outlined in Section 3.2 of the SWMP, to satisfy the MS4 permit requirement described in paragraph 4.3.1, to develop a stormwater system map for the Las Vegas Valley. The stormwater system map was generated to assist permittees, regulatory agencies and others in determining where potential stormwater quality problems may exist or originate. The map is based on existing computerized inventory information from CCRFCD which documents the existing drainage and flood control system.

2.2 STORMWATER SYSTEM MAP

A map of the existing regional storm drain system was prepared to document locations and contributing areas of major outfalls to receiving waters in the Las Vegas Valley. The map was prepared using information in the CCRFCD GIS system that was developed for the *Las Vegas Valley Flood Control Master Plan Update (2002)*.

Figure 2-1 is the overall Las Vegas Valley Stormwater System Map, which shows locations of regional detention basins, channels, storm drains, and the washes. The facilities are also indicated by color to show whether they are completed or under construction.

Figures 2-2 through **2-5** are the sectional areas of the Las Vegas Valley (Northwest, Northeast, Southwest, and Southeast) as indicated in **Figure 2-1.**

2.3 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Prepare regional stormwater system infrastructure map	Completed

Figures 2-1

Figure 2-2

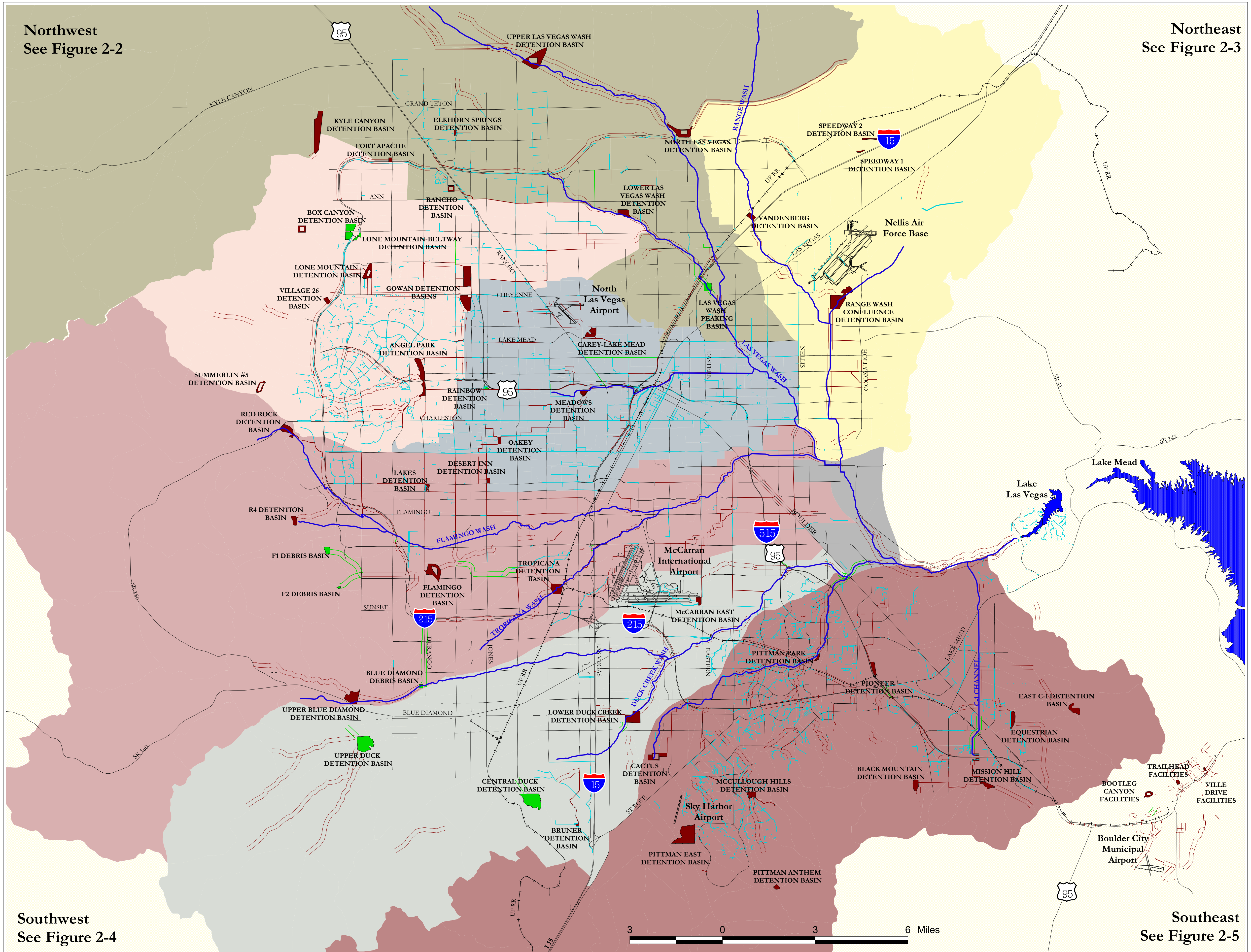
Figure 2-3

Figure 2-4

Figure 2-5

11 by 17 Pullouts

LAS VEGAS VALLEY STORMWATER SYSTEM MAP

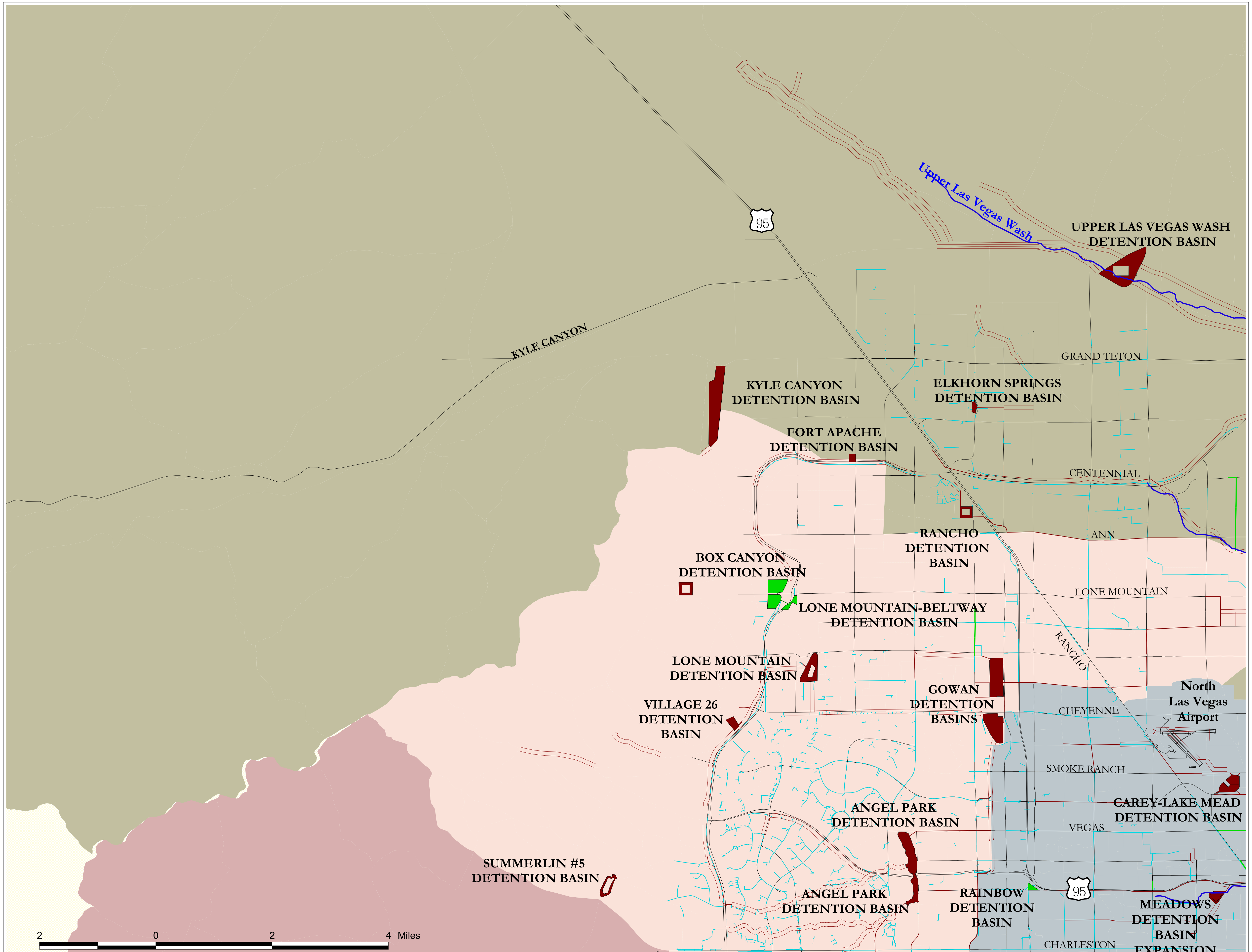


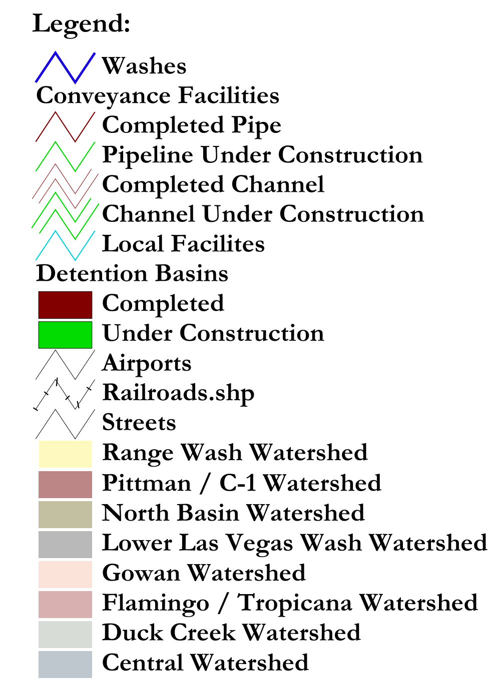
Legend:

- Washes
- Conveyance Facilities
- Completed Pipe
- Pipeline Under Construction
- Completed Channel
- Channel Under Construction
- Local Facilities
- Detention Basins
- Completed
- Under Construction
- Airports
- Railroads.shp
- Streets
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 2-1

LAS VEGAS VALLEY STORMWATER SYSTEM MAP NORTHWEST





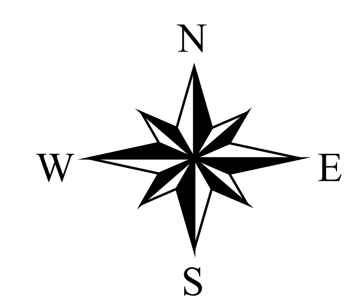
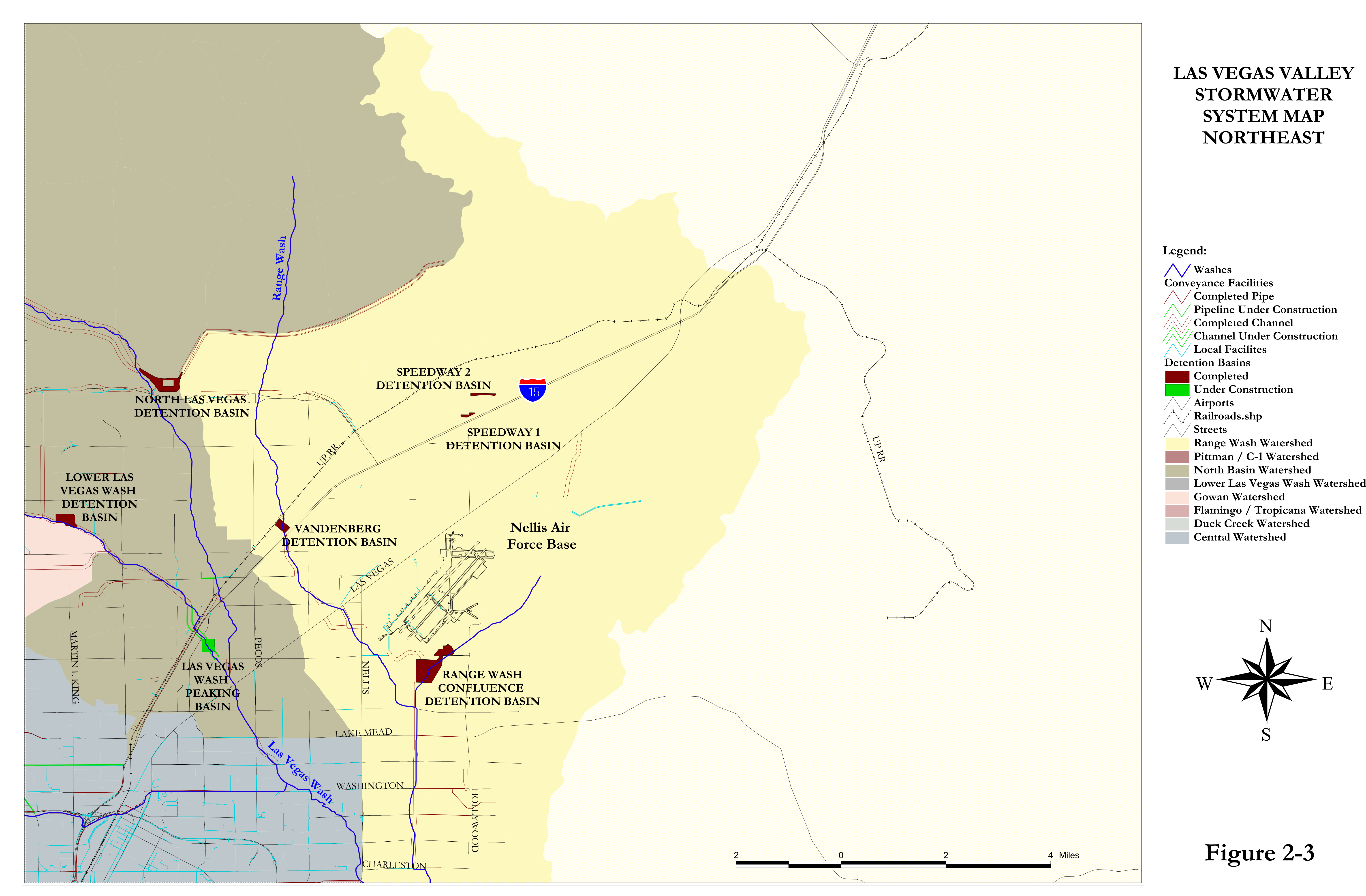
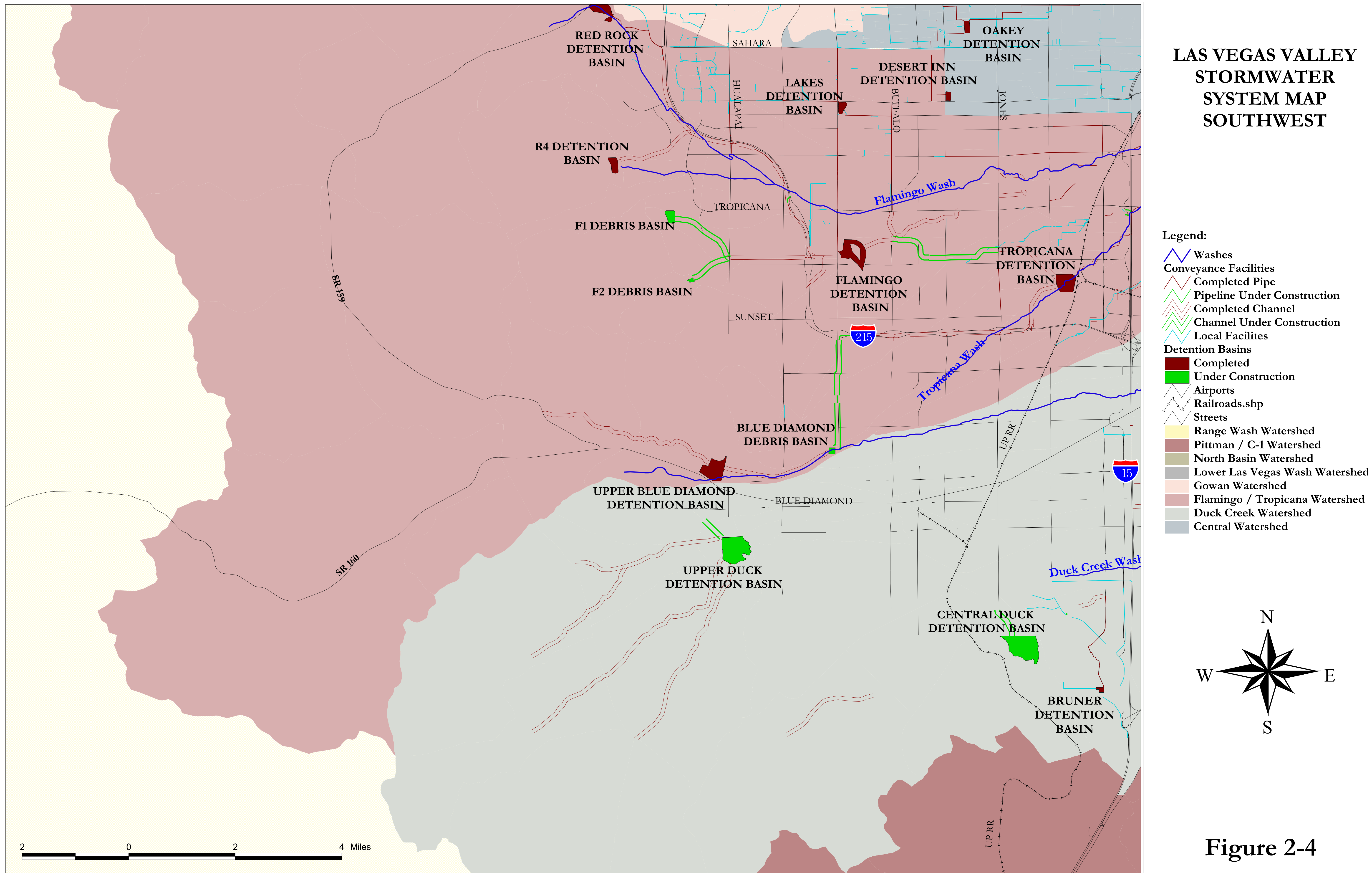


Figure 2-2



Range Wash
NORTH LAS VEGAS DETENTION BASIN
SPEEDWAY 2 DETENTION BASIN
15
SPEEDWAY 1 DETENTION BASIN
UP RR
LOWER LAS VEGAS WASH DETENTION BASIN
VANDENBERG DETENTION BASIN
Nellis Air Force Base
LAS VEGAS
MARTIN L KING
PECOS
NELLIS
LAS VEGAS WASH PEAKING BASIN
RANGE WASH CONFLUENCE DETENTION BASIN
LAKE MEAD
Las Vegas Wash
WASHINGTON
HOLLYWOOD
CHARLESTON
UP RR
2 0 2 4 Miles
N
W
E
S
LAS VEGAS VALLEY STORMWATER SYSTEM MAP NORTHEAST
Legend:
Washes
Conveyance Facilities
Completed Pipe
Pipeline Under Construction
Completed Channel
Channel Under Construction
Local Facilites
Detention Basins
Completed
Under Construction
Airports
Railroads.shp
Streets
Range Wash Watershed
Pittman / C-1 Watershed
North Basin Watershed
Lower Las Vegas Wash Watershed
Gowan Watershed
Flamingo / Tropicana Watershed
Duck Creek Watershed
Central Watershed

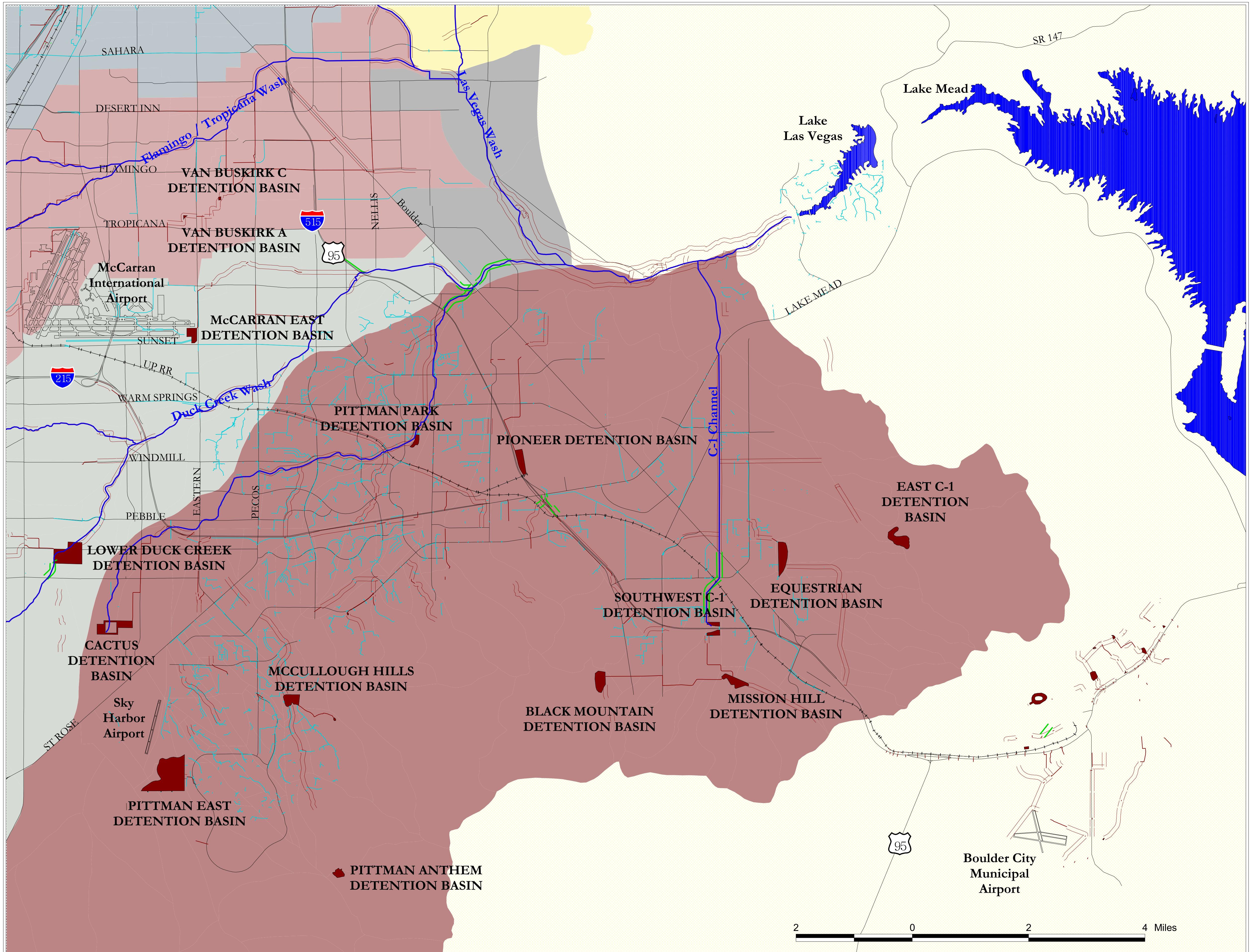
Figure 2-3



LAS VEGAS VALLEY STORMWATER SYSTEM MAP SOUTHWEST

Figure 2-4

LAS VEGAS VALLEY STORMWATER SYSTEM MAP SOUTHEAST



Legend:

- Washes
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  - Pipeline Under Construction
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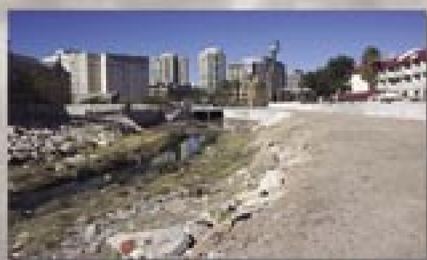
Figure 2-5



Section 3

Public Outreach and Education Program

SECTION 3
PUBLIC OUTREACH AND EDUCATION PROGRAM

3.1 INTRODUCTION

As part of the permit (paragraph 4.5) requirements the permittees have developed a Public Outreach and Education Program as described in the SWMP Section 5.2.

The overall objectives of the Public Education and Outreach Program are to:

- Inform the general public in Las Vegas Valley about important water quality issues related to stormwater runoff.
- Influence behavior of the general public to reduce activities that have a negative impact on stormwater runoff quality and increase activities that have a positive impact on stormwater runoff quality.

3.2 COMMUNITY EVENTS

During the 2003-2004 permit year, permittees attended several community events. These events were used as opportunities for education and outreach. Permittees distributed informational materials and answered questions.

- September 2003 - County staff participated in the Back-to-School fair.
- October 5 –11, 2003 - CCRFCD had staff at the Demonstration Gardens handing out brochures.
- March 27, 2004 - County staff attended Petapalooza and handed out pooper scoopers, which are intended to spread the “Don’t Pollute” message to pet owners.
- April 17, 2004 - CCRFCD, Clark County Department of Air Quality and Environmental Management (CCDAQEM), and Clark County Health District (CCHD) staff attended Earth Fair at Summerlin. It was a well attended event, and lots of education materials were distributed.
- May 2004 - CNLV, CLV and CCWRD staff attended the Earth Day event at Nellis Air Force Base.
- May 2004 - CNLV conducted a Career Day program at Marion Cahlan Elementary School dealing with pretreatment and stormwater.

3.3 MEDIA MATERIALS

During 2003-2004, permittees produced and distributed media materials, via regular and cable television, to disseminate public education and outreach information.

- November 2003 - A commercial on proper fertilization was run for three weeks on Channel 8. The fertilizer commercial was produced in Spanish and was provided to two Spanish television stations as a Public Service Announcement (PSA). CCRFCD did not purchase advertising time, but this will be considered in the future.
- February 2004 - CCRFCD produced another Flood Channel video. It included a segment on stormwater quality entitled *“Stormwater – Keeping it Clean, Episode 2.”* Topics that were included were programs in CNLV, water quality in Lake Mead, Southern Nevada Water Authority’s (SNWA) monitoring program, and interviews with Kevin Eubanks, Republic Silver State, public officials from Washington D.C., and EPA. It also included a spot on the cooperative program between SNWA, AutoZone and a local race car driver to promote used oil collection at AutoZone stores. The production aired in February and March, 2004.
- March 2004 - CCRFCD produced a new PSA on proper disposal of hazardous household chemicals. The message is that household chemicals must be disposed of properly (recycled or collected by Republic Silver State) to avoid adverse impacts to Lake Mead water quality. It was produced by Channel 3 and was aired on Channels 2 and 4 in late March and early April. CCRFCD feels this is the best PSA they have done to date.

3.4 PRINTED MATERIALS

In 2003-2004, permittees continued to update, produce, and distribute printed materials, such as brochures, about specific topics related to stormwater quality.

- April 2004 - The Miscellaneous Discharge BMP brochures were revised to incorporate language related to measures appropriate for times of drought restriction. CCRFCD reprinted and distributed the BMP brochures.

3.5 SECTION 319 GRANTS

Per Section 5.2.2 of the SWMP, permittees continue to pursue opportunities for obtaining Section 319 Nonpoint Source Management grants through NDEP, with cooperation from Conservation District of Southern Nevada and other regional planning and management agencies, for specific projects addressing stormwater quality issues. In 2003-2004, no Section 319 grant applications were submitted, but the permittees will continue to pursue these in the future.

3.6 WEBSITE

In 2003-2004, permittees maintained and updated their websites to provide information to the public on topics such as stormwater permitting, Las Vegas Valley water quality issues, BMPs, and related links.

The CCRFCD, Las Vegas Valley Water District (LVVWD) and the SQMC host a website, *www.lvstormwater.com,* which they maintain and update. The website provides information about stormwater pollution, monitoring programs, public outreach and community programs. As well, there is a link to the CCHD website and information on how to recognize and report illicit/illegal discharges to the storm drain system.

3.7 SCHOOL PROGRAMS

In 2003-2004, permittees continued to promote water quality awareness by conducting outreach activities in the Las Vegas Valley public schools.

- The CCRFCD conducted four programs per month at elementary schools. Although the primary message is flood safety, information related to stormwater quality is also presented. Since February, CCRFCD distributed educational materials on flood safety and water quality to approximately 900 teachers that could reach up to 22,000 students. **Table 3-1** summarizes the CCRFCD school programs.

- The County sent the *"Clear Blue Line"* video, which includes a stormwater quality message, to all middle schools in the Las Vegas Valley. It is estimated that as many as 32,000 middle school students have seen the video. CCRFCD's website also includes the video and lesson plan materials for science teachers. The County also distributed 11,000 *"Clear Blue Line"* books.

3.8 INVOLVEMENT IN OTHER ORGANIZATIONS

In 2003-2004, permittees continued to actively participate in other organizations in the Las Vegas Valley to promote interagency cooperation and have outreach and education functions.

- September 10, 2003 - CNLV gave a presentation on proper box inlet cleaning procedures at the Safety Engineers Association meeting.

- May 2004 - SNWA, through the Administrative Study Team of the Las Vegas Wash Coordination Committee, has prepared a handout on oil recycling that will be distributed at Checker Auto Part stores. It includes a stormwater quality message and promotes the importance of recycling used motor oil.

- May 2004 - SNWA has a public outreach program that includes water quality components. The SNWA television program similar to The Flood Channel often addresses water quality topics.

- May 2004 - EPA produced a 10 minute video called *"After the Storm,"* which presents information on the EPA stormwater rules and regulations. NDEP is working on a similar video covering state programs.

Table 3-1

CCRFCD School Program Summary

Elementary School	Students	Teachers	Presentation	Curriculum
Dailey	460	21	-	7/23/03
Ward	905	38	-	8/4/03
Hancock	110	4	-	8/6/03
Squires	230	7	-	8/6/03
McWilliams	825	37	-	8/14/03
Harmon	140	7	-	8/21/03
Harris	200	7	-	8/25/03
Snyder	128	4	-	8/27/03
Snyder	125	4	-	8/28/03
Long	30	1	-	9/18/03
Watson	150	8	-	11/13/03
Smith	550	22	-	11/13/03
Bowler	543	28	-	11/17/03
Squires	230	7	-	11/19/03
Hill	60	2	-	11/19/03
Carl	1200	51	-	11/26/03
Red Rock	702	55	-	12/1/03
Griffith	550	51	-	12/8/03
FEAT	300	0	-	12/15/03
Ward	355	13	-	12/18/03
Heard	700	27	-	12/18/03
Bennett	405	21	-	12/18/03
Rowe	90	3	-	1/21/04
Mackey	75	1	-	2/26/04
Rowe	120	4	-	3/3/04
Craig	150	5	-	4/14/04
McMillan	877	37	-	4/20/04
McCall	290	13	-	4/20/04
Smith	595	25	-	4/20/04
Earl	45	2	-	4/21/04
Treem	680	30	-	4/21/04
Thorpe	520	26	-	4/27/04
Rowe	850	70	-	4/29/04
Earl	35	1	-	5/4/04
Dearing	35	1	-	5/4/04
Heard	825	35	-	5/4/04
Whitney	712	34	-	5/4/04
Stanford	610	25	-	5/5/04
Hill	51	2	-	5/11/04
Fyfe	100	2	-	5/11/04
Gilbert Magnet	212	8	-	5/11/04
Warren	149	4	-	5/11/04
Diskin	93	3	-	5/13/04

Table 3-1 (Continued)

CCRFCD School Program Summary

Elementary School	Students	Teachers	Presentation	Curriculum
Edison	94	5	7/11/03	-
Ghering	111	5	7/16/03	-
Newton	75	3	7/22/03	-
Beckley	58	2	7/23/03	-
Mendoza	119	4	7/24/03	-
Kesterson	97	4	7/29/03	-
Mountain View	126	6	7/30/03	-
Kesterson	23	1	9/3/03	-
Bunker	123	4	9/10/03	-
Vanderburg	128	4	9/11/03	-
Deskin	115	3	9/15/03	-
Newton	132	4	9/17/03	-
MLK	83	2	9/18/03	-
Cartwright	100	3	9/25/03	-
Iverson	55	1	9/29/03	-
Iverson	60	2	10/1/03	-
Ober	135	4	10/2/03	-
Eisenberg	95	2	10/29/03	-
Brookman	141	5	11/12/03	-
Mack	150	5	11/13/03	-
Bowler	110	4	11/17/03	-
Taylor	120	4	11/19/03	-
Hinman	85	2	11/20/03	-
Herron	180	7	12/1/03	-
Tomiyasu	110	3	12/4/03	-
Ullum	130	4	12/10/03	-
Heard	130	4	12/11/03	-
Ferron	130	4	2/17/04	-
Rowe	50	2	2/25/04	-
Mackey	25	1	2/26/04	-
Kesterson	120	4	3/2/04	-
Rowe	100	4	3/3/04	-
Parson	120	4	3/8/04	-
Kesterson	120	4	3/17/04	-
Wolffe	130	4	3/24/04	-
Brookman	160	5	3/25/04	-
Neal	130	4	3/31/04	-
Craig	150	5	4/14/04	-
Warren	120	4	4/15/04	-
Snyder	120	4	4/20/04	-
Bell	150	5	4/29/04	-
Jacobson	120	4	5/4/04	-
Morrow	150	5	5/11/04	-
Gerhime	140	5	5/19/04	-
Beatty	150	5	5/27/04	-
Crestwood	130	4	6/2/04	-
Lake	155	5	6/10/04	-
Totals	21,367	925		-

3.9 CONSTRUCTION AND INDUSTRIAL PROGRAM

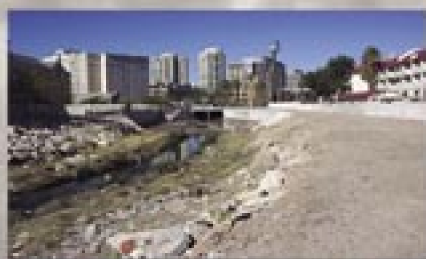
In 2003-2004, permittees conducted education and outreach activities targeting construction industry organizations (i.e., developers, contractors, engineers) and permitted industries. Components of the outreach and education programs that deal with construction and industrial sites are included in **Sections 6** and **7**. In addition, staff members from the CNLV and the CLV are considering a program to collect used cooking oil from restaurants. If viable, they hope to have it ready by the 2004 holiday season.

3.10 OTHER

The permittees are working on public education programs associated with the regional Drought Ordinance adopted in 2004. These programs will address excess outdoor water use (over watering) and other behaviors that impact stormwater quality.

3.11 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Attend three community events and distribute materials	Completed
• Produce flood channel documentary	Completed
• Produce or update one PSA	Completed
• Maintain Las Vegas Valley stormwater website	Completed
• Make five presentations in public schools	Completed



Section 4

Structural and Source Control Measure Program

SECTION 4
STRUCTURAL AND SOURCE CONTROL MEASURE PROGRAM

4.1 INTRODUCTION

A Structural and Source Control Measure Program has been developed to mitigate the effects of urbanization on stormwater quality. These structural BMPs and source control measures address the miscellaneous requirements described in paragraph 4.6 of the permit. This program is also described in Section 6 of the SWMP.

4.2 STORM SEWER AND STREET MAINTENANCE PROGRAM

Sections 6.2 and 6.4 of the Las Vegas Valley MS4 SWMP require development of maintenance programs for drainage facilities and streets. This section describes the stormwater maintenance objectives and methods of tracking and reporting maintenance activities conducted for the SWMP.

4.2.1 Maintenance Objectives

Each of the municipal entities in the Las Vegas Valley developed new storm drain system maintenance and street sweeping objectives based on their current and anticipated available resources as well as the expected benefit to stormwater quality. To the extent possible, these objectives were made consistent for all the permittees. **Table 4-1** summarizes the maintenance activity targets for each entity.

4.2.2 Tracking and Reporting Procedures

4.2.2.1 Data To Be Tracked

Each entity will maintain its own internal tracking and reporting process for storm drain maintenance and street sweeping activities. Data to be monitored and reported is listed below by maintenance program category.

Street Sweeping

- Total curb miles in street sweeping program
- Number of curb miles swept in the permit year (July – June)
- Statement at end of permit year as to whether targets/objectives were achieved

When possible, the total volume of street sweeping material disposed of during the permit year will be reported. At present, only CNLV has the potential for tracking this information.

Drop Inlet Cleaning

- Total number of drain inlets in the system
- Number of drain inlets inspected in the permit year
- Number of drain inlets cleaned out in the permit year
- Statement at end of permit year as to whether targets/objectives were achieved

When possible, the total volume of material removed from drain inlets during the permit year will be reported. At present, only CNLV has the potential for tracking this information.

Detention Basin Maintenance

- List of detention basins inspected during the permit year
- List of detention basins from which sediment and debris were removed during the permit year
- Statement at end of permit year as to whether targets/objectives were achieved

When possible, the total volume of material removed from detention basins during the permit year will be reported. At present, only CNLV has the potential for tracking this information.

The County, CLV and COH have common areas for storing and transferring refuse from street sweeping, storm drain maintenance, general debris cleanup and other sources; individual accounting of material generated from each source is not performed. Each of these entities will explore methods of estimating the

Table 4-1

Maintenance Goals for Entities

Entity	Street Sweeping	Drop Inlet Cleaning	Detention Basin Maintenance
County	Sweep curbed-and-paved public city streets in urban area once every 30 days(1) ; as-needed in rural areas	Inspect/clean 20 percent of drop inlets a minimum of once per year; clean as appropriate(4)	Inspect during semi-annual channel inspections and after major storms(5); clean as appropriate
CLV	Sweep curbed-and-paved public city streets once every 30 days(2)	Inspect/clean 20 percent of drop inlets a minimum of once per year; clean as appropriate	Inspect during semi-annual channel inspections and after major storms; clean as appropriate
CNLV	Sweep curbed-and-paved public city streets once every 30 days(3)	Inspect/clean 20 percent of drop inlets a minimum of once per year; clean as appropriate	Inspect during semi-annual channel inspections and after major storms; clean as appropriate
COH	Sweep curbed-and-paved public city streets once every 30 days	Inspect/clean 20 percent of drop inlets a minimum of once per year; clean as appropriate	Inspect during semi-annual channel inspections and after major storms; clean as appropriate

(1) County sweeps most urban public streets on a 7 to 10 day schedule.

(2) CLV sweeps most urban public streets on a 14 day schedule.

(3) CNLV sweeps most urban public streets on a 14 day schedule.

(4) Unincorporated Clark County is divided into 9 zones. Maintenance Management Division estimates it will take 8 to 10 weeks to complete a full rotation through all 9 zones. Therefore, most inlets will be inspected/cleaned 4 times per year.

(5) County also currently routinely inspects all detention basins two times per year

amount of refuse removed through street sweeping, drain inlet cleaning and detention basin cleaning (e.g., as a percentage of the total amount of material hauled to the Apex Landfill).

4.2.2.2 Reporting Procedures

Each entity will track information using internal tools and processes. These are summarized in the following paragraphs.

Clark County

The County's Maintenance Operations Manual Program will be used to track drainage system maintenance and street sweeping activities. The program is used to schedule and track maintenance activities throughout the County.

City of Las Vegas

Street Sweeping. The CLV is separated into districts which are swept at a minimum of once every two weeks. The number of lane miles for each district is taken from GPS system which is attached to each until. Sediment and debris from each unit is dumped into a central refuse pile at either the west or east city yards.

Drop Inlet Cleaning. CLV maintenance staff currently keep logs for drop inlet and drainage easement cleaning. Sediment and debris from each unit is dumped into a central refuse pile at either the west or east city yards.

Monthly reports are produced by the Field Operations Department which detail the number of street miles swept and the number of inlets cleaned.

Detention Basin Maintenance. Detention basins are inspected twice a year as a part of the "Wash Walk" program and are also inspected after each major storm event. The basins are cleaned as needed after each inspection by the CLV's annual maintenance contractor. The CLV reports the volume of sediment and debris removed based from the contractor's monthly invoices.

City of North Las Vegas

Street Sweeping. The CNLV Public Works Department's Roadway Division will be responsible for performing street sweeping duties on all CNLV-maintained streets. Street sweeping records will be maintained at the CNLV Public Works Department's Roadway Division. The number of curb or lane miles of street sweeping will be reported to the CNLV representative to the SQMC at the end of each month. The amount of debris collected from street sweeping will be noted on the daily work order, and will be provided to the CNLV SQMC representative quarterly. The CNLV swept 23,296 miles of street and picked up 6,240 cubic yards of debris.

Drop Inlet Cleaning. The CNLV Utility Department's Field Services Section will perform drop inlet cleaning and other storm drain system maintenance. Records for these maintenance activities will be maintained at the Utility Department, and reporting may be provided on a quarterly basis at the SQMC meeting. Reporting will include the number of drop inlets inspected and cleaned and an estimate of the amount of material removed. The CNLV cleaned 35 drop inlets, catch basins, and storm drains during the 2003-2004 period.

Detention Basin Maintenance. The CNLV Utility Department's Environmental Section will be responsible for performing semi-annual inspection of detention basins. The Public Works Department's Development and Flood Control Division will perform inspections of detention basin outfalls after each major storm event. The Public Works Department's Roadway Division will be notified if debris/sediment needs removal as determined from these inspections by the originating Department/ Division. Reporting of inspections and any debris removed, including estimated quantities, will be reported in the semi-annual "Wash Walk" reports, which are prepared as part of the Illicit Discharge Program.

The CNLV has summarized it's objectives in a letter which is included in **Appendix D**.

City of Henderson

Street Sweeping. The COH is divided into six areas. Each day, street sweeper operators color in the streets that were swept that day on a city map. When all the streets in the area have been swept, a new map is started and the process is repeated.

The COH expended 30,956 man-hours on street sweeping during the reporting period. The COH has seven street sweepers in operation, the same number as in past years.

Drop Inlet Cleaning. The procedure used for tracking and reporting drop inlet cleaning corresponds to the procedure described for street sweeping. The COH inspects/cleans 20 percent of drop inlets once per year and cleans as appropriate. Sediment and other material removed from storm drains, drop inlets, and lined channels, are deposited at the Warm Springs maintenance yard. From there it is transferred to the landfill at Apex. Material removed from unlined channels is placed on the side of the channel.

Detention Basin Maintenance. The COH inspects and maintains regional flood control facilities under a maintenance agreement with the CCRFCD. The procedure used for tracking and reporting detention basin maintenance corresponds to the procedure of drop inlet cleaning

4.3 PESTICIDE, HERBICIDE, AND FERTILIZER MANAGEMENT PROGRAM

Section 6.7 of the MS4 SWMP requires review and summary of pesticide and herbicide data collected over the course of the NPDES stormwater monitoring program, and assessment of potential impacts of those chemicals on Las Vegas Wash water quality. This section satisfies this SWMP requirement.

4.3.1 Pesticide and Herbicide Data Review and Summary

Wet and dry weather samples collected for the NPDES stormwater program have been analyzed for a standard suite of pesticides and herbicides since 1996. EPA Methods 614/619 and 508 (pesticides) and 615 (herbicides) were applied by MWH Laboratories. Special analyses were run for diuron, endothall, glyphoshate, hydroxide, diquat and paraquat.

Table 4-2 summarizes the number of wet weather samples collected at each monitoring site since 1996, and the number of samples in which a pesticide or herbicide was detected. It is seen that both pesticides and herbicides were rarely detected in wet weather runoff at any of the monitoring sites. Of the 57 wet weather samples analyzed, only 10 samples had a detectable pesticide and only 24 samples had a detectable herbicide. The most common chemical detected was the herbicide 2,4-D. **Table 4-3** summarizes the number of dry weather samples collected at each monitoring site since 1996, and the number of samples in which a pesticide or herbicide was detected. Of the six sites sampled, only Sloan Channel had a detectable quantity of a pesticide chemical and only Duck Creek, Flamingo Wash and Sloan Channel had detects of a herbicide chemical. Of the 59 dry weather samples analyzed, only one sample had a detectable pesticide and only four samples had a detectable herbicide.

Based on the rare occurrence of pesticides and herbicides in wet and dry weather flows, it is concluded that neither category of chemicals represents a significant impairment to water quality in Las Vegas Wash or its major tributaries.

Table 4-2

Summary of Wet Weather Data for Pesticides and Herbicides

Site	Pesticides			Herbicides		
	Number of Samples	Number of Samples With a Detect	Most Common Chemicals Detected	Number of Samples	Number of Samples With a Detect	Most Common Chemical Detected
Western Tributary	3	0		3	3	2,4-D
Las Vegas Creek	7	3	N/A	7	3	N/A
Duck Creek	12	0		12	4	2,4-D
Flamingo Wash	8	2	N/A	9	2	N/A
C-1 Channel	8	1	diazinon	8	4	2,4-D
Sloan Channel	7	1	prometon	6	3	2,4-D
Las Vegas Wash	12	3	N/A	12	5	2,4-D

N/A = Not Available – Information Not Recorded

Table 4-3

Summary of Dry Weather Data for Pesticides and Herbicides

Site	Pesticides		Herbicides	
	Number of Samples	Number of Samples with a Detect	Number of Samples	Number of Samples with a Detect
Western Tributary	2	0	2	0
Las Vegas Creek	16	0	16	0
Duck Creek	13	0	13	1
Flamingo Wash	10	0	10	1
Sloan Channel	11	1	11	2
Las Vegas Wash	7	0	7	0

4.3.2 Pesticide and Herbicide Control Measures

Pesticides and herbicides may be used by private individuals, landscaping contractors, and public maintenance crews (e.g., highway and parks and recreation departments). Pesticide use by public agencies is limited; commonly applied herbicide products include Roundup, Roundup Pro, Surflan and Barricade.

Based on the lack of impacts attributable to pesticides and herbicides, it may be concluded that existing BMP control measures are adequate. Current BMPs consist of applicator training and public outreach activities such as the following.

- Each municipality requires maintenance crews who are responsible for applying pesticides and herbicides to retain a State of Nevada Herbicide/Pesticide License. Training is provided by the State Department of Agriculture and University of Nevada at Las Vegas (UNLV) Cooperative Extension. Periodic refresher courses are required to maintain the license. Pesticides and herbicides are applied according to manufacturer's directions.

- Most commercial applicators have licensed personnel, and are expected to apply products in accordance with manufacturer's directions (over-use is not cost-effective).

- CCRFCD prepared and aired a public service announcement dealing with proper handling and disposal of pesticides and herbicides. This message is part of ongoing public education activities related to stormwater quality by the permittees.

- The Conservation District of Southern Nevada prepared and distributed a brochure on the proper handling and disposal of pesticides and herbicides.

- Las Vegas Valley communities are implementing water conservation plans in response to the current drought that have guidelines and ordinances addressing outdoor landscape irrigation. The plans are aimed at reducing water waste through over-watering. This also reduces the contribution of pesticides, herbicides, fertilizers and similar chemicals to downstream receiving waters.

4.4 NEW DEVELOPMENT PLANNING PROCEDURES

Paragraph 4.6.1.2 of the MS4 permit requires development of *"a plan to reduce the discharge of pollutants from MS4s which receive discharges from areas of new development and significant redevelopment."* The permittees are addressing this requirement through two approaches: (1) detention basin evaluation program; and (2) BMP design manual review and update. These two activities are described in the following sections.

4.4.1 Detention Basin Evaluation Program

CCRFCD has a regional flood control program that includes numerous existing and proposed detention basins located throughout the Las Vegas Valley. **Figure 2-1** shows the locations of existing regional detention basins. Runoff from most areas of new development and significant redevelopment is captured in the existing or proposed regional detention basins. There are currently no ordinances or other measures specifying on-site detention/retention requirements associated with new development. Rather, runoff from new development is managed using the same regional detention basins designed to manage existing development.

Existing CCRFCD design criteria for regional detention basins do not specifically address design elements to target water quality improvements (e.g., water quality outlets). The regional detention basins are designed to generally pass the small runoff events through storage with relatively little attenuation, but to capture enough of the 100-year runoff volume to mitigate downstream flooding impacts. Nonetheless, detention basins should provide water quality benefits by settling out sediments, settleable solids and pollutants that adhere to these solids.

There is currently no data on the pollutant removal effectiveness of existing regional detention basins in Las Vegas Valley that were designed and operated based on CCRFCD criteria. Because of their importance to the CCRFCD flood control strategy, a study work plan to determine the water quality benefits associated with existing detention basins was developed in the 2003-2004 permit year, and will be implemented in the following years. The details of this work plan are presented in **Section 4.5**.

4.4.2 BMP Design Manual Review and Update

The *CCRFCD Hydrologic Criteria and Drainage Design Manual (HCDDM)* includes a section on recommended structural BMPs for use in urban areas and on construction sites to control the discharge of pollutants to drainage systems. The BMPs in this manual are presented to communities, engineers and contractors as recommendations for use during and after the development phase. Post-development BMPs that could be used in designing new development or redevelopment (e.g., oil-grit separators, extended detention basins, porous pavement) are included in the current *HCDDM*.

The *HCDDM* BMP section was reviewed to determine whether changes in the recommended BMPs were justified. In addition to the *HCDDM*, the following BMP manuals were also reviewed to determine feasible BMPs to use in Las Vegas Valley for urban runoff and construction site runoff management.

- *Truckee Meadows Construction Site Best Management Practices Handbook, 2003*
- *Truckee Meadows Structural Controls Design Manual, 2004*
- *State of Nevada Handbook of Best Management Practices, 1994*
- *California Department of Transportation (Caltrans) BMP references materials*

Recommended BMPs were selected and described in three categories: Permanent (Post-Construction) BMPs, Site and Maintenance BMPs, and Temporary Construction BMPs. **Appendix D** summarizes the review and selection of BMPs for Las Vegas Valley. It is recommended that CCRFCD update the BMP section of the *HCDDM* during the next revision process.

4.5 FLOOD CONTROL STRUCTURE REVIEW PROGRAM

A study will be conducted in Permit Year 2 to assess the water quality benefits of existing detention basins and flood control channels in the Las Vegas Valley. It is anticipated that this study will include the following tasks.

- Detention basins are important structural controls for reducing sediment loads delivered to Las Vegas Wash. However, there are no data demonstrating the effectiveness of Las Vegas Valley detention basins in reducing loads of sediment or other pollutants. A monitoring program will be implemented to sample representative detention basin inflow and outflow, and compute the pollutant reduction provided.

- The first task of the plan includes wet weather sampling at three Las Vegas Valley detention basins. This plan is further described in **Section 8.6.1** of this report. Water quality monitoring of detention basin inflows and outflows will be conducted to document pollutant reduction benefits of existing regional detention basins.

- After large storms, sediment that is removed from the stormwater is deposited in either the detention basin or storm drains. By determining the amount of sediment deposited during or after a storm event, the effectiveness of the detention basins can be determined. The second task of the plan is to collect records for amount of sediment removed from regional detention basins and channels (e.g., for past 10 years), and any testing that may have been performed on that sediment. This effort will be continued in a monitoring and cleaning effort after subsequent storms. Future records will be maintained for sediment removed from detention basins and channels.

- Visual inspections will need to be performed after large storm events. The visual inspections should note where sediment deposits are located, indicate any large debris that was deposited (i.e. boulders, shopping carts), and if sediments or debris are clogging inlets or outlets of the detention basin.

If further maintenance is required, permittees will be notified following inspection.

Another aspect to be explored is the amount of sedimentation contributed by unlined channels. CCRFCD documentation of the number of miles of channel lining installed over the last 10 years and the number of proposed miles to be converted will be attained. Per CCRFCD criteria, regional detention basins are designed to impound the 100-year peak flow volume plus an additional volume of 15 percent for debris and sediment storage. Records of detention basin design sediment storage capacity will be collected. From the records, the total potential volume of sediment stored will be calculated.

4.6 ACTIVITIES COMPLETED DURING 2003-2004

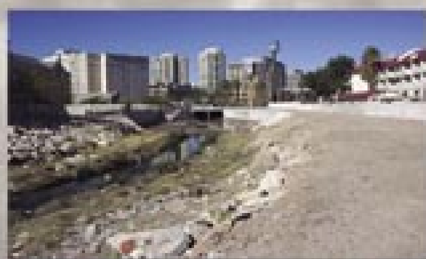
Permittees completed street sweeping and storm drain and inlet cleaning BMPs in 2003-2004. See **Appendix D** for reports of these activities.

4.7 DRINKING WATER DISCHARGES

On April 7, 2000, NDEP authorized the discharge of drinking water to the stormwater system under the Las Vegas Valley NPDES municipal stormwater discharge permit. This eliminated the need for previous individual permits for each entity, as well as LVVWD, to discharge treated potable water to the storm drainage system as part of routine maintenance activities for water distribution facilities. Annual reports for these activities are submitted to NDEP on a calendar-year basis, consistent with the requirements of the previous potable water discharge permits. Copies of this information are provided in **Appendix D**.

4.8 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Establish expected frequency of cleaning catch basins, inlets and storm drains	Completed
• Establish procedures for tracking and reporting of storm drain system maintenance	Completed
• Establish expected frequency of street sweeping	Completed
• Establish procedures for tracking and reporting of street sweeping	Completed
• Develop study work plan to assess water quality benefits of existing regional flood control facilities and potential benefits of structural BMPs in areas of new development	Completed
• Summarize available pesticide, herbicide and fertilizer monitoring data and existing management programs	Completed



Section 5

Illicit Discharge Detection Program

SECTION 5
ILLICIT DISCHARGE DETECTION PROGRAM

5.1 INTRODUCTION

The Illicit Discharge Detection Program elements are described in Section 7 of the SWMP and paragraph 4.7 of the permit. The program consists of three components: field screening, field inspections, and public reporting opportunities.

5.2 FIELD SCREENING PROGRAM

Field screening consisted of quarterly water quality sampling and analysis during dry weather conditions at 10 locations in Las Vegas Valley. The objective of the sampling program was to detect changes in dry weather water quality that could indicate the presence of illegal non-stormwater discharge to the drainage system. Dry weather monitoring was conducted by SNWA in 2003-2004 as part of its Urban Tributary Sampling program. See **Section 8.2** for dry weather results. The field screening program did not detect the presence of unusual concentrations of pollutants that could suggest the presence of illegal discharges.

5.3 INSPECTION PROGRAM

5.3.1 Channel Inspections

Municipal separate storm sewer systems were inspected in Fall 2003 and Spring 2004. Inspections were performed by staffs of the permittees, and included visually observing open channels and looking for evidence of illegal discharges. See **Appendix E** for inspection reports.

Channel inspections identified several potential illegal discharges or dumping. These incidents were referred to the proper local authorities for resolution.

5.3.2 Training Materials for Municipal Maintenance Staff

Permittees have developed materials for training municipal maintenance staff to look for evidence of non-stormwater discharges to the storm drain system during their normal duties. Training materials are included in **Appendix E**. Training programs will be conducted in the next permit year.

5.4 PUBLIC REPORTING PROGRAMS

There are several avenues by which the public can and has reported potential illicit discharges to the MS4. These are described below.

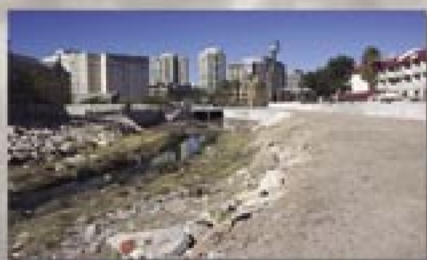
Website. The permittees' website, (www.lvstormwater.com) has a link for reporting illicit discharges. This link gives contact information for reporting illicit discharges, clogged storm drains, and an online complaint form through the CCHD.

CCPRO. The primary function of the Clark County Public Response Office is to receive citizen complaints related to possible municipal code violations and followup appropriately. Many complaints deal with illegal dumping and similar activities that could adversely affect stormwater quality.

Direct Contact With Permittees. Each of the permittees receives direct calls from citizens reporting dumping, illegal discharges of non-stormwater to the drainage system, maintenance problems, and other activities that may affect water quality.

5.5 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Develop and conduct dry weather monitoring per **Section 4**	Completed
• Conduct semi-annual field inspections of open channels	Completed
• Develop training materials for municipal maintenance staffs	Completed



Section 6

Industrial Facility Monitoring and Control Program

SECTION 6
INDUSTRIAL FACILITY MONITORING AND CONTROL PROGRAM

6.1 INTRODUCTION

Industrial sites can be potential sources of urban stormwater pollution. This section describes a proposed program for identifying and inspecting industrial facilities in Las Vegas Valley that are specifically covered by paragraph 4.8 of the MS4 permit. This program is required by Section 8 of the SWMP, and is intended to supplement the industrial site permitting program conducted by NDEP.

6.2 IDENTIFICATION OF INDUSTRIAL FACILITIES

The purpose of this section is to identify industrial facilities in categories called out in the Las Vegas Valley MS4 NPDES permit. This section will identify industrial facilities in the Las Vegas Valley that are specifically regulated under the MS4 permit. This section addresses the MS4 permit requirements in paragraph 4.8 and the SWMP requirements in Section 8.2.

The MS4 permit (paragraph 4.8.1) specifically identifies four classes of industrial facilities for which a program to monitor and control pollutants must be developed. These classes of industrial facilities are:

- Industrial facilities that are subject to Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)
- Municipal landfills
- Hazardous waste treatment, disposal and recovery facilities
- Industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system

This subsection addresses facilities in each of these categories.

6.2.1 Industrial Facilities Subject to Section 313

The United States Environmental Protection Agency (EPA) regulates and keeps a list of industrial and other facilities that release certain amounts of regulated chemicals into the environment. These are called Toxic Release Inventory (TRI) facilities. The EPA's website (http://www.epa.gov/enviro/html/tris/tris_query.html) was used to search for and list all TRI facilities in the County and a total of 38 facilities were found. It is noted that this list is compiled by EPA based on self-reporting by regulated industries and, therefore, may be incomplete. However, NDEP agreed that this was a reasonable source of information for this purpose. A few of the facilities listed were outside of the Las Vegas Valley; these are outside of the MS4 permit coverage area and were removed from the list of MS4 industrial facilities. EPA classifies facilities by Standard Industrial Classification (SIC) codes. See **Table 6-1** for a list of industries subject to Section 313. After deleting facilities not in the Las Vegas Valley, a list of industrial facilities that are subject to Section 313 in the Las Vegas Valley was compiled (see **Table 6-2**).

Using the street addresses or the latitude and longitude provided in the EPA database, a map was created using GIS software to display the location of these facilities (see **Figure 6-1**).

6.2.2 Municipal Landfills

The only landfill within the Las Vegas Valley is the Sunrise Landfill. This landfill has been closed since 1993. The Apex Regional Landfill is currently the only active local landfill, but is located outside of the Las Vegas Valley. Because there are no active municipal landfills in the Las Vegas Wash drainage area, no municipal landfills are covered under the MS4 industrial program requirements.

Table 6-1

Standard Industrial Classification (SIC)
Groups Subject To Section 313

SIC	Industry Group
10 (except 1011, 1081, and 1094)	Metal Mining
12 (except 1241)	Coal Mining
20	Food
21	Tobacco
22	Textiles
23	Apparel
24	Lumber and Wood
25	Furniture
26	Paper
27	Printing and Publishing
28	Chemicals
29	Petroleum and Coal
30	Rubber and Plastics
31	Leather
32	Stone, Clay, and Glass
33	Primary Metals
34	Fabricated Metals
35	Machinery (excluding electrical)
36	Electrical and Electronic Equipment
37	Transportation Equipment
38	Instruments
39	Miscellaneous Manufacturing
4911 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce)	Electric Utilities (Electric Services)
4931 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce)	Electric Utilities (Electric and Other Service Combined)
4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce)	Electric Utilities (Combination Utilities, not Elsewhere Classified)
4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C, 421 U.S.C. section 6821 *et seq.*)	Commercial Hazardous Waste Treatment
5169	Chemical and Allied Products Wholesale
5171	Petroleum Bulk Terminals and Plants
7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis)	Solvent Recovery Services

Table 6-2

Industrial Facilities Subject to Section 313 in the Las Vegas Valley

Facility Number	Facility Name	Address	SIC Codes	Latitude	Longitude	Jurisdiction
1	Anderson Dairy Prods.	801 Searles Avenue Las Vegas, NV 89101	2024, 2026	36.184711	-115.132031	City of Las Vegas
2	Capital Cabinet Corp.	3645 Losee Road North Las Vegas, NV 89030	2434	36.227058	-115.120439	City of North Las Vegas
3	Georgia-Pacific Corp.	11401 U. S. Highway 91 North Las Vegas, NV 89030	1375, 1499*	36.2171	-115.1483	City of North Las Vegas
4	Good Humor Corp.	1001 Olsen Street Henderson, NV 89015	2024	36.074286	-114.956542	City of Henderson
5	Kalco Lighting L.L.C.	6355 S. Windy Street #3 Las Vegas, NV 89119	2514, 3645, 3646	36.07227	-115.175217	Clark County
6	Kerr-McGee Chemical L.L.C.	8000 West Lake Mead Parkway Henderson, NV 89015	2800, 2819	36.047921	-115.003899	Clark County
7	Koch Performance Asphalt Co. Las Vegas, NV	3901 W. Ponderosa Way Las Vegas, NV 89118	1611, 2951, 5171	36.080838	-115.191772	Clark County
8	Las Vegas Finishing L.L.C.	3261 Builders Avenue Las Vegas, NV 89101	3471	36.160777	-115.101728	City of Las Vegas
9	Lighthouse Vip Prods.	4601 E. Cheyenne Avenue Las Vegas, NV 89115	2851	36.217987	-115.073806	Clark County
10	Mcc-Uniflex L.L.C.	1151 Grier Drive Las Vegas, NV 89119	2754	36.069584	-115.140388	Clark County
11	Monierlifetile L.L.C.	430 Eastgate Road Henderson, NV 89015	3272	36.057173	-115.019084	City of Henderson
12	Nevada Ready Mix	601 W. Bonanza Road Las Vegas, NV 89106	1442, 2451, 3273, 3531, 3532	36.182099	-115.160815	City of Las Vegas
13	Nevada Ready Mix	4301 W. Hacienda Avenue Las Vegas, NV 89109	3273	36.093611	-115.197222	Clark County
14	Ocean Spray Cranberries Inc.	1301 American Pacific Drive Henderson, NV 89014	2086	36.04054	-115.037802	City of Henderson
15	Pacific Engineering and Product Co. of Nevada	8291 Gibson Road Henderson, NV 89105	2819	36.057803	-115.027	City of Henderson
16	Pioneer Americas L.L.C.	8000 West Lake Mead Parkway Henderson, NV 89015	2812, 2879	36.041111	-115.008888	Clark County
17	Rebel Oil Co. Inc.	5054 N. Sloan Lane Las Vegas, NV 89115	5171	36.251052	-115.04282	Clark County

Table 6-2 (Continued)

Industrial Facilities Subject to Section 313 in the Las Vegas Valley

Facility Number	Facility Name	Address	SIC Codes	Latitude	Longitude	Jurisdiction
18	Service Rock Prods. Inc. Las Vegas	800 Feet S. of Intersection of Cactus Road and Polluck Drive Las Vegas, NV 89102	3273	35.995833	-115.143611	Clark County
19	Sigmatron Intl. Las Vegas	751 Pilot Road Las Vegas, NV 89119	3672	36.083333	-115.166666	Clark County
20	Southern Nevada Paving 5th Street	413 E. Gowan Road North Las Vegas, NV 89032	1611, 1771, 2951	36.225289	-115.124866	City of North Las Vegas
21	Southern Nevada Paving Charleston Boulevard	Western Beltway and Charleston Boulevard Las Vegas, NV 89145	2951	36.156111	-115.339166	Clark County
22	Sparkletts Drinking Water Corp.	4225 W. Desert Inn Road Las Vegas, NV 89102	2086	36.12997	-115.197098	Clark County
23	Sparkletts Water Sys. Aqua Vend	3140 Polaris Avenue #10 Las Vegas, NV 89102	7389	36.132711	-115.186233	City of Las Vegas
24	Spartan of Nevada Inc.	241 W. Desert Inn Road Las Vegas, NV 89109	3088	36.13977	-115.176167	Clark County
25	Thatcher Co. of Nevada	850 W. Lake Mead Parkway Henderson, NV 89014	2819	36.032881	-115.01334	City of Henderson
26	Titanium Metals Corp.	8000 W. Lake Mead Parkway Henderson, NV 89015	2800, 3339, 3356	36.0425	-114.994444	Clark County
26	Universal Urethane Inc.	4201 E. Lone Mountain Road North Las Vegas, NV 89030	3069, 3086, 3714	36.24786	-115.082737	City of North Las Vegas
28	Young Electric Sign Co.	5119 S. Cameron Street Las Vegas, NV 89118	3993, 7532	36.09682	-115.203623	Clark County

*SIC codes not included in SIC groups subject to Section 313, but the facility was identified during the TRI search on EPA's website.

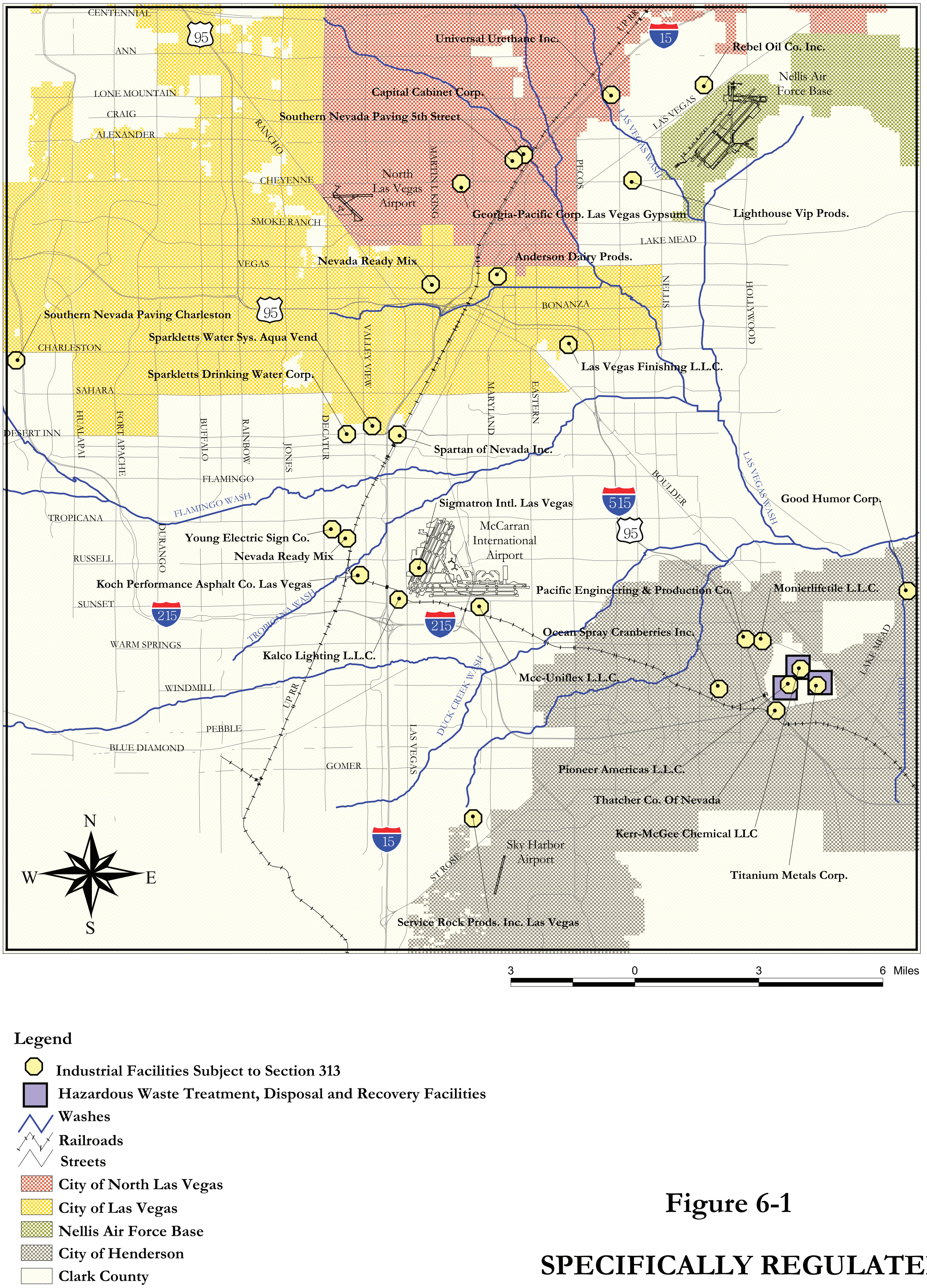


Figure 6-1

SPECIFICALLY REGULATED INDUSTRIAL FACILITY LOCATIONS

6.2.3 Hazardous Waste Treatment, Disposal and Recovery Facilities

The EPA keeps a list of hazardous waste treatment, disposal, and recovery facilities that are subject to the Resource Conservation and Recovery Act (RCRA). The EPA RCRAInfo website (http://www.epa.gov/enviro/html/rcris/rcris_query.html) was searched to find hazardous waste treatment and disposal facilities within the County. The search returned five facilities, all within Las Vegas Valley. One of the facilities listed was U.S. Air Force, Nellis Air Force Base. This facility was deleted from the final list because it is a military facility not covered by the MS4 permit. One of the facilities is no longer an active industrial operation, so it was also deleted. The following are the hazardous waste treatment, disposal and recovery facilities applicable to the permit:

- Kerr-McGee, 8000 West Lake Mead Parkway, Henderson, NV 89015
- Pioneer Americas L.L.C., 8000 West Lake Mead Parkway, Henderson, NV 89015
- Titanium Metals, 8000 West Lake Mead Parkway, Henderson, NV 89015

The locations of these facilities are shown on **Figure 6-1**. All the facilities are located in the BMI complex in unincorporated Clark County. All three of these facilities are also included on the list of Section 313 industries.

6.2.4 Other Industrial Facilities That Contribute a Substantial Pollutant Load

The MS4 permittees have not identified any facilities other than those already identified in the above categories that are contributing a substantial pollutant loading to the municipal storm sewer system. The BMI industrial complex could have the most potential for contributing industrial pollutants to the stormwater system based on the size of the installation, the proximity to Las Vegas Wash, and the types of chemicals and processes used. However, the businesses in this complex have been noted in the previous sections.

The following additional categories of industries were considered for special treatment, but it was determined that special analysis was not warranted.

6.2.4.1 Gas Stations

Gas stations could contribute pollutant loads of hydrocarbons and petrochemicals through spills and washoff of petroleum products, or through leaking pumps, tanks or other equipment. It was determined that gas stations should not be given special treatment for the following reasons:

- Oil, grease, and total petroleum hydrocarbons (TPH) were not found at elevated levels in wet or dry weather sampling performed for the MS4 program;
- These constituents have not been identified as a problem in monitoring for other water quality programs by SNWA and others; and
- Managing runoff from gas stations without addressing runoff from all paved roadways and parking lots at a similar level would impact only a small portion of the potential urban contribution of oil, grease, and TPH and is expected to have a negligible benefit to regional stormwater water quality.

6.2.4.2 Hotel/Casinos

Large hotel/casino developments are unique to Las Vegas Valley, and were considered for special treatment for stormwater quality management. Hotel/casinos could affect stormwater quality through runoff from extensive parking areas, or illicit connections to the stormwater system from kitchens, laundries or other industrial-type activities on the properties. It was determined that hotel/casinos should not be given special treatment for the following reasons:

- Hotel/casino parking areas are expected to be no different in terms of runoff quantity or quality from parking lots at shopping centers, malls, commercial centers or other similar highly urbanized developments that are not individually regulated;

- All new parking areas larger than 5 acres in the County are required to have a sand/oil separator; and

- Illicit connections to the stormwater system are very unlikely because most of the hotel/casino properties are relatively new and any attempted illicit connections would have been caught during building inspections and post-development inspections.

6.2.5 Conclusion

This section completes the requirement to identify industrial facilities subject to Section 313 of SARA Title III, municipal landfills, hazardous waste treatment and disposal facilities, and other industrial facilities determined by the permittees to be potential sources of substantial pollutant loading. The inventory of regulated industrial sites will be used by the permittees in developing their industrial site inspection and management programs.

6.3 INDUSTRIAL FACILITY MONITORING AND CONTROL PROGRAM

The purpose of this section is to describe an industrial facility monitoring and control program as required by the Las Vegas Valley MS4 NPDES permit. This section addresses the MS4 permit requirements in paragraph 4.8 and the SWMP requirements in Section 8.3 and 8.4.

Section 6.2 identifies industrial facilities that will be monitored in Las Vegas Valley. The programs described below apply to these facilities.

6.3.1 City of Las Vegas Program

The following text describes the CLV industrial facility monitoring and control program.

6.3.1.1 Identification of Applicable Facilities

Each January, the CLV's Industrial Waste Section (IWS) will update a list of all MS4 permit Section 4.8-applicable industrial facilities located within the CLV. IWS will identify municipal landfills; hazardous waste treatment, disposal and recovery facilities; and industrial facilities that contribute a substantial pollutant loading to the MS4 primarily using sanitary sewer discharge information. IWS will identify industrial facilities subject to Section 313 of Title III of the SARA using EPA's TRI search page (http://www.epa.gov/enviro/html/tris/tris_query.html), which identifies facilities subject to Section 313. IWS will execute a geography search to identify all Section 313 TRI facilities located within Clark County. IWS will then manually identify facilities located within the CLV from the County list.

6.3.1.2 Inspection of Section 4.8 - Applicable Facilities

IWS will inspect all facilities on the City's Section 4.8-applicable list for compliance with the stormwater-related provisions in Las Vegas Municipal Code (LVMC) 14.17 at least annually. IWS will document each inspection with a **Stormwater Compliance Inspection Form**. A copy of the proposed form is provided in **Appendix F**. IWS will ensure industries execute any required corrective actions through follow-up and/or referrals to other agencies or CLV Divisions.

6.3.1.3 Inspection of Other Industrial Facilities

In addition to the Section 4.8-applicable facilities, IWS will look for compliance with the stormwater-related provisions in LVMC 14.17 during all routine inspections at industrial and commercial facilities that IWS normally inspects for compliance with non-domestic discharges to the sanitary sewer. This includes industries holding Class I, Class II and Temporary Wastewater Contribution Permits from IWS, and also non-permitted facilities. IWS will document each inspection with the same **Stormwater Compliance Inspection Form**. IWS will ensure industries execute any required corrective actions through follow-up and/or referrals to other agencies or CLV Divisions.

6.3.1.4 Stormwater-Related Complaint Calls

IWS will respond to stormwater-related complaint calls associated with industrial or residential activity, when applicable under LVMC 14.17. IWS will document each complaint call action with the same **Stormwater Compliance Inspection Form**. IWS will ensure industries (or residents) execute any required corrective actions through follow-up and/or referrals to other agencies or CLV Divisions.

6.3.1.5 Recordkeeping and Reporting

IWS will file the original **Stormwater Compliance Inspection Form** from each inspection chronologically in a separate stormwater compliance file. IWS will file a copy of each **Stormwater Compliance Inspection Form** that pertains to facilities under permit with IWS in the permittee's file. IWS will summarize significant inspection findings and complaint calls circumstances, and resulting corrective actions, in the semi-annual report to MWH.

6.3.2 City of North Las Vegas Program

The CNLV Utility Department's Environmental Section will perform industrial site inspections. The sections will be divided into two categories: (1) Section 313 facilities; and (2) other commercial/industrial businesses. The CNLV's goal is to perform inspections of all Section 313 facilities each year, and to perform inspections on 50 percent of the other commercial/industrial businesses each year.

Records of inspections will be maintained at the Utilities Department, and a monthly summary of inspections performed may be provided at SQMC meetings.

6.3.3 City of Henderson Program

The COH Department of Utility Services Pretreatment Unit will update the list of all MS4 permit Section 4.8 applicable industrial facilities located within the COH in January of each year. The Department of Utility Services will identify municipal landfills; hazardous waste treatment, disposal and recovery facilities; and industrial facilities that contribute a substantial pollutant loading to the MS4 primarily using sanitary sewer discharge information. The Department of Utility Services will identify industrial facilities subject to Section 313 of Title III of the SARA using EPA's Toxic Release Inventory of Commercial and Industrial Businesses. The COH's goal is to perform inspection of all Section 313 facilities each year, and to perform inspection on 50 percent of the other commercial/industrial businesses each year.

Record of inspection will be maintained at the Department of Utility Services.

Industrial Facilities within the COH currently monitored by the Department of Utility Services:

Good Humor Corp.
1001 Olsen Street

Ocean Spray Cranberries
1301 American Pacific Drive

Additional Industrial Facilities within the COH that will be monitored by the Department of Utility Services to comply with the MS4 permit:

Monierlifetile L.L.C.
430 Eastgate Road

6.3.4 Clark County Program

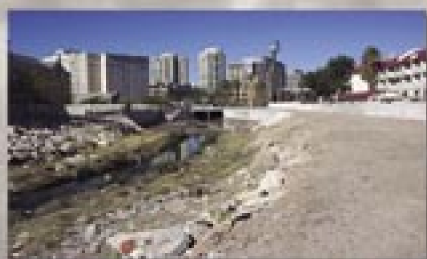
Each January, the CCDAQEM, in cooperation with the CCWRD, will update a list of all applicable industrial facilities covered by Section 8.2 of the Las Vegas Valley SWMP located within the unincorporated Clark County and within the Las Vegas Valley.

The CCWRD will inspect 50 percent of the total number of identified facilities per year. If violations of County permits or ordinances are found, the CCWRD will send an initial notice of violation to the individual company. The CCWRD will re-inspect companies that had identified problems within 60 days of the notice of violation. If problems still occur, the company will be referred to the CCHD or the State of Nevada's Stormwater Program Enforcement Officer for further enforcement action.

A database will be created by the CCWRD to record the inspection data and files will be kept for three years. The CCWRD will summarize significant inspection findings and resulting corrective actions, in a semi-annual report to MWH for incorporation into the annual report.

6.4 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Identify (map and description) all industrial facilities covered under this section of the permit	Completed
• Identify existing industrial site inspection programs	Completed
• Develop program for tracking inspection reports and follow-up activities	Completed
• Prepare inventory of operating and closed municipal waste landfills and treatment, storage and disposal facilities	Completed



Section 7

Construction Site Program

SECTION 7
CONSTRUCTION SITE PROGRAM

7.1 INTRODUCTION

This section describes the Construction Site Program required by paragraph 4.9 of the MS4 permit and described in Section 9 of the SWMP. The program consists of required elements to minimize the impacts of new construction on the quality of downstream receiving waters. The Construction Site Program will provide the permittees with information necessary to enforce their local ordinances prohibiting discharge of pollutants to the MS4 system. This local program complements, but is independent of, the State's construction site permitting program.

7.2 DEVELOPER NOTIFICATION PROGRAM

In paragraph 9.2 of the SWMP, the permittees commit to notifying developers of the requirements of the State's construction site permitting program. This is intended to improve compliance with the NDEP construction site program.

Table 7-1 describes the program procedures each permittee has developed to notify developers, engineers and contractors of the requirements of NDEP's Construction Site Permit Program.

7.3 CONSTRUCTION SITE BMP MANUALS

Section 9.3 of the SMWP requires the permittees to review existing BMP manuals addressing construction practices and recommend modifications to them to be pertinent to local conditions if necessary. The following existing BMP manuals were reviewed and evaluated for their applicability to construction practices in Las Vegas Valley.

- *Truckee Meadows Construction Site Best Management Practices Handbook, 2003*
- *Truckee Meadows Structural Controls Design Manual, 2004*, and
- *State of Nevada Handbook of Best Management Practices, 1994*

The construction site BMP evaluation is presented in **Appendix G**. It is recommended that the *HCDDM* incorporate the suggested BMP modifications during the next update cycle.

7.4 CONSTRUCTION SITE INSPECTION PROGRAM

This section summarizes the proposed inspection component of the Construction Site Program for the Las Vegas Valley MS4 SWMP. A construction site inspection program is required by the MS4 permit to assure that local ordinances are prohibiting discharge of pollutants to the drainage system and are not being violated. Based on Section 9 of the SWMP, the construction site inspection program will consist of two parts: routine inspections and post-storm inspections.

7.4.1 Routine Inspections

Routine inspections of active construction sites will be conducted by or on behalf of the permittees as follows.

- County, CLV, CNLV – The CCDAQEM will conduct construction site inspections in unincorporated Clark County, CLV and CNLV under an Interlocal Agreement with the CCRFCD. The CCDAQEM inspectors will conduct stormwater inspections during their normal air quality inspections. Sites will be visited based on the criteria established by the CCDAQEM for enforcing local air quality ordinances. At present, these criteria consist of inspecting sites that could be violating air quality regulations, based in part on the CCDAQEM's past history with specific contractors and owners and on public complaints. The CCDAQEM currently performs inspections on approximately 4,000 construction sites per year. Air quality inspectors will be trained to observe potential violations of local pollutant discharge ordinances and the State's stormwater permit.
- COH – Public Works Quality Control inspectors will conduct stormwater inspections as part of their regular site visits. COH inspectors visit all

Table 7-1

Summary of Procedures for Notifying Developers of Need for NDEP Construction Permit

Permittee	Procedure
County	Distribute brochure on need for NDEP construction permit
	Standard comment on Grading Permit review letter notifying developer of need for NDEP construction permit
	Standard general condition for construction plans or specifications on Public Works projects assigning the owner or contractor the responsibility for obtaining the NDEP construction permit
	CCDAQEM includes statement on dust permit applications that developer needs to submit a Notice of Intent (NOI) to NDEP for construction permit
CLV	Standard comment on Grading Permit review letter notifying developer of need for NDEP construction permit
	Standard general condition for construction plans or specifications on Public Works projects assigning the owner or contractor the responsibility for obtaining the NDEP construction permit
CNLV	Standard comment on Drainage Study review letter notifying developer of need for NDEP construction permit
	Standard general condition for construction plans or specifications assigning the owner or contractor the responsibility for obtaining the NDEP construction permit
COH	Standard comment on Drainage Study review letter notifying developer of need for NDEP construction permit
	Standard general condition for construction plans or specifications assigning the owner or contractor the responsibility for obtaining the NDEP construction permit

construction sites located in COH right-of-way or where utilities are being installed. Because most construction projects involve some off-site work in public right-of-way and/or utility installation, most sites will be inspected. Many sites receive numerous visits over the course of the construction period; every site will receive at least one visit per year.

Routine stormwater-related inspections of construction sites will consist of the following activities.

- Complete a **Construction Site Inspection Checklist**. An inspection form has been prepared for use by the CCDAQEM inspectors (see **Appendix H**); COH may use this form or develop a form of its own. Inspectors are asked to note any evidence of discharges of stormwater-related pollutants from the construction site to the municipal drainage system. This can be completed with as little as a windshield survey of the downstream boundary of the construction site. It is not expected that photographs will be taken of potential problems at this stage.

- If possible stormwater pollution discharges are found, notify the contractor of the potential problem and provide a handout describing the pertinent local ordinances and the NDEP general construction permit requirements and offering guidance on appropriate measures to follow to prevent future discharges.

- If clear and obvious stormwater pollution discharges are found, provide the contractor with a handout notifying him of the pertinent local ordinances and the NDEP general construction permit requirements and offering guidance on appropriate measures to follow to prevent future discharges, and notify the CCRFCD of the situation within five working days.

- Maintain a record (database) of inspections and complaints, and any follow-up activities required as a result of the inspections. The COH will set up its own database for monitoring inspections and complaints. The CCRFCD or its designee will manage a database of inspections conducted by the CCDAQEM, which will provide inspection summaries on a quarterly basis.

- Provide evidence of the inspection (e.g., copy of **Construction Site Inspection Checklist**, local entity tracking database) to MWH for tracking and documentation purposes.

Drainage system inspections (also known as Wash Walks) will be performed by the permittees two times per year (spring and fall). Inspections cover all major open channel segments in the Las Vegas Valley, and provide information for the Illicit Discharge Detection Program as well as the Construction Site Program. During the routine channel inspections, any evidence of high sediment loads, deposition of construction debris, or other indications of construction site impacts will be noted. Inspections will be documented as part of the Illicit Discharge Detection Program.

7.4.2 Post-Storm Inspections

Post-storm inspections will be conducted at selected construction sites and detention basins after storm events to determine whether illegal discharges may be occurring. Approximately 10 construction sites and five detention basins will be selected for post-storm inspections. The list of selected sites will be updated every six months to account for changes in construction activity.

7.4.2.1 Construction Sites

Construction sites will be selected for inspection by MWH, according to the prioritization process described below.

Criteria

The objective is to inspect those construction sites that have the most potential for contributing sediment to the drainage system. Sediment is the most prevalent pollutant commonly produced by construction sites. The following criteria will be used to select which construction sites are inspected.

Size. Larger sites will be given priority over smaller sites. Large sites will have more potential for contributing significant loads of sediment to the drainage system if BMPs are not properly installed.

Proximity to Existing Channels. Sites that are close to existing channels will be given priority over sites that are far from existing channels. Closer sites will have more potential for generating sediment loads that actually impact the drainage system and downstream water quality.

Duration of Construction. Sites that are scheduled to be under construction for longer periods of time will be given priority over shorter construction projects. Longer construction projects will allow for more consistency in the inspection program from year to year.

Below Existing Detention Basins. Sites below detention basins will be given higher priority than sites for which runoff is controlled by downstream detention basins because they will have more potential to directly impact the drainage system.

Geographic Variety. Sites representing the various geographic areas in Las Vegas Valley will be considered.

Access on Existing Streets. Sites that can be easily accessed on existing streets will be given priority over remote sites that cannot be reached easily in storm conditions. Sediment discharge to paved streets will be easier to observe than sediment discharge to unpaved streets or native areas.

Selection Process

To determine which construction sites disturb at least 1 acre of land, a GIS map of active construction sites with an area of 2 acres or greater, will be prepared. Information will be gathered from the following sources:

- NDEP construction permit database
- Aerial and satellite photography
- Local air quality and grading permit databases

The objective will be to locate construction sites that have potential for post-storm inspections. The result will not necessarily be a complete database of all active construction sites in Las Vegas Valley.

The above criteria will be applied to identify candidate construction sites for post-storm inspections. Then travel routes will be developed from the MWH office (centrally located near Charleston Boulevard and Rancho Drive) to connect a feasible number of construction sites in various parts of the Valley. Sites will have to be visited within 24 hours of the storm event for the inspection to be beneficial. Based on the technical and logistical criteria, approximately 10 sites will be selected for post-storm inspections.

Selected sites will be visited during dry weather conditions to verify directions, determine where the downstream site boundary is located, and determine and photo-document specific locations that should be inspected after a storm event.

7.4.2.2 Detention Basins

Criteria

The objective is to inspect detention basins that are in a position to capture sediment from upstream construction sites, as a measure of the potential contribution of upstream construction activity to the drainage system. Prime candidate detention basins are those facilities that are in the urbanized portion of the Las Vegas Valley downstream of areas of active construction. The ideal detention basin would be one that has a watershed area comprised only of construction sites and already developed land with no undeveloped native landscape; in this situation a significant portion of the sediment accumulated in the detention basin could be assumed to originate from the construction activity. Other sources could include: existing sediment in channels and basins, natural upstream washes, vacant lots, parks, recreational sports fields, school playgrounds, private easements, soft shoulders, and dirt roads.

Selection Process

The GIS map of active construction sites described above will be combined with the stormwater facility inventory map also required by the SWMP to determine candidate detention basins that are downstream of major construction areas. Travel routes will be investigated from the MWH office to the candidate detention basins. The target will be to visit all selected detention basins within 48 hours of the storm event.

Selected sites will be visited during dry weather conditions to verify directions, determine ingress/egress conditions that will likely occur during a storm event, and determine and photo-document specific locations that should be inspected after a storm event.

7.4.2.3 Inspection Protocol

- Track storm location and intensity on the CCRFCD precipitation gage network.
- Determine areas that experienced at least 0.2 inches of rainfall (less rainfall normally generates insignificant runoff rates from small areas unless intensities are very high).
- Determine which construction sites and detention basins identified by the above processes received at least 0.2 inches of rainfall.
- Conduct windshield survey of affected construction sites within 24 hours after the termination of rainfall.
- Conduct windshield survey of affected detention basins within 48 hours after the termination of rainfall.

- Complete the **Post-Storm Construction Site Inspection Checklist** or the **Detention Basin Inspection Checklist** (see **Appendix H**), as appropriate. Forward information related to any observed problems to the appropriate local entity and/or NDEP.

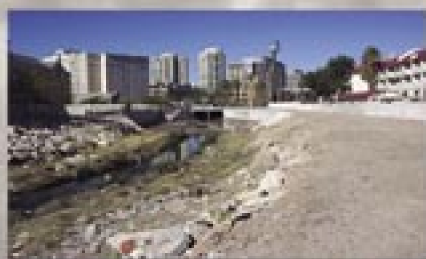
- Update a GIS database of construction sites visited during the post-storm inspection program and the results of the inspection (acceptable/not acceptable). The actual number of post-storm inspections conducted in a permit year will depend on the occurrence of runoff-producing storms at the 10 selected construction sites and five selected detention basins.

7.5 CONTRACTOR EDUCATION AND TRAINING PROGRAM

Section 9.5 of the SWMP describes requirements for developing a contractor education and training program. In compliance with the SWMP, in this first permit year the permittees supported NDEP in conducting local construction site permit program workshops for developers, contractors and engineers. Workshops were held on September 11, 2003. Permittees provided venues for the workshops, and handled local logistics and advertising. In the coming permit year, the permittees will develop printed outreach and education materials for the construction site management program, and will facilitate additional construction site permitting workshops.

7.6 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Develop process for notifying developers in each community of construction site permit programs	Completed
• Develop process for identifying high construction activity areas	Completed
• Develop program for post-storm inspections	Completed
• Review existing BMP manuals and modify for local conditions if necessary	Completed



Section 8

Stormwater Monitoring Program

SECTION 8
STORMWATER MONITORING PROGRAM

8.1 INTRODUCTION

Section 4 of the SWMP and paragraphs 4.4 and 5.1.1 of the MS4 permit describe the requirements of a stormwater monitoring program. This section presents the findings of that program as required for Year 1 of the MS4 permit.

This section is comprised of four subsections: Dry Weather Monitoring, Wet Weather Monitoring, Evaluation of Previously Collected Data, and the Stormwater Management Plan.

8.2 2003-2004 DRY WEATHER MONITORING PROGRAM

8.2.1 Preface

The dry weather sampling program for the MS4 permit has two primary objectives:

1. To target potential illegal or illicit discharges to the municipal storm sewer system (e.g., from industrial activity).
2. To develop a baseline of dry weather surface water quality data against which future changes can be measured and which can be used to compute urban pollutant loading to receiving waters.

During the 2003-2004 permit year, SNWA conducted dry weather sampling for the NPDES stormwater discharge permit.

This subsection summarizes the results of the 2003-2004 dry weather sampling effort and the analysis of the data collected. In addition, the effectiveness of the current program is evaluated with respect to potential changes in coming years.

8.2.2 Comprehensive Sampling

The comprehensive sampling program was designed to gather a wide range of dry weather water quality characterization data for each major outfall, and to build upon the water quality database started in 1991 and to continue it through 2004.

8.2.2.1 Sampling Procedures

Sampling procedures and locations were designed to be consistent with the dry weather field screening program conducted between 1991 and 2003.

The dry weather monitoring program consists of quarterly sampling at the following locations (see **Figure 8-1**):

- Meadows Detention Basin – LVC_2
- Las Vegas Wash at Desert Rose Golf Course – LW12.1
- Flamingo Wash at Nellis Boulevard – FW_0
- Sloan Channel at Charleston Boulevard – SC_1
- Monson Channel at Stephanie Street – MC_2
- Duck Creek at Boulder Highway – DC_1
- Las Vegas Creek at Lena Street – LW12.1
- C-1 Channel at Warm Springs Road (if dry weather flow is found)
- Kerr-McGee Seeps near Pabco Road – LWC6.3
- GCS-5 Seeps (downstream of the demonstration weirs, just above the Lake Las Vegas) – LWC3.7

Quarterly samples were collected in January, April, July and October. Single grab samples were collected at each monitoring site. Standard water chemistry analysis, metals, and pollutant analyses were performed by MWH Laboratories; phosphorus and other nutrient analyses were performed by NEL; bacteria and perchlorate analyses were performed by SNWA.

SNWA prepares an annual report on their sampling program. This section contains information from the second half of SNWA's report for calendar year 2003 and grab sample analysis from the first half of 2004. This report satisfies the requirements for dry weather flow water quality characterization in the NPDES stormwater discharge permit section 5.1.

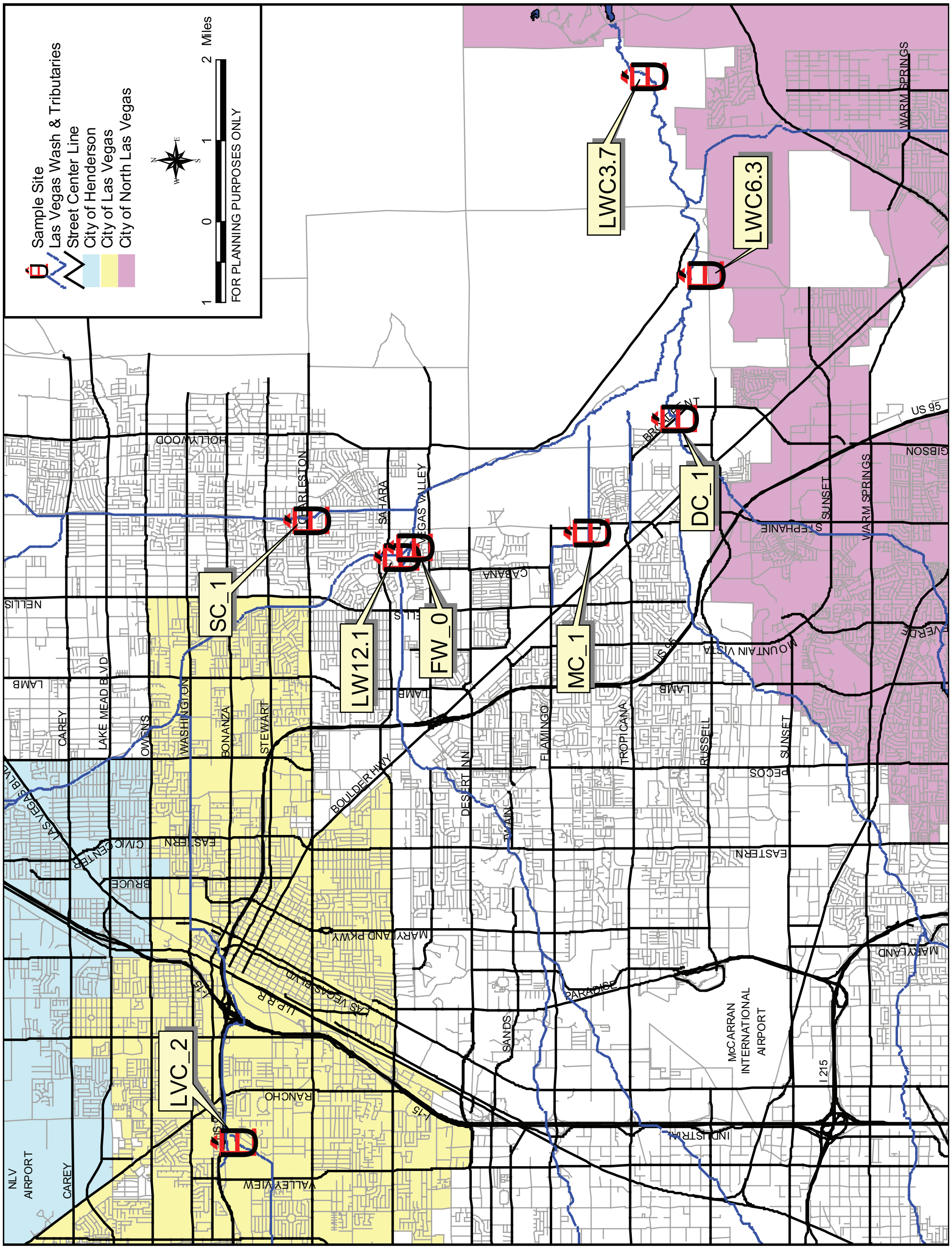


Figure 8-1
Map Showing Sample Locations of Urban Tributary Water Quality Monitoring Program
(Figure Provided by SNWA)

8.2.2.2 Results

Results of the 2003-2004 comprehensive dry weather sampling program are summarized below. The tables show the analytical results of the individual grab samples at all of the sites (except C-1 Channel) in the July 2003, October 2003, January 2004, and April 2004 grab samples. **Table 8-1** is a comprehensive list of all sampling performed in the period of 1991-2004.

The 2003-2004 SNWA dry weather concentrations were qualitatively compared to typical 1991-2000 NPDES dry weather concentrations to discover any general trends, see **Table 8-2**. Dry weather discharges remained similar to those measured in previous years, showing no upward or downward trend. A comparison for common constituents between the dry and weather programs is discussed in the Wet Weather Monitoring subsection.

Total Dissolved Solids (TDS)

For TDS concentrations for 2003-2004, see **Table 8-3**. Total dissolved solids varied widely (1,280 – 6,060 mg/L), depending largely on the contribution of resurfacing shallow groundwater which has a high TDS concentration. The Kerr-McGee Seeps and Duck Creek exhibited the highest TDS concentrations. The 2003-2004 TDS median was 3,050 mg/L which is slightly lower than the overall 1991-2004 average of 3,115 mg/L.

Nutrients

For nutrient concentrations for 2003-2004, see **Table 8-4**. Nitrogen and phosphorous levels remain low to very low. The GCS-5 Seeps had the highest median total phosphate (0.35 mg/L) concentration of 2003-2004. The highest orthophosphate concentration was detected at the Kerr-McGee Seeps (0.055 mg/L). Nitrate concentrations in 2003-2004 ranged from <0.08 to 13.0 mg/L with a median value of 4.5 mg/L. Total nitrogen concentrations ranged from 0.57 to 13.0 mg/L. Levels of nitrates and total nitrogen was highest in the GCS-5 Seeps, which is consistent with the 2002-2003 result.

Metals

For metals concentrations for 2003-2004, see **Table 8-5**. The concentrations of lead were, on average, at a non-detection level (<0.002 mg/L) in the 2003-2004 term, with the highest value (0.023 mg/L) detected at the GCS-5 Seeps.

Total copper concentrations ranged from <0.01 to 0.024 mg/L, with the highest detection at Meadows Detention Basin.

Concentrations of zinc ranged from <0.02 to 0.041 mg/L. The highest detections occurred at the GCS-5 Seeps and Meadows Detention Basin, which is consistent with the results of 2002-2003.

Selenium was not detected in any of the grab samples in the 2003-2004 term with a detection limit of <0.005 mg/L.

Perchlorate

For perchlorate concentrations for 2003-2004, see **Table 8-6**. The concentrations of perchlorate vary greatly between the tributaries and the seeps. At the Kerr-McGee Seeps and GCS-5 Seeps, the perchlorate concentrations in the grab samples were averaged to be 6.52 mg/L and 0.56 mg/L respectively, which is a decrease in the concentrations from 2002-2003. Perchlorate levels in the seeps are significantly higher, up to three orders of magnitude, than in the Las Vegas Valley washes.

Bacteria

For bacteria concentrations for 2003-2004, see **Table 8-6**. Bacteria data exhibited higher median values over the sampling period than in previous years. For fecal coliform, the median of the 2003-2004 data from SNWA is 2,250 MPN/100 mL, while the 1991-2004 median is 625 MPN/100 mL. The SNWA 2003-2004 data did have a few high values at the Las Vegas Creek (94,000 MPN/100 mL and 83,000 MPN/100 mL), Meadows Detention Basin (64,000 MPN/100 mL), and Sloan Channel (36,000 MPN/100 mL). All these high values occurred in the summer and fall 2003 samples. In all cases, 2004 values were significantly lower. These intermittent spikes in bacteria concentration suggest an influence by urban-related factors rather than natural background conditions.

Table 8-1

11 by 17 Pullout

TABLE 8-1

DRY WEATHER MONITORING DATA 1991-2004

Location	Date	Q (cfs)	Temp (Deg C)	Oil & Grease (mg/L)	TSS (mg/L)	TDS (mg/L)	pH *	MBAS (mg/L)	Ortho-Phosphate (mg/L)	Total Phosphate-Phosphorous (mg/L)	NO3-N (mg/L)	NO2-N (mg/L)	NH3-N (mg/L)	TKN (mg/L)	Total Nitrogen (mg/L)	Copper (mg/L)	Chromium (mg/L)	Lead (mg/L)	Mercury (mg/L)	Cadmium (mg/L)	Zinc (mg/L)
Western Tributary at Cheyenne	08/27/91	0.7	25.9	< 3	4	930	8.5	0.07	0.46	0.20	0.72		< 0.05	1.1	1.8	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.022
	04/06/92	1.0				1,350	8.6				2.50					< 0.01					
	09/13/92	1.7	26.2	< 3	6	3,420	8.3	< 0.05	< 0.05	< 0.05	1.80		< 0.05	< 1.0	1.8-2.8	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	03/07/93	4.4	29.1			1,370	8.6				2.70					< 0.01					
	08/23/93	0.9	29.0	< 3	21	1,085	8.4	0.25	< 0.05	< 0.05	0.38		0.13	< 1.0	1.4	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.049
	04/03/94	1.6	8.6			1,260	8.6				1.3					< 0.01					
	08/28/94	6.0	22.4	< 3	18	735	8.3	0.06	< 0.05	< 0.05	0.50		< 0.05	1.5	2.1	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.113
	03/26/95	5.7	10.1			1,340	8.3				2.40					< 0.01					
	08/28/95	2.0	21.9	< 3	4	1,225	7.8	0.07	< 0.05	< 0.05	< 0.40		< 0.05	1.0	1.4	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	09/10/96	0.9	27.3	< 3	22	1,515	8.4	< 0.05	< 0.05	< 0.05	1.10		< 0.05	< 1.0	2.1	< 0.01		< 0.001			< 0.020
	09/24/97	1.5	20.3	< 3	9	1,195	8.5	0.13	0.01	< 0.01	2.60		< 0.05	1.2	3.8	< 0.01		< 0.1			< 0.020
			No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program										No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program								No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program
	Median	**1.6**	**24.1**	**< 3**	**9**	**1,260**	**8.4**	**0.07**	**< 0.05**	**< 0.05**	**1.30**		**< 0.05**	**1.0**	**1.9**	**< 0.01**	**< 0.01**	**< 0.002**	**< 0.0002**	**< 0.005**	**0.020**
	Average	**2.4**	**22.1**	**< DL**	**12**	**1,402**	**8.4**	**0.09**	**0.09**	**0.05**	**1.47**		**< DL**	**< DL**	**2.1**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**	**0.032**
Flamingo at Swenson	06/24/91	0.7	23.5		4	2,500	7.4	< 0.05	< 0.05		9.20		< 0.05	9.4	18.5	< 0.01	< 0.01		< 0.0002	< 0.005	0.025
	07/14/91	0.8	25.6	< 3	9	2,700	7.8	0.07	0.05	0.08	10.00		< 0.05	5.0	14.7	0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	08/26/91	0.7	25.5	< 3	8	2,575	7.8	< 0.05	< 0.05	< 0.05	8.50		< 0.05	< 1.0	9.0	< 0.01	0.014	< 0.002	< 0.0002	< 0.005	0.033
	09/13/92	3.6	26.2	< 3	5	2,730	8.3	0.11	< 0.05	< 0.05	6.65		< 0.05	< 1.0	6.7-7.7	< 0.01	< 0.01	< 0.01	< 0.0002	< 0.005	< 0.020
	08/23/93	1.5	26.2	< 3	12	2,540	8.1	0.07	< 0.05	< 0.05	4.35		0.12	< 1.0	5.4	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	04/03/94	2.6				2,705	8.0				8.20					< 0.01					
	08/28/94	4.0	28.6	< 3	40	2,645	8.1	0.07	0.05	< 0.05	8.90		< 0.05	1.0	10.4	< 0.01	< 0.01	0.015	< 0.0002	< 0.005	0.015
	03/26/95	3.7	21.0			2,800	8.1				8.90					< 0.01					
	08/28/95	2.0	27.7	< 3	7	2,635	8.3	0.06	< 0.05	< 0.05	6.80		< 0.05	< 1.0	7.8	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	09/10/96	2.6	30.4	< 3	12	2,470	8.4	0.08	0.07	0.09	2.90		0.08	1.3	4.2	< 0.01		< 0.001			< 0.020
	09/24/97	9.4	27.2	< 3	16	1,835	8.4	0.13	< 0.01	< 0.01	4.30		< 0.05	0.5	< 5.3	< 0.01		< 0.1			0.021
			No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program										No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program								No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program
	Median	**2.6**	**26.2**	**< 3**	**9**	**2,635**	**8.1**	**0.07**	**< 0.05**	**< 0.05**	**8.20**		**< 0.05**	**< 1.0**	**7.8**	**< 0.01**	**< 0.01**	**< 0.002**	**< 0.0002**	**< 0.005**	**< 0.020**
	Average	**2.9**	**26.2**	**< DL**	**13**	**2,558**	**8.1**	**0.07**	**< DL**	**< DL**	**7.15**		**< DL**	**2.1**	**8.9**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**
Flamingo at Nellis	06/24/91	3.7	22.4	< 3	3	3,400	8.1	< 0.05	< 0.05		3.90		< 0.05			< 0.01	< 0.01		< 0.0002	< 0.005	0.022
	07/14/91	3.9	23.3	< 3	13	3,400	8.2	0.10	< 0.05	< 0.05	3.60		< 0.05	< 1.0	4.3	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	08/26/91	6.2	25.4	< 3	15	3,225	8.3	< 0.05	< 0.05	< 0.05	4.10		< 0.05	< 1.0	4.5	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.025
	04/07/92	9.6				3,310	7.8				4.10					< 0.01					
	09/13/92	12.5	24.0	< 3	13	3,450	8.2	< 0.05	< 0.05	< 0.05	1.40		< 0.05	< 1.0	1.4-2.4	< 0.01	< 0.01	< 0.01	< 0.0002	< 0.005	0.025
	03/07/93	8.3	21.2			3,640	8.7				4.60					< 0.01					
	08/23/93	5.4	29.6	< 3	18	3,270	8.3	0.06	< 0.05	< 0.05	4.10		0.08	< 1.0	5.1	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.088
	04/03/94	5.0	14.5			3,710	8.2				4.45					< 0.01					
	08/28/94	27.0	25.6	< 3	21	3,300	8.4	< 0.05	< 0.05	< 0.05	3.95		< 0.05	< 1.0	5.0	< 0.01	0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	03/26/95	25.0	20.5			3,780	8.4				5.20					0.01					
	08/28/95	18.0	27.0	< 3	8	3,290	8.5	0.07	0.05	< 0.05	3.30		< 0.05	< 1.0	4.3	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020
	09/10/96	7.6	31.0	< 3	25	3,490	8.6	< 0.05	< 0.05	< 0.05	3.00		< 0.05	< 1.0	3.5	< 0.01		< 0.001			< 0.020
	09/24/97	15.3	20.5	< 3	19	1,840	8.3	0.09	0.07	0.05	2.90		< 0.05	1.2	4.1	0.016		< 0.1			< 0.025
			No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program										No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program								No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program
	1/18/01*		9.0			3,470	8.4		0.02	0.02	6.1	< 0.08	< 0.08	0.1	6.2	0.008	0.005				0.017
	4/25/01*	0.4	24.5			3,010	8.4			0.01	3.9	< 0.08	< 0.08	0.1	4.0	0.014	0.002				0.015
	7/30/01*	0.3	26.8			3,250	8.6			0.01	3.6	< 0.08	< 0.08		3.6	0.012	0.002				0.011
	10/24/01*	7.1	14.9			3,400	9.2		0.02	0.02	4.4	< 0.08	< 0.08		4.4	0.009					0.011
	1/23/02*	6.0																			
	4/24/02*	6.2																			
	7/24/02*	5.6	29.2		31.0	3,060	8.4		0.007	0.218	2.9	< 0.08	< 0.08	1.3	2.9	0.003	0.003				0.001
	10/23/02*	6.0	15.0			3,200	8.2		0.024	0.084	4.3	< 0.08	0.17	0.05	4.4	0.005	0.003	0.0006			0.011
	1/22/03*		10.4			3,200	8.1		0.031	0.055	4.4	< 0.08	< 0.08		4.4	0.009	0.002				0.012
	4/23/03*		16.4			2,910	8.3		0.023		4.2	< 0.08	< 0.08		4.2	0.013	0.001				0.015
	7/23/03*		26.1			3,140	7.9		0.006	0.030	3.5		0.04	0.7	4.2	0.013	0.069	< 0.002			0.010
	10/22/03*		17.3			3,210	6.1		0.008	< 0.050	4.9	< 0.08	< 0.05	0.5	5.4	0.005	0.056	< 0.002			< 0.020
	1/21/04*		8.9			3,240	8.2		0.011	< 0.050	5.1	< 0.08	< 0.05	0.4	5.5	< 0.010	0.032	< 0.002			< 0.020
	4/21/04*		14.9			3,100	8.1		0.008	< 0.050	4.1	< 0.08	< 0.05	0.4	4.5	< 0.010	0.031	< 0.002			< 0.020
	Median	**6.2**	**21.8**	**< 3**	**16.5**	**3270**	**8.3**	**< 0.05**	**< 0.03**	**< 0.05**	**4.10**	**0.08**	**< 0.05**	**< 1.00**	**4.39**	**< 0.01**	**< 0.01**	**< 0.002**	**< 0.0002**	**< 0.005**	**0.020**
	Average	**9.0**	**20.8**	**< 1.5**	**15**	**3,316**	**8.2**	**< 0.05**	**< 0.02**	**D 0.04**	**4.0**	**0.04**	**< 0.04**	**< 0.51**	**4.4**	**0.007**	**0.014**	**0.005**	**0.0001**	**0.003**	**0.016**

Location	Date	Silver (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Arsenic (mg/L)	Boron (mg/L)	Cyanide (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Zinc Dissolved (mg/L)	BOD (mg/L)	COD (mg/L)	Apparent Color (ACU)	Turbidity (NTU)	Phenol (mg/L)	Total Petroleum Hydrocarbons (mg/L)	Total Chlorine (mg/L)	Conductance (mmhos)	Fecal Coliform (MPN/100 mL	Fecal Streptococcus (MPN/100 mL)	Total Coliform (MPN/100 mL)	Salmonella (MPN/100 mL	VOC's (# detects)	SOC's (# detects)	Pesticides (# detects)	Herbicides (# detects)
Western Tributary at Cheyenne	08/27/91	< 0.01	< 0.04		< 0.005	0.46	0.006				< 6	16	20	1.2	< 0.01		0.05	1.500	12,500	< 16						
	04/06/92					0.54	< 0.005								< 0.01		0.20		30		500					
	09/13/92	< 0.01	< 0.04		0.024	0.41	< 0.005				< 6	14	18	0.8	< 0.01		0.10	1.230	700	1,050						
	03/07/93					0.54	< 0.005								0.20		< 0.10	15.680	70		1,100					
	08/23/93	< 0.01	< 0.02	< 0.005	< 0.005	0.44	< 0.005				< 6	16	25	9.7	0.20		0.10	1.920	950,024	5,700						
	04/03/94					0.44	0.01								< 0.01		< 0.10	19.860	55		4,650					
	08/28/94	< 0.01	< 0.01	< 0.005	< 0.005	0.25	< 0.005				< 6	22	23	6.0	< 0.01		< 0.01	1.120	2,650	8,100		7				
	03/26/95					0.51	0.006								< 0.01		< 0.10	1.805	1,300	170	9,000					
	08/28/95	< 0.01	< 0.01	< 0.005	< 0.005	0.59	< 0.005				< 6	23	20	0.9	< 0.01		0.28	1.783	1,700	2,550		3.6				
	09/10/96					0.45	< 0.005				< 6	< 10	16	6.1	< 0.01	< 1.0	0.10	1.720	1,750	305		< 2.2			0	0
	09/24/97					0.67	< 0.005				< 6	< 10	20	4.3	< 0.01	< 1.0	0.26	0.032	1,950	1,400		3.7			0	0
														No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program												
	Median	**< 0.01**	**< 0.02**	**< 0.005**	**< 0.005**	**0.46**	**< 0.005**				**< 6**	**16**	**20**	**4.3**	**< 0.01**	**< 1.0**	**0.10**	**1.75**	**1,700**	**1,225**	**2,875**	**3.7**			**0**	**0**
	Average	**< DL**	**< DL**	**< DL**	**0.007**	**0.48**	**< DL**				**< DL**	**14**	**20**	**4.1**	**0.04**	**< DL**	**0.11**	**4.67**	**88,430**	**2,410**	**3,813**	**3.9**			**0**	**0**
Flamingo at Swenson	06/24/91	< 0.01	< 0.04			0.60	< 0.005						10	0.7	< 0.005		0.03	2.700	< 16	< 16						
	07/14/91	< 0.01	< 0.04		< 0.005	0.61	0.006				< 6	15	13	1.2	0.03		0.09	3.500	< 16	< 16						
	08/26/91	< 0.01	< 0.04		0.006	0.70	< 0.005				< 6	11	10	0.9	< 0.01		0.08	3.200	9,000	< 16						
	09/13/92	< 0.01	< 0.04		< 0.005	0.80	< 0.005				< 6	13	10	0.4	< 0.01		0.10	3.420	500	200						
	08/23/93	< 0.01	< 0.02	< 0.015	0.004	0.70	< 0.005				< 6	16	18	3.6	0.10		< 0.10	1.900	300,250	1,875	500					
	04/03/94					0.64	0.005								< 0.01		< 0.10	14.590	190		9,500					
	08/28/94	< 0.01	< 0.01	0.01	< 0.01	0.76	< 0.005				< 6	23	13	12.6	< 0.01		< 0.01	3.190	2,690	1,300		< 2				
	03/26/95					0.76	< 0.005								< 0.01		< 0.10	2.910	500	350	5,000					
	08/28/95	< 0.01	< 0.01	0.0075	< 0.005	0.75	0.006				< 6	13.5	12.5	0.6	< 0.01		0.03	2.920	2,900	1,250		< 2.2				
	09/10/96					0.58	< 0.005				< 6	10	18	2.7	< 0.01	< 1.0	0.05	2.650	4,700	335		2			0	0
	09/24/97					0.68	< 0.005				< 6	< 10	7.5	1.7	< 0.01	< 1.0	0.25	0.058	900	230		< 2.2			0	0
														No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program												
	Median	**< 0.01**	**< 0.04**	**0.010**	**< 0.005**	**0.70**	**< 0.005**				**< 6**	**13**	**13**	**1.2**	**< 0.01**	**< 1.0**	**0.09**	**2.920**	**900**	**283**	**5,000**	**2.10**			**0**	**0**
	Average	**< DL**	**< DL**	**0.008**	**< DL**	**0.69**	**< DL**				**< DL**	**13**	**12**	**2.7**	**0.02**	**< DL**	**0.07**	**3.731**	**29,241**	**556**	**5,000**	**< DL**			**0**	**0**
Flamingo at Nellis	06/24/91	< 0.01	< 0.04			1.20	< 0.005						5	0.8	< 0.005		0.04	3.900	< 16	< 16						
	07/14/91	< 0.01	< 0.04		< 0.005	1.20	< 0.005				< 6	10	15	5.2	< 0.005		0.08	3.700	< 16	< 16						
	08/26/91	< 0.01	< 0.04		< 0.005	1.20	< 0.005				< 6	< 10	13	5.8	< 0.01		0.05	3.900	1,600	< 16						
	04/07/92					1.20	< 0.005								< 0.01		0.04		2,400		8,000					
	09/13/92	< 0.01	< 0.04		0.008	0.09	< 0.005				< 6	13	10	2.0	< 0.01		0.10	3.400	550	190						
	03/07/93					1.20	< 0.005								0.10		< 0.10	1.310	14		300					
	08/23/93	< 0.01	< 0.02	< 0.02	0.006	1.15	< 0.005				< 6	11	15	6.3	< 0.01		< 0.10	5.650	12,100	85						
	04/03/94					1.25	< 0.005								< 0.01		< 0.10	10.650	1,220		3,150					
	08/28/94	< 0.01	< 0.01	0.02	< 0.025	1.10	< 0.005				< 6	16	15	1.2	< 0.01		< 0.01	3.875	11,115	1,800		10				
	03/26/95					1.30	< 0.005								< 0.01		< 0.10	4.210	30	50	1,600					
	08/28/95	< 0.01	< 0.01	0.0135	< 0.005	1.25	< 0.005				< 6	19	18	0.4	< 0.01		0.23	3.760	650	100		2.1				
	09/10/96					1.10	< 0.005				< 6	< 10	13	1.0	< 0.01	< 1.0	0.23	6.750	1,900	150		< 2.2			0	0
	09/24/97					0.75	< 0.005				< 6	11.5	15	5.7	< 0.01	< 1.0	0.26	0.063	6,150	2,615		< 2.2			0	0
														No Sample Taken for 1998, 1999, or 2000 Dry Weather Monitoring Program												
	1/18/01*		0.016		0.006									1.8				4.0	17.0							
	4/25/01*		0.014		0.008									2.0				3.5	60.0							
	7/30/01*		0.015		0.006									1.1				3.8	250.0							
	10/24/01*		0.008		0.009									2.6				3.8	617.0							
	1/23/02*																									
	4/24/02*																									
	7/24/02*		0.016	0.016	0.009									2.2				3.5	300.0						0	0
	10/23/02*		0.015	0.014	0.007									2.2				3.7	670.0						0	1
	1/22/03*		0.010	0.015	0.005									1.1				3.6	110.0						0	0
	4/23/03*		0.007	0.015	0.005									3.2				3.5	< 400						0	0
	7/23/03*		0.009	< 0.005	0.006									1.4				3.7	4800.0						0	0
	10/22/03*		0.019	< 0.005	0.005									0.7				3.8	430.0						0	0
	1/21/04*		< 0.01	< 0.005	0.007									1.3				3.8	< 200.0						0	0
	4/21/04*		< 0.01	< 0.005	0.005									1.2				3.6	450.0						0	0
	Median	**< 0.01**	**< 0.015**	**0.014**	**0.006**	**1.20**	**< 0.005**				**< 6**	**11**	**15**	**1.8**	**< 0.01**	**< 1.0**	**0.10**	**3.8**	**450**	**93**	**2,375**	**2.2**			**0**	**0**
	Average	**0.005**	**0.013**	**0.010**	**0.006**	**1.08**	**0.003**				**3**	**11**	**13**	**2.3**	**0.01**	**0.5**	**0.10**	**3.97**	**1830**	**501**	**3263**	**4**			**0**	**0**

Notes:
(1) In cases where measured constituant concentrations were less than detection limits, 1/2 of the detection limit was used to compute the average concentration.
When this approach resulted in a computed average value which was less than the detection limit, the average value was reported as "<DL".
(2) Discharge values for Flamingo at Nellis taken from USGS streamgage records, average daily flow, for 8/27/91 - 8/28/95
* Sample was taken by SNWA

TABLE 8-1
(continued)

Location	Date	Q (cfs)	Temp (Deg C)	Oil & Grease (mg/L)	TSS (mg/L)	TDS (mg/L)	pH *	MBAS (mg/L)	Ortho Phosphate (mg/L)	Total Phosphate-Phosphorous (mg/L)	NO3-N (mg/L)	NO2-N (mg/L)	NH3-N (mg/L)	TKN (mg/L)	Total Nitrogen (mg/L)	Copper (mg/L)	Chromium (mg/L)	Lead (mg/L)	Mercury (mg/L)	Cadmium (mg/L)	Zinc (mg/L)	Silver (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Arsenic (mg/L)	Boron (mg/L)	Cyanide (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Zinc Dissolved (mg/L)	BOD (mg/L)	COD (mg/L)	Apparent Color (ACU)	Turbidity (NTU)	Phenol (mg/L)	Total Petroleum Hydrocarbons (mg/L)	Total Chlorine (mg/L)	Conductance (mmhos)	Fecal Coliform (MPN/100 mL	Fecal Streptococcus (MPN/100 mL)	Total Coliform (MPN/100 mL)	Salmonella (MPN/100 mL	VOC's (# detects)	SOC's (# detects)	Pesticides (# detects)	Herbicides (# detects)
Duck Creek	06/23/91	0.8	22.0	< 3	20	6,700	8.2	< 0.05	< 0.05	< 0.01	4.20		< 0.05	< 1.0	5.2	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.030	< 0.01	< 0.04		0.044	3.40	< 0.005				< 6	24	13	3.9	< 0.005		0.04	7.600	< 16	< 16						
at Russell	08/26/91																																						1,400							
or Patrick	09/13/92	9.8	24.7	< 3	7	3,370	8.3	< 0.05	< 0.05	< 0.05	1.70		< 0.05	< 1.0	1.7-2.7	< 0.01	< 0.01	< 0.01	< 0.0002	< 0.005	< 0.020	< 0.01	< 0.04		0.026	1.70	< 0.005				< 6	17	15	1.2	< 0.01		< 0.10	7.100	800	3,300						
or Sunset	08/23/93	3.3	24.2	< 3	15	5,710	8.2	0.06	< 0.05	< 0.05	3.20		< 0.05	< 1.0	4.2	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.026	< 0.01	< 0.02	0.021	0.051	3.00	< 0.005				< 6	16	13	1.8	0.15		< 0.10		235	2,600						
	04/03/94	4.4				5,865	8.2				3.90					< 0.01										2.70	0.0065								< 0.01		< 0.10		125		1,500					
	08/28/94	2.0	22.3	< 3	31	5,375	8.0	< 0.05	< 0.05	< 0.05	8.90		< 0.05	1.0	9.9	< 0.01	0.013	< 0.002	< 0.0002	< 0.005	< 0.020	0.011	0.01	0.046	0.041	2.90	0.008				< 6	23	15	0.9	< 0.01		0.01	6.900	550	1,300		5				
	03/26/95	3.4	19.1			6,210	7.9				11.00					< 0.01										3.00	< 0.005								< 0.01		< 0.10	6.300	2,400	1,700	5,000					
	08/28/95	3.0	23.1	< 3	15	5,815	8.2	< 0.05	0.055	< 0.05	9.70		< 0.05	< 1.0	10.7	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.024	< 0.01	< 0.01	0.0455	0.03	3.20	0.005				< 6	14	5	0.7	< 0.01		0.16	6.320	260	950		7				
	09/10/96	2.2	27.9	< 3	14	4,490	8.1	< 0.05	< 0.05	< 0.05	8.70		< 0.05	< 1.0	9.2	< 0.01		< 0.001			< 0.020					3.00	< 0.005				< 6	11	13	2.3	< 0.01	< 1.0	0.08	6.295	650	1,250		< 2.2			0	0
	09/24/97	4.1	24.4	< 3	27	4,185	8.1	0.09	0.01	0.05	8.90		< 0.05	1.3	10.2	< 0.01		< 0.1			< 0.020					2.70	< 0.005				< 6	18.5	7.5	2.8	< 0.01	< 1.0	0.24	0.048	665	1,350		< 2.2			0	1
	09/24/98	6.6		< 3	17	3,510				< 0.02	7.80	< 0.10	< 0.05	0.7	8.5	0.01		< 0.1			< 0.020					2.60		0.018	< 0.10	< 0.02									210	1,000		< 2.2	0	0	0	0
	11/04/99	5.1		< 3	11	3,540				< 0.02	6.41	< 0.20	< 0.05	< 0.2	6.4	< 0.01		< 0.1			< 0.020					2.50		< 0.01	< 0.10	< 0.02									50	240			0	0	0	0
	11/05/99	5.1		< 3	26	2,620				< 0.02	6.26	< 0.20	< 0.05	0.4	6.7	< 0.01		< 0.1			< 0.020					2.50		< 0.01	< 0.10	< 0.02									110	80			0	0	0	0
	10/03/00	3.3		4.5	< 10	4,920				0.02	9.20	< 2.00	< 0.05	1.7	10.90	< 0.01		< 0.1			< 0.020					2.80		0.01	0.10	0.02									50	210			0	0	0	0
	10/04/00	3.3		< 3	13	4,920				0.02	8.52	< 2.00	0.083	< 0.2	8.52	< 0.01		< 0.1			< 0.020					2.80		< 0.01	< 0.10	< 0.02									500	5,000			0	0	0	0
	10/17/00*																																						280	300						
	12/18/00*	2.5		< 3	< 10	4,780				7.70	10.30	< 0.50	< 0.05	0.7	10.95	< 0.01		< 0.1			< 0.020					2.50		< 0.01	< 0.10	< 0.02									50	300			1	1	0	0
	1/18/01*		9.0			5,060	8.2		0.013	0.12	6.10	< 0.08	< 0.08	0.3	6.10	0.013	0.0026	0.0006			0.022		0.028		0.051									13.8				6.120	93							
	4/25/01*		21.0			5,140	8.3			0.02	4.69	< 0.08	< 0.08	0.2	4.69	0.017	0.002				0.019		0.022		0.052									2.4				6.020	0							
	7/30/01*	5.3	25.9			5,160	8.1			0.02	4.24	< 0.08	< 0.08		4.24	0.014	0.0018				0.013		0.022		0.054									1.4				6.070	233							
	10/24/01*	6.6	18.7			5,050	8.5		0.030	0.02	5.43	< 0.08	< 0.08		5.43	0.012									0.041									0.5				6.010	337,503							
	1/23/02*	6.5																																												
	4/24/02*	5.1																																												
	7/24/02*	5.5	26.8			5,020	8.1		0.02		3.89	< 0.08	< 0.08	0.9	3.9								0.03	0.0236	0.043									1.3				5.820	1,440						0	0
	10/23/02*	6.2	20.9			5,140	8.2		0.02	0.03	5.39	< 0.08	0.26	0.7	5.7	0.0034	0.0028				0.006	< 0.01	0.021	0.0233	0.055									1.0				6.080	2,850						0	0
	1/22/03*		10.4			5,150	7.9	0.06	0.04	0.05	5.77	< 0.08	< 0.08		5.8	0.0067	0.0018				0.008		0.014	0.023	0.05									5.7				5.790	80						0	0
	4/23/03*		4.6		29	5,000	7.9		0.02		5.28	< 0.08	< 0.08		5.3	0.0081	0.0012				0.006	< 0.01	0.011	0.0224	0.046									12.7				6.130							0	0
	7/23/03*		25.7			5,220	7.9		0.01		4.90		< 0.05	0.8	5.7	0.0028	0.0011	< 0.002			< 0.020		0.013	< 0.005	0.051									1.8				6.000	5,100						0	0
	Median	**4.4**	**22.3**	**< 3**	**15**	**5,055**	**8.1**	**< 0.05**	**< 0.03**	**< 0.03**	**5.9**	**< 0.08**	**< 0.05**	**< 0.9**	**5.9**	**< 0.01**	**< 0.00**	**< 0.010**	**< 0.0002**	**< 0.005**	**< 0.020**	**< 0.01**	**< 0.02**	**0.023**	**0.048**	**2.80**	**< 0.005**	**0.010**	**< 0.10**	**< 0.020**	**< 6**	**17**	**13**	**1.8**	**< 0.01**	**< 1.0**	**< 0.10**	**6.100**	**260**	**1,000**	**3,250**	**2**	**0**	**0**	**0**	**0**
	Average	**4.5**	**20.6**	**< 1.5**	**17.7**	**4914**	**8.1**	**< 0.04**	**< 0.02**	**0.45**	**6.31**	**0.14**	**0.04**	**0.6**	**6.9**	**0.007**	**0.004**	**0.022**	**0.0001**	**0.003**	**0.013**	**0.006**	**0.017**	**0.026**	**0.045**	**2.75**	**0.004**	**0.008**	**0.050**	**0.010**	**3**	**18**	**12**	**3.4**	**0.021**	**0.500**	**0.081**	**5.913**	**14,816**	**1,384**	**3,250**	**3**	**0.17**	**0.17**	**0.00**	**0.13**
Duck Creek	06/23/91	1.3	17.7	< 3	19	5,800	8.3	< 0.05	< 0.05	< 0.25	0.90		< 0.05	< 1.0	1.9	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.026	< 0.01	< 0.04		0.047	2.70	< 0.005				< 6	9	8	2.6	0.005		0.03	6.600	< 16	< 16						
at Callahan	08/26/91																																						2,300							
or Broadbent	04/06/92	5.5				6,450	8.0				2.80					< 0.01										2.80	< 0.005								< 0.01		0.20		500		1,700					
	09/13/92	1.6	25.6	< 3	84	6,030	8.0	< 0.05	< 0.05	0.07	6.80		0.07	< 1.0	6.8-7.8	< 0.01	< 0.01	< 0.01	< 0.0002	< 0.005	0.030	< 0.01	< 0.04		0.062	3.00	< 0.005				< 6	19	13	38.0	< 0.01		< 0.10	7.400	760	1,050						
	03/07/93	0.7	22.2			5,760	7.6				17.00					< 0.01										3.00	< 0.005								< 0.01		< 0.10	5.900	4		500					
	08/23/93	1.4	22.2	< 3	26	5,570	8.0	< 0.05	< 0.05	< 0.05	9.90		< 0.05	< 1.0	10.9	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.038	< 0.01	< 0.02	0.07	0.05	3.10	< 0.005				< 6	20	10	3.2	0.10		< 0.10		150	20,500						
	04/03/94	2.2	15.8			4,255	7.9				9.90					< 0.01										3.05	< 0.005								0.10		< 0.10	5.900	110		6,650					
	08/28/94	3.0	23.5	< 3	31	5,255	8.1	< 0.05	< 0.05	< 0.05	4.00		< 0.05	< 1.0	5.0	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020	< 0.01	< 0.01	< 0.025	0.045	2.80	0.005				< 6	22	15	2.4	< 0.01		< 0.01	6.800	650	5,500		< 2				
	03/26/95	7.0	18.9			6,760	7.9				4.00					0.017										2.60	0.005								< 0.01		< 0.10	6.820	500	500	16,000					
	08/28/95	5.0	24.8	< 3	7	5,335	8.2	< 0.05	< 0.05	< 0.05	3.80		< 0.05	< 1.0	4.8	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	< 0.020	< 0.01	< 0.01	0.019	0.035	2.90	0.0065				< 6	17.5	10	0.4	< 0.01		0.08	6.210	950	1,800		3				
	09/10/96		27.4	< 3	16	5,470	8.3	< 0.05	< 0.05	< 0.05	4.10		< 0.05	< 1.0	4.6	< 0.01		< 0.001			< 0.020					2.85	< 0.005				< 6	< 10	13	2.5	< 0.01	< 1.0	0.08	6.055	1,100	327		< 2.2			0	0
	09/24/97	13.2	25.2	< 3	28	4,235	8.2	0.10	0.01	0.05	4.90		< 0.05	1.2	6.6	< 0.01		< 0.1			< 0.020					2.40	< 0.005				< 6	15.5	10	2.4	< 0.01	< 1.0	0.35	0.055	500	650		< 2.2			0	1
	09/24/98	7.5		< 3	47	3,750				< 0.02	4.70	< 0.10	< 0.05	1.0	5.6	< 0.01		0.11			< 0.020					2.20		< 0.01	0.1	< 0.02									370	600		< 2.2	0	0	0	0
	11/04/99	11.1		< 3	10	3,240				< 0.02	9.60	< 0.20	< 0.05	< 0.2	9.6	< 0.01		< 0.1			< 0.020					2.70		< 0.01	< 0.1	< 0.02									300	240			0	0	0	0
	11/05/99	11.1		< 3	27	2,400				< 0.02	9.90	< 0.20	< 0.05	0.4	10.3	< 0.01		< 0.1			< 0.020					2.50		< 0.01	< 0.1	< 0.02									700	110			0	0	0	0
	10/03/00	20.0		< 3	< 10	4,930				< 0.02	5.94	< 2.00	< 0.05	0.3	6.3	< 0.01		< 0.1			< 0.020					2.50		< 0.01	< 0.1	< 0.02									500	500			0	0	0	0
	10/17/00			< 3	12	5,020				< 0.02	5.86	< 1.00	0.073	1.0	6.9	< 0.01		< 0.1			< 0.020					2.50		< 0.01	< 0.1	< 0.02									300	24,000			0	0	0	0
	12/18/00	18.1		< 3	< 10	5,070				4.90	6.58	< 0.50	< 0.05	0.7	7.3	< 0.01		< 0.1			< 0.020					2.40		< 0.01	< 0.1	< 0.02									80	500			0	0	0	0
	Median	**5.5**	**22.9**	**< 3**	**19**	**5,255**	**8.0**	**< 0.05**	**< 0.05**	**< 0.05**	**5.86**	**< 0.35**	**< 0.05**	**< 1.0**	**6.6**	**< 0.01**	**< 0.01**	**< 0.100**	**< 0.0002**	**< 0.005**	**< 0.020**	**< 0.01**	**< 0.02**	**0.025**	**0.047**	**2.70**	**< 0.005**	**< 0.01**	**< 0.10**	**< 0.02**	**< 6**	**18**	**10**	**2.5**	**< 0.01**	**< 1.0**	**< 0.10**	**6.210**	**500**	**550**	**4,175**	**2.2**	**0**	**0**	**0**	**0**
	Average	**7.2**	**22.3**	**< DL**	**24**	**5019**	**8.0**	**< DL**	**< DL**	**0.41**	**6.51**	**< DL**	**< DL**	**< DL**	**6.63**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**	**0.01**	**0.034**	**0.048**	**2.71**	**< DL**	**< DL**	**< DL**	**< DL**	**< DL**	**15**	**11**	**7**	**0.02**	**< DL**	**< DL**	**5.749**	**543**	**4020**	**6,213**	**< DL**	**0**	**0**	**0**	**0.13**
Las Vegas Creek	07/14/91	1.1	27.0	3	10	1,450	8.7	0.08	0.46	0.36	0.85		< 0.05	1.7	2.5	< 0.01	< 0.01	0.005	< 0.0002	< 0.005	0.023	< 0.01	< 0.04		< 0.005	0.61	< 0.005				6	35	35	2.3	< 0.005		0.07	2.100	< 16	< 16						
	08/27/91	0.8	23.3	< 3	4	1,420	8.7	0.13	0.13	0.15	1.30		< 0.05	< 1.0	1.5	< 0.01	< 0.01	0.002	< 0.0002	< 0.005	0.029	< 0.01	< 0.04		< 0.005	0.65	0.005				< 6	19	30	0.7	< 0.01		0.11	2.100	800	< 16						
	04/06/92	0.8				2,110	8.3				4.80					< 0.01										0.76	< 0.005								< 0.01		0.25		1,300		13,000					
	09/13/92	2.1	28.1	< 3	8	1,640	8.5	0.05	0.11	0.08	2.10		0.51	< 1.0	2.1-3.1	0.01	< 0.01	< 0.01	< 0.0002	< 0.005	0.022	< 0.01	< 0.04		< 0.005	0.91	< 0.005				< 6	22	23	2.7	< 0.01		< 0.10	3.180	4,650	1,650						
	03/07/93	14.8	23.4			1,660	8.5				3.80					< 0.01										0.58	< 0.005								0.10		0.10	7.160	70		1,300					
	08/23/93	3.2	26.1	< 3	13	1,275	8.6	0.22	< 0.05	0.06	1.50		0.07	< 1.0	2.5	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.093	< 0.01	< 0.02	< 0.015	< 0.005	0.46	< 0.005				< 6	22	25	2.1	0.10		< 0.10		6,650	1,550						
	04/03/94	1.1	15.8			2,030	8.1				1.80					< 0.01										0.61	< 0.005								< 0.01		< 0.10	9.320	425		10,500					
	08/28/94	1.0	23.9	< 3	61	1,540	8.3	0.07	0.13	0.10	< 0.50		0.49	3.0	3.5	< 0.01	< 0.01	0.003	< 0.0002	< 0.005	0.035	< 0.01	< 0.01	< 0.005	< 0.005	0.53	< 0.005				< 6	41	28	12.4	< 0.01		< 0.01	2.160	2,300	3,150		5				
	03/26/95	0.9	16.2			1,790	8.4				3.00					< 0.01										0.65	< 0.005								< 0.01		0.10	0.682	230	170	5,000					
	08/28/95	3.0	25.4	< 3	< 4	1,435	8.5	0.08	0.07	0.09	0.75		< 0.05	1.1	1.9	< 0.01	< 0.01	< 0.002	< 0.0002	< 0.005	0.024	< 0.01	< 0.01	< 0.005	< 0.005	0.59	< 0.005				< 6	29	25	1.3	< 0.01		0.08	1.970	1,550	3,150		4.1				
	09/10/96	2.9	27.4	< 3	9	1,565	8.7	0.07	0.06	0.09	1.00		< 0.05	< 1.0	1.5	< 0.01		< 0.001			0.027					0.41	< 0.005				< 6	17	21	4.4	< 0.01	< 1.1	0.08	1.924	6,650	1,500		< 2.2			0	0
	09/24/97	1.4	25.2	< 3	27	1,385	8.2	0.13	0.1	0.08	1.30		0.1	1.8	3.1	0.016		< 0.1			0.030					0.53	< 0.005				< 6	14	20	7.1	< 0.01	< 1.0	0.15	0.051	155,500	27,500		3.7			0	0
	09/24/98	8.0		< 3	179	1,430				0.06	1.90	< 0.10	< 0.05	0.5	2.4	< 0.01		< 0.1			0.049					0.40		0.01	< 0.1	< 0.02									3,200	1,800		<2.2	1	0	0	0
	11/04/99	2.0		< 3	6	1,100				0.04	1.86	< 0.20	< 0.05	< 0.2	1.9	< 0.01		< 0.1			< 0.020					0.46		< 0.01	< 0.1	< 0.02									110	2,300			0	0	0	0
	11/05/99	4.3		< 3	12	660				0.08	1.54	< 0.20	< 0.05	0.28	1.8	< 0.01		< 0.1			0.021					0.39		< 0.01	< 0.1	< 0.02									170	1,700			1	0	0	0
	10/03/00	2.2		< 3	< 10	1,870				0.16	3.65	< 2.00	< 0.05	0.49	4.1	< 0.01		< 0.1			0.024					0.62		< 0.01	< 0.1	0.024									3,000	3,000			0	0	0	0
	10/04/00	2.2		< 3	66	1,960				0.15	2.91	< 2.00	< 0.05	0.43	3.3	0.016		< 0.1			0.027					0.65		< 0.01	< 0.1	< 0.02									300	9,000			0	0	0	0
	10/17/00*																																						2,400	5,000						
	12/18/00*	1.1		< 3	< 10	2,070				0.04	3.58	< 0.50	< 0.05	0.51	4.1	< 0.01		< 0.1			< 0.020					0.63		< 0.01	< 0.1	< 0.02									28	900			0	0	0	0
	1/18/01*		10.5			3,210	8.4		0.023	0.03	4.71	< 0.08	< 0.08	0.40	4.7	0.01	0.0032	0.0007			0.019		0.013		0.0044									7.9				3.810	507							
	4/25/01*		23.7			3,200	8.4			0.01	3.64	0.12	< 0.08	0.50	3.8	0.014	0.0025				0.021		0.01		0.0067									2.3				9.740	107							
	7/30/01*	2.2	29.0			3,200	8.6			0.03	1.97	0.18	< 0.08		2.2	0.01	0.0019				0.013		0.011		0.0062									5.0				9.780	2,700							
	10/24/01*	3.1	18.1			3,230	9.2		0.03	0.06	2.26	< 0.08	< 0.08		2.3	0.012	0.002	0.0011			0.026		0.008		0.0072									1.3				2.280	1,667							
	1/23/02*	2.9																																												
	4/24/02*	3.4																																												
	7/24/02*	3.3	29.2			2,800	8.7	0.06	0.018	0.02	2.46	< 0.08	< 0.08	2.60	2.5	0.0038	0.0024	0.0006			0.012		0.011	0.0104										1.8				3.310	2,180						0	0
	10/23/02*	2.7	13.9			3,130	8.3	0.05	0.021	0.03	3.45	< 0.08	0.17	1.20	3.6	0.003	0.0027	0.0007			0.012		0.011	0.016	0.0057									2.1				3.740	1,200						0	0
	1/22/03*		10.7			2,990	8.4		0.032	0.05	3.29	< 0.08	< 0.08		3.3	0.0054	0.0018				0.013		0.007	0.011	0.0047									2.4				3.400	260						0	0
	4/23/03*		19.0			3,210	8.6		0.013	0.01	3.17	< 0.08	< 0.08		3.2	0.0044	0.0011				0.006		0.006	0.0114	0.0046									1.6				3.880	240						0	0
	7/23/03*		26.7			2,940	8.1		0.007	0.09	1.90		0.038	0.92	2.8		0.013	0.001			0.023		0.007	< 0.005	0.0062									2.7				3.590	83,000						0	0
	10/22/03*		16.4			2,930	8.0		0.008	0.03	3.30	< 0.08	< 0.05	0.74	4.0		0.004	0.0011			0.015		0.014	< 0.005	0.0065									12.0				3.500	94,000						0	0
	1/21/04*		7.2			3,050	8.3		0.015	< 0.02	4.20	< 0.08	< 0.05	0.59	4.8		< 0.002	< 0.001			< 0.020		< 0.01	< 0.005	0.0069									2.2				3.580	< 200						0	0
	4/21/04*		15.5			3,490	8.1		0.01	0.01	3.30	< 0.08	< 0.05	0.48	3.8		< 0.002	< 0.001			< 0.020		< 0.01	< 0.005	0.0075									1.1				3.980	547						0	0
	Median	**2.2**	**23.4**	**< 3**	**10**	**1,995**	**8.4**	**0.07**	**0.03**	**0.06**	**2.36**	**< 0.08**	**0.05**	**< 0.83**	**3.1**	**< 0.01**	**< 0.00**	**< 0.002**	**< 0.0002**	**< 0.005**	**0.022**	**< 0.01**	**< 0.01**	**< 0.005**	**< 0.005**	**0.60**	**< 0.005**	**< 0.01**	**< 0.10**	**< 0.02**	**< 6**	**22**	**25**	**2.3**	**< 0.01**	**< 1.1**	**0.10**	**3.450**	**1,200**	**1,750**	**7,750**	**3.9**	**0**	**0**	**0**	**0**
	Average	**2.8**	**20.0**	**1.5**	**38**	**2309**	**8.4**	**0.10**	**0.04**	**0.06**	**2.46**	**0.18**	**0.06**	**0.90**	**3.04**	**0.01**	**0.003**	**0.017**	**0.0001**	**0.003**	**0.024**	**0.005**	**0.009**	**0.006**	**0.005**	**0.525**	**0.003**	**0.006**	**0.050**	**0.013**	**3**	**25**	**24**	**4.1**	**0.019**	**0.525**	**0.074**	**3.928**	**14,760**	**4,985**	**7,750**	**3.5**	**0.4**	**0**	**0**	**0**

Notes:
(1) In cases where measured constituant concentrations were less than detection limits, 1/2 of the detection limit was used to compute the average concentration.
When this approach resulted in a computed average value which was less than the detection limit, the average value was reported as "<DL".
(2) Discharge values for Flamingo at Nellis taken from USGS streamgage records, average daily flow, for 8/27/91 - 8/28/95
* Sample was taken by SNWA

TABLE 8-1
(continued)

Location	Date	Q (cfs)	Temp (Deg C)	Oil & Grease (mg/L)	TSS (mg/L)	TDS (mg/L)	pH *	MBAS (mg/L)	Ortho Phosphate (mg/L)	Total Phosphate-Phosphorous (mg/L)	NO3-N (mg/L)	NO2-N (mg/L)	NH3-N (mg/L)	TKN (mg/L)	Total Nitrogen (mg/L)
Las Vegas Wash	09/24/97	42.5	25.2	< 3	16	2,395	8.4	0.07	< 0.01	0.01	4.00		< 0.05	1.1	5.1
	09/23/98	54.1		< 3	55	2,280				0.02	5.70	< 0.10	< 0.05	1.7	7.3
	11/04/99	10.0		< 3	26	1,880				0.04	4.47	< 0.20	< 0.05	< 0.2	4.5
	11/05/99	10.0		< 3	39	1,340				< 0.02	4.65	< 0.20	< 0.05	0.6	5.3
	10/03/00	18.4		< 3	< 10	3,700				< 0.02	5.45	< 2.00	< 0.05	0.3	5.7
	10/04/00	18.4		< 3	< 10	3,600				< 0.02	4.42	< 2.00	< 0.05	0.4	4.9
	12/18/00	31.6		< 3	< 10	3,570				< 0.02	5.31	< 0.50	< 0.05	0.4	5.7
	Median	**18.4**	**25.2**	**< 3**	**16**	**2,395**	**8.4**	**0.07**	**< 0.01**	**0.02**	**4.65**	**< 0.35**	**< 0.05**	**0.4**	**5.3**
	Average	**26.4**	**25.2**	**< DL**	**22**	**2,681**	**8.4**	**0.07**	**< DL**	**< DL**	**4.86**	**< DL**	**< DL**	**0.67**	**5.5**
Sloan Channel	09/23/98	1.0		< 3	23	1,220				0.04	1.10	< 0.10	< 0.05	2.2	3.3
			No Sample Taken for 1999 Dry Weather Monitoring Program								No Sample Taken for 1999 Dry Weather Monitoring Program				
	10/03/00	0.01		< 3	13	760				0.15	< 1.00	< 1	< 0.05	1.2	1.2
	10/04/00	0.01		< 3	12	750				0.12	< 0.50	< 10	< 0.05	1.3	1.3
	10/17/00*	0.01													
	1/18/01*		7.0			1,880	8.1		0.09	0.08	2.97	< 0.08	0.96	1.6	3.9
	4/25/01*		18.2			1,970	8.1			0.01	2.45	< 0.08	0.16	0.9	2.6
	7/30/01*	0.15	22.9			2,150	8.0			0.03	1.33	0.21	0.11		1.5
	10/24/01*	0.20	15.0			1,770	8.5				2.96	< 0.08	< 0.08		3.0
	1/23/02*	0.25													
	4/24/02*	0.25													
	7/24/02*	0.25	29.3			1,660	9.0	0.10	0.009	0.03	1.12	< 0.08	< 0.08	20.4	1.1
	10/23/02*	0.20	17.5			1,750	8.9	0.05	0.01	0.03	2.85	< 0.08	0.17	0.8	3.0
	1/22/03*		7.5			1,810	8.4		0.028	0.05	3.72	< 0.08	< 0.08		3.7
	4/23/03*		11.9			1,710	8.0		0.041	0.02	2.35	0.09	0.19		2.5
	7/23/03*		31.0			1,750	9.3		0.007	0.01	1.40		< 0.05	1.0	2.4
	10/22/03*		21.7			1,900	8.9		0.018	0.02	3.90	< 0.08	< 0.05	0.7	4.6
	1/21/04*		8.6			1,990	9.3		0.024	< 0.02	4.40	< 0.08	< 0.05	0.8	5.2
	4/21/04*		15.9			2,000	8.7		0.018	< 0.02	4.50	< 0.08	0.055	0.4	4.9
	Median	**0.20**	**16.70**	**< 3**	**13**	**1770**	**8.6**	**0.08**	**0.018**	**0.03**	**2.45**	**0.08**	**< 0.08**	**1.00**	**2.96**
	Average	**0.2**	**18.3**	**< 1.5**	**16**	**1671**	**8.6**	**0.08**	**0.027**	**0.04**	**2.39**	**0.44**	**0.13**	**2.84**	**2.96**
Meadows Detention Basin	10/25/00*		14.2			1380	8.2		0.100	0.13	1.28	< 0.08	0.16	0.60	1.88
	1/18/01*		1.0			1870	8.4		0.030	0.03	4.38	< 0.08	< 0.08	0.50	4.88
	4/25/01*		15.0			1280	8.3			0.05	1.37	0.18	0.30	1.30	2.67
	7/30/01*		24.0			1220	9.0			0.23	0.70	< 0.08	< 0.08		0.70
	10/24/01*		20.1			1640	8.3		0.020	0.02	4.40	< 0.08	< 0.08		4.40
	1/23/02*		5.5			1730	9.0		0.010	0.01	4.30	< 0.08	< 0.08		4.30
	4/24/02*		17.5			650	8.3		0.280	0.55	< 0.08	< 0.08	1.24	4.40	4.40
	7/24/02*		29.6			930	9.3		0.090	0.22	< 0.08	< 0.08	< 0.08	2.90	2.90
	10/23/02*		22.8			1450	9.3		0.050	0.08	2.38	< 0.08	0.18	1.20	3.58
	1/22/03*		8.8			1770	8.4		0.030	0.06	3.94	< 0.08	< 0.08		3.94
	4/23/03*		15.5			1620	8.3		0.040		2.90	< 0.08	< 0.08		2.90
	7/23/03*		28.0			1280	7.9		0.008	0.08	1.70		0.03	1.50	3.20
	10/22/03*		17.3			1290	8.1		0.115	0.31	3.40	< 0.08	< 0.08	0.82	4.22
	1/21/04*		7.5			1920	8.3		0.007	0.05	5.00	< 0.08	< 0.08	1.20	6.20
	4/21/04*		14.2			1960	7.5		0.007	0.03	5.10	< 0.08	< 0.08	1.20	6.30
	Median		**15.5**			**1,450**	**8.3**		**0.03**	**0.07**	**2.90**	**< 0.08**	**< 0.08**	**1.20**	**3.94**
	Average		**16.1**			**1,466**	**8.4**		**0.06**	**0.13**	**2.73**	**0.05**	**0.15**	**1.56**	**3.76**
Monson Channel	10/25/00*		21.3			3920	8.5		0.040	0.04	1.11	< 0.08	< 0.08	0.80	1.91
	1/18/01*		12.1			4660	8.6		0.010	0.01	5.05	< 0.08	< 0.08	0.60	5.65
	4/25/01*		21.0			4590	8.4			0.01	3.77	0.14	< 0.08	1.20	4.05
	7/30/01*		27.8			4580	8.1			0.02	3.57	0.11	< 0.08		3.68
	10/24/01*		23.3			4540	8.6		0.010	0.01	4.16	< 0.08	< 0.08		4.16
	1/23/02*		6.3			5250	8.3		0.010	0.01	8.12	0.09	< 0.08		8.21
	4/24/02*		21.3			4300	8.1		0.020	0.01	5.46	0.14	0.13	1.00	6.46
	7/24/02*		27.6			4230	8.3		0.010	0.03	2.81	< 0.08	< 0.08	1.20	3.01
	10/23/02*		23.5			4360	8.5		< 0.010	0.03	4.20	< 0.08	0.17	0.20	4.40
	1/22/03*		10.8			4570	8.2		0.030	0.05	4.80	< 0.08	< 0.08		4.80
	4/23/03*		20.2			4560	8.5		0.020		4.53	< 0.08	< 0.08		4.53
	7/23/03*		26.8			4550	7.8		0.007		3.10		0.08	0.58	3.68
	10/22/03*		19.7			4630	8.2		0.015	< 0.08	5.20	< 0.08	< 0.08	0.54	5.74
	1/21/04*		10.0			4610	8.1		0.017	< 0.08	5.40	< 0.08	< 0.08	0.42	5.82
	4/21/04*		15.0			4710	8.1		0.013	0.03	4.80	< 0.08	< 0.08	0.32	5.12
	Median		**21.0**			**4,570**	**8.3**		**0.01**	**0.03**	**4.53**	**< 0.08**	**< 0.08**	**0.59**	**4.53**
	Average		**19.1**			**4,537**	**8.3**		**0.02**	**0.03**	**4.41**	**0.06**	**0.06**	**0.69**	**4.75**
1991-2004 Median (All Sites)		**3.3**	**23.1**	**< 3.0**	**13.0**	**3,115**	**8.3**	**0.1**	**< 0.031**	**0.050**	**3.98**	**< 0.080**	**< 0.05**	**1.00**	**4.39**
2003-2004 Median (All Sites)			**16.4**			**3,050**	**8.1**		**0.008**	**0.030**	**4.20**	**< 0.080**	**0.05**	**0.67**	**4.79**

Location	Date	Copper (mg/L)	Chromium (mg/L)	Lead (mg/L)	Mercury (mg/L)	Cadmium (mg/L)	Zinc (mg/L)	Silver (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Arsenic (mg/L)	Boron (mg/L)	Cyanide (mg/L)	Copper Dissolved (mg/L)	Lead Dissolved (mg/L)	Zinc Dissolved (mg/L)
Las Vegas Wash	09/24/97	< 0.01		< 0.1			0.023					0.96	< 0.005			
	09/23/98	< 0.01		< 0.1			0.026					1.00		< 0.01	< 0.1	< 0.02
	11/04/99	< 0.01		< 0.1			0.030					0.91		< 0.01	< 0.1	< 0.02
	11/05/99	< 0.01		< 0.1			0.025					0.94		< 0.01	< 0.1	< 0.02
	10/03/00	< 0.01		< 0.1			< 0.020					1.30		< 0.01	< 0.1	< 0.02
	10/04/00	< 0.01		< 0.1			< 0.020					1.30		< 0.01	< 0.1	< 0.02
	12/18/00	< 0.01		< 0.1			< 0.020					1.20		< 0.01	< 0.1	< 0.02
	Median	**< 0.01**		**< 0.10**			**0.023**					**1.00**	**< 0.005**	**< 0.01**	**< 0.10**	**< 0.02**
	Average	**< DL**		**< DL**			**< DL**					**1.09**	**< DL**	**< DL**	**< DL**	**< DL**
Sloan Channel	09/23/98	0.01		< 0.1			0.020					0.60		0.01	< 0.1	< 0.02
					No Sample Taken for 1999 Dry Weather Monitoring Program											
	10/03/00	< 0.01		< 0.1			< 0.020					0.30		< 0.01	< 0.1	< 0.02
	10/04/00	< 0.01		< 0.1			0.028					0.24		< 0.01	< 0.1	< 0.02
	10/17/00*															
	1/18/01*	0.004	0.0035				0.006		0.009		0.032					
	4/25/01*	0.008	0.0034				0.012		0.006		0.034					
	7/30/01*	0.007	0.0028				0.008		0.006		0.033					
	10/24/01*	0.007	0.0054	0.0006			0.012				0.018					
	1/23/02*															
	4/24/02*															
	7/24/02*	0.006	0.0049	0.0006			0.011		0.001	0.00638	0.014					
	10/23/02*	0.003	0.0063						0.003	0.00747	0.014					
	1/22/03*		0.0049						0.004	0.00776	0.019					
	4/23/03*	0.004	0.0024				0.005		0.003	0.00595	0.024					
	7/23/03*	0.007	0.0034	< 0.001			0.007		< 0.01	< 0.005	0.011					
	10/22/03*	< 0.010	0.0058	< 0.001			< 0.020		< 0.01	< 0.005	0.019					
	1/21/04*	< 0.010	0.0042	< 0.001			< 0.020		< 0.01	< 0.005	0.02					
	4/21/04*	< 0.010	< 0.002	< 0.001			< 0.020		< 0.01	< 0.005	0.016					
	Median	**< 0.01**	**0.0039**	**< 0.001**			**0.012**		**0.006**	**0.005**	**0.019**	**0.300**		**< 0.01**	**< 0.10**	**< 0.02**
	Average	**0.01**	**0.0040**	**< 0.02**			**0.012**		**0.005**	**0.005**	**0.021**	**0.380**		**0.007**	**0.05**	**0.01**
Meadows Detention Basin	10/25/00*	0.005	< 0.0020	0.001			0.021		0.007	0.005	< 0.005					
	1/18/01*	0.005	0.0029	< 0.001			0.011		0.008	< 0.005	0.002					
	4/25/01*	0.007	0.0024	0.001			0.029		0.006	< 0.005	0.004					
	7/30/01*	0.008	0.0018	0.002			0.024		0.007	< 0.005	0.004					
	10/24/01*	0.010	< 0.0020	0.002			0.029		0.006	< 0.005	0.005					
	1/23/02*	0.006	0.0029	0.001			0.021		0.009	0.007	< 0.005					
	4/24/02*	0.008	0.0021	0.001			0.019		0.005	0.002	0.006					
	7/24/02*	0.007	0.0023	0.001			0.023		0.006	0.003	0.003					
	10/23/02*	0.004	0.0025	< 0.001			0.012		0.007	0.005	0.004					
	1/22/03*	0.006	0.0013	< 0.001			0.015		0.006	0.006	0.003					
	4/23/03*	0.010	< 0.0020	0.001			0.013		< 0.001	0.055	0.003					
	7/23/03*	0.024	0.0034	0.0015			0.023		0.006		0.003					
	10/22/03*	0.089	0.0011	0.001			0.041		0.007		0.003					
	1/21/04*	0.004	< 0.0020	0.001			0.330		0.007		0.005					
	4/21/04*	< 0.002	< 0.0020	< 0.001			< 0.020		< 0.01		< 0.005					
	Median	**0.007**	**< 0.002**	**0.001**			**0.021**		**0.007**	**0.005**	**0.004**					
	Average	**0.013**	**0.002**	**0.001**			**0.041**		**0.006**	**0.009**	**0.003**					
Monson Channel	10/25/00*	0.009	< 0.0020	0.001			0.022		0.016	0.023	0.009					
	1/18/01*	0.010	0.0026	< 0.001			0.011		0.018	< 0.005	0.012					
	4/25/01*	0.017	< 0.0020	< 0.001			0.017		0.018	< 0.005	0.016					
	7/30/01*	0.015	0.0022	0.001			0.016		0.017	< 0.005	0.015					
	10/24/01*	0.013	0.0019	0.002			0.019		0.012	< 0.005	0.012					
	1/23/02*	< 0.002	< 0.0020	< 0.001					< 0.01	0.023	0.026					
	4/24/02*	< 0.002	< 0.0020	< 0.001					< 0.01	0.020	0.030					
	7/24/02*	0.003	0.0027	0.001			0.008		0.019	0.022	0.013					
	10/23/02*	0.004	0.0027	< 0.001			0.006		0.018	0.023	0.020					
	1/22/03*	0.005	0.0017	0.001			0.009		0.014	0.023	0.018					
	4/23/03*	0.004	< 0.0020	< 0.001					0.008	0.024	0.014					
	7/23/03*	0.005	< 0.0020	< 0.001			0.008		0.011	< 0.005	0.019					
	10/22/03*	< 0.002	< 0.0020	< 0.001			< 0.020		0.025	< 0.005	0.017					
	1/21/04*	< 0.002	< 0.0020	< 0.001			< 0.020		< 0.01	< 0.005	0.020					
	4/21/04*	< 0.002	< 0.0020	< 0.001			< 0.020		< 0.01	< 0.005	0.021					
	Median	**0.004**	**< 0.002**	**0.001**			**0.017**		**0.014**	**0.005**	**0.017**					
	Average	**0.006**	**0.002**	**0.001**			**0.012**		**0.013**	**0.012**	**0.017**					
1991-2004 Median (All Sites)		**< 0.010**	**< 0.003**	**< 0.002**	**< 0.0002**	**< 0.005**	**< 0.020**	**< 0.01**	**0.010**	**0.006**	**< 0.008**	**0.96**	**< 0.005**	**< 0.01**	**< 0.10**	**< 0.02**
2003-2004 Median (All Sites)		**< 0.007**	**0.002**	**0.001**			**< 0.020**		**0.010**	**0.005**	**0.007**					

Location	Date	BOD (mg/L)	COD (mg/L)	Apparent Color (ACU)	Turbidity (NTU)	Phenol (mg/L)	Total Petroleum Hydrocarbons (mg/L)	Total Chlorine (mg/L)	Conductance (mmhos)	Fecal Coliform (MPN/100 mL	Fecal Streptococcus (MPN/100 mL)	Total Coliform (MPN/100 mL)	Salmonella (MPN/100 mL	VOC's (# detects)	SOC's (# detects)	Pesticides (# detects)	Herbicides (# detects)
Las Vegas Wash	09/24/97	< 6	< 10	10	2.5	< 0.01	< 1.0	0.25	0.067	500	850		< 2.2			0	0
	09/23/98									900	1,050		< 2.2	0	0	0	0
	11/04/99									1,300	1,300			3	0	0	0
	11/05/99									700	240			3	0	0	0
	10/03/00									900	3,000			0	0	0	0
	10/04/00									900	2,400			0	0	0	0
	12/18/00									700	2,400			0	1	0	0
	Median	**< 6**	**< 10**	**10**	**2.5**	**< 0.01**	**< 1.0**	**0.25**	**0.067**	**900**	**1,300**		**< 2.2**	**0**	**0**	**0**	**0**
	Average	**< DL**	**< DL**	**10**	**2.5**	**< DL**	**< DL**	**0.25**	**0.067**	**843**	**1,606**		**< DL**	**1.00**	**0.17**	**0**	**0**
Sloan Channel	09/23/98									162	225		< 2.2	0	0	0	0
						No Sample Taken for 1999 Dry Weather Monitoring Program											
	10/03/00									1,600	9,000			1	0	1	0
	10/04/00									1,700	9,000			1	0	0	0
	10/17/00*									300	2,200						
	1/18/01*				1.4				2.530	257							
	4/25/01*				3.3				2.550	680							
	7/30/01*				3.2				2.710	260							
	10/24/01*				2.6				3.950	1,103							
	1/23/02*																
	4/24/02*																
	7/24/02*				3.1				2.150	5,800						0	0
	10/23/02*				1.3				2.290	5,000						0	0
	1/22/03*				0.1				2.300	1,390						0	0
	4/23/03*				2.3				2.320	300						0	1
	7/23/03*				1.3				2.510	36,000						0	1
	10/22/03*				1.8				2.440	2,400						0	0
	1/21/04*				2.2				2.560	< 200						0	0
	4/21/04*				0.5				2.550	633						0	0
	Median				**1.98**				**2.52**	**892**	**5,600**			**1**	**0**	**0**	**0**
	Average				**1.91**				**2.57**	**3,826**	**6,075**			**1**	**0**	**0**	**0**
Meadows Detention Basin	10/25/00*				1.52				1.93								
	1/18/01*				0.50				2.49	95							
	4/25/01*				3.45				1.85	1,490							
	7/30/01*				8.02				1.53	1,300							
	10/24/01*				8.35				2.20	665							
	1/23/02*				3.53				2.33	50							
	4/24/02*				7.30				1.04	190							
	7/24/02*				4.05				1.37	16,500						0	0
	10/23/02*				2.08				1.63	5,300						0	0
	1/22/03*				0.75				2.37	10						0	0
	4/23/03*				0.83				2.18	<400						0	0
	7/23/03*				2.62				1.85	64,000						0	1
	10/22/03*				1.69				1.83	2,200						0	0
	1/21/04*				1.13				2.51	387						0	0
	4/21/04*				0.77				2.58	600						0	0
	Median				**2.08**				**1.93**	**665**						**0**	**0**
	Average				**3.11**				**1.98**	**7137**						**0**	**0**
Monson Channel	10/25/00*				0.13				4.42								
	1/18/01*				0.37				5.18	20							
	4/25/01*				1.20				5.03	545							
	7/30/01*				2.26				5.01	20							
	10/24/01*				2.27				5.01	230							
	1/23/02*				2.95				5.80	20							
	4/24/02*				0.96				5.65	660							
	7/24/02*				3.10				4.74	15						0	0
	10/23/02*				1.20				3.96	2,220						0	0
	1/22/03*				4.56				4.97	185						0	0
	4/23/03*				0.72				1.27	260						0	0
	7/23/03*				0.42				4.92	8,600						0	0
	10/22/03*				1.15				5.00	2,300						0	0
	1/21/04*				0.29				4.97	<200						0	0
	4/21/04*				0.40				5.14	740						0	0
	Median				**1.15**				**5.00**	**260**							
	Average				**1.47**				**4.74**	**1217**							
1991-2004 Median (All Sites)		**< 6**	**16**	**15**	**2.08**	**< 0.01**	**< 1.00**	**< 0.10**	**3.58**	**609**	**1,025**	**4,650**	**< 2.2**	**0**	**0**	**0**	**0**
2003-2004 Median (All Sites)					**1.25**				**3.59**	**1,470**							

Notes:
(1) In cases where measured constituant concentrations were less than detection limits, 1/2 of the detection limit was used to compute the average concentration.
When this approach resulted in a computed average value which was less than the detection limit, the average value was reported as "<DL".
* Sample was taken by SNWA

Table 8-2

Comparison of Point-of-Record For All NPDES Sites to SNWA Medians For SNWA Sites 2003-2004

Constituent	NPDES Median (1991-2004)	SNWA Median (2003-2004)
TDS	3,115 mg/L	3,050 mg/L
Zinc	<20 ug/L	<20 ug/L
Lead	<2 ug/L	<1 ug/L
Copper	<10 ug/L	<10 ug/L
Nitrite	<0.08 mg/L	<0.08 mg/L
Nitrate	3.98 mg/L	4.1 mg/L
Orthophosphate	0.05 mg/L	0.008 mg/L
Total Phosphate	0.05 mg/L	0.025 mg/L

Table 8-3

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)	Total Organic Carbon (mg/L)
LVC_2	7/23/2003	110	69	120	13	292	2.4	470	190	0.18	0.51	23	1,280	12.9
	10/22/2003	120	81	150	15	275	2.8	590	160	0.2	0.69	23	1,290	9.6
	1/21/2004	200	150	210	24	352	2.29	860	240	0.41	0.33	27	1,920	4.6
	4/21/2004	160	140	220	24	339	2.8	890	250	0.39	0.39	29	1,960	7.4
2003-2004 Median		**140**	**110.5**	**180**	**19.5**	**315.5**	**2.58**	**725**	**215**	**0.305**	**0.45**	**25**	**1,605**	**8.5**
LW12.1	7/23/2003	180	220	250	43	266	5.5	1,600	270	0.65	0.52	22	2,940	7.0
	10/22/2003	220	260	270	50	266	2.2	1,600	280	0.55	0.54	32	2,930	5.7
	1/21/2004	240	250	280	51	278	2.86	1,600	260	0.7	0.46	39	3,050	2.8
	4/21/2004	220	280	320	57	240	2.0	1,900	320	0.73	0.49	44	3,490	3.4
2003-2004 Median		**220**	**255**	**275**	**50.5**	**266**	**2.52**	**1,600**	**275**	**0.675**	**0.505**	**35.5**	**2,995**	**4.55**
FW_0	7/23/2003	270	160	250	22	256	3.3	1,600	350	0.77	0.58	26	3,140	4.9
	10/22/2003	330	190	270	26	256	2.6	1,800	350	0.95	0.63	33	3,210	2.9
	1/21/2004	360	210	300	26	248	2.55	1,700	340	0.89	0.59	31	3,240	2.0
	4/21/2004	320	190	280	24	231	2.4	1,700	320	0.74	0.59	35	3,100	2.4
2003-2004 Median		**325**	**190**	**275**	**25**	**252**	**2.595**	**1,700**	**345**	**0.83**	**0.59**	**32**	**3,175**	**2.65**
SC_1	7/23/2003	100	110	170	13	171	17.6	700	230	0.82	1.2	52	1,750	9.9
	10/22/2003	136	170	180	13	187	6.1	960	290	1.1	1.2	85	1,900	2.5
	1/21/2004	130	180	200	15	171	11.1	880	280	1.2	1.2	77	1,990	3.0
	4/21/2004	120	180	190	14	206	4.2	920	290	1.1	1.1	92	2,000	1.5
2003-2004 Median		**125**	**175**	**185**	**13.5**	**179**	**8.595**	**900**	**285**	**1.1**	**1.2**	**81**	**1,945**	**2.75**
MC_2	7/23/2003	370	280	340	28	268	2.2	2,600	400	1.1	0.67	37	4,550	4.6
	10/22/2003	480	340	430	34	242	3.1	2,600	450	1.1	0.69	58	4,630	2.5
	1/21/2004	450	320	450	35	254	2.1	2,300	390	1.2	0.68	52	4,610	2.0
	4/21/2004	440	300	410	32	259	2.1	2,640	440	1.1	0.65	57	4,710	2.3
2003-2004 Median		**445**	**310**	**420**	**33**	**256.5**	**2.155**	**2,600**	**420**	**1.1**	**0.675**	**54.5**	**4,620**	**2.4**
DC_1	7/23/2003	420	240	470	59	236	1.5	2,600	860	1.15	1.4	47	5,220	3.3
	10/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003-2004 Median		**420**	**240**	**470**	**59**	**236**	**1.53**	**2,600**	**860**	**1.15**	**1.4**	**47**	**5,220**	**3.3**
LWC6.3	7/23/2003	410	150	1,300	29	266	1.1	1,700	1900	0.99	1.3	64	6,060	1.4
	10/22/2003	425	160	1,300	30	266	0.5	1,800	1900	0.9	1.4	88	5,840	2.7
	1/21/2004	210	95	960	32	330	0.9	1,000	1000	0.59	1.6	84	3,580	3.2
	4/21/2004	240	100	900	30	341	1.1	1,100	1200	0.57	1.6	88	3,960	3.8
2003-2004 Median		**325**	**125**	**1,130**	**30**	**298**	**0.972**	**1,400**	**1550**	**0.745**	**1.5**	**86**	**4,900**	**2.95**
LWC3.7	7/23/2003	220	94	280	44	198	1.02	870	390	0.46	1	39	2,230	5
	10/22/2003	190	87	280	42	191	0.393	820	380	0.33	1.1	45	1,930	4.1
	1/21/2004	300	120	370	58	184	0.378	1,200	420	0.52	0.95	45	2,660	2.5
	4/21/2004	220	97	290	38	178	0.291	810	370	0.31	0.95	40	1,900	7.5
2003-2004 Median		**220**	**95.5**	**285**	**43**	**187.5**	**0.3855**	**845**	**385**	**0.395**	**0.975**	**42.5**	**2,080**	**4.55**
Overall 2003-2004 Median		**220**	**170**	**280**	**30**	**256**	**2.29**	**1,600**	**350**	**0.74**	**0.69**	**44**	**3,050**	**3.3**

NA = Not Analyzed

Table 8-4

Nutrient Concentrations of Water Samples From Tributary/Seep Locations

Location	Site Name	Sample Date		Ammonia mg N/L		Nitrite mg N/L	Nitrate Mg N/L	Nitrate-Nitrite mg N/L	Total Kjeldahl Nitrogen (TKN) mg N/L	Orthphospate mg P/L		Total Phosphate mg P/L
Meadows Detention	LVC_2	7/23/2003		0.032		NA	1.70	1.40	1.50	0.008		0.08
Basin		10/22/2003	<	0.08	<	0.08	3.40	2.90	0.82	0.115		0.31
		1/21/2004	<	0.08	<	0.08	5.0	5.2	1.20	0.007		0.05
		4/21/2004	<	0.08	<	0.08	5.10	5.60	1.20	0.007		0.03
2003-2004 Median				**0.08**		**0.08**	**4.20**	**4.05**	**1.20**	**0.01**		**0.07**
Las Vegas Creek	LW12.1	7/23/2003		0.038		NA	1.90	2.00	0.92	0.007		0.09
		10/22/2003	<	0.08	<	0.08	3.30	3.10	0.74	0.008		0.03
		1/21/2004	<	0.08	<	0.08	4.20	4.00	0.59	0.015		ND
		4/21/2004	<	0.08	<	0.08	3.30	3.30	0.48	0.01		0.01
2003-2004 Median				**0.08**		**0.08**	**3.30**	**3.20**	**0.67**	**0.01**		**0.03**
Flamingo Wash	FW_0	7/23/2003	<	0.08		NA	3.50	3.60	0.70	0.006		0.03
		10/22/2003	<	0.08	<	0.08	4.90	4.90	0.47	0.008	<	0.08
		1/21/2004	<	0.08	<	0.08	5.10	5.30	0.38	0.011	<	0.08
		4/21/2004	<	0.08	<	0.08	4.10	4.00	0.40	0.008	<	0.08
2003-2004 Median				**0.08**		**0.08**	**4.50**	**4.45**	**0.44**	**0.01**		**0.08**
Sloan Channel	SC_1	7/23/2003	<	0.08		NA	1.40	1.30	1.00	0.007		0.01
		10/22/2003	<	0.08	<	0.08	3.90	3.30	0.67	0.018		0.02
		1/21/2004	<	0.08	<	0.08	4.40	4.30	0.75	0.024	<	0.08
		4/21/2004		0.055	<	0.08	4.50	5.00	0.40	0.018	<	0.08
2003-2004 Median				**0.08**		**0.08**	**4.15**	**3.80**	**0.71**	**0.02**		**0.05**
Monson Channel	MC_2	7/23/2003		0.078		NA	3.10	3.40	0.58	0.007		NA
		10/22/2003	<	0.08	<	0.08	5.20	4.90	0.54	0.015	<	0.08
		1/21/2004	<	0.08	<	0.08	5.40	4.90	0.42	0.017	<	0.08
		4/21/2004	<	0.08	<	0.08	4.80	5.10	0.32	0.013		0.03
2003-2004 Median				**0.08**		**0.08**	**5.00**	**4.90**	**0.48**	**0.01**		**0.08**
Duck Creek	DC_1	7/23/2003	<	0.08		NA	4.90	5.50	0.81	0.008		NA
		10/22/2003		NA		NA	NA	NA	NA	NA		NA
		1/21/2004		NA		NA	NA	NA	NA	NA		NA
		4/21/2004		NA		NA	NA	NA	NA	NA		NA
2003-2004 Median				**0.08**		**NA**	**4.90**	**5.50**	**0.81**	**0.01**		**NA**
Kerr-McGee Seeps	LWC6.3	7/23/2003	<	0.08		NA	9.20	7.20	0.33	0.044		0.04
		10/22/2003	<	0.08	<	0.08	9.50	11.00	0.37	0.055		0.03
		1/21/2004	<	0.08	<	0.08	0.57	0.57	0.66	0.05		0.02
		4/21/2004	<	0.08	<	0.08	1.10	1.10	0.67	0.036		0.04
2003-2004 Median				**0.08**		**0.08**	**5.15**	**4.15**	**0.52**	**0.05**		**0.04**
GCS-5 Seeps	LWC3.7	7/23/2003		0.06		NA	10.00	11.00	2.20	0.029		0.60
		10/22/2003	<	0.08	<	0.08	11.00	12.00	0.95	0.016		0.10
		1/21/2004	<	0.08	<	0.08	13.00	13.00	0.74	0.023		ND
		4/21/2004	<	0.08	<	0.08	10.00	13.00	1.30	0.027		0.35
2003-2004 Median				**0.08**		**0.08**	**10.50**	**12.50**	**1.13**	**0.03**		**0.35**
Overall 2003-2004 Median				**0.08**		**0.08**	**4.50**	**4.90**	**0.67**	**0.02**		**0.08**

NA = Not Analyzed

Table 8-5

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)	Total Copper (ug/L)	Total Iron (mg/L)	Total Lead (ug/L)	Manganese (ug/L)	Nickel (ug/L)	Selenium (ug/L)	Zinc (ug/L)
LVC_2	7/23/2003	49.0	3.3	78.0	3.4	24.0	0.17	1.5	7.4	5.9	NA	23.0
	10/22/2003	50.0	3.4	65.0	1.1	8.9	0.074	0.83	2.4	7.4	NA	41.0
	1/21/2004	460.0	4.7	54	ND	4.2	0.29	1.3	12	6.7	NA	33.0
	4/21/2004	ND	ND	35.0	ND	ND	0.017	ND	ND	ND	NA	ND
2003-2004 Median		**50.0**	**3.4**	**59.5**	**2.3**	**8.9**	**0.1**	**1.3**	**7.4**	**6.7**	**NA**	**33.0**
LW12.1	7/23/2003	54.0	6.2	69.0	ND	13.0	ND	0.96	31.0	7.3	ND	23.0
	10/22/2003	290.0	6.5	56.0	1.2	4.8	0.28	1.1	36.0	14.0	ND	15.0
	1/21/2004	ND	6.9	32.0	ND	ND	0.05	ND	32.0	ND	ND	ND
	4/21/2004	ND	7.5	31.0	ND	ND	0.043	ND	ND	ND	ND	ND
2003-2004 Median		**172.0**	**6.7**	**44.0**	**1.2**	**8.9**	**0.1**	**1.0**	**32.0**	**10.7**	**ND**	**19.0**
FW_0	7/23/2003	ND	5.8	48.0	1.2	9.5	ND	ND	14.0	8.8	ND	9.8
	10/22/2003	ND	4.9	49.0	1.2	3.9	ND	ND	ND	19.0	ND	ND
	1/21/2004	ND	7.4	41.0	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	5.4	40.0	ND	ND	0.052	ND	ND	ND	ND	ND
2003-2004 Median		**ND**	**5.6**	**44.5**	**1.2**	**6.7**	**0.1**	**ND**	**14.0**	**13.9**	**ND**	**ND**
SC_1	7/23/2003	29.0	11.0	72.0	3.4	6.9	ND	ND	2.4	ND	ND	7.3
	10/22/2003	1,200	19.0	68.0	5.8	ND	1.0	ND	24.0	ND	ND	ND
	1/21/2004	110.0	20.0	42.0	4.2	ND	0.065	ND	6.0	ND	ND	ND
	4/21/2004	ND	16.0	37.0	ND	ND	0.051	ND	ND	ND	ND	ND
2003-2004 Median		**110.0**	**17.5**	**55.0**	**4.2**	**6.9**	**0.1**	**ND**	**6.0**	**ND**	**ND**	**ND**
MC_2	7/23/2003	ND	19.0	29.0	ND	4.6	ND	ND	ND	11.0	ND	7.5
	10/22/2003	ND	17.0	24.0	ND	ND	0.071	ND	ND	25.0	ND	ND
	1/21/2004	ND	20.0	20.0	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	21.0	20.0	ND	ND	0.013	ND	ND	ND	ND	ND
2003-2004 Median		**ND**	**19.5**	**22.0**	**ND**	**ND**	**0.04**	**ND**	**ND**	**18.0**	**ND**	**ND**
DC_1	7/23/2003	160.0	51.0	30.0	1.1	2.8	0.18	ND	55.0	13.0	ND	ND
	10/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003-2004 Median		**160.0**	**51.0**	**30.0**	**1.1**	**2.8**	**0.2**	**ND**	**55.0**	**13.0**	**NA**	**ND**
LWC6.3	7/23/2003	ND	110.0	24.0	33.0	ND	ND	ND	340.0	28.0	ND	ND
	10/22/2003	ND	104.0	25.0	35.0	ND	0.045	ND	540.0	31.0	ND	ND
	1/21/2004	ND	110.0	14.0	ND	ND	ND	ND	180.0	28.0	ND	ND
	4/21/2004	ND	120.0	15.0	ND	ND	0.015	ND	63.0	34.0	ND	ND
2003-2004 Median		**ND**	**110.0**	**19.5**	**34.0**	**ND**	**0.03**	**ND**	**260.0**	**29.5**	**ND**	**ND**
LWC3.7	7/23/2003	7,000	46.0	150	13	16	7	23	1,600	26	ND	54.0
	10/22/2003	1,200	38.0	57.0	8.4	11.0	1.7	4.2	730	18.0	ND	16.0
	1/21/2004	ND	52.0	25.0	ND	ND	0.012	ND	11	ND	ND	ND
	4/21/2004	2,700	36.0	75.0	6.7	12.0	3.6	16.0	420	16.0	ND	26.0
2003-2004 Median		**2,700**	**42.0**	**66.0**	**8.4**	**12.0**	**2.7**	**16.0**	**575.0**	**18.0**	**ND**	**26.0**
Overall 2003-2004 Median		**ND**	**18.00**	**40.00**	**3.80**	**8.90**	**0.07**	**ND**	**32.00**	**16.00**	**ND**	**23.00**

NA = Not Analyzed
ND = Not Detected

Table 8-6

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

Location	ID	Date	Conductivity uS/cm	DO mg/L	pH Units	Temperature ^{0}C	Turbidity NTU	Perchlorate ug/L	Fecal Coliform MPN/100 mL	E. coli MPN/100 mL
Meadows	LVC _2	7/23/2003	1,853	3.71	7.90	28.0	2.62	50	64,000	28,000
Detention		10/22/2003	1,832	8.38	8.09	17.3	1.69	6.7	2,200	530
Basin		1/21/2004	2,510	10.62	8.27	7.5	1.13	15	387	520
		4/21/2004	2,580	8.70	7.46	14.2	0.77	15	600	<200
2003-2004 Median			**2,182**	**8.54**	**8.00**	**15.75**	**1.41**	**15**	**1,400**	**530**
Las Vegas Creek	LW12.1	7/23/2003	3,590	7.64	8.07	26.7	2.70	16	83,000	3,300
		10/22/2003	3,500	8.14	8.04	16.4	12.00	9.3	94,000	10,700
		1/21/2004	3,580	9.72	8.29	7.2	2.21	11	<200	<200
		4/21/2004	3,980	8.65	8.11	15.5	1.13	11	547	380
2003-2004 Median			**3,585**	**8.395**	**8.09**	**15.95**	**2.455**	**11**	**83,000**	**3,300**
Flamingo Wash	FW_0	7/23/2003	3,730	6.52	7.89	26.1	1.37	14	4,800	710
		10/22/2003	3,780	7.30	8.06	17.3	0.66	8.5	430	<200
		1/21/2004	3,770	9.19	8.24	8.9	1.25	15	<200	<200
		4/21/2004	3,610	8.86	8.12	14.9	1.20	9.7	450	<200
2003-2004 Median			**3,750**	**8.08**	**8.09**	**16.1**	**1.225**	**11.85**	**450**	**710**
Sloan Channel	SC_1	7/23/2003	2,510	8.31	9.27	31.0	1.32	12	36,000	3,700
		10/22/2003	2,440	9.88	8.90	21.7	1.80	4.4	2,400	940
		1/21/2004	2,560	12.88	9.32	8.6	2.16	5.7	<200	<200
		4/21/2004	2,550	8.90	8.67	15.9	0.52	5	633	240
2003-2004 Median			**2,530**	**9.39**	**9.09**	**18.8**	**1.56**	**5.35**	**2,400**	**940**
Monson Channel	MC_2	7/23/2003	4,920	6.17	7.91	26.8	0.42	17	8,600	470
		10/22/2003	5,000	9.60	8.18	19.7	1.15	20	2,300	320
		1/21/2004	4,970	7.62	8.10	10.0	0.29	14	<200	<200
		4/21/2004	5,140	9.73	8.13	15.0	0.40	<4	740	807
2003-2004 Median			**4,985**	**8.61**	**8.12**	**17.35**	**0.41**	**17**	**2,300**	**470**
Duck Creek	DC_1	7/23/2003	6,000	8.92	7.90	25.7	1.84	26	5,100	230
		10/22/2003	NA	NA	NA	NA	NA	NA	NA	NA
		1/21/2004	NA	NA	NA	NA	NA	NA	NA	NA
		4/21/2004	NA	NA	NA	NA	NA	NA	NA	NA
2003-2004 Median			**6,000**	**8.92**	**7.90**	**25.7**	**1.84**	**26**	**5,100**	**230**
Kerr-McGee	LWC6.3	7/23/2003	8,420	7.34	7.15	24.4	0.05	13	<100	<100
Seeps		10/22/2003	8,300	6.57	7.30	22.6	0.09	40	<200	<10
		1/21/2004	8,000	6.72	7.25	19.5	0.19	13000	<5	<5
		4/21/2004	5,920	6.03	7.63	17.5	0.33	20000	<10	<200
2003-2004 Median			**8,150**	**6.645**	**7.28**	**21.05**	**0.14**	**6520**	**ND**	**ND**
GCS-5	LWC3.7	7/23/2003	2,990	2.69	7.35	24.9	2.58	630	6,800	<200
Seeps		10/22/2003	2,780	1.6	7.31	23.2	17.7	490	<200	<400
		1/21/2004	3,600	4.33	7.37	20.5	2.55	810	175	135
		4/21/2004	2,750	0.85	7.28	20.8	287	350	220	<200
2003-2004 Median			**2,885**	**2.145**	**7.33**	**22**	**10.14**	**560**	**220**	**135**
Overall 2003-2004 Median			**3,600**	**8.14**	**8.06**	**19.5**	**1.25**	**15**	**2,250**	**530**

NA = Not Analyzed
ND = Not Detected

Semi-Volatile Organic Compounds (SOCs) and Volatile Organic Compounds (VOCs)

For SOC and VOC pollutant concentrations for 2003-2004, see **Table 8-7**. During the 2003-2004 Dry Weather Monitoring period, six SOCs and VOCs were detected in the grab samples. Since 2001, the detection limit for many of the SOCs and VOCs have dropped significantly, sometimes by a factor of one hundred. This accounts for the increase in the number of detects of SOCs and VOCs in the grab samples during the past two years. The SOCs detected were butylbenzylphthalate, caffeine, di(2-ethylhexyl)phthalate, and di-n-butylphthalate. Every site, except for the Kerr-McGee Seeps, had at least one detection of one of the aforementioned SOCs. The VOCs detected were 1,1-dichoroethane, 1,2,4-trichlorobenzene, chloroform, total THM, tetrachloroethylene (PCE), and trichloroethylene (TCE). At least one VOC was detected at each of the sites, except Monson Channel and Duck Creek, during the 2003-2004 monitoring period.

Pesticides and Herbicides

For pesticide and herbicide concentrations for 2003-2004, see **Table 8-7**. In the 2003-2004 Dry Weather Monitoring period, three pesticides were detected in the grab samples, alpha-BHC, beta-BHC, and delta-BHC. These pesticides were detected in grab samples at the GCS-5 Seeps and the Kerr-McGee Seeps. The only herbicide that was detected was 2,4-D which was detected in both the Meadows Detention Basin and Sloan Channel. The frequency of detection is similar to previous years.

8.2.3 Conclusion

This report satisfies the requirements for dry weather flow water quality characterization in the NPDES stormwater discharge permit. Given the inherent variability expected in sampling results derived from isolated grab samples, the constituent concentrations in Las Vegas Valley dry weather flows have shown strong consistency over time to date. Although certain constituents have shown considerable variability in individual samples (e.g., fecal coliform), the overall results are very consistent.

8.3 2003-2004 WET WEATHER MONITORING PROGRAM

8.3.1 Preface

One of the requirements for compliance with the MS4 permit is the performance of a wet weather monitoring program.

This subsection discusses the work performed and the results acquired during the wet weather monitoring program in the July 2003 to June 2004 period of the MS4 permit. The monitoring program as implemented in 2003-2004 has the key elements described in the following subsections.

8.3.2 Wet Weather Characterization Monitoring Program

8.3.2.1 Monitoring Locations

The nine locations that were monitored for the 2003-2004 permit year include seven sites on the major tributaries to Las Vegas Wash and two sites on Las Vegas Wash. These nine locations, shown in **Figure 8-2**, are listed below:

- Las Vegas Creek (Washington Avenue Channel) at Lena Street
- Duck Creek at Boulder Highway
- C-1 Channel at Warm Springs Road
- Meadows Detention Basin (at the Alta Channel)
- Flamingo Wash at Nellis Boulevard (upstream of Las Vegas Wash confluence)
- Monson Channel at Stephanie Street
- Sloan Channel at Charleston Boulevard
- Las Vegas Wash at downstream end of Desert Rose Golf Course (downstream of Flamingo Wash confluence)
- Las Vegas Wash at Lake Las Vegas

Table 8-7

11 by 17 Pullout

Table 8-7

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-Dichloroethane	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2,4,-Trimethylbenzene	2-(2-(2-butoxyethoxy)ethoxy)eth	2,4-D	2-Butoxyethanol phosphate (3:1	3,6,9,12-tetraoxahexadecan-1-o	2,3,5,6-Tetrafluorobenzaldehyd	Acetaldehyde	Aldrin	Alpha-BHC	Benzo (k) Fluoranthene	Beta-BHC	Bromoform	Butanal	Butylbenzylphthalate
LWC6.3	7/23/2003	ND	ND	4.9	6	ND	ND	ND	ND	ND	ND	ND	94	ND	ND	0.11	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	101	ND	ND	0.11	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	1.4	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	0.43	ND	0.21	ND	ND	ND
	4/21/2004	ND	ND	1.2	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND	0.32	ND	ND	ND
LVC_2	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	0.78	ND	ND	98	4	ND	ND	ND	ND	ND	ND	31
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	96	2	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND
DC_1	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	ND	ND	ND	ND	ND	ND	ND	0.8
	10/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FW_0	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	98	2	ND	ND	ND	ND	0.6	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	99	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LW12.1	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	95	2	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	2	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LWC3.7	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	1	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	97	ND	ND	ND	ND	0.01	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND
MC_2	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	99	3	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	97	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SC_1	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	0.37	ND	ND	95	6	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	101	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Number of Detects		**0**	**0**	**4**	**1**	**0**	**2**	**0**	**0**	**2**	**0**	**0**	**15**	**9**	**0**	**4**	**0**	**0**	**1**	**0**	**2**

NA = Not Analyzed
ND = Not Detected

Table 8-7 (Continued)

Organic Compound Concentrations (ug/L)
of Water Samples From Tributary/Seep Locations

Location	Sample Date	Caffeine	Chlorodibromomethane	Chloroform	Chloroform (Trichloromethane)	Dalapon	Diazinon	Dieldrin	Delta-BHC	Dibromochloromethane	Di(2-Ethylhexyl)phthalate	Dichloroiodomethane	Dichlorprop	Diethylphthalate	Dicamba	Di-n-Butylphthalate	Diuron	Endrin	Endrin Aldehyde	Formaldehyde	Glyoxal	Glyphosate	Hexadecanoic Acid	Lindane	Lindane (gamma-BHC)
LWC6.3	7/23/2003	ND	ND	28	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	26	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	0.1	0.73	ND	ND	ND	ND	ND	ND	ND	ND	0.16	0.36	ND	ND	ND	ND	ND	ND
LVC_2	7/23/2003	0.7	ND	ND	ND	ND	ND	ND	ND	ND	4.7	ND	ND	ND	ND	1.1	ND	ND	ND	ND	6	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	0.8	ND	ND	ND	ND	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND
	1/21/2004	0.21	ND	ND	ND	ND	0.15	ND	ND	ND	0.89	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND
	4/21/2004	0.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	ND
DC_1	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FW_0	7/23/2003	ND	0.6	0.9	1.9	5.7	ND	ND	ND	0.6	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	1	ND	ND	ND	ND
LW12.1	7/23/2003	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	2	15	ND	ND	ND
	10/22/2003	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND
	1/21/2004	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND
LWC3.7	7/23/2003	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	0.5	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MC_2	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SC_1	7/23/2003	ND	ND	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	5	ND	ND	ND	ND
	10/22/2003	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND
Total Number of Detects		**8**	**1**	**4**	**8**	**1**	**1**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**2**	**14**	**1**	**0**	**0**	**0**

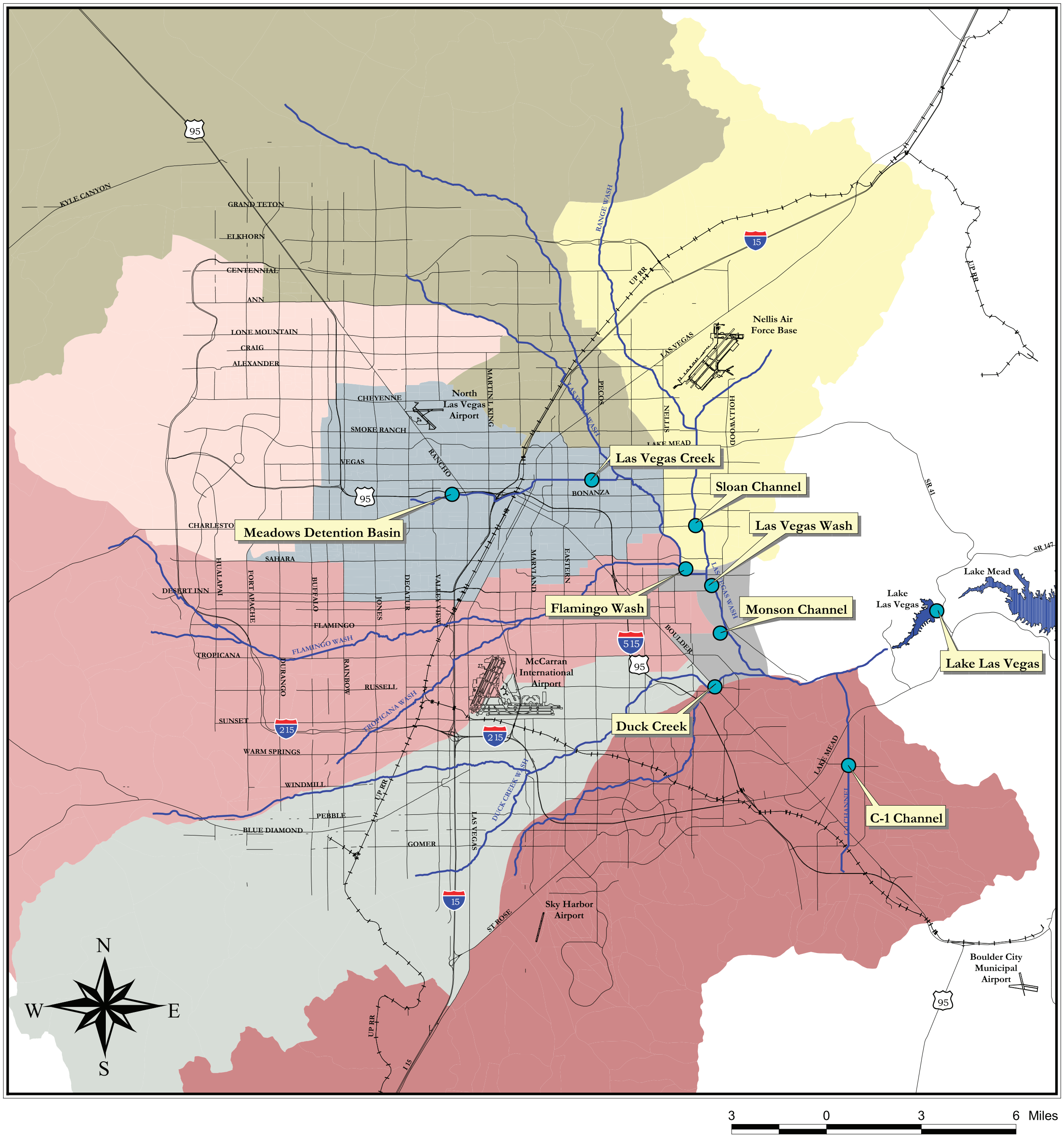
NA = Not Analyzed
ND = Not Detected

Table 8-7 (Continued)

Organic Compound Concentrations (ug/L)
of Water Samples From Tributary/Seep Locations

Location	Sample Date	Methyl Tert-butyl ether (MTBE)	m-Dichlorobenzene (1,3-DCB)	M-Glyoxal(Pyruvic Aldehyde)	p-Dichlorobenzene (1,4-DCB)	Pentanal	Propanal	Tetrachloroethylene (PCE)	Simazine	Toluene	Tot DCPA Mono&Diacid Degradate	Total Trihalomethanes	Total THM	Tri(2-chloroethyl)phosphate	Trichloroethylene (TCE)	Unknown (Total)	Unknown alcohol (Total)
LWC6.3	7/23/2003	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	25	ND	1	ND	ND
	10/22/2003	2.2	ND	2	ND	ND	ND	ND	ND	ND	ND	26	24	ND	1	ND	ND
	1/21/2004	ND	1	1	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.42	ND	ND	ND	ND	ND	ND
LVC_2	7/23/2003	ND	ND	5	ND	ND	1	0.5	ND	ND	0.2	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	3	ND	1	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	1	ND	ND	4	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	2	ND	ND	ND	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
DC_1	7/23/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.39	ND	ND	ND	ND	ND	ND
	10/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/21/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FW_0	7/23/2003	ND	ND	2	ND	ND	ND	ND	ND	ND	1.6	ND	2.2	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	1	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND
LW12.1	7/23/2003	ND	ND	3	ND	2	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	4	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LWC3.7	7/23/2003	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	2	ND	ND	ND	ND	ND	ND	ND	0.5	0.6	ND	ND	ND	ND
MC_2	7/23/2003	ND	ND	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	1	ND	ND	ND	ND	ND	ND	0.28	ND	ND	ND	ND	ND	ND
SC_1	7/23/2003	ND	ND	6	ND	4	2	ND	ND	ND	0.28	ND	ND	ND	ND	ND	ND
	10/22/2003	ND	ND	3	ND	ND	ND	ND	ND	ND	0.27	ND	ND	ND	ND	ND	ND
	1/21/2004	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/21/2004	ND	ND	2	ND	ND	ND	ND	ND	ND	0.41	ND	ND	ND	ND	ND	ND
Total Number of Detects		**1**	**1**	**20**	**1**	**4**	**3**	**4**	**0**	**0**	**12**	**2**	**5**	**0**	**2**	**0**	**0**

NA = Not Analyzed
ND = Not Detected



Legend

- Wet Weather Sampling Point
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-2

WET WEATHER MONITORING SITES

Las Vegas Creek at
Lena Street
(Washington Avenue Channel)

C-1 Channel at Warm Springs Road

Duck Creek at
Boulder Highway

Meadows Detention Basin
(at the Alta Channel)

Flamingo Wash at Nellis Boulevard
(Upstream of Las Vegas Wash Confluence)

Las Vegas Wash at Downstream
End of Desert Rose Golf Course
(Downstream of Flamingo Wash Confluence)

Monson Channel at Stephanie Street

Las Vegas Wash at Lake Las Vegas

Sloan Channel at Charleston Boulevard

The Las Vegas Wash site near Desert Rose Golf Course is located at a station previously established by United States Geological Survey (USGS) as part of the National Water Quality Assessment (NAWQA) program.

Monitoring stations on major outfalls were established in 1992 and revised in 1998. The Las Vegas Wash site near Desert Rose Golf Course was established in 1997.

For a more detailed description of these sites, please see the *1998-1999 Annual Report*.

For a discussion on sharing of samplng duties between the permittees and SNWA, see the *2002-2003 Annual Report*.

8.3.2.2 Monitoring Frequency

At each of the sites being monitored, the objective was to collect up to two runoff samples from a “representative” or “typical” storm event. Representative storm events are defined as having a total rainfall depth of 0.1 to 0.8 inches at any rain gage within the drainage area tributary to a monitoring station. For the Las Vegas Wash at Desert Rose Golf Course site, a typical event was defined as having at least 0.1 inches of rainfall at one or more CCRFCD rain gages in at least three of the major outfall watersheds upstream of the site (Western Tributary, Upper Las Vegas Wash, Las Vegas Creek, Flamingo Wash). For the Las Vegas Wash below Lake Las Vegas site, a typical event was defined as having at least 0.1 inches of rainfall at one or more CCRFCD rain gages in at least three of the major outfall watersheds upstream of the site (C-1 Channel, Duck Creek, Western Tributary, Upper Las Vegas Wash, Las Vegas Creek, Flamingo Wash). In order to evaluate seasonal effects, the program included the objective to sample from one storm in the winter/spring period and one storm in the summer/fall period, when possible.

Stormwater was collected for the first three hours of the runoff event or for the entire event, whichever was shorter.

8.3.2.3 Method of Sampling

Automated samplers were installed at most of the monitoring sites for sample collection. This equipment is described in the *1998-1999 Annual Report*. Whenever necessary, grab samples were collected for constituents for which automated sample collection is not recommended by EPA (oil and grease, fecal coliform, fecal streptococci). The Monson Channel and Meadows Detention Basin sites are not equipped with automated samplers; therefore grab samples must be collected at those locations.

8.3.2.4 Types of Samples

Whenever possible, a flow-weighted mean composite sample was collected and analyzed for each storm at each monitoring site. The composite sample is comprised of individual samples collected during the first three hours of runoff. When sampling equipment was not functioning properly or not effective due to low flow depths, grab samples were taken from the flow. These samples were then composited in the laboratory for analysis.

8.3.2.5 Flow/Precipitation Data

Three methods were employed to obtain runoff data used to characterize sampled storm events and prepare the flow-weighted composite samples. At three of the monitoring stations, precipitation data required to determine the “representativeness” of storms in real-time was taken from the CCRFCD computerized on-line gaging system and database. The following sites were monitored by this method:

- Flamingo Wash at Nellis Boulevard
- Range Wash (Sloan Channel) at Charleston Boulevard
- C-1 Channel at Warm Springs Road

Ultrasonic flow meters were used to provide flow data for locations at which rain gages are not close in proximity to the corresponding monitoring site. Monitoring sites that require flow meters are as follows:

- Las Vegas Creek at Lena Street
- Duck Creek at Boulder Highway

The USGS stream gages were used for flow data at the Las Vegas Wash at Desert Rose Golf Course (USGS gage # 094196783), and the Las Vegas Wash below Lake Las Vegas (USGS gage # 09419790).

At the following two sites, there were neither CCRFCD nor USGS stream gages close enough to accurately obtain runoff data:

- Meadows Detention Basin
- Monson Channel at Stephanie Street

8.3.2.6 Constituents Analyzed

The basic list of constituents analyzed for 2003-2004 is shown in **Table 8-8**. These are the same constituents analyzed in previous years. These parameters were selected in accordance with the NPDES permit and NDEP staff recommendations. A short review of constituents sampled in past years is included in the *1998-1999 Annual Report*.

8.3.2.7 Monitoring Equipment

The monitoring equipment used in this reporting period was the same as that used in previous years. A detailed description may be found in the *1998-1999 Annual Report*. An Operations and Maintenance Manual was prepared in 1995 for sampling procedures and monitoring equipment. The Manual is on file with CCRFCD and MWH.

Table 8-9 provides a description of monitoring equipment and the CCRFCD Flood Warning System identification number for stream gages. The Operations and Maintenance Manual contains additional detail on equipment characteristics and specifications.

Equipment installed at the Las Vegas Wash near Desert Rose Golf Course station is the responsibility of USGS.

8.3.2.8 Monitoring Procedures

Sample sets generally consisted of one flow-weighted composite sample and, if possible, a grab sample for analyzing in-situ constituents and other selected pollutants such as oil, grease and bacteria. A description of monitoring procedures may be found in the *1998-1999 Annual Report*. The Las Vegas Valley Wet Weather Monitoring Program was conducted by MWH.

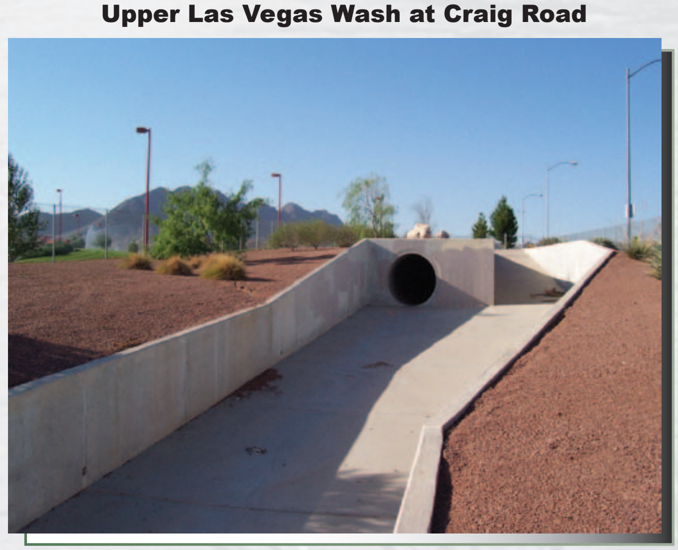
8.3.3 Undisturbed Area Monitoring Program

In 2001-2002, a program was initiated to collect and analyze wet weather runoff samples from undisturbed desert areas adjacent to the Las Vegas Valley urban area. The purpose of the monitoring program was to provide input to the Las Vegas Valley Constituent Load Model, which is very sensitive to assumed pollutant concentrations in undeveloped area runoff.

Two sites were monitored for the Undisturbed Area Monitoring Program in 2003-2004:

- Upper Las Vegas Wash at Craig Road
- Mission Hills Detention Basin at College Drive and Mission Drive

Upper Las Vegas Wash at Craig Road



Mission Hills Detention Basin

Table 8-8

Constituents Analyzed in Wet Weather Samples in 2003-2004

Constituent	Test Method	Constituent	Test Method
TDS	160.1	Nickel, total	200.8
TSS	160.2	Silver, total	200.8
Alkalinity	310.1	Thallium, total	200.8
Bicarbonate	310.1	Zinc, total	200.8
Carbonate	310.1	Mercury, total	245.1
Nitrate	300	Pesticides	614/619
Nitrite	300	Pesticides	508
Bromide	300	SVOC	625
Chloride	300	VOC	624
Sulfate	300	VOC	524.2
Bromate	300.1	Organics	551.1
Chlorate	300.1	Organics	6252
Chlorite	300.1	Organics	504.1
Calcium	200.7	Organics	525.1
Iron	200.7	Organics	531.1
Magnesium	200.7	Organics	515.1
Potassium	200.7	Diuron	532
Silica	200.7	Endothall	548.1
Sodium	200.7	Fluorine	4500
Selenium	200.9	Glyphosphate	547
Arsenic	200.9	Hydroxide	2320
Anion/Cation	1040	Diquat	549.2
PH	150.1	Paraquat	549.2
Specific Conductance	S2510	Fecal Coliform	9221B
Hardness	2340B	Fecal Streptococci	9230
Total Organic Carbon	5310C	Total Phosphorus	365.4
Surfactants	5540	TKN	351.2
Aluminum, Total	200.8	Oil and Grease	413.1
Antimony, Total	200.8	Dissolved Copper	200.8
Barium, Total	200.8	Dissolved Lead	200.8
Beryllium, Total	200.8	Dissolved Zinc	200.8
Cadmium, Total	200.8	Boron	200.7
Chromium, Total	200.8	Herbicides	615
Copper, Total	200.8	Carbon Dioxide	
Lead, Total	200.8	Total Coliform Bacteria	
Manganese, Total	200.8	Langelier Index	

Table 8-9

Monitoring Equipment Summary

Outfall	Sampler	Flow Measurement Device	FWS[1] Sensor ID Number
Las Vegas Creek	ISCO 2700	Ultrasonic Flow Meter	None
Flamingo Wash	ISCO 2700	Stream Gage	4393
Sloan Channel (Range Wash)	ISCO 2700	Stream Gage	4173
Duck Creek[2]	ISCO 2700	Ultrasonic Flow Meter	None (4683 and 4748 as backup)
C-1 Channel	ISCO 2700	Stream Gage	4783
Las Vegas Wash at Lake Las Vegas	ISCO 2700	Stream Gage	None (4543 as backup)

1. CCRFCD Flood Warning System
2. Currently Disabled Due to Construction

One sample was grabbed at the Upper Las Vegas Wash at Craig Road on November 12, 2003.

A list of constituents for the Undisturbed Area Monitoring Program is included in **Table 8-10**.

Table 8-10

Constituents Analyzed For Undisturbed Area Samples, 2003-2004

Parameter	Units
TDS	mg/L
TSS	mg/L
Total Phosphorus-P	mg/L
Nitrate-N by IC	mg/L
Total Kjeldahl Nitrogen	mg/L
Nitrogen, Total	mg/L
Copper, Total, ICAP	mg/L
Lead, Total, ICAP	mg/L
Zinc, Total, ICAP	mg/L
Copper, Dissolved	mg/L
Lead, Dissolved	mg/L
Zinc, Dissolved	mg/L

8.3.4 Results

In 2003-2004, wet weather monitoring was possible during nine storms: July 19, 2003, July 24, 2003, July 25, 2003, July 31, 2003, August 16, 2003, September 4, 2003, November 12, 2003, December 11, 2003, and February 21, 2004. Due to the variability in localized rainfall, not all sites were sampled for each storm. **Table 8-11** shows which site was sampled for each storm and states whether the sampling was a flow weighted composite or a grab sample.

Rainfall and runoff characteristics of each of the monitored events are described below.

8.3.4.1 Precipitation and Streamflow Characteristics

Data on rainfall contributing to the runoff at the eleven active sampling sites was taken from the CCRFCD precipitation data collection and storage system. Rainfall data is collected by recording gages at a time interval of 7 minutes and a minimum rainfall increment of 0.04 inches. A listing of the precipitation gages in each of the sampled watersheds is provided in **Table 8-12**. Refer to **Figure 8-3** for rain gage locations.

Table 8-11

2003 – 2004 Wet Weather Monitoring Events

Location	July 19, 2003	July 24, 2003	July 25, 2003	July 31, 2003	August 16, 2003	September 4, 2003	November 12, 2003	December 11, 2003	February 21, 2004
Las Vegas Creek			Composite		Composite				
Duck Creek		Grab Sample							
C-1 Channel						Composite	Grab Sample		
Las Vegas Wash at Desert Rose	Composite								Composite
Monson Channel				Grab Sample			Grab Sample		
Meadows Detention Basin			Grab Sample					Grab Sample	
Flamingo Wash		Composite			Composite				
Lake Las Vegas*									
Sloan Channel*									
Upper Las Vegas Wash at Craig Road							Grab Sample		
Mission Hills Detention Basin									

* Samples were not taken in 2003-2004 due to lack of rainfall at the site.

Table 8-12

CCRFCD Recording Precipitation Gages in Las Vegas Valley

Las Vegas Wash Main Stem (Northern)	Las Vegas Creek Watershed (Central Basin)	Range Wash Watershed	Flamingo Wash Watershed (Flamingo/ Tropicana)	Duck Creek Watershed (Including Pittman)	C-1 Channel Watershed
4014	4204	4104	4304	4614	4754
4024	4209	4109	4309	4619	4759
4029	4214	4119	4314	4624	4764
4034	4219	4124	4319	4634	4769
4039	4224	4134	4324	4644	4774
4044	4229	4154	4329	4654	4779
4049	4234	4184	4334	4674	4784
4054	4239	4189	4339	4684	4789
4064	4244		4344	4704	4794
4069	4249		4349	4719	4799
4074	4254		4354	4724	4854
4079	4259		4359	4729	5634
4094	4269		4364	4734	
4094	4274		4374	4739	
4509	4279		4379	4744	
4544	4284		4399	4749	
	4289		4404		
	4504		4409		
			4574		

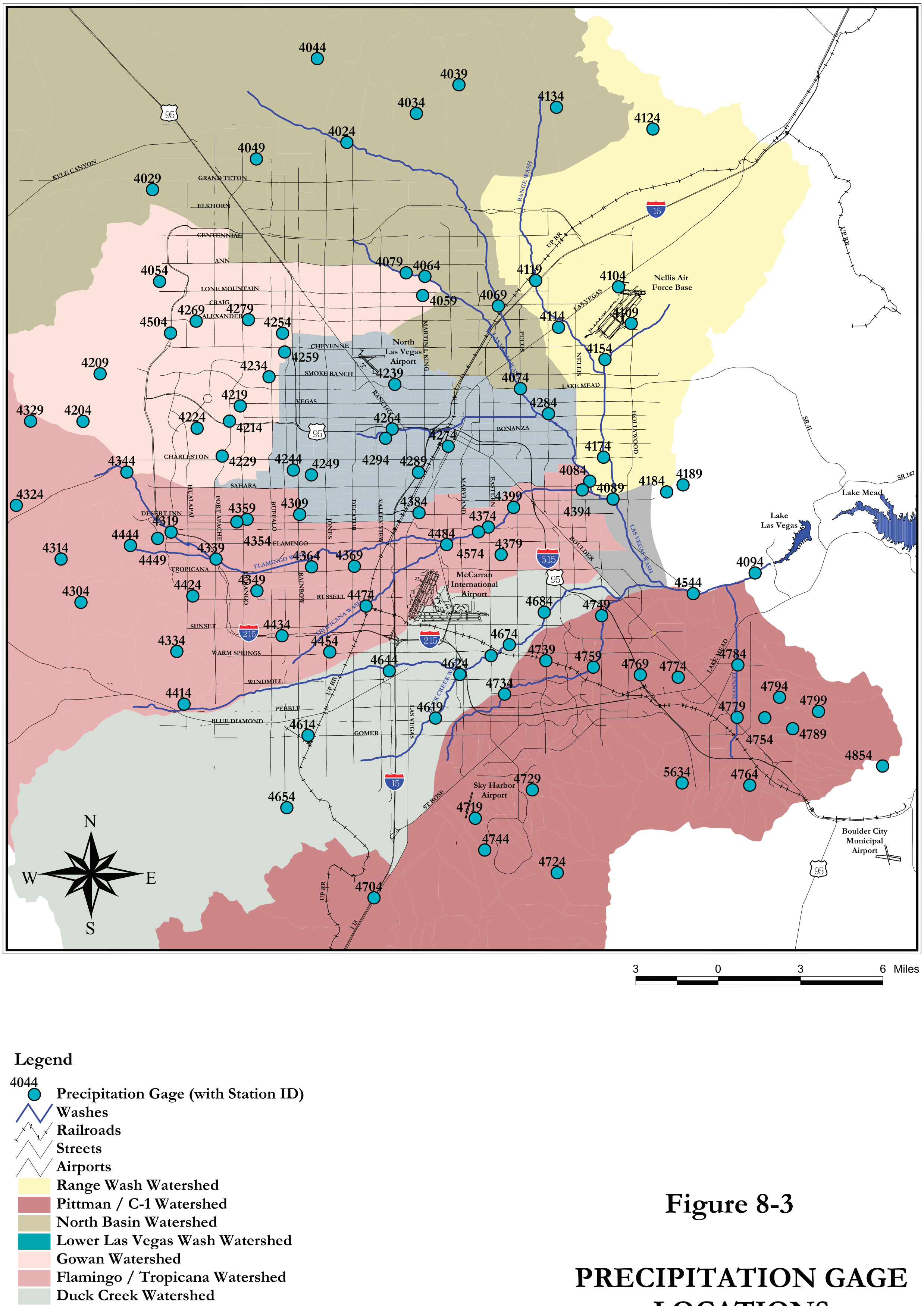


Figure 8-3

PRECIPITATION GAGE LOCATIONS

General characteristics of each of the sampled storm events are described in the following paragraphs.

8.3.4.2 Wet Weather Events

July 19, 2003, Storm - Las Vegas Wash at Desert Rose Golf Course

This was a Valley-wide storm, with pockets of rainfall in the Flamingo Wash watersheds. Most rainfall occurred between 6:00 a.m. and 10:00 a.m. Representative rainfall data for the July 19, 2003, storm is presented in **Figure 8-4**.

The USGS collected samples at the Las Vegas Wash at Desert Rose Golf Course from 7:12 a.m. to 12:41 p.m. **Figure 8-5** represents the hydrograph of the data provided by the USGS for Las Vegas at Desert Rose Golf Course.

July 24, 2003 Storm - Duck Creek, Flamingo Wash at Nellis Boulevard

This was an early afternoon storm in which intense rainfall was concentrated over the southeastern portion of the Las Vegas Valley. Most rainfall occurred between 12:00 p.m. and 3:00 p.m., with heavy rains up to 0.31 inches recorded in the Duck Creek watershed. Representative rainfall data for the July 24, 2003 storm is presented in **Figure 8-6**.

The portion of channel at Duck Creek at Boulder Highway was under construction, so grab samples were taken at a location along Duck Creek upstream of the construction at Boulder Highway. Sampling commenced at 2:00 p.m. with a total of 24 1-liter samples taken at 1-minute intervals until 2:25 p.m. A hydrograph of the data for Duck Creek is presented in **Figure 8-7**.

The data used to create the hydrograph for Duck Creek was taken at the next closest working rain gage, Duck Creek near Tomiyasu Lane, which is upstream of the sample location. The travel time between the gage location and the sample location is approximately 45 minutes.

A composite sample was taken at Flamingo Wash at Nellis Boulevard starting at 2:14 p.m. The automatic sampler was set up to collect samples at 1-minute intervals. A hydrograph of the data for Flamingo Wash at Nellis Boulevard is presented in **Figure 8-8**.

July 25, 2003, Storm - Meadows Detention Basin, Las Vegas Creek

During this Valley-wide storm, most rainfall occurred between 11:00 a.m. and 1:00 p.m., with some areas receiving up to 0.47 inches of total rainfall throughout the storm. Representative rainfall data for the July 25, 2003 storm is presented in **Figure 8-9**.

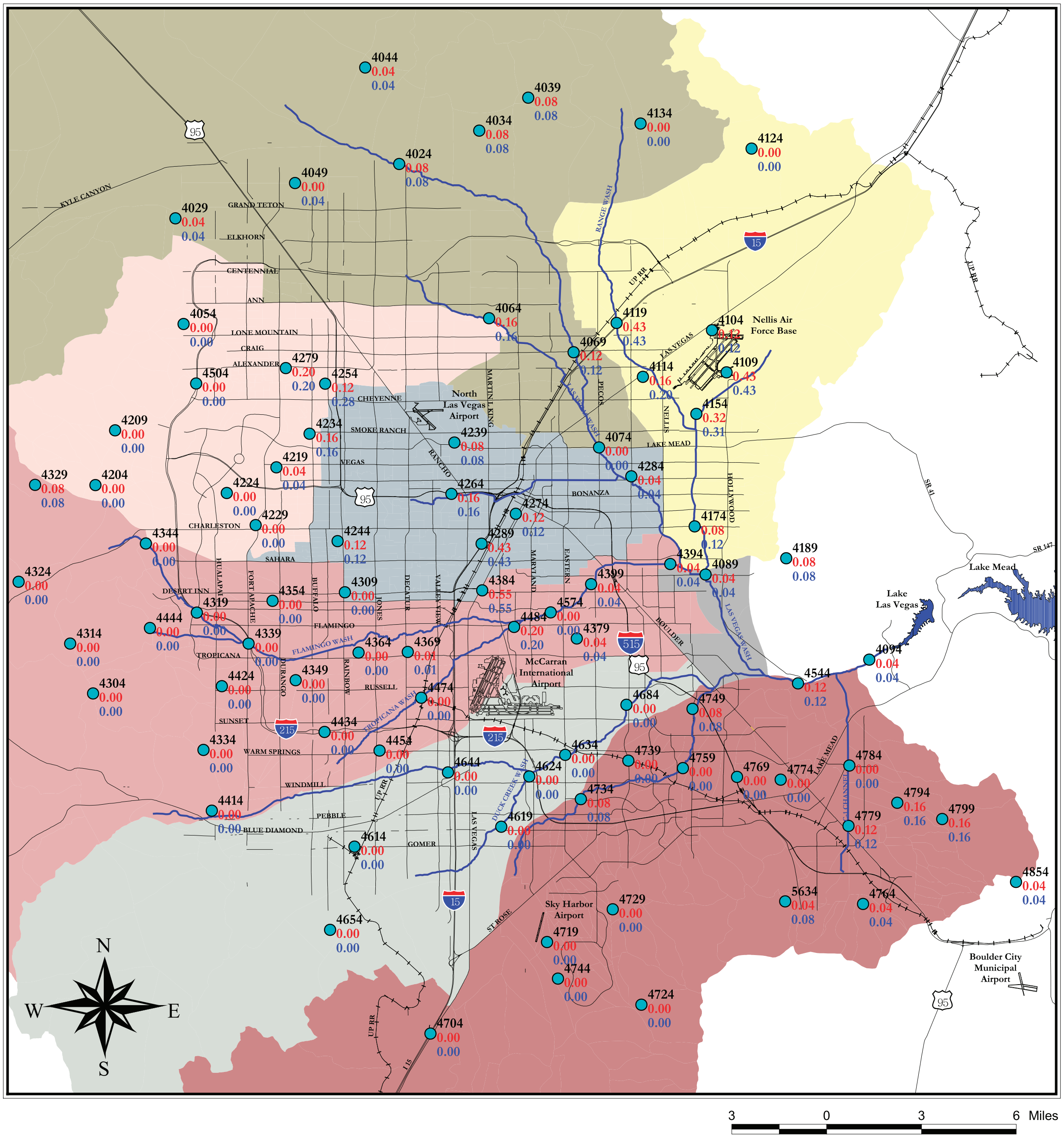
Grab samples were collected along the Alta Channel upstream of the Meadows Detention Basin at 12:18 p.m. The weather at the time of sampling was overcast with slight precipitation and variable winds. The grab samples were drawn from the concrete trapezoidal Alta Channel at 1-minute intervals. A hydrograph was not created for Meadows Detention Basin since sampling occurred upstream of the basin, and the gage is located downstream of the basin.

At Las Vegas Creek, samples were obtained at 12:50 p.m. The weather at the time of sampling was moderate precipitation and variable winds. The samples were collected every minute, by the automatic sampler. From the water level recorded by the gage and using the corresponding rating curve, the discharge at Las Vegas Creek was estimated to be 80 cfs to 90 cfs.

July 31, 2003, Storm - Monson Channel

This afternoon storm was Valley-wide with most rainfall occurring between noon and 3:00 p.m. One rain gage in the Flamingo Wash read as much as 0.75 inches of rain. Representative rainfall data for the July 31, 2003, storm is presented in **Figure 8-10**.

At Monson Channel, there is no automatic sampler, so grab samples were obtained. The weather was overcast with slight precipitation and variable winds. The samples were grabbed every minute from the middle of Monson Channel downstream of Stephanie Street. The water level had increased by 2 inches from the time sampling started until completion.



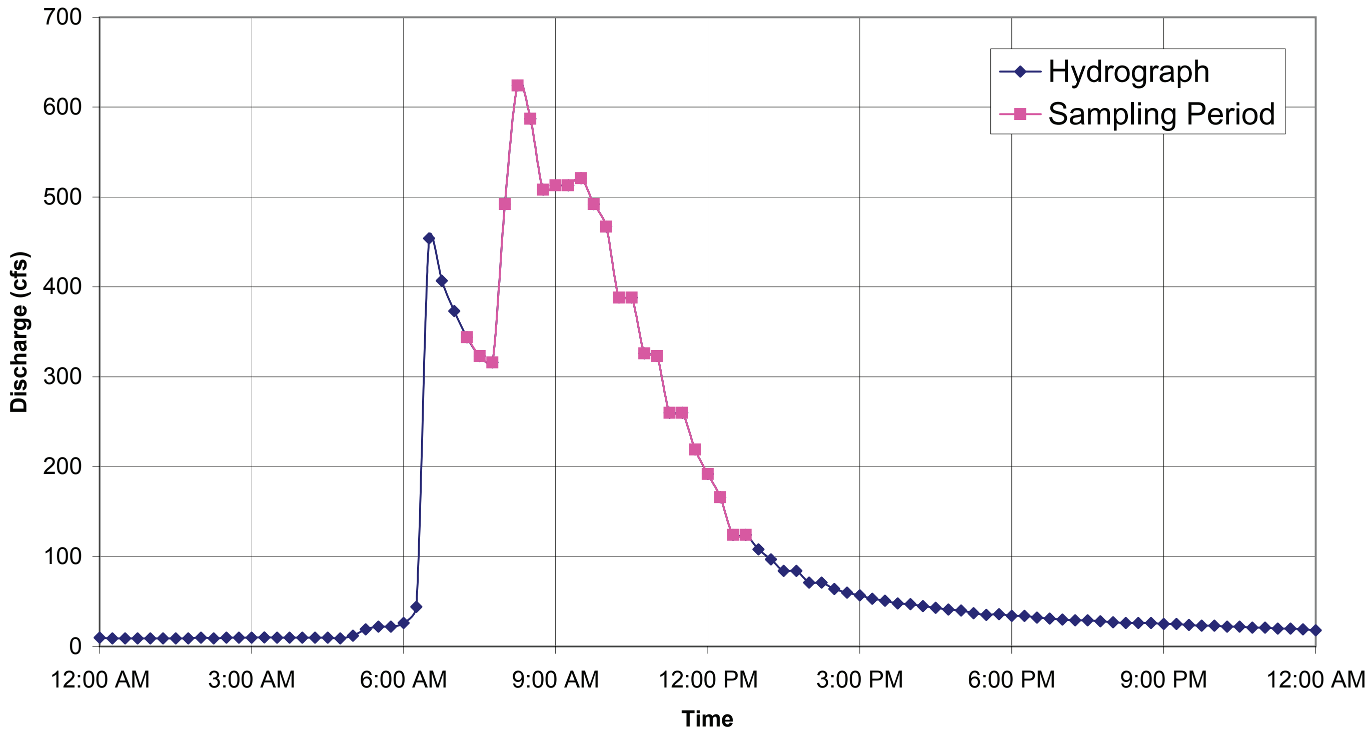
Legend

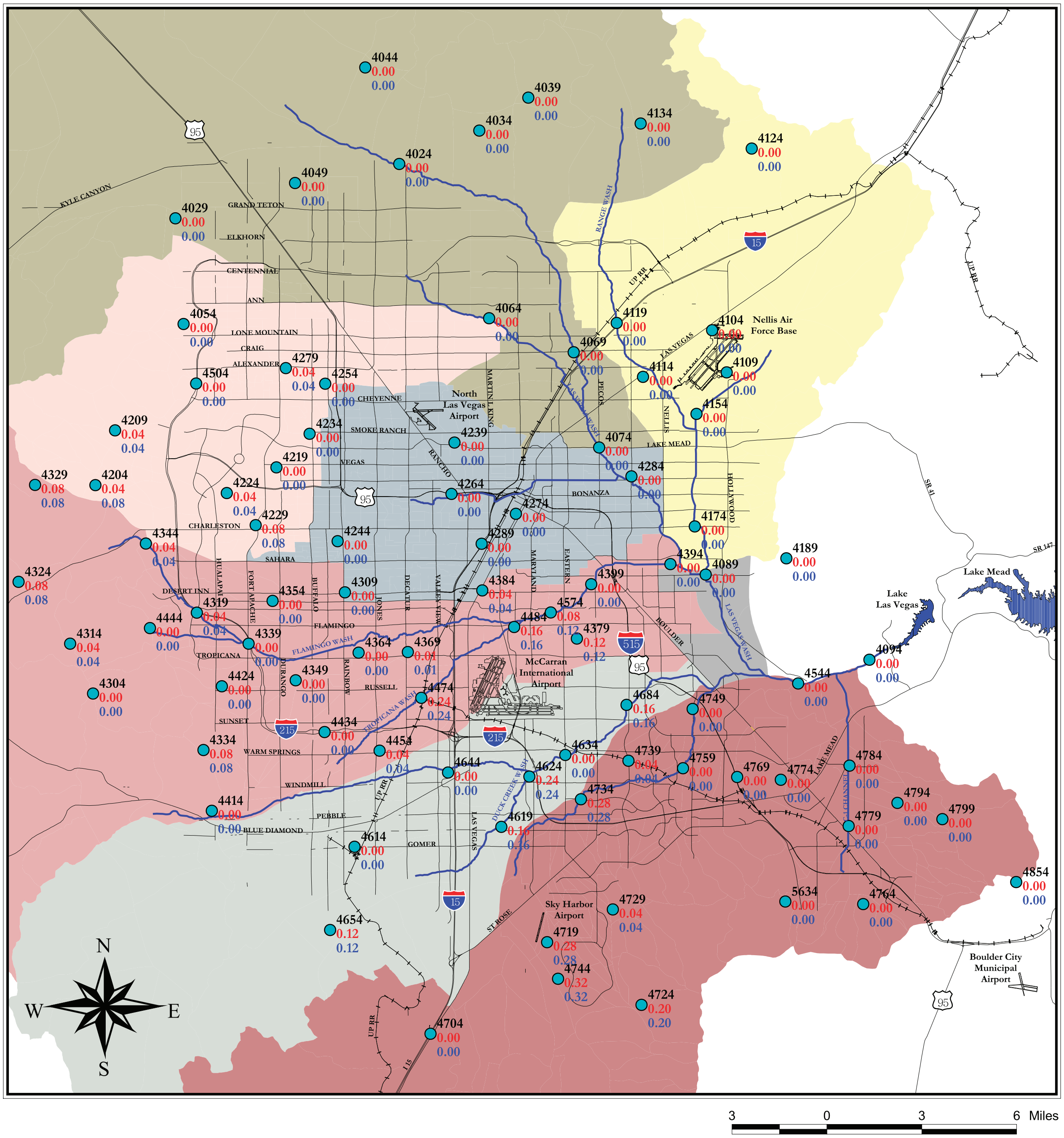
- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-4

JULY 19, 2003
STORM RAINFALL

Figure 8-5
Las Vegas Wash at Desert Rose Golf Course Hydrograph
July 19, 2003, Storm





Legend

Precipitation Gage

4044 Station ID

0.00 3-hour Rainfall Total

0.00 Storm Rainfall Total

Washes

Railroads

Streets

Airports

Range Wash Watershed

Pittman / C-1 Watershed

North Basin Watershed

Lower Las Vegas Wash Watershed

Gowan Watershed

Flamingo / Tropicana Watershed

Duck Creek Watershed

Central Watershed

Figure 8-6

JULY 24, 2003
STORM RAINFALL

Figure 8-7
Duck Creek Hydrograph
July 24, 2003, Storm

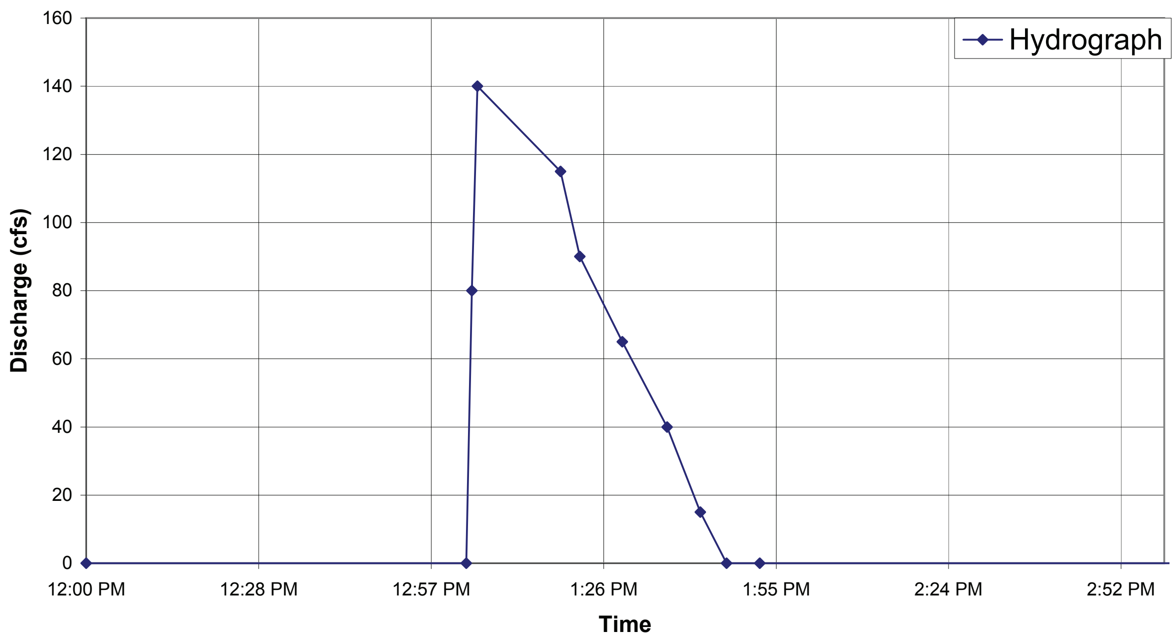
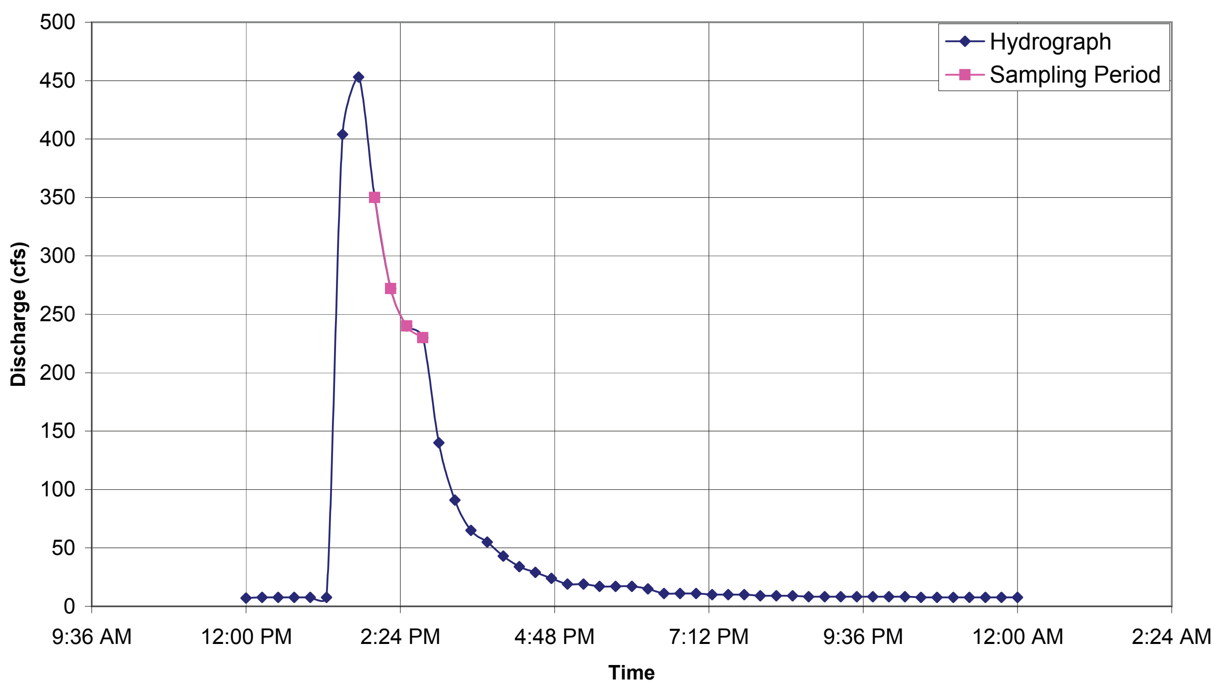
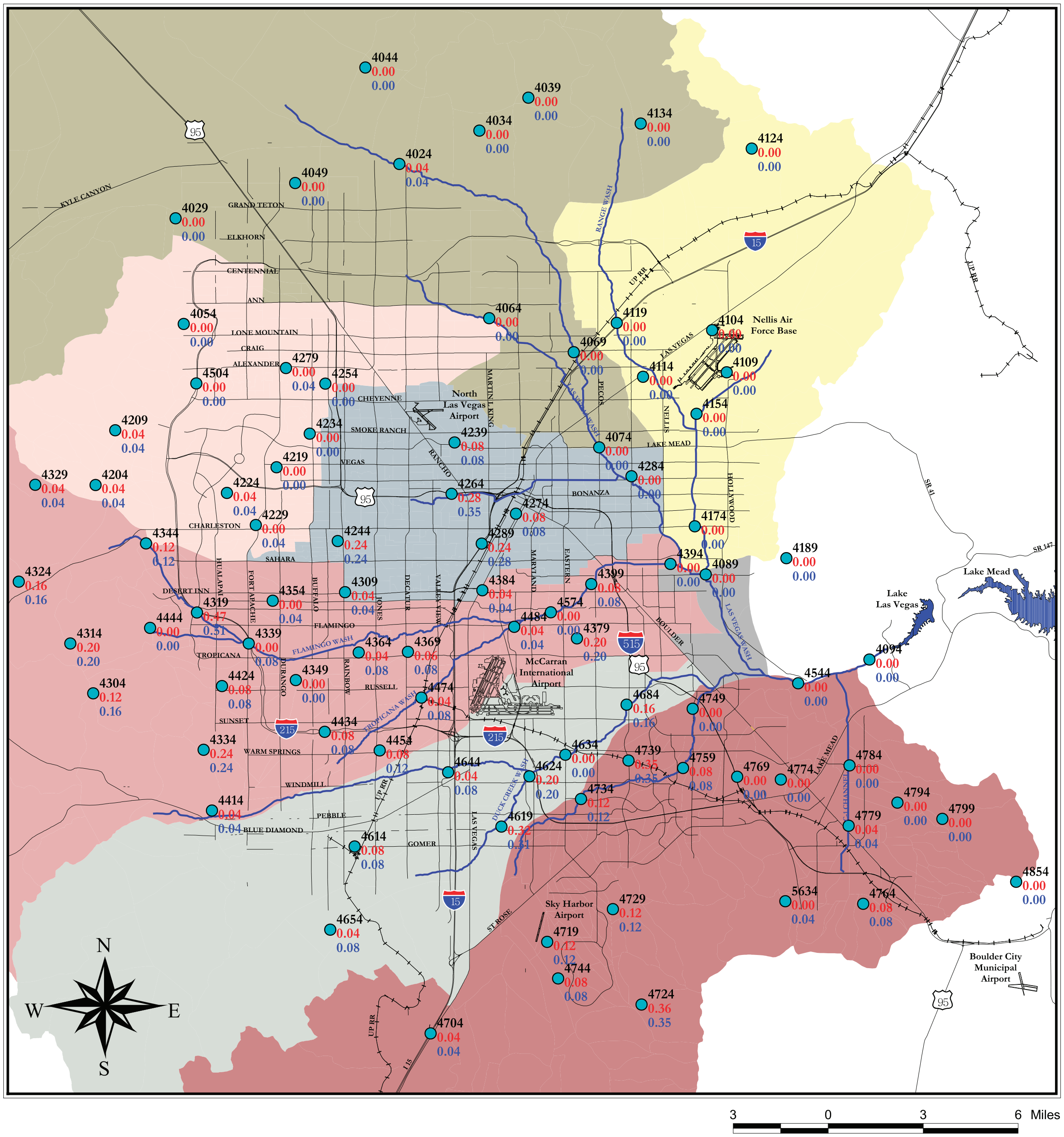


Figure 8-8
Flamingo Wash at Nellis Boulevard Hydrograph
July 24, 2003, Storm



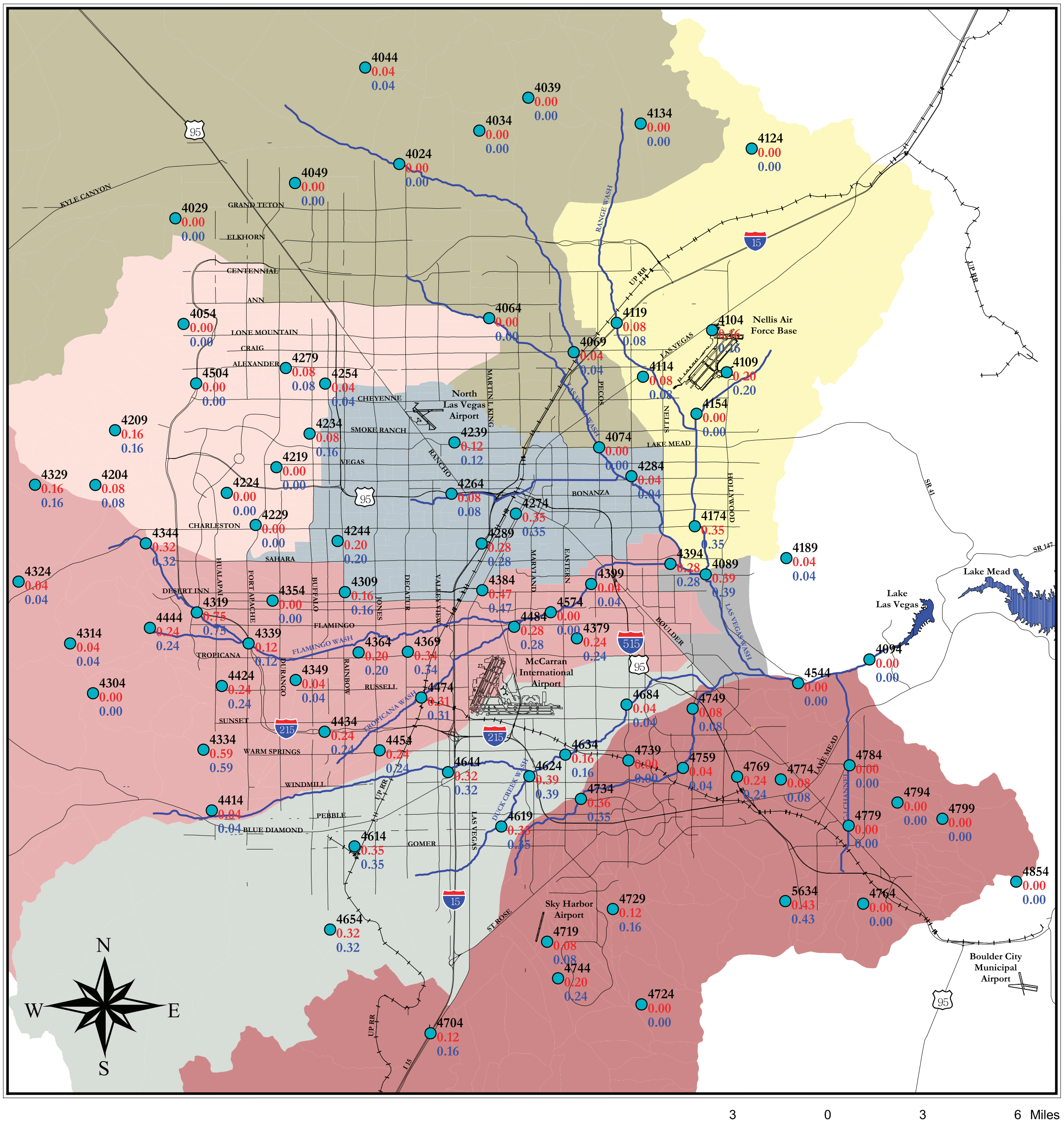


Legend

- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-9

JULY 25, 2003
STORM RAINFALL



Legend

Precipitation Gage

4044 Station ID

0.00 3-hour Rainfall Total

0.00 Storm Rainfall Total

Washes

Railroads

Streets

Airports

Range Wash Watershed

Pittman / C-1 Watershed

North Basin Watershed

Lower Las Vegas Wash Watershed

Gowan Watershed

Flamingo / Tropicana Watershed

Duck Creek Watershed

Central Watershed

Figure 8-10

JULY 31, 2003 STORM RAINFALL

August 16, 2003, Storm - Flamingo Wash at Nellis Boulevard, Las Vegas Creek

This mild late evening storm was concentrated through the central portion of the Las Vegas Valley. The storm started around 8:30 p.m. and continued until about 10:00 p.m. Representative rainfall data for the August 16, 2003, storm is presented in **Figure 8-11**.

At Flamingo Wash, samples were obtained at 10:00 p.m. The samples were collected every 2 minutes, by the automated sampler. At Las Vegas Creek, samples were obtained at 10:00 p.m. The samples were collected every 2 minutes, by the automated sampler. A hydrograph of the data for Flamingo Wash is presented in **Figure 8-12**.

September 4, 2003, Storm - C-1 Channel

This afternoon storm was concentrated over the southern portion of the Las Vegas Valley. Localized heavy rain was noted, with some gages in the southeast measuring up to 0.55 inches. The storm started around 3:00 p.m. and continued until about 5:00 p.m. Representative rainfall data for the September 4, 2003, storm, is presented in **Figure 8-13**.

At C-1 Channel, the automated sampler did not initiate on its own, and the peak of the hydrograph was missed. The sampler was triggered manually at 5:45 p.m. with no time interval set between samples. A hydrograph of the data for C-1 Channel is presented in **Figure 8-14**.

November 12, 2003, Storm - C-1 Channel, Monson Channel, Upper Las Vegas Wash at Craig Road

This Valley-wide winter storm consisted of constant light rainfall from 8:00 a.m. to 6:00 p.m, with some pockets of intense rainfall. The average rainfall precipitation depths were 0.45 inches with maximum rainfall up to 0.71 inches. Representative rainfall data for the November 12, 2003, storm is presented in **Figure 8-15**.

At C-1 Channel, the automated sampler did not initiate on its own, so grab samples were taken. The water depth in the channel was about 2 inches and grab samples were taken from the middle of the channel. Sampling began at 3:14 p.m. with 1-minute intervals between samples. The weather was overcast with temperatures around 40°F, with constant precipitation. A hydrograph of the data for C-1 Channel is presented in **Figure 8-16**.

There is no automatic sampler at Monson Channel, so grab samples were obtained at 4:20 p.m. The weather was overcast with slight precipitation and variable winds. Samples were grabbed every minute from the middle of Monson Channel at a location along the south bank, downstream of Stephanie Street. The water was around 1 to 2 feet in depth in the middle of the channel.

A sample was collected at the Upper Las Vegas Wash at Craig Road, which is an undisturbed area. Samples were grabbed manually from the north bank of the earthen channel. The water depth was 6 inches to 12 inches.

December 11, 2003, Storm - Meadows Detention Basin

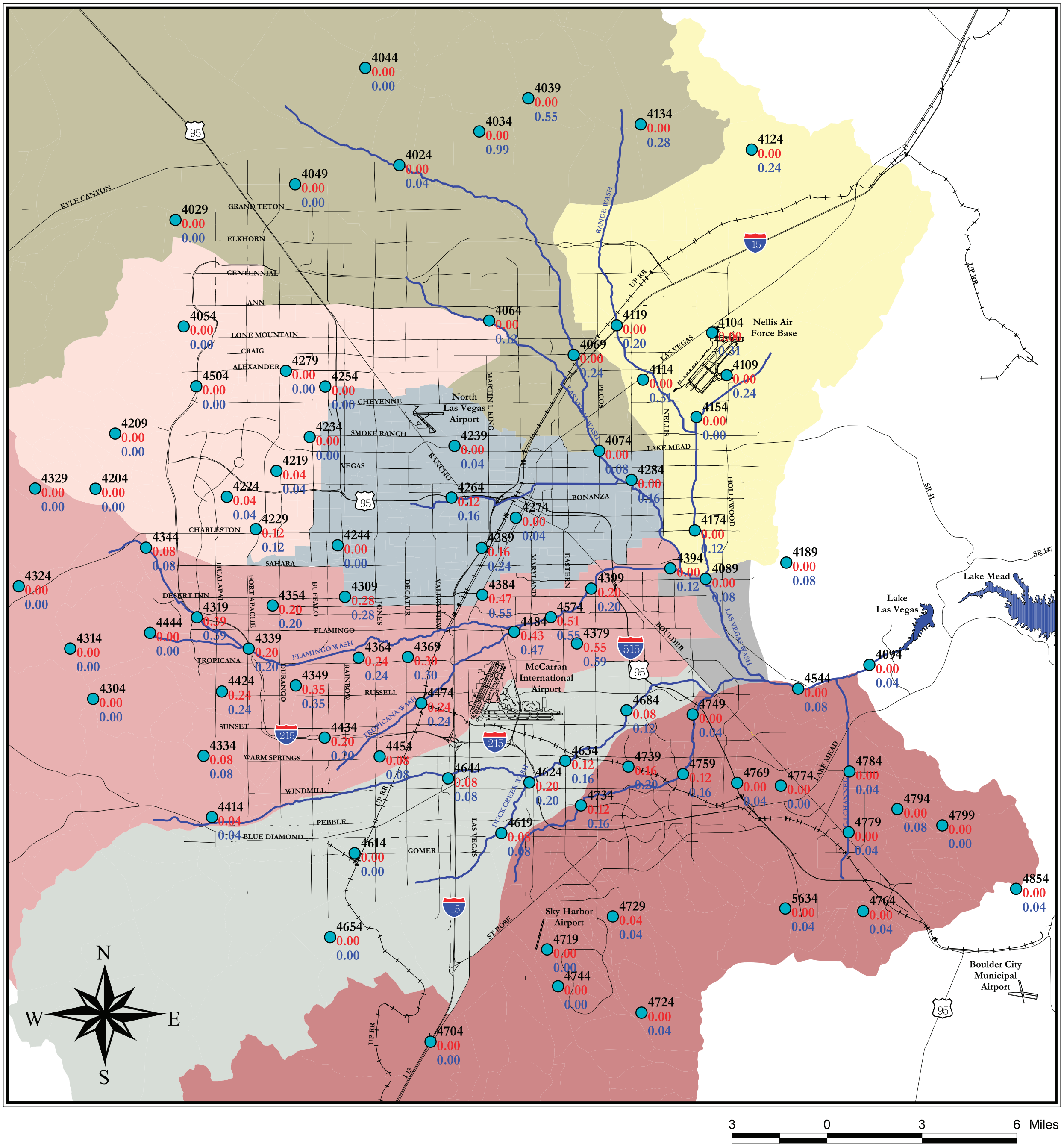
This was a Valley-wide storm, with constant light precipitation from 10:00 a.m. through the night. The average rainfall precipitation depths were 0.16 inches with maximums up to 0.32 inches. Representative rainfall data for the December 11, 2003 storm is presented in **Figure 8-17**.

Grab samples were collected from the Meadows Detention Basin at 3:30 p.m. The weather at the time of sampling was 40°F with light precipitation and variable winds. The grab samples were drawn from the west bank of concrete trapezoidal Alta Channel at 1-minute intervals.

February 21, 2004, Storm - Las Vegas Wash at Desert Rose Golf Course

This was a Valley-wide storm, which lasted from the early morning until early evening. Most rainfall occurred between 6:00 a.m. and 12:00 p.m. Representative rainfall data for the February 21, 2004 storm is presented in **Figure 8-18**.

The USGS collected samples at the Las Vegas Wash at Desert Rose Golf Course from 9:00 a.m. to 1:30 p.m. **Figure 8-19** represents the hydrograph of the data provided by the USGS for Las Vegas Wash at Desert Rose Golf Course.



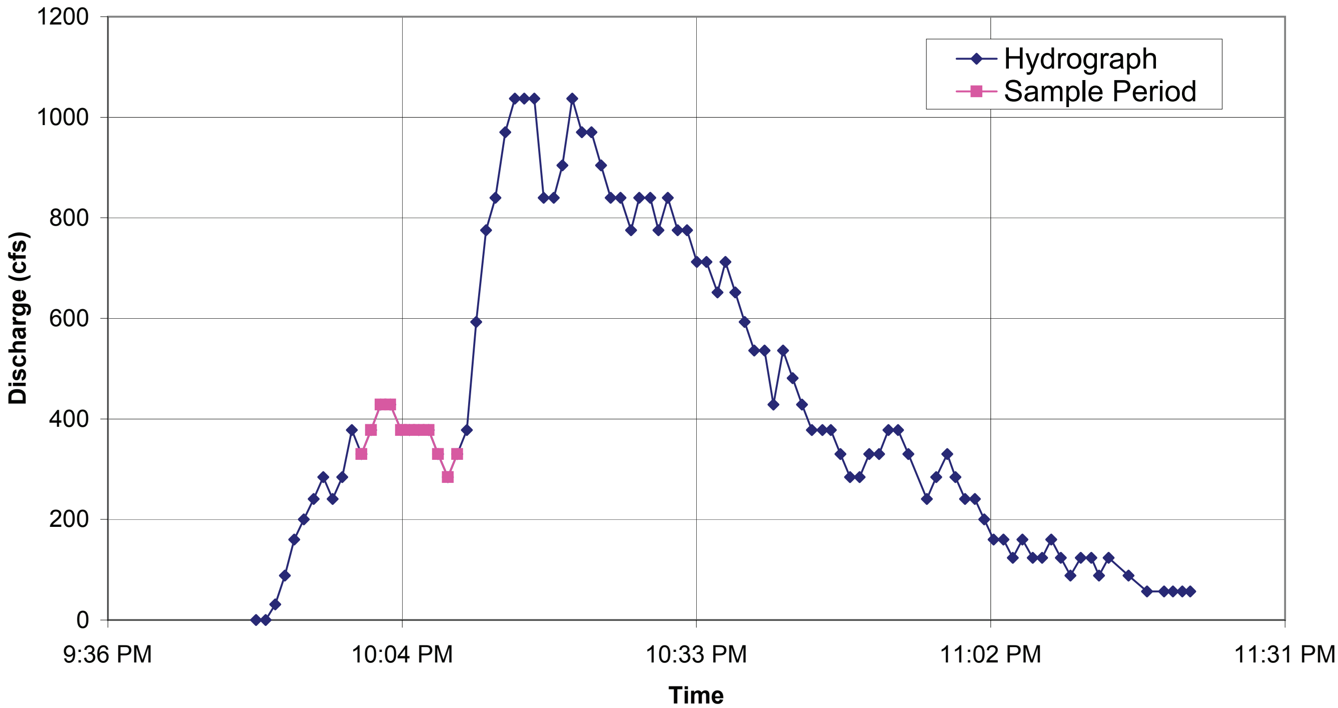
Legend

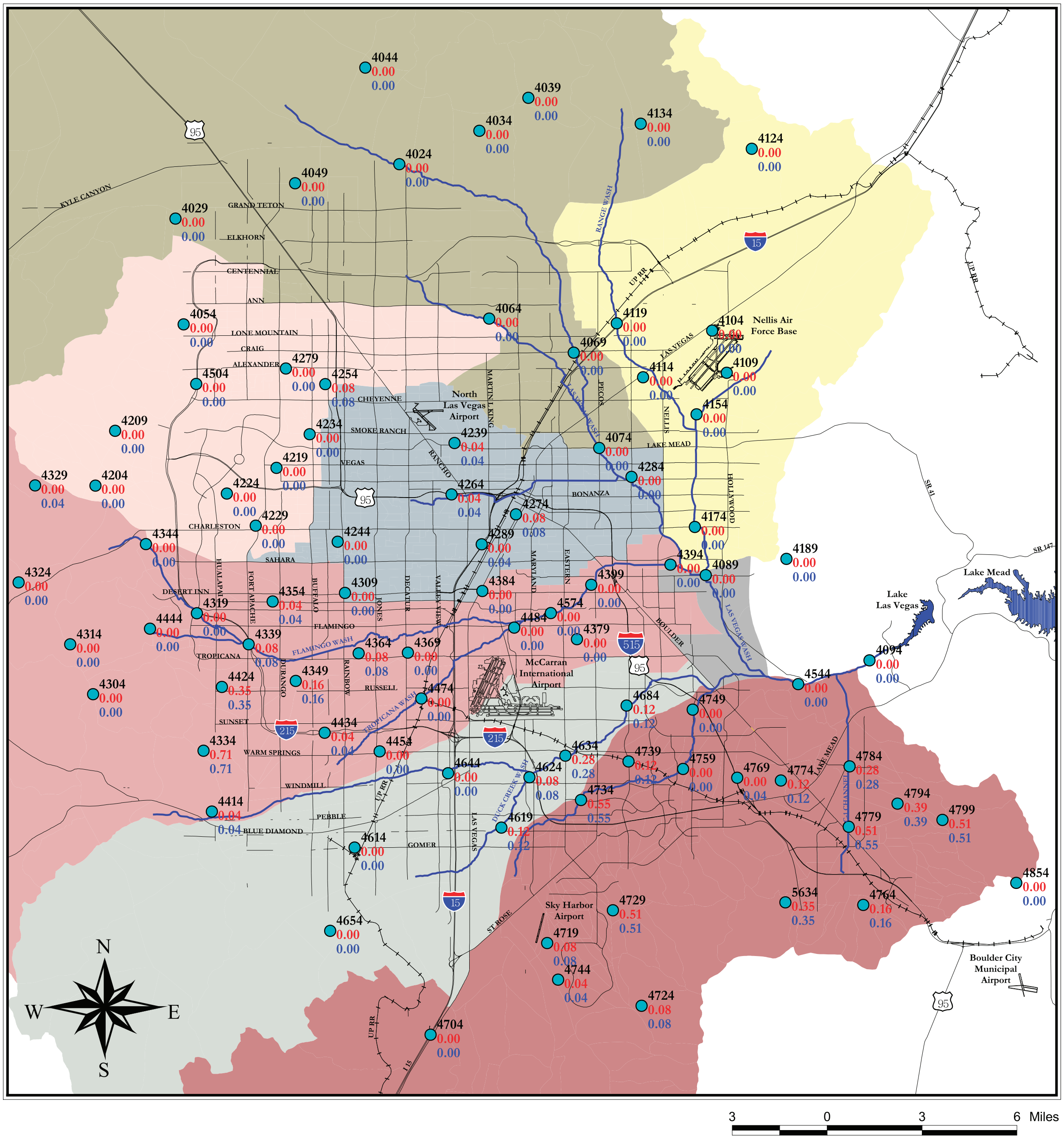
- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-11

AUGUST 16, 2003 STORM RAINFALL

Figure 8-12
Flamingo Wash at Nellis Boulevard Hydrograph
August 16, 2003, Storm





Legend
- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-13

SEPTEMBER 4, 2003 STORM RAINFALL

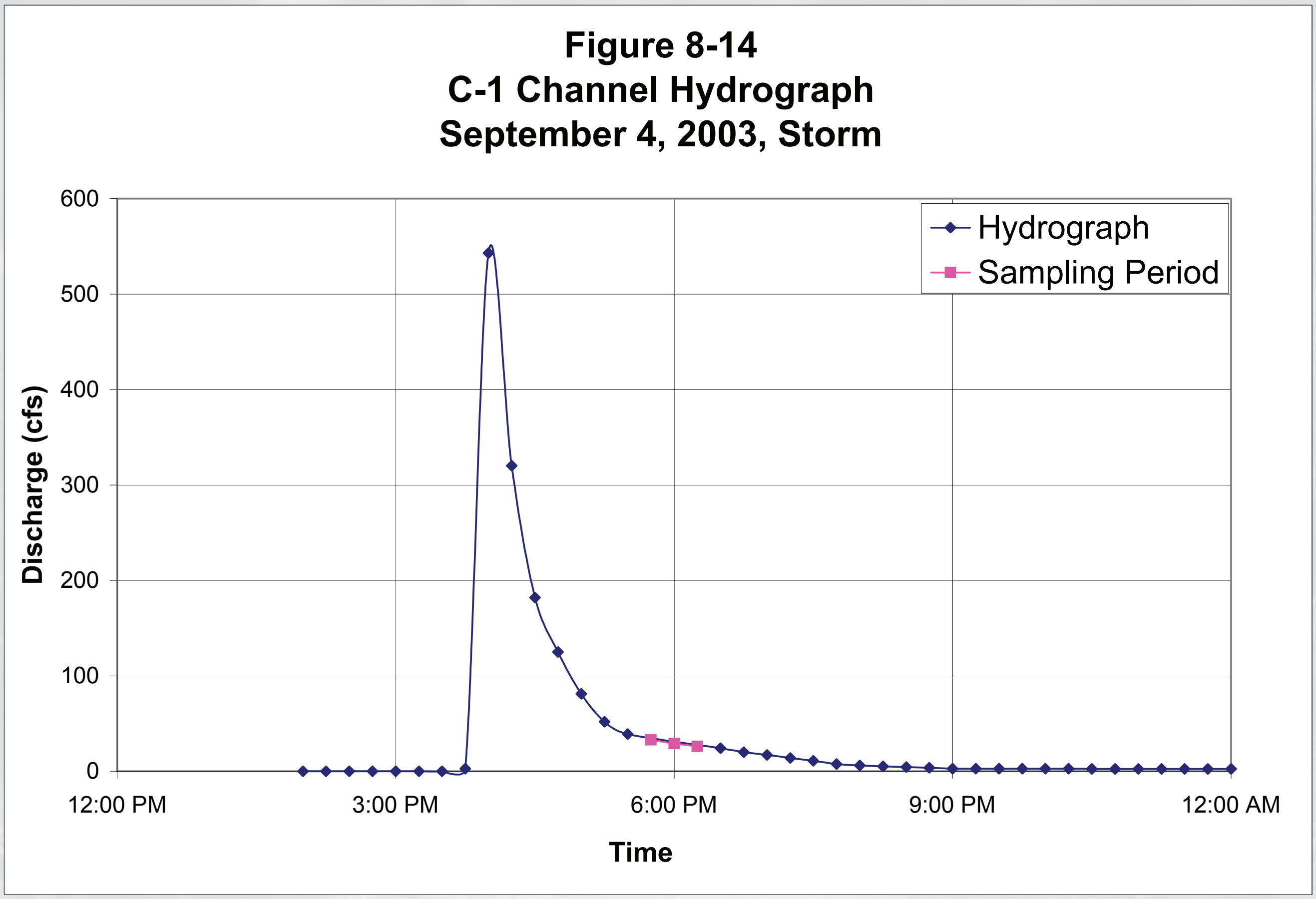
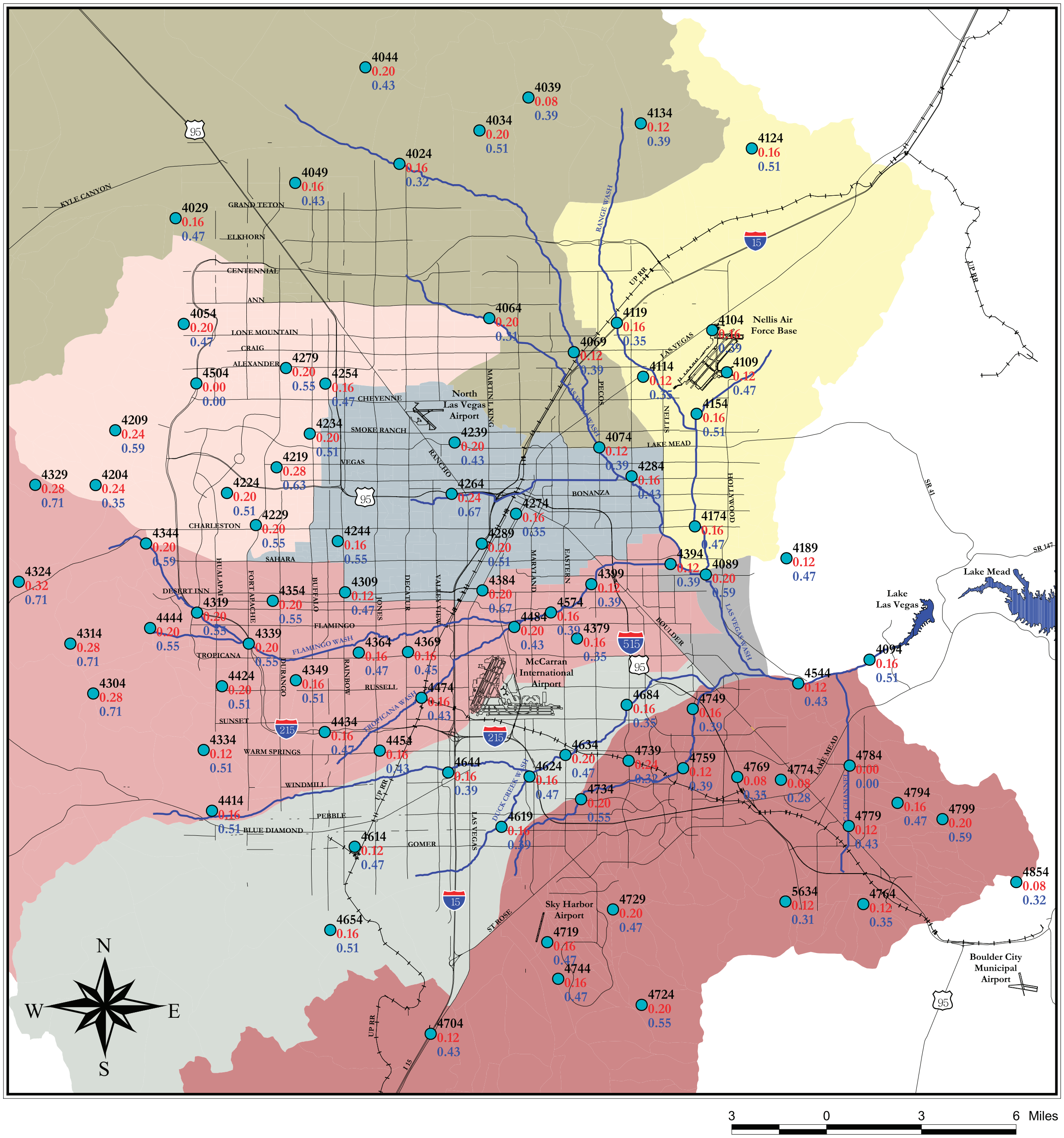


Figure 8-14
C-1 Channel Hydrograph
September 4, 2003, Storm
Discharge (cfs)
600
500
400
300
200
100
0
12:00 PM
3:00 PM
6:00 PM
9:00 PM
12:00 AM
Time
Hydrograph
Sampling Period



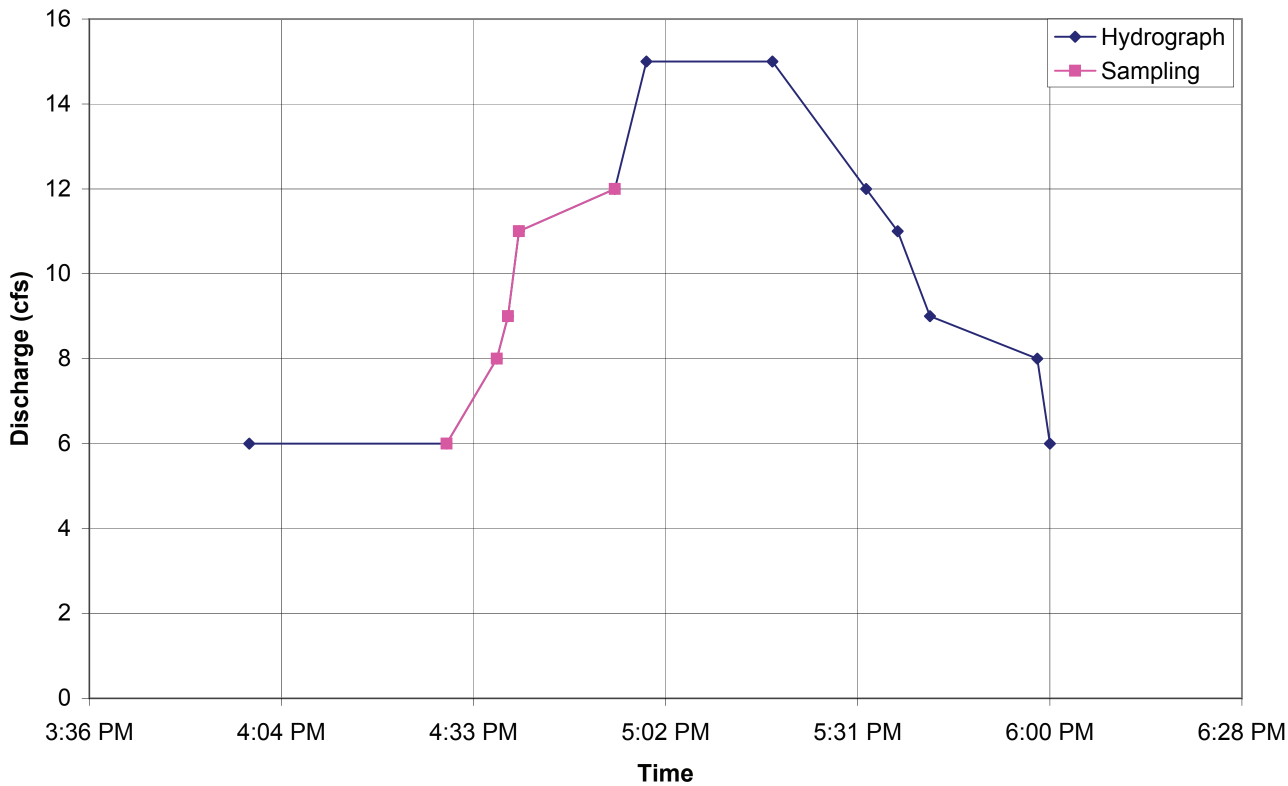
Legend

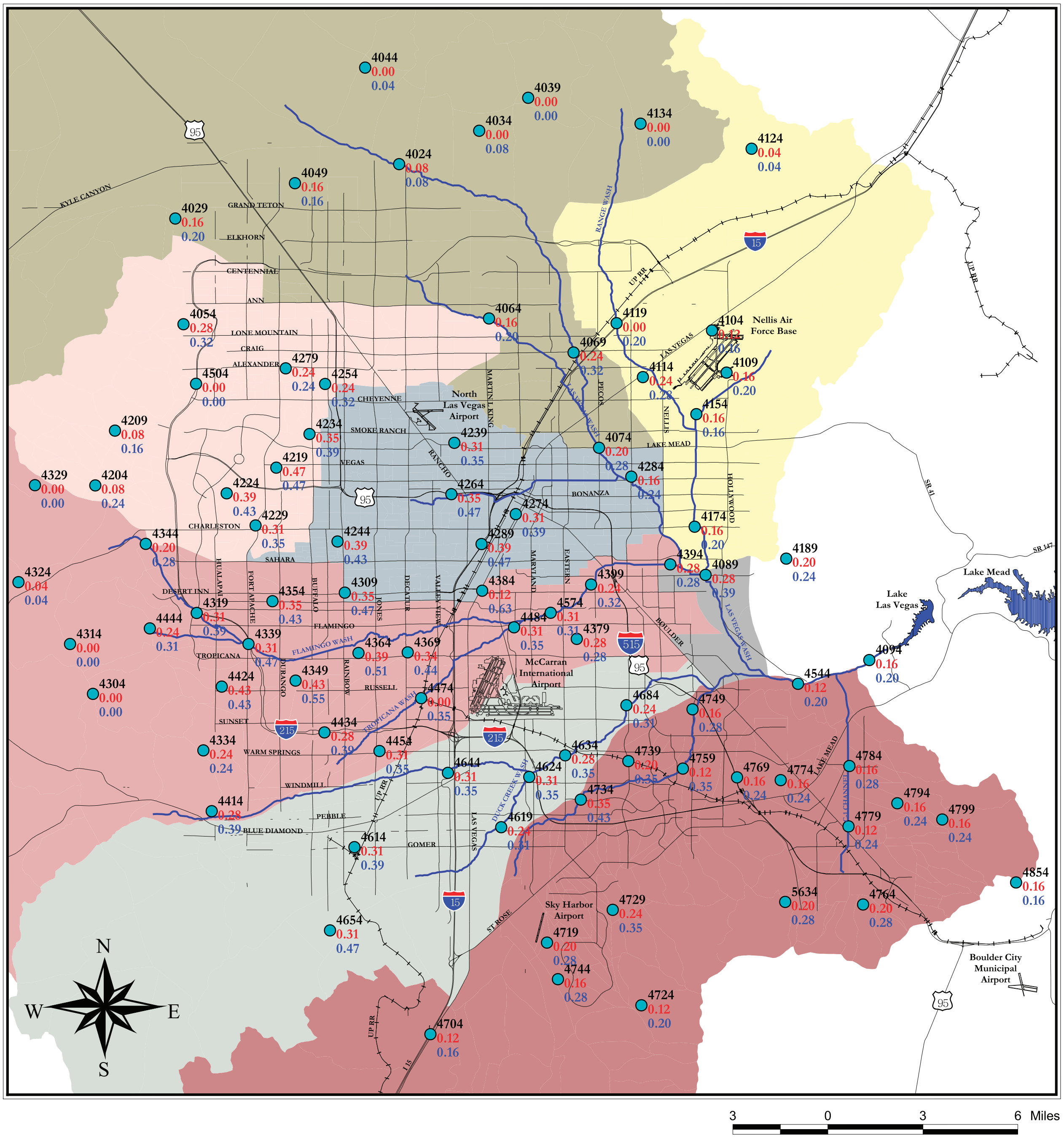
- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-15

NOVEMBER 12, 2003
STORM RAINFALL

Figure 8-16
C-1 Hydrograph
November 11, 2003, Storm

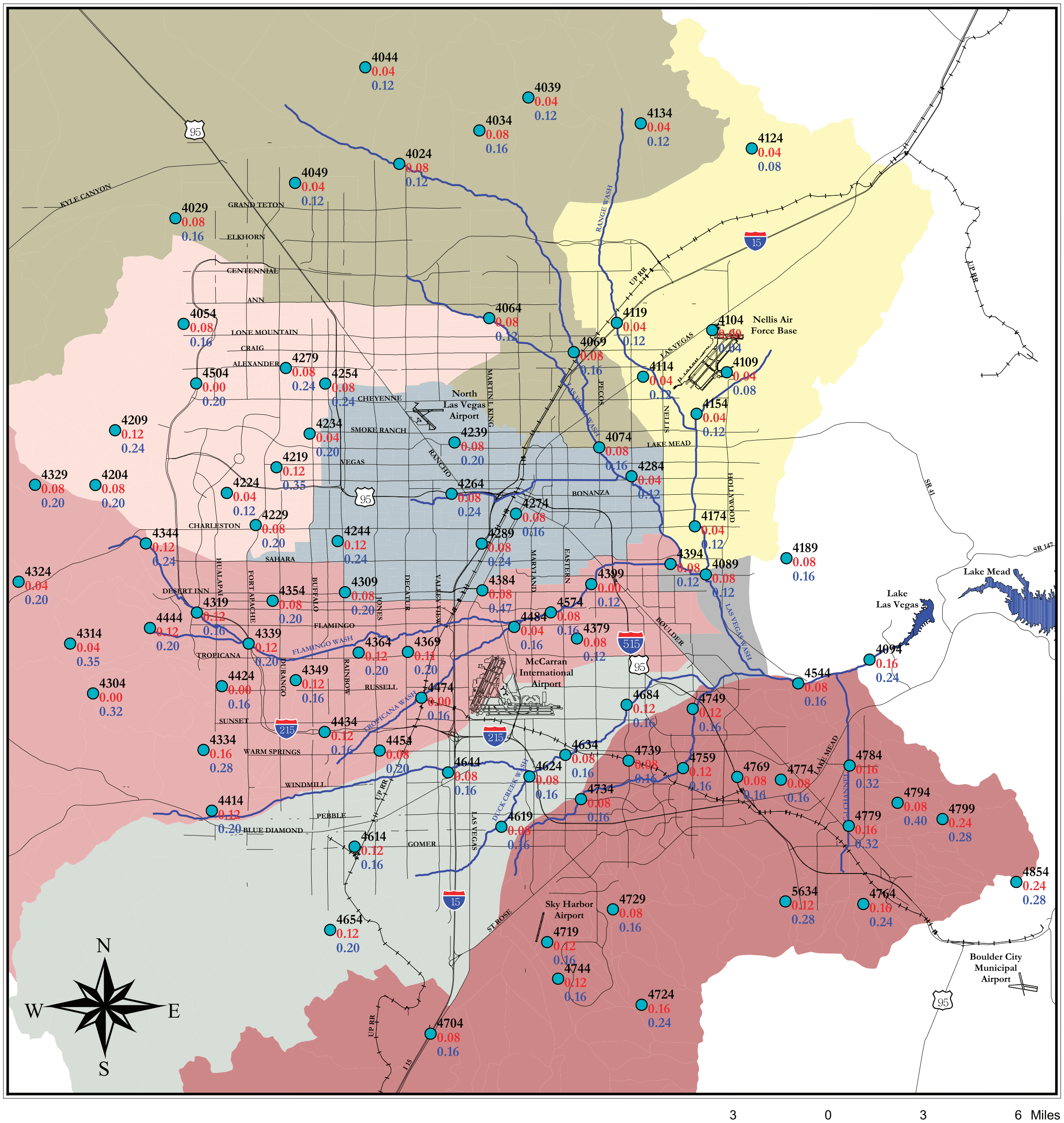




Legend
- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-17

DECEMBER 11, 2003 STORM RAINFALL



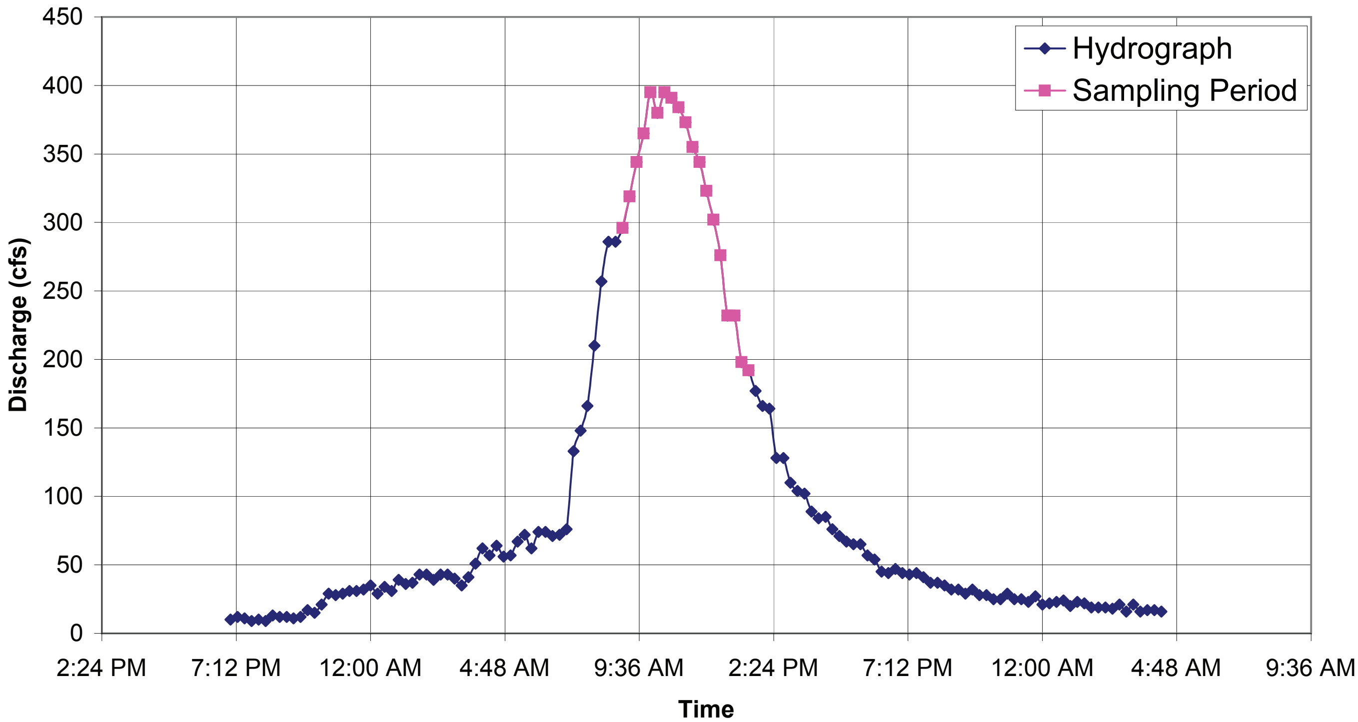
Legend

- Precipitation Gage
- 4044 Station ID
- 0.00 3-hour Rainfall Total
- 0.00 Storm Rainfall Total
- Washes
- Railroads
- Streets
- Airports
- Range Wash Watershed
- Pittman / C-1 Watershed
- North Basin Watershed
- Lower Las Vegas Wash Watershed
- Gowan Watershed
- Flamingo / Tropicana Watershed
- Duck Creek Watershed
- Central Watershed

Figure 8-18

FEBRUARY 21, 2004
STORM RAINFALL

Figure 8-19
Las Vegas Wash at Desert Rose Golf Course Hydrograph
February 21, 2004, Storm



8.3.4.3 Water Quality

For each of the monitored outfalls experiencing significant runoff, flow-weighted water quality samples were analyzed for the constituents listed previously. Due to the number of storms and quantity of samples during 2003-2004, three tables were created to present the pollutant concentrations. **Table 8-13a** presents the pollutant concentrations for the July 2003 storm runoff events. **Table 8-13b** presents pollutant concentrations for the storms from August 2003 through November 2003. **Table 8-13c** consists of the pollutant concentrations during the December 2003 and February 2004 storm events.

Table 8-14a presents data and statistics for wet weather monitoring from 1992 through 2004 for the originally tested constituents. The results for the additional constituents added during the 2001-2002 expansion can be found in **Table 8-14b**.

8.3.5 Findings

8.3.5.1 Typical Concentrations

Table 8-15 presents "typical" wet weather pollutant concentrations for the sampled storms in 1992 through June 2004, and an overall value representing the current period of record. Due to the great variability in wet weather constituent concentrations, derivation of a "typical" concentration can sometimes be somewhat arbitrary. In the case of overall typical values presented in **Table 8-15**, typical concentrations have been taken to be the median of the sample set. These typical values are based on as many as three storms per year and 21 storms for the full period of record at each monitoring site, and are considered to be representative of overall stormwater quality characteristics.

Table 8-14a shows that despite the limited number of storms sampled in each year and the large variability of water quality between storms and between sites, the overall average pollutant concentrations are quite

Table 8-13a, b, and c
Table 8-14a and b

11 by 17 Pullouts

Table 8-13a

Wet Weather Monitoring Data 2003-2004

	Parameter	Units	Las Vegas Wash at Desert Rose LVW-100-DS Wet Weather Composite 19-Jul-03	Flamingo Wash FL-100-FW Wet Weather Composite 24-Jul-03	Duck Creek DC-100-FW Wet Weather Composite 24-Jul-03	Las Vegas Creek LVC-100-FW Wet Weather Composite 25-Jul-03	Meadows Detention Basin LVC2-100-05 Wet Weather Composite 25-Jul-03	Monson Channel MC-2-100-DS Wet Weather Composite 31-Jul-03	1992 - 2004 Median
NPDES Constituents	Oil and Grease - Gravimetric	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<3
	Total Dissolved Solid (TDS)	mg/L	1,330	790	3,290	580	310	800	885
	Total Suspended Solids (TSS)	mg/L	500	2,230	1,080	880	490	170	580
	Total phosphorus-P	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.96
	Orthophosphate-P	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.18
	Nitrite, Nitrogen by IC	mg/L	1.2	<0.5	1.8	0.23	<.10	0.18	0.2
	Nitrate-N by IC	mg/L	0.63	1.8	2.8	2.7	3.3	2.9	1.7
	Kjeldahl Nitrogen	mg/L	7.7	6.6	6.2	18	7.6	7.9	4.9
	Nitrogen, Total	mg/L	9.53	8.4	10.8	20.93	10.9	10.98	7.3
	Ammonia Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	0.6
	Copper, Total, ICAP	mg/L	0.075	0.17	<0.2	0.066	0.11	0.058	0.044
	Lead, Total, ICAP	mg/L	0.02	0.074	0.019	0.043	0.04	0.012	0.086
	Zinc, Total, ICAP	mg/L	0.25	1.1	0.14	0.45	0.51	0.21	0.23
	Copper, ICAP, Dissolved	mg/L	0.02	<0.01	<0.02	<0.01	<0.01	<0.01	0.01
	Lead, ICAP, Dissolved	mg/L	<0.1	<0.10	<0.2	<10	<10	<0.10	<0.1
	Zinc, ICAP, Dissolved	mg/L	0.052	0.023	<.04	0.042	0.09	<.02	0.023
	Boron, Total, ICAP	mg/L	0.33	0.24	1.3	0.22	0.13	0.29	0.24
	Fecal Coliform Bacteria	MPN/100 mL	N/A	>1,600,000	>1,600,000	900,000	160,000	>1,600,000	24,000
	Fecal Streptococci	MPN/100 mL	N/A	170,000	80,000	500,000	1,600,000	1,600,000	60,000
	SOCs	# of Detects	0	3(ii,jj,kk)	7(d,e,f,g,h,q,ll)	8(g,m,n,o,p,q,r,s)	8(z,aa,bb,cc,dd,ee,ff,gg)	8(c,d,e,f,g,h,i,j)	
	Volatile Organic Compounds	# of Detects	1(a)	2(k,l)	1(l)	1(k)	1(k)	1(k)	
	Pesticides	# of Detects	0	0	0	4(t,u,v,w)	0	1(l)	
	Herbicides	# of Detects	0	0	0	2(x,y)	1(hh)	0	
SNWA Expansion Constituents	2-Chloroethylvinylether	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5
	Alkalinity in CaCO3	mg/L	138	105	127	127	94	73	95
	Aluminum, Total, ICAP	mg/L	6.2	<2.5	17	2.0	6.1	2.5	2.5
	Anion Sum, Calculated	meq/L	15.8	10.8	49.7	8.27	3.32	8.44	8.3
	Antimony, Total, ICAP	ug/L	4.7	<10	<10	3.5	13	<10	4
	Arsenic, Total GF	mg/L	0.01	0.017	0.06	0.0094	0.0074	0.009	0.015
	Barium, Total, ICAP	mg/L	0.19	0.49	0.31	0.16	0.28	0.11	0.12
	Beryllium, Total, ICAP	ug/L	<1	<10	<10	<1	<10	<10	1
	Bicarbonate Alkalinity as HCO3	mg/L	168	128	155	155	115	89	116
	Bromide	mg/L	0.29	0.1	0.5	0.13	0.042	0.13	0.078
	Bromate by IC	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	CO2, Free, Calculated	mg/L	13.4	5.11	4.91	9.8	14.5	8.92	7.7
	Carbonate, Calculated	mg/L	0.274	0.417	0.636	0.319	0.1118	0.115	0.18
	Cadmium, Total, ICAP	ug/L	0.59	<5.0	<5.0	1	<5.0	<5.0	<5.0
	Calcium, Total, ICAP	mg/L	200	400	470	150	68	98	130
	Cation Sum, Calculated	meq/L	20.2	31.3	53.8	13.8	5.46	10.1	15.3
	Chlorate, IC	mg/L	0.22	0.7	0.042	0.051	0.055	0.091	0.03
	Chloride	mg/L	150	110	480	40	13	47	41
	Chlorite, IC	mg/L	<0.1	<0.04	<0.04	<0.05	<0.05	<0.04	0.04
	Chromium, Total, ICAP	ug/L	11	<100	<100	10	15	<10	0.015
	Diuron	ug/L	N/A	7.9	<0.4	1.2	1	3.31	1
	Diquat	ug/L	N/A	<0.4	<0.4	<0.4	<0.4	<0.8	0.4
	Paraquat	ug/L	N/A	<2.0	<2.0	2.36	2.53	<4.0	2
	Endothall	ug/l	<20	<20	<20	<20	<5.0	<20	0.02
	Fluoride	mg/L	0.62	0.8	0.81	0.61	0.4	0.55	0.48
	Glyphosate	ug/L	14	6.2	153	13.5	13.9	24	7.7
	Hardness as CaCO3	mg/L	775	1,410	2,000	601	236	389	705
	Hydroxide as OH, Calc	mg/L	0.004	0.009	0.01	0.005	0.003	0.003	0.005
	Iron, Total, ICAP	mg/L	6.7	22	16	8	6.1	2.8	3
	Langelier Index – 25 degree	None	0.48	0.96	1.2	0.42	-0.29	-0.2	0.37
	Magnesium, Total, ICAP	mg/L	67	100	200	55	16	35	44
	Manganese, Total, ICAP	mg/L	0.23	0.54	0.72	0.18	0.15	0.12	0.15
	Mercury	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Nickel, Total, ICAP	mg/L	0.016	<0.05	<0.5	0.012	<0.05	<0.05	0.026
	pH, Lab	Units	7.4	7.7	7.8	7.5	7.2	7.3	7.5
	Potassium, Total, ICAP	mg/L	15	16	48	11	6.8	11	11
	Reactive Silica	mg/L	N/A	18	23	30	29	29	14.5
	Selenium	mg/L	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.005
	Silver, Total, ICAP	ug/L	<5	<5	<5	<.5	14	<5	<10
	Sodium, Total, ICAP	mg/L	98	62	290	35	13	48	35
	Specific Conductance	umho/cm	1,490	3,930	3,960	796	356	994	642
	Sulfate	mg/L	420	260	1,600	210	39	260	220
	Surfactants	mg/L	0.72	0.445	0.246	1.35	3.07	3.08	0.61
	Thallium, Total, ICAP	ug/L	<1	<10	<10	<1	<10	<10	1
	Total Coliform Bacteria	MPN/100 mL	N/A	>1,600,000	>1,600,000	1,600,000	>160,000	>1,600,000	350,000
	Total Organic Carbon	mg/L	66	24	48	80	99	38	36

(1) Total Nitrogen = TKN + NO3. If TKN or NO3 are below the detection limit, the concentration was assumed to be equal to the detection limit.
(2) N/A = Not Available

(a) VOC detected is Acetone
(b) VOC detected is p-Isopropyltoluene
(c) SOC detected is 2 (3H) - Furanone, 5-ethyldihydro
(d) SOC detected is 2 (3H) - Furanone, dihydro-5-meth
(e) SOC detected is 2,5 - Hecanedione
(f) SOC detected is 2 - Cyclohexen-1-one, 3 - methyl
(g) SOC detected is Ethanol, 2 - [2 - (butoxyethoxy) eh
(h) SOC detected is Hexadecanoic acid
(i) SOC detected is Petanoic acid, 4-oxo
(j) SOC detected is Unknown Carbolic Acid
(k) VOC detected is 2 - Butanone
(l) Pesticide detected is Acetone
(m) SOC detected is 1,3,6,9,12 - Tetraoxahecadecan-1
(n) SOC detected is Ethanol, 2 - butoxy
(o) SOC detected is Hexadecanoic acid
(p) SOC detected is Octadecanoic acid
(q) SOC detected is Oleic Acid
(r) SOC detected is Tetratetracontane
(s) SOC detected is Unknown phthalate
(t) Pesticide detected is heptachlor Epoxide
(u) Pesticide detected is Lindane (gamma-BHC)
(v) Pesticide detected is Methoxychlor
(w) Pesticide detected is Toxaphene
(x) Herbicide detected is Tot DCPA Mono&Diacid Degradate
(y) Herbicide detected is Pentachlorophenol
(z) SOC detected is 3,6,9,12-Tetraoxahecadecan-1-o
(aa) SOC detected is Alpha.-Pinene
(bb) SOC detected is Caryophyllene
(cc) SOC detected is Ethanol, 2-(2-ethoxyethoxy)
(dd) SOC detected is Ethanol, 2-[2-(2-methoxyethoxy
(ee) SOC detected is Ethanol, 2 - [2 - (butoxyethoxy) e
(ff) SOC detected is Formamide, N,N-dimethyl
(gg) SOC detected is Hexatriacontane
(hh) Herbicide detected is 2,4-D
(ii) SOC detected is Di(2-Ethylhexyl)phthalate
(jj) SOC detected is Caffeine
(kk) SOC detected is Diethylphthalate
(ll) SOC detected is Tetradecanoic acid
(mm) SOC detected is 2-(2-(20butozyethyoxy)ethoxyet
(nn) SOC detected is 3,6,9,12-Tetraoxahexadecan-1-o
(oo) SOC detected is 3-methyl-2-cyclohexen-1-one

Table 8-13b

Wet Weather Monitoring Data 2003-2004

	Parameter	Units	Flamingo Wash FL-200-FW Wet Weather Composite 16-Aug-03	Las Vegas Creek LVC-200-FW Wet Weather Composite 16-Aug-03	C-1 Channel C1-100-DS Wet Weather Composite 4-Sep-03	Upper Las Vegas Wash Craig Road LVWCRAIG-100-DS Wet Weather Composite 12-Nov-03	C-1 Channel C1-200-FW Wet Weather Composite 12-Nov-03	Monson Channel MC2-200-FW Wet Weather Composite 12-Nov-03	1992 - 2004 Median
NPDES Constituents	Oil and Grease - Gravimetric	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<3
	Total Dissolved Solid (TDS)	mg/L	810	580	440	370	150	540	885
	Total Suspended Solids (TSS)	mg/L	19,200	1,570	3,850	110	110	210	580
	Total phosphorus-P	mg/L	1	2.4	6.8	0.58	0.38	0.69	0.96
	Orthophosphate-P	mg/L	0.343	0.288	N/A	N/A	0.255	0.356	0.18
	Nitrite, Nitrogen by IC	mg/L	<.20	0.13	<.10	0.11	<0.1	0.25	0.2
	Nitrate-N by IC	mg/L	2.0	1.4	1.7	1.3	0.61	4.8	1.7
	Kjeldahl Nitrogen	mg/L	5.4	10	6.4	4.6	2.4	0.69	4.9
	Nitrogen, Total	mg/L	7.4	11.53	8.1	6.01	3.01	5.74	7.3
	Ammonia Nitrogen	mg/L	N/A	N/A	N/A	1.48	N/A	N/A	0.6
	Copper, Total, ICAP	mg/L	0.32	0.22	<0.2	0.036	0.024	0.028	0.044
	Lead, Total, ICAP	mg/L	0.12	0.12	0.09	<.02	0.0045	0.0092	0.086
	Zinc, Total, ICAP	mg/L	1.50	1.0	0.45	0.36	0.08	0.13	0.23
	Copper, ICAP, Dissolved	mg/L	<0.01	<0.01	<0.01	0.037	0.038	0.035	0.01
	Lead, ICAP, Dissolved	mg/L	<0.10	<0.10	<0.10	<.02	<.02	<.02	<0.1
	Zinc, ICAP, Dissolved	mg/L	<.02	0.02	<.02	0.39	0.083	0.18	0.023
	Boron, Total, ICAP	mg/L	0.27	0.15	0.11	N/A	<0.05	0.26	0.24
	Fecal Coliform Bacteria	MPN/100 mL	300,000	>1,600,000	17,000	N/A	24,000	50,000	24,000
	Fecal Streptococci	MPN/100 mL	10,000	240,000	30,000	N/A	16,000	220,000	60,000
	SOCs	# of Detects	0	7(e,o,q,jj,mm,nn,oo)	0	N/A	4(ii,pp,jj,kk)	4(ii,pp,jj,kk)	
	Volatile Organic Compounds	# of Detects	1(b)	2(k,l)	0	N/A	4(qq,rr,ss,tt)	1(a)	
	Pesticides	# of Detects	0	0	0	N/A	0	0	
	Herbicides	# of Detects	0	0	0	N/A	0	0	
SNWA Expansion Constituents	2-Chloroethylvinylether	ug/L	<0.5	<0.5	<0.5	N/A	<0.5	<0.5	0.5
	Alkalinity in CaCO3	mg/L	95	100	87.7	N/A	41.1	60.9	95
	Aluminum, Total, ICAP	mg/L	3.1	<2.5	6.5	N/A	1.6	1.8	2.5
	Anion Sum, Calculated	meq/L	8.41	4.05	2.99	N/A	1.4	6.34	8.3
	Antimony, Total, ICAP	ug/L	<10	<10	<10	N/A	<1	2.6	4
	Arsenic, Total GF	mg/L	0.035	<0.02	0.017	N/A	0.0024	0.0064	0.015
	Barium, Total, ICAP	mg/L	1.3	0.6	3	N/A	0.083	0.084	0.12
	Beryllium, Total, ICAP	ug/L	<10	<10	<10	N/A	<1	<1	1
	Bicarbonate Alkalinity as HCO3	mg/L	116	122	107	N/A	50.1	74.3	116
	Bromide	mg/L	0.081	0.037	0.019	N/A	0.01	0.077	0.078
	Bromate by IC	ug/L	<5.0	<5.0	<5.0	N/A	<5.0	<5.0	<5.0
	CO2, Free, Calculated	mg/L	4.63	9.71	1.7	N/A	6.32	14.9	7.7
	Carbonate, Calculated	mg/L	0.378	0.199	0.875	N/A	0.0516	0.0483	0.18
	Cadmium, Total, ICAP	ug/L	<5.0	<5.0	<5.0	N/A	<5.0	<5.0	<5.0
	Calcium, Total, ICAP	mg/L	1,000	280	210	N/A	23	82	130
	Cation Sum, Calculated	meq/L	71.6	20.5	17.9	N/A	1.92	7.96	15.3
	Chlorate, IC	mg/L	0.14	0.026	0.29	N/A	0.016	<0.02	0.03
	Chloride	mg/L	33	13	7.6	N/A	6.9	29	41
	Chlorite, IC	mg/L	<0.02	<0.02	<0.01	N/A	<0.05	1.1	0.04
	Chromium, Total, ICAP	ug/L	960	250	<100	N/A	4.4	5.3	0.015
	Diuron	ug/L	8	<1	<1.0	N/A	<1	<2	1
	Diquat	ug/L	<0.4	<0.4	<0.4	N/A	<0.4	<0.4	0.4
	Paraquat	ug/L	<2.0	<2.0	<2.0	N/A	<2	2.12	2
	Endothall	ug/L	<20	<20	<5.0	N/A	<5.0	<20	0.02
	Fluoride	mg/L	0.3	0.33	0.15	N/A	0.17	0.49	0.48
	Glyphosate	ug/L	7.52	20	<6.0	N/A	<6.0	41.6	7.7
	Hardness as CaCO3	mg/L	3,730	983	837	N/A	75.6	316	705
	Hydroxide as OH, Calc	mg/L	0.009	0.004	0.02	N/A	0.003	0.002	0.005
	Iron, Total, ICAP	mg/L	65	17	79	N/A	1.8	2.4	3
	Langelier Index – 25 degree	None	1.3	0.49	1	N/A	-1	-0.59	0.37
	Magnesium, Total, ICAP	mg/L	300	69	76	N/A	4.4	27	44
	Manganese, Total, ICAP	mg/L	0.94	0.43	2.6	N/A	0.06	0.071	0.15
	Mercury	ug/L	<0.2	<0.2	<0.2	N/A	<0.2	<0.2	<0.2
	Nickel, Total, ICAP	mg/L	0.1	<0.05	0.97	N/A	0.005	0.0084	0.026
	pH, Lab	Units	7.7	7.4	8.1	N/A	7.2	7	7.5
	Potassium, Total, ICAP	mg/L	25	8.4	24	N/A	3	8.1	11
	Reactive Silica	mg/L	17	22	15	N/A	23	37	14.5
	Selenium	mg/L	<0.20	<0.20	<0.02	N/A	<0.01	0.02	<0.005
	Silver, Total, ICAP	ug/L	<5	<5	8	N/A	0.8	<5	<10
	Sodium, Total, ICAP	mg/L	27	13	12	N/A	7.7	33	35
	Specific Conductance	umho/cm	787	402	274	N/A	170	670	642
	Sulfate	mg/L	260	75	43	N/A	16	200	220
	Surfactants	mg/L	0.194	0.847	<.05	N/A	0.669	0.948	0.61
	Thallium, Total, ICAP	ug/L	<100	<100	<10	N/A	<1	<1	1
	Total Coliform Bacteria	MPN/100 mL	500,000	>1,600,000	300,000	N/A	50,000	160,000	350,000
	Total Organic Carbon	mg/L	35	54	28	N/A	22	56	36

(1) Total Nitrogen = TKN + NO3. If TKN or NO3 are below the detection limit, the concentration was assumed to be equal to the detection limit.
(2) N/A = Not Available

(a) VOC detected is Acetone
(b) VOC detected is p-Isopropyltoluene
(c) SOC detected is 2 (3H) - Furanone, 5-ethyldihydro
(d) SOC detected is 2 (3H) - Furanone, dihydro-5-meth
(e) SOC detected is 2,5 - Hecanedione
(f) SOC detected is 2 - Cyclohexen-1-one, 3 - methyl
(g) SOC detected is Ethanol, 2 - [2 - (butoxyethoxy) eh
(h) SOC detected is Hexadecanoic acid
(i) SOC detected is Petanoic acid, 4-oxo
(j) SOC detected is Unknown Carbolic Acid
(k) VOC detected is 2 - Butanone
(l) Pesticide detected is Acetone
(m) SOC detected is 1,3,6,9,12 - Tetraoxahecadecan-1
(n) SOC detected is Ethanol, 2 - butoxy
(o) SOC detected is Hexadecanoic acid
(p) SOC detected is Octadecanoic acid
(q) SOC detected is Oleic Acid
(r) SOC detected is Tetratetracontane
(s) SOC detected is Unknown phthalate
(t) Pesticide detected is heptachlor Epoxide
(u) Pesticide detected is Lindane (gamma-BHC)
(v) Pesticide detected is Methoxychlor
(w) Pesticide detected is Toxaphene
(x) Herbicide detected is Tot DCPA Mono&Diacid Degradate
(y) Herbicide detected is Pentachlorophenol
(z) SOC detected is 3,6,9,12-Tetraoxahecadecan-1-o
(aa) SOC detected is Alpha.-Pinene
(bb) SOC detected is Caryophyllene
(cc) SOC detected is Ethanol, 2-(2-ethoxyethoxy)
(dd) SOC detected is Ethanol, 2-[2-(2-methoxyethoxy
(ee) SOC detected is Ethanol, 2 - [2 - (butoxyethoxy) eh
(ff) SOC detected is Formamide, N,N-dimethyl
(gg) SOC detected is Hexatriacontane
(hh) Herbicide detected is 2,4-D
(ii) SOC detected is Di(2-Ethylhexyl)phthalate
(jj) SOC detected is Caffeine
(kk) SOC detected is Diethylphthalate
(ll) SOC detected is Tetradecanoic acid
(mm) SOC detected is 2-(2-(20butozyethyoxy)ethoxyet
(nn) SOC detected is 3,6,9,12-Tetraoxahexadecan-1-o
(oo) SOC detected is 3-methyl-2-cyclohexen-1-one
(pp) SOC detected is butylbenzylphthalate
(qq) VOC detected is chloroform
(rr) VOC detected is chlorodibromomethane
(ss) VOC detected is bromodichloromethane
(tt) VOC detected is total THM

Table 8-13c

Wet Weather Monitoring Data 2003-2004

	Parameter	Units	Meadows Detention LVC2-100-05 Wet Weather Composite 11-Dec-03	Las Vegas Wash at Desert Rose LVW-200-DS Wet Weather Composite 21-Feb-04	1992 - 2004 Median
NPDES Constituents	Oil and Grease - Gravimetric	mg/L	N/A	N/A	<3
	Total Dissolved Solid (TDS)	mg/L	140	660	885
	Total Suspended Solids (TSS)	mg/L	94	340	580
	Total phosphorus-P	mg/L	0.84	0.42	0.96
	Orthophosphate-P	mg/L	0.203	ND	0.18
	Nitrite, Nitrogen by IC	mg/L	<0.4	<0.2	0.2
	Nitrate-N by IC	mg/L	0.52	1.8	1.7
	Kjeldahl Nitrogen	mg/L	2.2	2.9	4.9
	Nitrogen, Total	mg/L	2.72	4.7	7.3
	Ammonia Nitrogen	mg/L	N/A	N/A	0.6
	Copper, Total, ICAP	mg/L	0.031	0.027	0.044
	Lead, Total, ICAP	mg/L	0.014	0.077	0.086
	Zinc, Total, ICAP	mg/L	0.15	0.89	0.23
	Copper, ICAP, Dissolved	mg/L	0.034	<0.01	0.01
	Lead, ICAP, Dissolved	mg/L	<0.02	<0.02	<0.1
	Zinc, ICAP, Dissolved	mg/L	0.15	0.4	0.023
	Boron, Total, ICAP	mg/L	0.052	0.24	0.24
	Fecal Coliform Bacteria	MPN/100 mL	2,200	1,600	24,000
	Fecal Streptococci	MPN/100 mL	17,000	33,000	60,000
	SOCs	# of Detects	2(ii,jj)	0	
	Volatile Organic Compounds	# of Detects	0	1(a)	
	Pesticides	# of Detects	0	0	
	Herbicides	# of Detects	0	0	
SNWA Expansion Constituents	2-Chloroethylvinylether	ug/L	<0.5	<0.5	0.5
	Alkalinity in CaCO3	mg/L	38.3	105	95
	Aluminum, Total, ICAP	mg/L	1.6	2.5	2.5
	Anion Sum, Calculated	meq/L	1.24	10.4	8.3
	Antimony, Total, ICAP	ug/L	4.1	3.3	4
	Arsenic, Total GF	mg/L	<0.002	0.0051	0.015
	Barium, Total, ICAP	mg/L	0.086	0.082	0.12
	Beryllium, Total, ICAP	ug/L	<1	<1	1
	Bicarbonate Alkalinity as HCO3	mg/L	46.6	129	116
	Bromide	mg/L	0.0098	0.074	0.078
	Bromate by IC	ug/L	<5	<5	<5.0
	CO2, Free, Calculated	mg/L	1.48	8.16	7.7
	Carbonate, Calculated	mg/L	0.191	0.265	0.18
	Cadmium, Total, ICAP	ug/L	0.53	<0.5	<5.0
	Calcium, Total, ICAP	mg/L	25	120	130
	Cation Sum, Calculated	meq/L	2.01	12.7	15.3
	Chlorate, IC	mg/L	0.027	0.17	0.03
	Chloride	mg/L	5.4	80	41
	Chlorite, IC	mg/L	<0.02	<0.04	0.04
	Chromium, Total, ICAP	ug/L	5.5	<10	0.015
	Diuron	ug/L	<1	N/A	1
	Diquat	ug/L	<0.4	N/A	0.4
	Paraquat	ug/L	<2	N/A	2
	Endothall	ug/L	<5	N/A	0.02
	Fluoride	mg/L	0.17	0.53	0.48
	Glyphosate	ug/L	<6	N/A	7.7
	Hardness as CaCO3	mg/L	86.3	481	705
	Hydroxide as OH, Calc	mg/L	0.01	0.005	0.005
	Iron, Total, ICAP	mg/L	1.9	2.7	3
	Langelier Index – 25 degree	None	-0.49	0.25	0.37
	Magnesium, Total, ICAP	mg/l	5.8	44	44
	Manganese, Total, ICAP	mg/L	0.045	0.078	0.15
	Mercury	ug/L	<0.2	<0.2	<0.2
	Nickel, Total, ICAP	mg/L	<0.005	<.005	0.026
	pH, Lab	Units	7.8	7.5	7.5
	Potassium, Total, ICAP	mg/L	2.8	12	11
	Reactive Silica	mg/L	12	14	14.5
	Selenium	mg/L	<0.005	<0.025	<0.005
	Silver, Total, ICAP	ug/L	<0.5	0.63	<10
	Sodium, Total, ICAP	mg/L	4.8	64	35
	Specific Conductance	umho/cm	150	274	642
	Sulfate	mg/L	13	280	220
	Surfactants	mg/L	0.288	0.481	0.61
	Thallium, Total, ICAP	ug/L	<1	<10	1
	Total Coliform Bacteria	MPN/100 mL	50,000	1,600,000	350,000
	Total Organic Carbon	mg/L	17.1	N/A	36

(1) Total Nitrogen = TKN + NO3. If TKN or NO3 are below the detection limit, the concentration was assumed to be equal to the detection limit.
(2) N/A = Not Available

(a) VOC detected is Acetone
(b) VOC detected is p-Isopropyltoluene
(c) SOC detected is 2 (3H) - Furanone, 5-ethyldihydro
(d) SOC detected is 2 (3H) - Furanone, dihydro-5-meth
(e) SOC detected is 2,5 - Hecanedione
(f) SOC detected is 2 - Cyclohexen-1-one, 3 - methyl
(g) SOC detected is Ethanol, 2 - [2 - (butoxyethoxy) eh
(h) SOC detected is Hexadecanoic acid
(i) SOC detected is Petanoic acid, 4-oxo
(j) SOC detected is Unknown Carbolic Acid
(k) VOC detected is 2 - Butanone
(l) Pesticide detected is Acetone
(m) SOC detected is 1,3,6,9,12 - Tetraoxahecadecan-1
(n) SOC detected is Ethanol, 2 - butoxy
(o) SOC detected is Hexadecanoic acid
(p) SOC detected is Octadecanoic acid
(q) SOC detected is Oleic Acid
(r) SOC detected is Tetratetracontane
(s) SOC detected is Unknown phthalate
(t) Pesticide detected is heptachlor Epoxide
(u) Pesticide detected is Lindane (gamma-BHC)
(v) Pesticide detected is Methoxychlor
(w) Pesticide detected is Toxaphene
(x) Herbicide detected is Tot DCPA Mono&Diacid Degradate
(y) Herbicide detected is Pentachlorophenol
(z) SOC detected is 3,6,9,12-Tetraoxahecadecan-1-o
(aa) SOC detected is Alpha.-Pinene
(bb) SOC detected is Caryophyllene
(cc) SOC detected is Ethanol, 2-(2-ethoxyethoxy)
(dd) SOC detected is Ethanol, 2-[2-(2-methoxyethoxy
(ee) SOC detected is Ethanol, 2 - [2 - (butoxyethoxy) eh
(ff) SOC detected is Formamide, N,N-dimethyl
(gg) SOC detected is Hexatriacontane
(hh) Herbicide detected is 2,4-D
(ii) SOC detected is Di(2-Ethylhexyl)phthalate
(jj) SOC detected is Caffeine
(kk) SOC detected is Diethylphthalate
(ll) SOC detected is Tetradecanoic acid
(mm) SOC detected is 2-(2-(20butozyethyoxy)ethoxyet
(nn) SOC detected is 3,6,9,12-Tetraoxahexadecan-1-o
(oo) SOC detected is 3-methyl-2-cyclohexen-1-one
(pp) SOC detected is butylbenzylphthalate
(qq) VOC detected is chloroform
(rr) VOC detected is chlorodibromomethane
(ss) VOC detected is bromodichloromethane
(tt) VOC detected is total THM

Table 8-14a

Wet Weather Monitoring Data, 1992-2004

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Cond-uctance umho/cm	Lab pH units	MBAS mg/L	Ortho-Phos-phate mg/L	Total Phos phate-Phos-phorous mg/L	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitro gen mg/L	Copper mg/L	Dis-solved Copper mg/L	Chrom-ium mg/L	Lead mg/L	Dis-solved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dis-solved Zinc mg/L
Western Tributary at Civic Center	08/30/92		26.3	3.5	92	1,110		7.2	2.67	< 0.05	0.29	3.9		0.66	9.8	13.68	0.024		< 0.01	< 0.010		< 0.0002	< 0.005	0.055	
	10/24/92		17.3	3	66	760		7.3	1.02	0.18	0.50	2.9		0.73	6.2	9.1	0.017		< 0.01	< 0.010		< 0.0002	< 0.005	0.074	
	02/08/93		12.0	3	950	300		7.9	0.24	0.26	0.55	1.1		0.3	1.1	2.2	0.018		0.024	0.018		< 0.0002	< 0.005	0.270	
	05/14/93	839	26.4	3.5	110	600		7.2	1.64	0.19	0.51	2.4		1.3	5.5	7.9	0.015		< 0.01	0.009		< 0.0002	< 0.005	0.078	
	08/04/93	211	26.0	3	840	980		7.6	1.13	0.06	0.88	2.1		1.4	6.6	8.7	0.033		0.027	0.022		< 0.0002	< 0.005	0.180	
	02/04/94	181	8.2	5.7	3,720	400	465	7.5	0.44	2.34	2.10	1.1		1.1	16	17.1	0.092		0.05	0.150		0.0008	< 0.005	0.440	
	03/25/94	353	12.9	10	2,800	520	2,530		0.73	0.75	1.40	1.2		1.1	6.7	7.9	0.058		0.033	0.076		< 0.0002	< 0.005	0.320	
	07/19/94		23.6	< 3	81	400	535	7.8	1.49	0.11	0.23	1.4		0.47	< 1	2.4	0.016		< 0.01	0.006		< 0.0002	< 0.005	0.050	
	08/09/94	4	29.5	< 3	5,550	370	525	7.9	0.35	0.18	0.87	1.4		0.47	2.7	4.1	0.052		0.035	0.140		< 0.0002	< 0.005	0.240	
	01/24/95	624	9.7	< 3	880	5,210	187	8	0.24	0.06		4.5		< 0.05	< 1	5.5	0.012		< 0.01	< 0.100		< 0.0002	< 0.005	0.057	
	05/24/95		19.7	5.5	125	300	488	7.5	1.35	0.08	0.32	1.2		0.6	4.9	6.1	0.023		< 0.01	0.020		< 0.0002	< 0.005	0.094	
	08/12/95	583	27.5	3.7	450	690	633	7.2	1.50	0.09	0.83	0.9		0.6	7.2	8.1	0.042		0.013	0.025		< 0.0002	< 0.005	0.200	
	03/13/96			4	510	780		7.5		0.45	0.97	1.7		0.9	6.2	2.6	0.041							0.120	
	11/21/96	163	15.6	< 3	2,500	290	498	7.8	< 0.05	0.59	2.80	1.7		0.8	11	12.7	0.038			< 0.100				0.240	
	07/28/97		25.7	6.1	890	380	588	7.7	1.84	0.11	0.30	1.6		1.2	4.8	6.4	0.100			0.170				0.630	
	09/01/97			4.2	290	580		7.5	1.75	< 0.01	0.33	1		0.9	7.2	8.2	0.044			< 0.100				0.160	
	Median	**282**	**21.7**	**3.5**	**675**	**550**	**525**	**7.5**	**1.13**	**0.15**	**0.55**	**1.5**		**0.8**	**6.2**	**7.9**	**0.036**	**N/A**	**0.012**	**0.025**		**< 0.0002**	**< 0.005**	**0.170**	
	Average	**370**	**20.0**	**3.8**	**1,241**	**854**	**717**	**7.6**	**1.09**	**0.34**	**0.86**	**1.9**		**0.8**	**6.1**	**7.7**	**0.039**	**N/A**	**0.018**	**0.053**		**< DL**	**< DL**	**0.201**	
Las Vegas Creek at Pecos or Lena	08/30/92	75	27.1	4	550	830		7.2	3.10	0.06	1.10	1.8		0.42	9.5	11.3	0.010		0.019	0.072		< 0.0002	< 0.005	0.320	
	10/24/92	204	17.5	3.9	500	530		7.3	1.89	0.55	< 0.05	1.8		1.2	8.8	10.6	0.190		0.057	0.280		0.006	< 0.005	0.960	
	10/28/92	76	18.1	< 3	460	440		7.4	1.12	0.18	0.51	1.4		0.33	3.7	5.1	0.055		0.019	0.071		< 0.0002	< 0.005	0.280	
	02/08/93	454	11.1	64	300	190		7.8	0.17	0.25	0.55	0.7		0.22	1.1	1.8	0.019		< 0.01	0.036		< 0.0002	< 0.005	0.290	
	05/14/93	138	26.9	7.2	220	490		7.1	1.34	0.36	1.00	0.1		2.3	6.5	6.6	0.027		< 0.01	0.026		< 0.0002	< 0.005	0.150	
	08/04/93	34	30.7	< 3	560	1,070		7.1	1.41	0.12	0.96	1.5		2.4	10	11.5	0.078		0.021	0.078		< 0.0002	< 0.005	0.380	
	02/04/94	114	8.2	4.8	1,050	320	984	7.6	0.83	0.87	1.50	1.3		0.92	5.3	6.6	0.047		0.018	0.057		0.0003	< 0.005	0.230	
	09/19/94		22.0	5.4	230	880	950	7.3	1.00	0.78	1.50	4.3		1.7	13	17.3	0.057		0.015	0.053		< 0.0002	< 0.005	0.300	
	03/11/95	23	13.4	4.1	93	150	1,150	7.6	0.25	0.21	0.36	0.4		0.2	1.6	2	< 0.010		< 0.01	0.017		< 0.0002	< 0.005	0.075	
	05/24/95	24	26.5	12	330	270	680	7.5	0.87	0.21	1.15	1.4		0.7	7.2	8.6	0.098		0.023	0.140		< 0.0002	< 0.005	0.590	
	08/20/95	4	26.7	3.9	42	520	883	7.3	1.55	0.20	0.55	1.1		0.3	5	6.1	0.024		< 0.01	0.008		< 0.0002	< 0.005	0.120	
	05/24/96		17.8	15	490	500	500	7	4.74	6.50	7.00	3.4		1.9	10	11.9	0.070							0.430	
	07/15/96	148	27.0	23	480	470		7.4		0.68	0.94			1.2	8.5	8.7	0.091			< 0.100				0.350	
	02/24/98		12.0	< 3	200	100		8	< 0.50	0.20	0.46	0.58		0.3	< 1	0.6	0.013			< 0.100				0.073	
	03/26/98		15.2	< 3	1,390	200	570	8.2	0.73	0.54	0.85	0.56		0.23	3.2	3.8	0.012			< 0.100				0.110	
	09/22/99			3.5	950	100					0.61	0.68		0.322	2.9	3.58	0.049	< 0.010		< 0.100	< 0.100			0.288	< 0.200
	02/12/03			< 3	110	130	200	7.4	0.36			0.71	< 0.1		1.9	2.61	0.020	< 0.010	0.0044	0.008	< 0.100	< 0.0002	0.0011	0.090	< 0.200
	07/25/03				880	580						2.7	0.23		18	20.93	0.066	< 0.010		0.043	< 0.100			0.450	0.042
	08/16/03				1,570	580				0.29	2.40	1.4	0.13		10	11.53	0.220	< 0.010		0.120	< 0.100			1.000	0.020
	Median	**76**	**18.1**	**4.0**	**480**	**470**	**782**	**7.4**	**1.00**	**0.27**	**0.94**	**1.35**	**0.13**	**0.56**	**6.5**	**6.6**	**0.049**	**< 0.010**	**0.017**	**0.072**	**< 0.100**	**< 0.0002**	**< 0.005**	**0.290**	**< 0.200**
	Average	**118**	**20**	**9.3**	**548**	**439**	**740**	**7.5**	**1.31**	**0.75**	**1.26**	**1.44**	**0.14**	**0.92**	**6.67**	**7.96**	**0.061**	**0.01**	**0.02**	**0.067**	**0.05**	**0.0006**	**0.002**	**0.34**	**0.066**
Duck Creek at Boulder Highway	08/30/92	30	27.1	< 3	120	4,590		7.8	0.64	< 0.05	0.12	3.5		0.06	2.6	4.5	< 0.010		< 0.01	< 5.000		< 0.0002	< 0.005	0.053	
	10/24/92	73	17.7	< 3	130	4,670		7.6	0.62	0.06	0.16	3.8		0.42	3.7	7.5	< 0.010		< 0.01	< 0.010		< 0.0002	< 0.005	0.038	
	02/08/93	43	11.5	< 3	23	4,700		8.1	< 0.10	< 0.05	0.06	4.6		< 0.1	< 1	5.6	< 0.010		< 0.01	< 0.004		< 0.0002	< 0.005	0.097	
	08/04/93	15	27.5	< 3	150	5,150		7.3	0.54	< 0.05	0.13	4.1		0.68	3.1	7.2	< 0.010		< 0.01	< 0.004		< 0.0002	< 0.005	0.035	
	02/04/94	22	9.0	< 3	4,430	3,360	7,380	7.5	0.15	2.26	1.30	4.5		0.69	4.3	8.8	0.044		0.045	0.031		0.0002	< 0.005	0.200	
	03/25/94	22	17.3	< 3	240	3,990	17,480	7.7	0.23	0.11	0.20	< 2		0.4	3.4	5.4	0.016		0.01	0.006		< 0.0002	< 0.005	0.053	
	07/19/94	38	23.0	< 3	280	3,350	4,930	7.3	2.25	0.07	0.37	4.1		2.3	5.5	9.6	0.025		0.01	0.007		< 0.0002	< 0.005	0.073	
	01/24/95	21	9.4	3	360	230	2,520	8	0.30	0.11		1		0.2	1.5	2.5	0.022		< 0.01	< 0.100		0.0002	< 0.005	0.110	
	02/20/96			4	2,170	2,910		7.4		0.33	1.00	3.6		1	8.1	9.1	0.062							0.160	
	07/14/96	177	29.1	3	1,270	2,450	2,900	7.1		0.65	5.60	2.3		1.2	11	13.3	0.046			< 0.100				0.210	
	04/02/97		12.3	< 3	170	1,660	2,050	7.2	0.77	< 0.05	0.38	3.2		1	5.2	8.4	0.016			< 0.100				0.083	
	07/22/97		24.8	375	6,540	2,960	389	7.5		0.04	0.41	< 1		0.6	6.8	7.8	0.140			< 0.100				0.190	
	02/03/98		12.0	< 3	2,020	2,290	290	7.5	< 0.50	0.09	1.34	3.8		0.6	5.2	9	< 0.010			0.120				0.340	
	09/08/98	171		< 3	5,720	1,520					1.20	2.2		0.44	13	2.33	0.240	0.023		0.220	< 0.100			0.730	< 0.020
	06/02/99	10		< 3	50	1,100					0.58	2.38		0.79	4.73	7.11	0.040	< 0.010		< 0.100	< 0.100			0.130	< 0.020
	09/22/99			< 3	210	870					0.44	1.86		0.401	2.45	4.31	< 0.010	< 0.010		< 0.100	< 0.100			0.079	< 0.020
	02/16/00			< 3	1,920	1,240					2.29	3.04		0.885	6.9	9.94	0.150	< 0.010		< 0.100	< 0.100			0.500	< 0.020
	08/30/00	108		< 3	4,360	1,300					3.60	1.78		0.261	4.9	6.68	0.240	< 0.010		< 0.100	< 0.100			0.910	< 0.020
	07/06/01	242		< 3	8,420	1,610					7.50	2		< 0.05	11	13	0.240	< 0.010		0.150	< 0.100			0.850	0.029
	02/12/03	489		< 3	2,580	1,270	1,580	7.4	0.23	0.08	2.70	1.3	< 0.5		9.7	11	0.094	< 0.010	0.0091	0.040	< 0.100	< 0.0002	0.0011	0.270	< 0.020
	07/24/03				1,080	3,290						2.8	1.8		6.2	10.8	< 0.200	< 0.020		0.019	< 0.200			0.140	< 0.040
	Median	**41**	**18**	**< 3**	**1,080**	**2,450**	**2,520**	**7.5**	**0.50**	**0.08**	**0.58**	**2.8**	**1.2**	**0.6**	**5.2**	**7.8**	**0.040**	**0.010**	**< 0.01**	**0.100**	**< 0.100**	**< 0.0002**	**< 0.005**	**0.140**	**< 0.020**
	Average	**68**	**18.4**	**20**	**2,012**	**2,596**	**4,391**	**7.5**	**0.55**	**0.28**	**1.55**	**2.73**	**1.03**	**0.63**	**5.70**	**7.80**	**0.072**	**0.008**	**0.011**	**0.175**	**< 0.056**	**< 0.0001**	**< 0.002**	**0.250**	**< 0.014**
Flamingo Wash at Nellis	10/24/92	115	18.0	< 3	1,710	1,270		7.4	1.51	0.18	1.20	2.3		1.4	7.6	9.9	0.100		0.038	0.079		0.0002	< 0.005	0.430	
	02/08/93	160	12.3	< 3	1,130	130		8.2	< 0.05	0.46	0.66	0.4		0.13	< 1	1.4	0.020		0.031	0.019		< 0.2	< 0.005	0.180	
	06/05/93	41	17.7	3.9	1,420	1,520		7.5	1.84	0.44	0.82	3.2		1.1	4.9	8.1	0.059		0.031	0.051		0.0002	< 0.005	0.260	
	08/05/93	57	26.1	< 3	5,910	2,290		7.6	1.18	0.06	1.20	4.3		1.9	6.6	10.9	0.067		0.04	0.086		< 0.0002	< 0.005	0.270	
	02/04/94	45	9.0	5.3	620	1,180	2,300	7.4	0.69	0.61	0.68	2.6		1	3.7	6.3	0.046		0.011	0.014		< 0.0002	< 0.005	0.088	
	03/25/94	79	17.4	6.5	3,860	1,140	7,570	7.4	0.78	0.84	1.80	< 0.5		0.8	7.1	7.6	0.094		0.048	0.100		0.0004	< 0.005	0.370	
	07/19/94		24.4	7	6,710	1,200	1,501	7.4	3.49	0.19	2.10	3		2.5	6.1	9.1	0.130		0.05	0.130		0.0004	< 0.005	0.550	
	08/19/94	37	26.0	3.8	4,750	1,060	2,080	7.7	0.05	< 0.05	1.00	2		0.82	9.1	11.1	0.094		0.043	0.125		0.0002	< 0.005	0.440	
	01/24/95	125	9.3	4.5	1,960	600	389	7.9	0.22	0.08		1.3		0.3	2.6	3.9	0.061		0.028	< 0.100		< 0.0002	< 0.005	0.260	
	05/24/95	30	18.3	< 3	255	1,160	1,302	7.5	0.71	0.06	0.32	2.1		0.4	3.1	5.2	0.027		< 0.01	0.018		< 0.0002	< 0.005	0.094	
	08/12/95	335	26.4	7.2	1,050	1,010	1,003	7.2	1.70	0.14	1.50	< 0.3		1	9.3	9.6	0.069		0.017	0.049		< 0.0002	< 0.005	0.370	
	01/31/96			18	560	1,920		7	1.99	0.44	1.30	5.1		2.5	13	18.1	0.070			0.130				0.860	
	11/21/96	184	17.3	< 3	2,620	440	3,830	7.8	< 0.05	0.15	1.50	1		0.6	3.8	4.8	0.057			< 0.100				0.280	
	09/25/97		19.7	< 3	324	580	710	7.3	1.75	0.57	0.66	0.5		0.3	2.7	3.2	0.026			< 0.100				0.130	
	02/04/98		11.2	5.2	1,800	680	240	7.6	0.92	0.22	2.94	1.7		0.8	19	20.7	0.065			0.120				0.360	
	02/24/98		12.0	< 3	660	380		7.8	< 0.50	0.08	0.88	0.98		0.3	2.2	3.2	0.020			< 0.100				0.150	
	02/12/03	538		< 3	1,900	260	415	7.6	0.33	0.15	1.05	0.97	< 0.1		3.2	4.17	0.039	< 0.010	0.0063	0.030	< 0.100	< 0.0002	0.00073	0.170	0.100
	04/14/03	411			3,410	505	650	7.4	< 0.05			1.23	0.13		7.6	8.96	0.100	< 0.010	34	0.047	< 0.100	< 0.0002	< 0.00250	0.450	< 0.020
	07/24/03	120			2,230	790						1.8	< 0.5		6.6	8.4	0.170	< 0.010		0.074	< 0.100			1.100	0.023
	08/16/03	366			19,200	810				0.34	1.00	2	< 0.2		5.4	7.4	0.320	< 0.010		0.120	< 0.100			1.500	< 0.020
	Median	**120**	**17.7**	**3.8**	**1,850**	**910**	**1,153**	**7.5**	**0.75**	**0.19**	**1.05**	**1.8**	**0.17**	**0.8**	**5.8**	**7.85**	**0.066**	**0.010**	**0.031**	**0.093**	**0.10**	**< 0.0002**	**< 0.005**	**0.320**	**0.022**
	Average	**146**	**18**	**4.3**	**3,104**	**946**	**1,833**	**8**	**0.97**	**0.28**	**1.21**	**1.84**	**0.13**	**0.99**	**6.21**	**8.10**	**0.082**	**0.005**	**2.642**	**0.070**	**0.050**	**< 0.0079**	**< 0.0023**	**0.416**	**0.036**

Location	Date	Silver mg/L	Nickel mg/L	Selen-ium mg/L	Arsenic mg/L	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turb-idity NTU	Phenol mg/L	Petro-leum Hydro-carbons	TPH (diesel) MPN/100 mL	TPH (gas-oline) MPN/100 mL	Total Chlor-ine mg/L	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	Salmon-ella MPN/100 mL	VOC # of detects	Pesti-cides # of detects	SOC # of detects	Herbi-cides # of detects
Western Tributary at Civic Center	08/30/92	< 0.01	< 0.04		< 0.025	0.42	0.029	85	559	313	60	0.09				< 0.10	< 160,000			> 16							
	10/24/92	< 0.01	< 0.04		< 0.025	0.25	0.009	31	210	90	45	0.04				< 0.10	130,000			300,000							
	02/08/93	< 0.01	< 0.04	< 0.005	0.01	0.14	< 0.005	25	98	25	750	0.1				< 0.10	30,000	5,000		22,000	30,000						
	05/14/93	< 0.01	< 0.04	< 0.005	0.005	0.27	0.01	63	220	200	70	0.1				< 0.10	5,000,000	240,000	13,000	1,700,000	160,000	50,000					
	08/04/93	< 0.01	0.021	< 0.005	0.011	0.05	0.008	83	390	400	130	0.2				< 0.10	30,000	110,000	500,000	160,000	500,000	700,000					
	02/04/94	< 0.01	0.023	< 0.02	0.027	0.23	< 0.005	57	475	750	950	0.1				< 0.10	3,000	500		90,000	28,000						
	03/25/94	< 0.01	0.02	< 0.005	0.016	0.17	< 0.005	59	310	1,000	1,200	0.04				< 0.10	< 2	8,000	8,000	50,000	230,000	90,000	< 2.0				
	07/19/94	< 0.01	0.011	< 0.005	< 0.005	0.16	0.009	110	215	150	44	0.08				0.10		> 160,000	1,600,000		50,000	140,000	8.0				
	08/09/94	< 0.01	0.025	< 0.005	0.05	0.19	< 0.005	19	300	75	6.5	< 0.01				0.10		80,000	2,300		130,000	50,000	< 2.0				
	01/24/95	< 0.01	< 0.01	< 0.005		2.40	0.007	< 6	23	10	100	0.10		< 1.1	< 1.1	< 0.01			5,000			22,000	< 2.0				
	05/24/95	< 0.01	0.011	< 0.005	< 0.005	0.18	0.01	35	215	40	68	0.02	< 1			< 0.01			> 160,000			> 160,000	2.0				
	08/12/95	< 0.01	0.02	< 0.005	0.007	0.28	0.03	77	345	250	11	< 0.10		< 2.3	< 2.3	< 0.01						> 1,600	6.0				
	03/13/96					0.27	0.009	52	250	100	32					0.05	5,000			11,000			< 2.2				
	11/21/96					0.19	< 0.005	45	400	80	5,600	< 0.01	< 1			< 0.01	40,000			50,000			< 2.2		0		1 (2,4-D)
	07/28/97					0.21	< 0.005	36	930	110	600	< 0.01	< 1			< 0.10	160,000			90,000			5.1		0		1
	09/01/97					0.25	0.052	38	160	128	160	0.019					160,000			90,000			< 2.2		0		1
	Median	**< 0.01**	**0.022**	**< 0.005**	**0.011**	**0.22**	**0.009**	**49**	**275**	**119**	**85**	**0.08**	**< 1**	**1.7**	**1.7**	**< 0.10**	**40,000**	**80,000**	**13,000**	**90,000**	**130,000**	**70,000**	**2.2**		**0**		**1**
	Average	**< DL**	**0.018**	**< DL**	**0.014**	**0.35**	**0.012**	**51**	**319**	**233**	**614**	**0.06**	**< DL**	**< DL**	**< DL**	**< DL**	**512,546**	**86,214**	**326,900**	**233,001**	**161,143**	**151,700**	**2.2**		**0**		**1**
Las Vegas Creek at Pecos or Lena	08/30/92	< 0.01	< 0.04		< 0.025	0.43	0.032	80	760	300	275	0.10				< 0.10	160,000			> 16							
	10/24/92	< 0.01	< 0.04		< 0.025	0.26	0.024	69	500	120	340	0.10				< 0.10	700,000			500,000							
	10/28/92	< 0.01	< 0.04		< 0.025	0.22	0.015	35	195	5	300	0.03				< 0.10	80,000			500,000							
	02/08/93	< 0.01	< 0.04	< 0.005	< 0.005	0.08	< 0.005	27	230	15	180	0.10				< 0.10	17,000	8,000	13,000	160,000	30,000	5,000					
	05/14/93	< 0.01	< 0.02	< 0.005	< 0.005	0.27	0.011	86	400	320	90	0.20				< 0.10	5,000,000	1,700,000	300,000	6,000,000	1,300,000	3,000,000					
	08/04/93	< 0.01	0.02	0.017	0.015	0.30	0.011	115	690	560	65	0.10				< 0.10	5,000,000	300,000	1,300,000	160,000	1,700,000	3,000,000					
	02/04/94	< 0.01	< 0.02	< 0.01	0.008	0.15	0.006	57	360	100	350	0.10				< 0.10	2,200	2,400		35,000	1,300						
	09/19/94	< 0.01	0.026	< 0.005	0.008	0.40	0.016	99	720	500	20	0.06				< 0.01			900,000			160,000	< 2.0				
	03/11/95	< 0.01	< 0.01	< 0.005	< 0.005	0.10	< 0.005	10	85	50	62	< 0.10		< 1	< 1	< 0.01			24,000			160,000	22.0				
	05/24/95	< 0.01	0.016	< 0.005	0.007	0.13	0.005	34	295	30	270	0.02	< 1			< 0.01			160,000			> 160,000	< 2.0				
	08/20/95	< 0.01	0.011	< 0.005	0.007	0.19	< 0.005	29	245	200		0.10		< 1	< 1	0.20			28,000			90,000	7.0				
	05/24/96					0.30	0.01	265	550	175	8	0.09					11,000			> 16,000			160.0		1		
	07/15/96					0.19	< 0.005	58	380	300	190	< 0.01				< 0.01	3,000,000			80,000			9.2		0		0
	02/24/98					0.06	< 0.005	17	100	15	132	< 0.01	< 1			0.10	5,000			13,000			< 2.2		0		1
	03/26/98					0.08	< 0.005	27	130	30	720	< 0.01	< 1			< 0.10	160,000			90,000			< 2.2		1		4
	09/22/99					0.06											8,000			170,000				1e			0
	02/12/03	< 0.0005	< 0.005	< 0.005	< 0.002	< 0.05											5,000			90,000				1a	0	4 g,k,n,x	0
	07/25/03					0.22											900,000			500,000				1k	4	7	2
	08/16/03					0.15											1,600,000			240,000				2k,l	0	7	0
	Median	**< 0.01**	**0.020**	**< 0.005**	**0.008**	**0.19**	**0.006**	**57**	**360**	**120**	**185**	**0.10**	**< 1**	**< 1**	**< 1**	**< 0.10**	**160,000**	**154,000**	**160,000**	**160,000**	**665,000**	**160,000**	**4.6**	**1.0**	**0**	**7**	**0**
	Average	**0.005**	**0.015**	**0.004**	**0.008**	**0.19**	**0.010**	**67**	**376**	**181**	**214**	**0.07**	**0.50**	**0.50**	**0.50**	**0.05**	**1,109,880**	**502,600**	**389,286**	**570,268**	**757,825**	**939,286**	**25**	**1**	**0**	**4**	**1**
Duck Creek at Boulder Highway	08/30/92	< 0.01	< 0.04		0.06	2.70	0.013	19	99	100	55	0.02				< 0.10	50,000			> 16							
	10/24/92	< 0.01	< 0.04		0.038	2.50	0.007	21	125	225	55	0.5				< 0.10	50,000			30,000							
	02/08/93	< 0.01	< 0.04	< 0.025	0.042	2.30	< 0.005	< 6	30	25	14	0.1				< 0.10	400	800		3,000	13,000						
	08/04/93	< 0.01	< 0.02		0.037	3.00	< 0.005	77	230	200	34	0.02				< 0.10	1,700,000	1,400,000	1,300,000	160,000	160,000	3,000,000					
	02/04/94	< 0.01	0.027	< 0.02	0.1	1.50	< 0.005	28	175	225	650	0.1				< 0.10	1,100	2,300	220	8,000	2,300	230					
	03/25/94	< 0.01	< 0.01	0.019	0.046	1.80	< 0.005	15	89	60	70	< 0.01				< 0.10	3,000		3,000	13,000		30,000	< 2.0				
	07/19/94	< 0.01	0.01	< 0.01	0.034	1.60	0.011	67	445	60	45					< 0.10	900,000	300,000	500,000	240,000	240,000	240,000	2.0				
	01/24/95	< 0.01	< 0.01	< 0.005		0.08	0.009	12	90	30	120	< 0.10		< 1	< 1	< 0.01			5,000			17,000	< 2.0				
	02/20/96					1.20	0.03	50	245	30	14	< 0.01	< 1				3,000			13,000			5.0				
	07/14/96					1.60	< 0.005	110	780	200	3,800	< 0.01				< 0.01	5,000,000			500,000			2.2		0		0
	04/02/97					0.79	0.006	40	280	150	72	< 0.01	< 1			0.00	7,000			90,000			4.0		0		3
	07/22/97					1.60	0.022	20	170	150	2,300	< 0.01	< 1			0.40	22,000			17,000			9.2		0		1
	02/03/98					1.20	< 0.005	48	190	75	370	< 0.01	< 1			< 0.10	1,100			50,000			< 2.2		0		1
	09/08/98					0.72											17,000			24,000			< 2.2	0	0		0
	06/02/99					0.77											7,900			130,000				1 (acetone)	0		0
	09/22/99					0.46											160,000			35,000				1a	0		0
	02/16/00					0.77											8,000			80,000				1a	0		0
	08/30/00					0.56											110,000			90,000				0	0		0
	07/06/01					0.79											900,000			300,000				2a,b	0		2 f
	02/12/03	< 0.0005	0.031	< 0.05	0.089	0.33											30,000			160,000				1a	0	3 g,m,x	0
	07/24/03					1.30											1,600,000			80,000				1.0	0	7	0
	Median	**< 0.01**	**0.03**	**0.02**	**0.04**	**1.200**	**0.006**	**28**	**175**	**100**	**70**	**0.02**	**< 1**	**< 1**	**< 1**	**< 0.10**	**26,000**	**151,150**	**5,000**	**65,000**	**86,500**	**30,000**	**2.2**	**1**	**0**	**3**	**0**
	Average	**0.004**	**0.016**	**0.012**	**0.056**	**1.313**	**0.009**	**39**	**227**	**118**	**585**	**0.068**	**< 1**	**< 1**	**< 1**	**< 0.068**	**528,525**	**425,775**	**361,644**	**101,151**	**103,825**	**657,446**	**3**		**0**	**3**	**1**
Flamingo Wash at Nellis	10/24/92	< 0.01	< 0.04		< 0.025	0.49	0.008	54	555	175	750	0.02				< 0.10	80,000			80,000							
	02/08/93	< 0.01	< 0.04	< 0.025	0.015	0.09	< 0.005	< 6	57	15	700	0.1				< 0.10	1,700	3,000		90,000	30,000						
	06/05/93	< 0.01	< 0.02	< 0.015	0.016	0.58	< 0.005	56	375	320	390	< 0.01				< 0.10	8,000	28,000	5,000	50,000	160,000	90,000					
	08/05/93	< 0.01	0.03		0.027	0.97	0.008	85	415	320	200	0.02				< 0.10	300,000	500,000	50,000	90,000	160,000	90,000					
	02/04/94	< 0.01	< 0.02	< 0.01	0.008	0.41	< 0.005	37	185	100	190	0.1				< 0.10	1,300	500	2,300	22,000	1,300	500					
	03/25/94	< 0.01	0.032	< 0.015	0.031	0.37	0.008	55	395	1,000	1,400	0.01				< 0.10	24,000	30,000	30,000	160,000	160,000	90,000	< 2.0				
	07/19/94	< 0.01	0.054	< 0.01	0.032	0.44	0.013	22	630	150	0.2	0.13				< 0.10		1,600,000	500,000		500,000	170,000	13.0				
	08/19/94	< 0.01	0.026	< 0.005	0.031	0.35	< 0.005	40	465	150	950	< 0.10				< 0.10	170,000	80,000	140,000	300,000	130,000	130,000	8.0				
	01/24/95	< 0.01	0.016	< 0.005		0.18	< 0.005	33	155	25	510	0.10		< 1.1	< 1.1	< 0.01			3,000			22,000	8.0				
	05/24/95	< 0.01	0.011	0.007	< 0.005	0.50	0.007	19	115	35	180	0.01	< 1			< 0.01			160,000			90,000	2.0				
	08/12/95	< 0.01	0.027	< 0.005	0.009	0.34	< 0.005	78	450	250	8	< 0.10		< 1	< 1	< 0.01			> 160,000			> 1,600	2.0				
	01/31/96					0.71	0.03	116	660	230	520	0.02	< 1				13,000			3,000			< 2.0		0		0
	11/21/96					0.12	< 0.005	18	220	30	3,300	< 0.01	< 1			< 0.01	240			738			< 2.2		0		0
	09/25/97					0.30	< 0.005	42	160	60	280	< 0.01	1.5				90,000			160,000			< 2.2		0		0
	02/04/98					0.22	< 0.005	63	570	75	2,200	< 0.01	< 1			0.10	5,000			50,000			< 2.2		2		1
	02/24/98					0.13	< 0.005	13	98	15	740	< 0.01	< 1			0.20	13,000			17,000			< 2.2		1		1
	02/12/03	< 0.0500	0.015	< 0.05	0.012	< 0.05											7,000			17,000				1a	0	9 g,h,j,o,q,s,t,u,x	0
	04/14/03	0.0057	0.038	< 0.04	0.014	0.18											130,000			70,000				1d		8 g,h,k,o,x,z,aa,bb	0
	07/24/03					0.24											1,600,000			170,000				2	0	3	0
	08/16/03					0.27											300,000			10,000			0.0	1	0	0	0
	Median	**0.010**	**0.027**	**0.010**	**0.016**	**0.32**	**0.005**	**41**	**385**	**125**	**515**	**0.02**	**< 1**	**< 1**	**< 1**	**< 0.10**	**18,500**	**30,000**	**50,000**	**60,000**	**160,000**	**90,000**	**2.2**	**1**	**0**	**6**	**1**
	Average	**0.007**	**0.024**	**0.009**	**0.018**	**0.346**	**0.006**	**45.9**	**344.1**	**184.4**	**769.9**	**0.04**	**< 0.7**	**< 0.5**	**< 0.5**	**< 0.1**	**171,453**	**320214.3**	**116700.0**	**80,609**	**163042.9**	**76011.1**	**3.6**	**1**	**1**	**9**	**1**

Table 8-14a (Continued)

Wet Weather Monitoring Data, 1992-2004

Location	Date	Q cfs	Temp Deg. C	Oil & Grease mg/L	TSS mg/L	TDS mg/L	Specific Cond-uctance umho/cm	Lab pH units	MBAS mg/L	Ortho-Phos-phate mg/L	Total Phos phate-Phos-phorous mg/L	NO3-N mg/L	NO-2 mg/L	NH3-N mg/L	TKN mg/L	Total Nitro gen mg/L
C-1 Channel at Warm Springs	08/30/92	500	24.5	< 3	17,800	230		8	0.26	< 0.05	2.20	1.6		0.07	8.3	9.9
	02/08/93	181	11.1	< 3	3,670	140		8.3	< 0.05	1.50	3.90	0.3		0.11	< 1	1.3
	07/19/94		24.1	3.2	77	290	486	7.5	1.81	0.41	0.42	0.8		0.97	2.8	3.6
	09/19/94		22.7	3	120	930	888	7.6	2.60	1.20	2.70	5.2		1.6	4.1	9.3
	01/24/95	5	9.5	< 3	1,190	210	274	8.2	0.14	0.41		0.8		0.06	< 1	1.8
	11/21/96	30	17.0	< 3	1,980	150	575	8.2	< 0.05	0.52	1.90	0.8		0.3	2.1	2.9
	08/10/97		17.5	< 3	4,800	260		8.5	0.60	0.37	1.48	2		0.2	5.2	7.2
	02/24/98		12.0	< 3	1,460	88		8.4	< 0.50	0.61	6.04	0.59		0.2	1.7	2.3
	02/16/00			< 3	610	62					2.15	0.49		0.362	1.9	2.39
	08/16/00	76		5.2	1,170	380					1.50	4.12		1.13	6.1	10.22
	02/25/03	9		< 3	187	100	139	7.7	0.19			0.44	< 0.1		0.92	1.36
	09/04/03	29			3,850	440					6.80	1.7	< 0.1		10	11.53
	11/12/03	156			110	150				0.26	0.38	0.61	< 0.1		2.4	3.01
	Median	**53**	**17.3**	**< 3**	**1,190**	**210**	**486**	**8.2**	**0.26**	**0.41**	**2.15**	**0.8**	**0.1**	**0.3**	**2.4**	**3.0**
	Average	**179**	**17.3**	**< 2.1**	**2,848**	**264**	**472**	**8.0**	**0.66**	**0.59**	**2.68**	**1.50**	**0.05**	**0.50**	**3.58**	**5.14**
Sloan Channel (Range Wash) at Charleston	10/24/92	32	17.8	< 3	280	100		7.9	0.21	0.41	0.43	0.5		0.2	1.1	1.6
	02/08/93	56	10.5	< 3	830	130		8.2	< 0.10	0.64	4.70	0.4		0.14	< 1	1.4
	07/19/94	24	23.4		6,540	430	611	7.3	0.61	0.09	2.10	2.3		1.2	1.7	4
	08/09/94	5	24.1	< 3	16,200	440	598	7.9	0.31	0.09	2.00	1.3		0.14	2.7	4
	08/19/94	2	23.1	< 3	4,010	390	626	8	< 0.05	< 0.05	0.82	2		0.37	3.1	5.1
	01/24/95		10.0	< 3	3,540	230	3	8.1	0.22	0.08		8.7		0.7	2.5	11.2
	08/12/95	5	27.3	3	3,390	510	620	7.4	0.75	0.24	3.10	< 0.2		0.4	8	8.2
	11/21/96	63	16.9	< 3	5,230	240	413	8	< 0.05	0.51	1.70	1.1		0.5	3.7	4.8
	07/22/97		27.0	1,060	230	200	297	8.1		0.44	0.13	0.9		1	2.5	3.4
	08/08/97			3.7	1,500	240		7.9	1.53	0.08	0.47	2		2.5	6.1	8.1
	08/14/98	30		< 3	4,060	330					1.00	2.5		0.66	5.8	8.3
	02/16/00			< 3	1,970	200					1.71	1.74		0.485	3.9	5.64
	02/26/01			< 3	220	110					0.33	0.64		0.278	1.3	1.94
	02/12/03	99		< 3	79	110	172	7.2	0.31	0.18	0.26	0.73	< 0.1		2	2.73
	Median	**30**	**23.1**	**< 3**	**2,680**	**235**	**506**	**7.9**	**0.27**	**0.18**	**1.00**	**1.2**	**0.10**	**0.5**	**2.6**	**4.4**
	Average	**27**	**20.0**	**< 83.2**	**3,434**	**261**	**417**	**7.8**	**0.40**	**0.25**	**1.44**	**1.8**	**0.05**	**0.7**	**3.2**	**5.0**
Las Vegas Wash	04/02/97		12.6	< 3	480	1,060	1,549	7.1	0.63	0.55	0.91	3.3		1.3	8.5	11.8
	07/28/97		26.6	1,180	400	1,200	1,092	7.6	1.34	0.04	0.52	2.1		0.8	3.9	6
	02/04/98			< 3	2,590	980		7.7	0.60	0.17	1.97	0.63		0.7	7.3	7.9
	02/24/98		12.0		5,580	540		7.9	< 0.50	0.09	1.46	1		0.2	< 1	1
	04/24/99	112		3.8	1,240	1,000					0.93	2.8		0.5	7.45	10.25
	04/30/99	550		< 3	1,870	440					1.83	1.9		0.78	8.73	1.9
	02/21/00			5.1	1,910	100					2.10	0.64		0.179	3.2	3.84
	10/23/00	312		4.55	1,390	2,430					1.20	3.48		0.601	7.4	10.88
	02/26/01	400		< 3	2,940	1,250					1.70	2.64		0.404	4.9	7.54
	11/24/01	75		14.5	630	1,590					0.86	2		1.61	7.8	11.8
	09/11/02	83		< 3	110	1,300	1,570	7.1	2.18		0.49	3.9	< 2.5	1.13	5.4	9.3
	02/12/03	400		5	5,980	1,180	819	7.7	< 0.05	0.13	2.40	1.5	< 0.2		4.7	6.2
	02/25/03	775		8							0.44			0.379	3	3
	07/19/03				500	1,330						0.63	1.2		7.7	9.53
	02/21/04				340	660	274	7.5	0.48		0.42	1.8	< 0.2		2.9	4.7
	Median		**12.6**	**4**	**1,315**	**1,120**	**1,092**	**7.6**	**0.60**	**0.13**	**1.06**	**2.0**	**0.7**	**0.7**	**5.4**	**7.5**
	Average		**17.1**	**102**	**1,854**	**1,076**	**1,061**	**7.5**	**0.79**	**0.20**	**1.23**	**2.02**	**0.66**	**0.72**	**5.56**	**7.04**
Monson Channel	02/12/03			12	11,600	740	940	7.5	0.79	0.98	2.32	1.3	0.56		8.6	10.46
	07/31/03				800	170						2.9	0.18		7.9	10.98
	11/12/03				210	540				0.36	0.69	4.8	0.25		0.69	5.74
	Median			**12**	**800**	**540**	**940**	**7.5**	**0.79**	**0.67**	**1.51**	**2.90**	**0.25**		**7.90**	**10.46**
	Average			**12**	**4,203**	**483**	**940**	**7.5**	**0.79**	**0.67**	**1.51**	**3.00**	**0.33**		**5.73**	**9.06**
Meadows Detention Basin	02/12/03			7	100	110	153	7.4	0.37	0.19	0.32	0.6	< 0.1		1.6	2.2
	07/25/03				490	310						3.3	< 0.1		7.6	10.9
	12/11/03				94	140	150	7.8	0.29	0.20	0.84	1.8	< 0.2		2.2	2.72
	Median			**7**	**100**	**140**	**152**	**7.6**	**0.33**	**0.20**	**0.58**	**1.80**	**< 0.10**		**2.20**	**2.72**
	Average			**7**	**228**	**187**	**152**	**7.6**	**0.33**	**0.20**	**0.58**	**1.90**	**0.07**		**3.80**	**5.27**
Lake Las Vegas	02/12/03	560			11,100	1,160	1,650	7.5	< 0.05	0.13	4.30	5.02	0.52		9.6	15.14
	Median				**11,100**	**1,160**	**1,650**	**7.5**	**0.05**			**5.02**	**0.52**		**9.6**	**15.14**
	Average				**11,100**	**1,160**	**1,650**	**7.5**	**0.025**			**5.02**	**0.52**		**9.6**	**15.14**
Las Vegas Wash at Pabco Rd.	09/11/02	320		< 3	60	1,450	1,950	7.3	< 0.45		0.32	9.9	< 2.5		3.2	13.1
	10/27/02	218		< 3	10	1,490	2,230	8			0.29	9.86			1.2	11.06
	Median				**35**	**1,470**	**2,090**	**8**	**0.45**		**0.31**	**9.9**	**2.50**		**2.2**	**12.1**
	Average				**35**	**1,470**	**2,090**	**8**	**0.226**		**0.305**	**9.9**	**1.25**		**2.2**	**12.1**
2003-2004 Median				**N/A**	**800**	**580**	**212**	**7.7**	**0.385**	**0.288**	**0.84**	**1.8**	**0.20**	**N/A**	**6.6**	**9.5**
2003-2004 Average				**N/A**	**2,412**	**753**	**212**	**7.7**	**0.385**	**0.289**	**1.79**	**2.2**	**0.35**	**N/A**	**6.7**	**9.1**
1992-2004 Median		**81**	**18**	**< 3**	**885**	**580**	**642**	**7.5**	**0.61**	**0.19**	**0.96**	**1.74**	**0.20**	**0.60**	**4.9**	**7.4**
1992-2004 Average		**136**	**18.9**	**29**	**2,144**	**982**	**1,483**	**7.6**	**0.87**	**0.40**	**1.41**	**2.11**	**0.50**	**0.76**	**5.4**	**7.3**

Location	Date	Copper mg/L	Dis-solved Copper mg/L	Chrom-ium mg/L	Lead mg/L	Dis-solved Lead mg/L	Mercury mg/L	Cadmium mg/L	Zinc mg/L	Dis-solved Zinc mg/L	Silver mg/L	Nickel mg/L	Selen-ium mg/L	Arsenic mg/L	Boron mg/L	Cyanide mg/L	BOD mg/L	COD mg/L	Color ACU	Turb-idity NTU
C-1 Channel at Warm Springs	08/30/92	0.270		0.19	0.220		0.0014	< 0.005	0.890		< 0.01	0.21		0.12	0.27	0.015	13	88	30	8,500
	02/08/93	0.092		0.063	0.060		< 0.0002	< 0.005	0.370		< 0.01	0.077	< 0.025	0.021	0.09	< 0.005	< 6	81	30	1,900
	07/19/94	0.021		< 0.01	0.010		< 0.0002	< 0.005	0.083		< 0.01	0.017	< 0.005	< 0.005	0.10	0.006	27	190	200	26
	09/19/94	0.029		0.014	0.022		< 0.0002	< 0.005	0.200		< 0.01	0.022	< 0.005	0.008	0.23	0.009	105	560	400	18
	01/24/95	0.035		0.019	< 0.100		0.0002	< 0.005	0.180		< 0.01	0.068	< 0.005		0.06	0.007	7	60	25	380
	11/21/96	0.033			< 0.100				0.230						0.07	< 0.005	< 6	58	32	840
	08/10/97	0.029			< 0.100				0.200						0.15	< 0.005	8	230	< 3	4,400
	02/24/98	< 0.010			< 0.100				0.170						0.09	< 0.005	13	120	20	850
	02/16/00	0.071	< 0.010		< 0.100	< 0.100			0.320	< 0.200					0.00					
	08/16/00	0.150	0.034		< 0.100	< 0.100			0.490	< 0.020					0.12					
	02/25/03	0.025	< 0.010	0.0089	0.0055	< 0.100	< 0.0002	< 0.0005	0.080	0.100	< 0.0005	0.0071	< 0.005	0.0025	< 0.05					
	09/04/03	< 0.200	< 0.010		0.0900	< 0.100			0.450	< 0.020					0.11					
	11/12/03	0.024	0.038		0.0045	< 0.020			0.080	0.083					< 0.05					
	Median	**0.033**	**0.020**	**0.02**	**0.100**	**< 0.100**	**< 0.0002**	**< 0.005**	**0.215**	**< 0.200**	**0.01**	**0.045**	**< 0.005**	**0.008**	**0.09**	**0.006**	**11**	**104**	**30**	**845**
	Average	**0.068**	**0.017**	**0.050**	**0.055**	**< 0.042**	**0.0003**	**< 0.0021**	**0.288**	**< 0.061**	**< 0.004**	**0.067**	**< 0.0045**	**0.031**	**0.103**	**0.006**	**22**	**173**	**92**	**2,114**
Sloan Channel (Range Wash) at Charleston	10/24/92	0.028		0.019	0.020		< 0.0002	< 0.005	0.170		< 0.01	< 0.04		< 0.025	0.08	0.005	12	74	10	0
	02/08/93	0.017		0.021	0.018		< 0.0002	< 0.005	0.110		< 0.01	< 0.04	< 0.005	0.01	0.08	< 0.005	< 6	46	15	600
	07/19/94	0.068		0.057	0.063		< 0.0002	< 0.005	0.310		< 0.01	0.046	< 0.01	0.049	0.24	0.007	28	135	100	3
	08/09/94	0.049		0.031	0.086		0.0002	< 0.005	0.170		< 0.01	0.028	< 0.005	0.061	0.93	< 0.005	15	295	75	1
	08/19/94	0.040		0.035	0.037		< 0.0002	< 0.005	0.150		< 0.01	0.026	0.027	0.027	0.24	< 0.005	10	115	150	1,350
	01/24/95	0.064		0.058	< 0.100		< 0.0002	< 0.005	0.290		< 0.01	0.044	< 0.005		0.11	0.01	14	97	15	1,100
	08/12/95	0.056		0.035	0.029		< 0.0002	< 0.005	0.300		< 0.01	0.03	< 0.005	0.018	0.20	< 0.005	59	375	250	63
	11/21/96	0.033			< 0.100				0.200						0.15	< 0.005	17	140	37	1,600
	07/22/97	0.029			< 0.100				0.260						0.12	< 0.005	26	130	200	240
	08/08/97	0.150			0.210				0.620						0.18	0.33	41	310	150	600
	08/14/98	0.110	0.011		< 0.100	< 0.100			0.440	< 0.020					0.24					
	02/16/00	0.012	< 0.010		< 0.100	< 0.100			0.054	< 0.020					0.10					
	02/26/01	0.029	< 0.010		0.011	< 0.001			0.120	< 0.020					0.00					
	02/12/03	0.018	< 0.010	0.0043	0.0060	< 0.100	< 0.0002	< 0.0005	0.075	< 0.020	< 0.0005	< 0.0005	< 0.050	0.0026	< 0.05					
	Median	**0.037**	**0.010**	**0.033**	**0.075**	**< 0.100**	**< 0.0002**	**< 0.005**	**0.185**	**< 0.020**	**< 0.01**	**0.035**	**< 0.005**	**0.025**	**0.14**	**< 0.005**	**16**	**133**	**88**	**420**
	Average	**0.050**	**0.007**	**0.033**	**0.052**	**< 0.038**	**< 0.0001**	**< 0.002**	**0.234**	**< 0.010**	**< 0.004**	**0.027**	**0.010**	**0.026**	**0.19**	**0.037**	**23**	**172**	**100**	**556**
Las Vegas Wash	04/02/97	0.024			< 0.100				0.180						0.52	0.015	77	290	150	230
	07/28/97	0.023			< 0.100				0.150						0.57	0.007	35	240	180	220
	02/04/98	0.065			0.180				0.550						0.37	< 0.005	74	260	25	1,660
	02/24/98	< 0.010			0.180				0.320						0.21	< 0.005	10	90	10	1,050
	04/24/99	< 0.010	< 0.010		< 0.100	< 0.100			0.280	< 0.020					0.55					
	04/30/99	0.130	< 0.010		< 0.100	< 0.100			0.540	< 0.020					0.36					
	02/21/00	0.012	< 0.010		< 0.100	< 0.100			0.833	< 0.020					0.25					
	10/23/00	0.090	< 0.010		< 0.100	< 0.100			0.540	0.032					0.57					
	02/26/01	0.055	< 0.010		0.029	0.001			0.280	0.039					0.24					
	11/24/01	0.012	< 0.010		< 0.100	< 0.100			0.071	0.035					0.70					
	09/11/02	0.098	0.110	< 0.01	0.010	< 0.100	< 0.0002	0.0069	0.180	0.220	< 0.0005	0.019		0.0055	0.41					
	02/12/03	0.110	< 0.010	0.015	0.096	< 0.100	< 0.0002	0.0028	0.390	< 0.020	< 0.0005	0.045	< 0.05	0.034	< 0.05					
	02/25/03	0.390		0.0094	0.014			0.00055	0.190			0.012		0.0059	0.22					
	07/19/03	0.075	0.020		0.020	< 0.100			0.250	0.052					0.33					
	02/21/04	0.027	< 0.010	< 0.01	0.077	< 0.020	< 0.0002	< 0.00050	0.890	0.400	0.0006	< 0.05	< 0.025	0.0051	0.24					
	Median	**0.055**	**0.010**	**0.010**	**0.100**	**< 0.100**	**0.0002**	**0.0017**	**0.280**	**0.034**	**0.0005**	**0.019**	**0.038**	**0.006**	**0.360**	**0.006**	**55**	**250**	**88**	**640**
	Average	**0.075**	**0.017**	**0.009**	**0.064**	**< 0.041**	**0.0001**	**0.0026**	**0.376**	**0.082**	**0.0004**	**0.025**	**0.019**	**0.013**	**0.371**	**0.007**	**49**	**220**	**91**	**790**
Monson Channel	02/12/03	0.053	< 0.050	0.0079	0.034	< 0.500	< 0.0002	0.00090	0.330	< 0.100	< 0.0005	0.015	< 0.02	0.02	0.028					
	07/31/03	0.058	< 0.010		0.120	< 0.100			0.210	< 0.020					0.29					
	11/12/03	0.028	0.035		0.009	< 0.020			0.130	0.180					0.26					
	Median	**0.053**	**< 0.035**	**0.0079**	**0.034**	**< 0.100**	**< 0.0002**	**0.00090**	**0.210**	**< 0.100**	**< 0.0005**	**0.015**	**< 0.02**	**0.02**	**0.260**					
	Average	**0.046**	**0.022**	**0.008**	**0.054**	**0.103**	**0.0001**	**0.00090**	**0.223**	**0.080**	**0.0003**	**0.015**	**0.010**	**0.02**	**0.193**					
Meadows Detention Basin	02/12/03	0.026	< 0.010	0.0053	0.012	< 0.100	< 0.0002	0.00074	0.100	< 0.020	< 0.0005	0.0051	< 0.005	0.0025	< 0.05					
	07/25/03	0.110	< 0.010		0.040	< 0.100			0.510	0.090					0.13					
	12/11/03	0.031	< 0.010	0.00055	0.014	< 0.020	< 0.00021	0.00053	0.150	0.150	< 0.0005		< 0.005	< 0.002	0.05					
	Median	**0.031**	**< 0.010**	**0.003**	**0.014**	**< 0.100**	**< 0.0002**	**0.0006**	**0.150**	**< 0.090**	**< 0.0005**	**0.0051**	**< 0.005**	**0.0023**	**< 0.052**					
	Average	**0.056**	**0.005**	**0.003**	**0.022**	**0.037**	**0.0001**	**0.0006**	**0.253**	**0.083**	**0.0003**	**0.0051**	**0.003**	**0.0018**	**0.069**					
Lake Las Vegas	02/12/03	0.082		0.043	0.092		< 0.0002	< 0.0025	0.350		< 0.0025	0.06								
	Median	**0.082**		**0.043**	**0.092**		**< 0.0002**	**< 0.0025**	**0.350**		**< 0.0025**	**0.06**								
	Average	**0.082**		**0.043**	**0.092**		**0.0001**	**0.0013**	**0.350**		**0.0013**	**0.06**								
Las Vegas Wash at Pabco Rd.	09/11/02	0.015	0.017	0.0045	0.0024	< 0.100	< 0.0002	< 0.0005	0.051	0.058	< 0.0005	0.014		0.0038	0.59					
	10/27/02	0.012	0.0082	0.0031	0.0006	< 0.0005	< 0.0002	< 0.0005	0.065	0.058	< 0.0005	0.0083	< 0.005	0.0086	0.59					
	Median	**0.014**	**0.013**	**0.0038**	**0.002**	**0.050**	**< 0.0002**	**< 0.0005**	**0.058**	**0.058**	**< 0.0005**	**0.011**	**0.005**	**0.0062**	**0.59**					
	Average	**0.014**	**0.013**	**0.0038**	**0.002**	**0.025**	**0.0001**	**0.0003**	**0.058**	**0.058**	**0.0003**	**0.011**	**0.003**	**0.0062**	**0.59**					
2003-2004 Median		**0.075**	**0.010**	**0.005**	**0.043**	**0.100**	**0.0002**	**0.0005**	**0.450**	**0.042**	**0.0006**	**0.05**	**0.015**	**0.0036**	**0.24**					
2003-2004 Average		**0.102**	**0.011**	**0.003**	**0.058**	**0.042**	**0.0001**	**0.0004**	**0.528**	**0.084**	**0.0004**	**0.03**	**0.008**	**0.0031**	**0.28**					
1992-2004 Median		**0.044**	**0.010**	**0.015**	**0.086**	**< 0.100**	**< 0.0002**	**< 0.0050**	**0.230**	**0.023**	**< 0.010**	**0.026**	**< 0.005**	**0.015**	**0.24**	**< 0.005**	**35**	**230**	**100**	**230**
1992-2004 Average		**0.065**	**0.016**	**0.509**	**0.113**	**< 0.097**	**0.0032**	**< 0.0042**	**0.298**	**0.066**	**< 0.009**	**0.030**	**0.013**	**0.022**	**0.44**	**0.013**	**45**	**283**	**159**	**721**

Location	Date	Phenol mg/L	Petro-leum Hydro-carbons	TPH (diesel) MPN/100 mL	TPH (gas-oline) MPN/100 mL	Total Chlor-ine mg/L	Fecal Coliform MPN/100 mL	Fecal* Coliform MPN/100 mL	Fecal** Coliform MPN/100 mL	Fecal Strep. MPN/100 mL	Fecal* Strep. MPN/100 mL	Fecal** Strep. MPN/100 mL	Salmon-ella MPN/100 mL	VOC # of detects	Pesti-cides # of detects	SOC # of detects	Herbi-cides # of detects
C-1 Channel at Warm Springs	08/30/92	0.02				< 0.10	90,000			> 16							
	02/08/93	0.10				< 0.10	3,000			30,000							
	07/19/94	0.08				< 0.10		11,000	30,000		80,000	300,000	4.0				
	09/19/94	0.02				< 0.01			30,000			90,000	8.0				
	01/24/95	0.10		< 1.1	< 1.1	< 0.01			1,700			13,000	< 2.0				
	11/21/96	< 0.01	< 1.1			< 0.01	240			1,230			< 2.2		0		1 (2,4-D)
	08/10/97	< 0.01				< 0.10	3,000			50,000			9.2		0		1
	02/24/98	< 0.01	< 1			0.10	5,000			24,000			< 2.2		0		2
	02/16/00						13,000			30,000				1d	0		0
	08/16/00						30,000			90,000				1a	1 (diazinon)		1 (2, 4-D)
	02/25/03						8,000			2,400				0	0	5 g,h,l,o,x	0
	09/04/03						17,000			30,000				0	0	0	0
	11/12/03						24,000			16,000				4	0	4	0
	Median	**0.02**	**< 1.1**	**< 1.1**	**< 1.1**	**< 0.10**	**10,500**	**11,000**	**30,000**	**27,000**	**80,000**	**90,000**	**3.1**		**0**	**4**	**1**
	Average	**0.04**	**< DL**	**< DL**	**< DL**	**0.04**	**19,324**	**11,000**	**20,567**	**27,365**	**80,000**	**134,333**	**4.1**		**0**	**5**	**1**
Sloan Channel (Range Wash) at Charleston	10/24/92	< 0.01				< 0.10	5,000			130,000							
	02/08/93	0.2				< 0.10	1,300		1,400	24,000		50000					
	07/19/94	0.04				< 0.10	28,000	23,000	23,000	22,000	30,000	30,000	12.0				
	08/09/94	< 0.01				< 0.10		170,000	30,000		70,000	23,000	< 2.0				
	08/19/94	< 0.01				< 0.10	30,000	80,000	130,000	23,000	35,000	9,000	170.0				
	01/24/95	0.10		< 1.2	< 1.2	< 0.01			3,000			17,000	4.0				
	08/12/95	0.10		< 1.4	< 1.4	< 0.01			> 160,000			> 1,600	< 14.0				
	11/21/96	< 0.01	< 1			< 0.01	240			9,300			< 2.2		1 Prometon		1 (2,4-D)
	07/22/97	< 0.01	< 1			< 0.10	90,000			90,000			< 2.2		0		1
	08/08/97	0.012					5,000			160,000			< 2.2		0		0
	08/14/98						3,000			160,000			< 2.2	1 (acetone)	0		1 (2,4-D)
	02/16/00						11,000			30,000				1a	0		0
	02/26/01						5,000			50,000				1a	0		0
	02/12/03						5,000			80,000				1a	0	9 g,h,l,j,k,l,u,v,x	
	Median	**0.01**	**< 1**	**1.3**	**1.3**	**< 0.10**	**5,000**	**80,000**	**26,500**	**50,000**	**35,000**	**20,000**	**2.2**		**0**	**9**	**1**
	Average	**0.05**	**< DL**	**< DL**	**< DL**	**< DL**	**16,685**	**91,000**	**57,900**	**70,755**	**45,000**	**21,767**	**24.7**		**0**	**9**	**1**
Las Vegas Wash	04/02/97	0.01	4.3				7,500			90,000			< 2.0		1		4
	07/28/97	< 0.01	< 1			< 0.10	1,600,000			1,600,000			< 2.2				
	02/04/98	0.01					8,000			28,000			< 2.2		2		1
	02/24/98	< 0.01	< 1				2,400			8,000			< 2.2		1		1
	04/24/99													1 (acetone)	0		1 (2,4-D)
	04/30/99													2 ***	0		1 (2,4-D)
	02/21/00													1a			0
	10/23/00														0		0
	02/26/01						2,200			220,000				1a	0		0
	11/24/01													1a	0		0
	09/11/02						300,000			500,000							
	02/12/03						500,000			22,000				1a	0	4 g,j,o,x	0
	02/25/03						30,000			30,000				0	0		
	07/19/03													1	0	0	0
	02/21/04						1,600			33,000				1a	0	0	0
	Median	**< 0.01**	**< 1**			**< 0.10**	**8,000**			**33,000**			**< 2.2**		**0**	**4**	**1**
	Average	**< DL**	**2**			**< DL**	**272,411**			**281,222**			**< DL**		**0**	**4**	**1**
Monson Channel	02/12/03						28,000			28,000				1a	0	4 g,h,o,x	0
	07/31/03						1,600,000			1,600,000				1	1	8	0
	11/12/03						50,000			220,000				1	0	4	0
	Median						**50,000**			**220,000**				**1a**	**0**	**4**	**0**
	Average						**559,333**			**616,000**					**0**	**4**	**0**
Meadows Detention Basin	02/12/03						7,000			30,000				1a	0	5 g,h,k,p,x	0
	07/25/03						160,000			1,600,000				1	0	8	1
	12/11/03						2,200			17,000				0	0	2	0
	Median						**7,000**			**30,000**				**1a**	**0**	**5**	**0**
	Average						**56,400**			**549,000**				**1a**	**0**	**5**	**0**
Lake Las Vegas	02/12/03						1,600,000			300,000							
	Median						**1,600,000**			**300,000**							
	Average						**1,600,000**			**300,000**							
Las Vegas Wash at Pabco Rd.	09/11/02						1,600,000			900,000							
	10/27/02													4d,cc,dd,ee	0	2 i,j	0
	Median						**1,600,000**			**900,000**							
	Average						**1,600,000**			**900,000**				**4**	**0**	**2**	**0**
2003-2004 Median							**230,000**			**125,000**					**0**	**4**	**0**
2003-2004 Average							**654,567**			**376,333**					**0**	**4**	**0**
1992-2004 Median		**0.02**	**< 1**	**1.10**	**1.10**	**< 0.10**	**24,000**	**55,000**	**30,000**	**60,000**	**105,000**	**90,000**	**< 2.2**	**0**	**0**	**4**	**0**
1992-2004 Average		**0.05**	**< DL**	**< DL**	**< DL**	**< DL**	**435,556**	**263,173**	**223,809**	**227,077**	**228,112**	**323,514**	**9.9**	**0**	**0**	**4**	**1**

Notes:

(1) Insitu pH used for 3/25/94 Western Trib
(2) Phenol values are Lab measurements when both lab and in-situ measurements are available
(3) In computing median values, concentrations below detection limits were assumed to equal the detection limit
(4) Concentrations less than the detection limit were assumed to be 1/2 the detection limit for purposes of computing average values.
(5) Pesticides tested are atrazine, chlorpyrifos (Dursban), metachlor, malathion, prometon, and simazine.
(6) SOC detection limits dropped and the new detection limit is indicated in the "Notes" section, after each name.
* Denotes grab sample taken from bottle X
** Denotes grab sample taken from flow stream while bottle X is filling
*** VOCs detected were carbon disulfide and acetone

(a) VOC detected is Acetone
(b) VOC detected is 2-Butanone
(d) VOC detected is Chloroform
(e) VOC detected is Trichlorofloromethane
(f) Herbicide detected is 2, 4-D and MCCP
(g) SOC detected is Butylbenzylphthalate, 0.5 ug/L
(h) SOC detected is Caffeine, 0.05 ug/L

(i) SOC detected is Di-(2-Ethylhexyl)adipate, 0.6 ug/L.
(j) SOC detected is Di-n-Butylphthalate, 0.5 ug/L
(k) SOC detected is Phenanthrene, 0.02 ug/L
(l) SOC detected is Pyrene, 0.05 ug/L
(m) SOC detected is Simazine, 0.05 ug/L
(n) SOC detected is Dimethylphthalate, 0.5 ug/L
(o) SOC detected is Diethylphthalate, 0.5 ug/L

(p) SOC detected is Alachlor, 0.05 ug/L
(q) SOC detected is Benzopyrene, 0.02 ug/L
(s) SOC detected is Metolalchlor, 0.05 ug/L
(t) SOC detected is Propachlor, 0.05 ug/L
(u) SOC detected is Benzo(g,h,I)Perylene, 0.05 ug/L
(v) SOC detected is Benzo(k)Fluoranthene, 0.02 ug/L
(x) SOC detected is Di(2-Ethylhexyl)phthalate, 0.6 ug/L

(y) Pesticide detected is Diazinon
(z) SOC detected is Heptachlor, 0.04 ug/L
(aa) SOC detected is Lindane, 0.02 ug/L
(bb) SOC detected is Metribuzin, 0.05 ug/L
(cc) VOC detected is chlorodibromomethane
(dd) VOC detected is bromodichloromethane
(ee) VOC detected is Total THM

Table 8-14b

Wet Weather Monitoring Data, 2002-2004

Location	Date	2-Chloro-ethylvinyl-ether ug/L	Alkalinity in $CaCO_3$ mg/L	Aluminum mg/L	Anion Sum meq/L	Cation Sum meq/L	Antimony mg/L	Barium mg/L	Beryllium ug/L	Bicarbonate Alkalinity as HCO_3 mg/L	Bromide mg/L	Bromate ug/L	CO_2 Free mg/L	Carbonate mg/L	Calcium mg/L	Chlorate mg/L	Chloride mg/L	Chlorite mg/L
Las Vegas Wash	09/11/02	< 1	118	2.7	16.8	22	0.0056	0.11	< 1	144	0.32	< 5	22.9	0.118	200	0.270	160	< 0.05
	02/12/03		106	3.1	8.26	9.03	0.0045	0.41	< 1	129	0.11	< 5	5.15	0.42	89	0.031	43	< 0.04
	02/25/03			2.8			0.0044	0.009							110	1.20		0.036
	07/19/03	< 0.5	138	6.2	15.8	20.20	0.0047	0.190	< 1	168	0.29	< 5	13.4	0.274	200	0.22	150	< 0.100
	02/21/04	< 0.5	105	2.5	10.4	12.70	0.0033	0.082	< 1	129	0.074	< 5	8.16	0.265	120	170.00	80	< 0.040
Median		**0.5**	**112**	**2.8**	**13.1**	**16.5**	**0.0045**	**0.11**	**1.0**	**137**	**0.20**	**5.0**	**10.8**	**0.27**	**120**	**0.27**	**102**	**0.04**
Average		**0.3**	**117**	**3.5**	**12.8**	**16.0**	**0.0045**	**0.16**	**0.5**	**143**	**0.20**	**2.5**	**12.4**	**0.27**	**144**	**0.50**	**102**	**0.03**
C-1 Channel at Warm Springs	02/25/03	< 0.5	38	4.6	1.21	1.60	< 0.01	0.14	< 1	46.3	< 0.005	< 5	1.85	0.151	23	< 0.01	3.5	< 0.01
	09/04/03	< 0.5	88	6.5	3.0	17.90	< 0.01	3.00	< 10	107.0	0.02	< 5.0	1.7	0.875	210	0.29	7.60	< 0.01
	11/12/03	< 0.5	41	1.6	1.4	1.92	< 0.001	0.08	< 1	50.1	0.01	< 5.0	6.3	0.052	23	0.02	6.90	< 0.05
Median		**0.5**	**41**	**4.6**	**1.4**	**1.9**	**0.0100**	**0.14**	**1.0**	**50**	**0.01**	**5.0**	**1.9**	**0.15**	**23**	**0.02**	**7**	**0.01**
Average		**0.3**	**56**	**4.2**	**1.9**	**7.1**	**0.0035**	**1.07**	**2.0**	**68**	**0.01**	**2.5**	**3.3**	**0.36**	**85**	**0.10**	**6**	**0.01**
Sloan Channel (Range Wash) at Charleston	02/12/03	< 0.5	50	0.51	1.62	1.77	< 0.001	0.046	< 1	61	0.012	7.1	7.7	0.0628	23	< 0.01	5.01	< 0.01
Duck Creek at Boulder Highway	02/12/03	< 0.5	86	3.3	17.9	39	0.0023	0.25	< 1	105	0.12	< 5	8.36	0.171	580	< 0.01	120	< 0.01
	07/24/03	< 0.5	127	17	49.7	53.80	< 0.01	0.31	< 10	155	0.5	< 5	4.91	0.636	470	0.04	480	< 0.04
Median		**0.5**	**107**	**10.150**	**33.8**	**46.4**	**0.0062**	**0.28**	**5.5**	**130**	**0.31**	**5.0**	**6.6**	**0.40**	**525**	**0.0260**	**300**	**0.03**
Average		**0.3**	**107**	**10.150**	**33.8**	**46.4**	**0.0037**	**0.28**	**2.8**	**130**	**0.31**	**2.5**	**6.6**	**0.40**	**525**	**0.0235**	**300**	**0.01**
Flamingo Wash at Nellis	02/12/03	< 0.5	82	0.85	4.14	17.5	0.0032	0.13	< 1	99.9	< 0.005	< 5	5.02	0.258	270	0.013	14	< 0.01
	04/14/03	< 0.5	93	1.911	6.68	29	0.014	0.44	< 5	113	0.078	< 5	9	0.184	380	0.430	42	< 0.01
	07/24/03	< 0.5	105	< 2.500	10.8	31	< 0.010	0.49	< 10	128	0.1	< 5	5.11	0.417	400	0.700	110	< 0.04
	08/16/03	< 0.5	95	3.1	8.41	71.6	< 0.0100	1.300	< 10	116	0.081	< 5	4.63	0.378	1000	0.14	33	< 0.020
Median		**0.5**	**94**	**2.2**	**7.5**	**30.2**	**0.0100**	**2.21**	**7.5**	**115**	**0.08**	**5.0**	**5.1**	**0.32**	**390**	**0.29**	**38**	**0.02**
Average		**0.3**	**94**	**1.8**	**7.5**	**37.4**	**0.0068**	**1.78**	**3.3**	**114**	**0.07**	**2.5**	**5.9**	**0.31**	**513**	**0.32**	**50**	**0.01**
Monson Channel	02/12/03	< 0.5	167	1.3	12	16.8	0.0022	0.11	< 1	204	0.15	< 5	12.9	0.419	190	0.036	58	< 0.10
	07/31/03	< 0.5	73	2.5	8.44	10.1	< 0.0100	0.11	< 10	89	0.13	< 5	8.92	0.115	98	0.091	47	< 0.04
	11/12/03	< 0.5	61	1.8	6.34	8.0	0.0026	0.08	< 1	74.3	0.077	< 5	14.9	0.0483	82	< 0.020	29	1.1
Median		**0.5**	**73**	**1.8**	**8.4**	**10.1**	**0.0026**	**0.11**	**1.0**	**89**	**0.13**	**5.0**	**12.9**	**0.12**	**98**	**0.04**	**47**	**0.10**
Average		**0.3**	**100**	**1.9**	**8.9**	**11.6**	**0.0033**	**0.10**	**2.0**	**122**	**0.12**	**2.5**	**12.2**	**0.19**	**123**	**0.05**	**45**	**0.39**
Meadows Detention	02/12/03	< 0.5	49	0.48	1.74	1.79	0.0024	0.055	< 1	59.7	0.009	< 5	4.75	0.0975	23	< 0.01	4.5	< 0.10
	07/25/03	< 0.5	94	6.10	3.32	5.46	0.0130	0.280	< 10	115	0.042	< 5	14.5	0.1118	68	0.06	13	< 0.05
	12/11/03	< 0.5	38	1.60	1.24	2.01	0.0041	0.086	< 1	46.6	0.01	< 5	1.48	0.191	25	0.03	5.4	< 0.02
Median		**0.5**	**49**	**1.6**	**1.7**	**2.0**	**0.0041**	**0.09**	**1.0**	**60**	**0.01**	**5.0**	**4.8**	**0.11**	**25**	**0.03**	**5**	**0.05**
Average		**0.3**	**60**	**2.7**	**2.1**	**3.1**	**0.0065**	**0.14**	**2.0**	**74**	**0.02**	**2.5**	**6.9**	**0.13**	**39**	**0.03**	**8**	**0.03**
Lake Las Vegas	02/12/03		122	< 2.5	17.6	12.3	< 0.005		< 5	149			9.42	0.306	120		160	
Las Vegas Creek	02/12/03	< 0.5	55	0.5	1.88	2.67	< 0.001	0.056	< 1	67	0.016	< 5	5.33	0.109	35	< 0.01	5.9	< 0.10
	07/24/03	< 0.5	127	2.0	8.27	13.80	0.004	0.160	< 1	155	0.13	< 5	9.8	0.319	150	0.05	40	< 0.05
	08/16/03	< 0.5	100	< 2.5	4.05	20.50	< 0.010	0.600	< 10	122	0.037	< 5	9.71	0.199	280	0.03	13	< 0.02
Median		**0.5**	**100**	**2.0**	**4.1**	**13.8**	**0.0035**	**0.16**	**1.0**	**122**	**0.04**	**5.0**	**9.7**	**0.20**	**150**	**0.03**	**13**	**0.05**
Average		**0.3**	**94**	**1.3**	**4.7**	**12.3**	**0.0030**	**0.27**	**2.0**	**115**	**0.06**	**2.5**	**8.3**	**0.21**	**155**	**0.03**	**20**	**0.03**
Las Vegas Wash at Pabco Rd.	02/12/03	< 1	133	0.025	19.8	23.3	< 0.001	0.069	< 1	162	0.23	< 5	16.2	0.21	150	0.0034	220	< 0.05
	04/14/03	< 5	117	0.064	24.3	23.4	< 0.001	0.067	< 1	142	0.17	< 5	2.84	0.923	130	0.0063	390	0.15
Median		**3.0**	**125**	**0.045**	**22.1**	**23.4**	**0.0010**	**0.07**	**1.0**	**152**	**0.20**	**5.0**	**9.5**	**0.57**	**140**	**0.0049**	**305**	**0.10**
Average		**1.5**	**125**	**0.045**	**22.1**	**23.4**	**0.0005**	**0.07**	**0.5**	**152**	**0.20**	**2.5**	**9.5**	**0.57**	**140**	**0.0049**	**305**	**0.09**
2003-2004																		
Median		**0.5**	**95**	**2.5**	**8.3**	**13.8**	**0.010**	**0.190**	**10.0**	**116**	**0.077**	**5.0**	**8.2**	**0.27**	**150**	**0.06**	**33**	**0.040**
Average		**0.3**	**92**	**4.1**	**10.1**	**20.7**	**0.005**	**0.521**	**2.9**	**112**	**0.115**	**2.5**	**8.0**	**0.30**	**240**	**13.21**	**78**	**0.103**
Overall:																		
2002-2004 Median		**0.5**	**95**	**2.5**	**8.3**	**15.3**	**0.004**	**0.120**	**1.0**	**116**	**0.078**	**5.0**	**7.9**	**0.20**	**130**	**0.03**	**41**	**0.040**
2002-2004 Average		**0.4**	**93**	**2.8**	**10.2**	**18.1**	**0.004**	**0.333**	**1.9**	**113**	**0.109**	**2.7**	**8.3**	**0.28**	**202**	**6.68**	**86**	**0.068**

Location	Date	Diuron ug/L	Diquat mg/L	Paraquat mg/L	Endothall mg/L	Fluoride mg/L	Glyphosate ug/L	Hardness as $CaCO_3$ mg/L	Hydroxide as OH mg/L	Iron mg/L	Langelier Index - 25 degree mg/L	Magnesium mg/L	Manganese mg/L	Potassium mg/L	Reactive Silica mg/L	Sodium mg/L	Sulfate mg/L	Thallium ug/L	Total Coliform Bacteria MPN/100 mL	Total Organic Carbon mg/L
Las Vegas Wash	09/11/02				< 0.02	0.81	20	839	0.002	3.6	0.11	71	0.14	18.0	20	130	460	< 1		116
	02/12/03		< 0.4	< 2	< 0.005	0.55	10.3	839	0.009	2	0.32	30	0.79	9.6	11	43	230	< 1	50,000	36
	02/25/03		< 0.4	< 2						3		44	0.09	8.1		54			170,000	31
	07/19/03				< 20.00	0.620	14	775	0.004	6.7	0.48	67	0.23	15.0		98	420	< 1		66
	02/21/04					0.530		481	0.005	2.7	0.25	44	0.08	12.0	14	64	280	< 10	1,600,000	
Median			**0.4**	**2.0**	**0.013**	**0.68**	**15.2**	**839**	**0.006**	**3.0**	**0.22**	**44**	**0.14**	**9.6**	**16**	**54**	**345**	**1.0**	**110,000**	**36**
Average			**0.2**	**1.0**	**0.006**	**0.68**	**15.2**	**839**	**0.006**	**2.9**	**0.22**	**48**	**0.34**	**11.9**	**16**	**76**	**345**	**0.5**	**110,000**	**61**
C-1 Channel at Warm Springs	02/25/03	< 1	< 0.4	< 2	< 0.005	0.110	< 6	83.4	0.009	4.3	-0.59	1.8	0.15	2.1	12	5.7	15	< 10	13,000	2.3
	09/04/03	< 1	< 0.4	< 2	< 0.005	0.150	< 6	837	0.020	79	1.00	76.0	2.60	24	15	12	43	< 10	300000	28
	11/12/03	< 1	< 0.4	< 2	< 0.005	0.170	< 6	76	0.003	2	-1.00	4.4	0.06	3	23	7.7	16	< 1	50000	22
Median		**1.0**	**0.4**	**2.0**	**0.005**	**0.15**	**6.0**	**83**	**0.009**	**4.3**	**-0.59**	**4**	**0.15**	**3.0**	**15**	**8**	**16**	**10.0**	**50,000**	**22**
Average		**0.5**	**0.2**	**1.0**	**0.003**	**0.14**	**3.0**	**332**	**0.011**	**28.4**	**-0.20**	**27**	**0.94**	**9.7**	**17**	**8**	**25**	**3.5**	**121,000**	**17**
Sloan Channel (Range Wash) at Charleston	02/12/03	< 1	< 0.4	< 2	< 0.01	0.130	< 6	73	0.003	1.5	-1.00	3.8	0.041	2.5	4.7	5.7	20	< 1	220,000	23.7
Duck Creek at Boulder Highway	02/12/03	22	< 0.4	< 2	< 0.01	0.470	< 6	1,760	0.004	4.5	0.74	75	1.2	18	7	78	610	< 1	500,000	43
	07/24/03	< 0.4	< 0.4	< 2	< 0.02	0.810	153	2000	0.01	16	1.20	200	1	48	23	290	1600	< 10	> 1,600,000	48
Median			**0.4**	**2.0**	**0.015**	**0.64**	**79.5**	**1,880**	**0.007**	**10.3**	**0.97**	**138**	**0.96**	**33.0**	**15**	**184**	**1,105**	**5.5**		**46**
Average			**0.2**	**1.0**	**0.008**	**0.64**	**78.0**	**1,880**	**0.007**	**10.3**	**0.97**	**138**	**0.96**	**33.0**	**15**	**184**	**1,105**	**2.8**		**46**
Flamingo Wash at Nellis	02/12/03	140	< 0.4	< 2	< 0.02	0.360	< 6	839	0.007	2	0.59	40	0.27	4.9	9.8	14	97	< 1	500,000	21
	04/14/03	3	< 0.4	< 2	< 0.005	0.35	9.1	1,360	0.004	21	0.59	100	0.49	12.0	14	33	170	< 5	500,000	60
	07/24/03	8	< 0.4	< 2	< 0.020	0.80	6.2	1,410	0.009	22	0.96	100	0.54	16.0	18	62	260	< 10	> 1,600,000	24
	08/16/03	0.008	< 0.4	< 2	< 0.02	0.300	7.52	3730	0.009	65	1.30	300	0.94	25.0	17	27	260	< 0.1	500,000	35
Median		**5**	**0.4**	**2.0**	**0.020**	**0.36**	**6.9**	**1,385**	**0.008**	**21.5**	**0.78**	**100**	**0.52**	**14.0**	**16**	**30**	**215**	**3.0**	**500,000**	**30**
Average		**38**	**0.2**	**1.0**	**0.008**	**0.45**	**6.5**	**1,835**	**0.007**	**27.5**	**0.86**	**135**	**0.56**	**14.5**	**15**	**34**	**197**	**2.0**	**775,000**	**35**
Monson Channel	02/12/03	66	< 0.4	< 2	< 0.02	0.830	10.8	705	0.005	2	0.64	56	0.20	8.9	12	57	330	< 1	350,000	20
	07/31/03	3	< 0.8	< 4	< 0.02	0.550	24	389	0.003	2.8	-0.20	35	0.12	11.0	29	48	260	< 10	> 1,600,000	38
	11/12/03	< 2	< 0.4	2.12	< 0.02	0.490	41.6	316	0.002	2.4	-0.59	27	0.07	8.1	37	33	200	< 1	160,000	56
Median		**3.3**	**0.4**	**2.1**	**0.020**	**0.55**	**24.0**	**389**	**0.003**	**2.4**	**-0.20**	**35**	**0.12**	**8.9**	**29**	**48**	**260**	**1.0**	**350,000**	**38**
Average		**23.4**	**0.3**	**1.7**	**0.010**	**0.62**	**25.5**	**470**	**0.003**	**2.4**	**-0.05**	**39**	**0.13**	**9.3**	**26**	**46**	**263**	**2.0**	**703,333**	**38**
Meadows Detention	02/12/03	< 1	< 0.4	< 2	< 0.005	0.200	< 6	75.9	0.004	0.57	-0.90	4.5	0.033	2.3	12	5	28	< 1	170,000	62
	07/25/03	1	< 0.4	2.53	< 0.005	0.400	0.0139	236	0.003	6.1	-0.29	16	0.150	6.8	29	13	39	< 10	> 160,000	99
	12/11/03	< 1	< 0.4	< 2	< 0.005	0.170	< 6	86.3	0.01	1.9	-0.49	5.8	0.045	2.8	12	5	13	< 1	50,000	17
Median		**1.0**	**0.4**	**2.0**	**0.005**	**0.20**	**6.0**	**86**	**0.004**	**1.9**	**-0.49**	**6**	**0.05**	**2.8**	**12**	**5**	**28**	**1.0**	**160,000**	**62**
Average		**0.7**	**0.2**	**1.5**	**0.003**	**0.26**	**2.0**	**133**	**0.006**	**2.9**	**-0.56**	**9**	**0.08**	**4.0**	**18**	**8**	**27**	**2.0**	**126,667**	**59**
Lake Las Vegas	02/12/03					0.640		1,980	0.005	56	0.95	33	2.8	14		75	490	< 5	1,600,000	
Las Vegas Creek	02/12/03	< 1	< 0.4	< 2	< 0.005	0.330	7.9	117	0.004	0.53	-0.59	7.1	0.033	2.6	12	6.1	26	< 1	170,000	20
	07/24/03	1.2	< 0.4	2.36	< 0.020	0.610	13.5	601	0.005	8	0.42	55	0.180	11.0	30	35.0	210	< 1	1,600,000	80
	08/16/03	< 1	< 0.4	< 2	< 0.020	0.330	20	983	0.004	17	0.49	69	0.430	8.4	22	13.0	75	< 100	> 1,600,000	54
Median		**1.0**	**0.4**	**2.0**	**0.020**	**0.33**	**13.5**	**601**	**0.004**	**8.0**	**0.42**	**55**	**0.18**	**8.4**	**22**	**13**	**75**	**1.0**	**1,600,000**	**54**
Average		**0.7**	**0.2**	**1.5**	**0.008**	**0.42**	**13.8**	**567**	**0.004**	**8.5**	**0.11**	**44**	**0.21**	**7.3**	**21**	**18**	**104**	**17.0**	**1,123,333**	**51**
Las Vegas Wash at Pabco Rd.	02/12/03				< 0.02	0.92	13.4		0.003	1.2	0.24	74	0.10	24	21	210	490	< 1		50
	04/14/03		< 0.4	< 2	< 0.02	0.61	< 6	530	0.02	< 0.1	0.82	50	0.034	25	8.6	280	490	< 1		8
Median			**0.4**	**2.0**	**0.020**	**0.77**	**9.7**	**530**	**0.012**	**0.7**	**0.53**	**62**	**0.07**	**24.5**	**15**	**245**	**490**	**1.0**		**29**
Average			**0.2**	**1.0**	**0.010**	**0.77**	**8.2**	**530**	**0.012**	**0.6**	**0.53**	**62**	**0.07**	**24.5**	**15**	**245**	**490**	**0.5**		**29**
2003-2004																				
Median		**1.0**	**0.4**	**2.0**	**0.020**	**0.49**	**10.5**	**601**	**0.005**	**6.7**	**0.42**	**55**	**0.18**	**11.0**	**22.5**	**33**	**210**	**10.0**	**1,050,000**	**43**
Average		**1.5**	**0.2**	**1.5**	**0.840**	**0.46**	**24.1**	**917**	**0.007**	**17.8**	**0.27**	**77**	**0.47**	**14.7**	**22.4**	**54**	**283**	**6.4**	**901,667**	**47**
Overall:																				
2002-2004 Median		**1.0**	**0.4**	**2.0**	**0.020**	**0.48**	**7.7**	**705**	**0.005**	**3.0**	**0.37**	**44**	**0.15**	**11.0**	**14.5**	**35**	**220**	**1.0**	**350,000**	**36**
2002-2004 Average		**13.1**	**0.2**	**1.2**	**0.423**	**0.47**	**15.8**	**845**	**0.006**	**12.4**	**0.21**	**59**	**0.46**	**12.7**	**17.2**	**63**	**274**	**3.8**	**654,913**	**42**

Notes:

This chart shows the lab results of the expansion constituents added during the 2001-2002 term.

Table 8-15

Typical Wet Weather Pollutant Concentrations
Based on 1992 - 2004 Runoff Data

Parameter	Units	1992 Typical Value	1993 Typical Value	1994 Typical Value	1995 Typical Value	1996-97 Typical Value	1997-98 Typical Value	1998-99 Typical Value	1999-00 Typical Value (1)	2000-01 Typical Value (2)	2001-02 Typical Value (3)	2002-03 Typical Value (4)	2003-04 Typical Value (4)	Overall Typical Value (5)
Discharge	cfs	varies	varies	varies	varies	varies	varies	varies	varies	varies	varies	varies	varies	varies
Oil and Grease	mg/L	3	3	3	4	3	3	<3.0	<3.0	4.88	9	<3	N/A	<3
Total Suspended Solids (TSS)	mg/L	500	700	2,700	500	900	1,400	1,870	1,430	1,390	4,525	187	800	885
Total Dissolved Solids (TDS)	mg/L	1,000	1,300	1,100	600	700	500	1,000	150	1,250	1,600	740	580	580
Total Phosphate-Phosphorus	mg/L	0.7	1	1.3	0.8	1.4	0.8	1	1.91	1.5	4.18	0.49	0.84	0.96
Nitrite, Nitrogen by IC	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<0.10	<0.10	<0.5	0.17	0.20	0.20
Nitrate-Nitrogen (NO3-N)	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.21	2.64	2.64	1.3	1.8	1.7
Total Kjeldahl Nitrogen (TKN)	mg/L	6	3.5	5	4.5	8.3	4.4	7.45	3.05	4.9	4.9	3.2	6.6	4.9
Total Nitrogen	mg/L	8	6	7	6.1	8.9	6.2	7.1	4.08	7.54	12.4	7.6	9.5	7.3
Ammonia-Nitrogen (NH3-N)	mg/L	0.5	0.9	1	0.4	1	0.6	0.66	0.38	0.40	0.83	0.75	N/A	0.6
Copper, Total, ICAP	mg/L	0.05	0.035	0.05	0.04	0.04	0.03	0.11	0.10	0.09	0.13	0.046	0.075	0.044
Lead, Total, ICAP	mg/L	0.05	0.03	0.06	0.02	<0.10	0.1	<0.10	<0.10	<0.1	0.13	0.013	0.043	0.086
Zinc	mg/L	0.3	0.2	0.2	0.2	0.2	0.2	0.44	0.3	0.49	0.46	0.175	0.45	0.23
Dissolved Copper	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.10
Dissolved Zinc	mg/L	N/A	N/A	N/A	N/A	N/A	N/A	<0.02	<0.02	<0.02	0.03	0.058	0.042	0.023
Boron, Total, ICAP	mg/L	0.5	0.6	0.5	0.2	0.3	0.2	0.55	0.18	0.20	0.75	0.05	0.24	0.24
Fecal Coliform Bacteria	MPN/100 mL	100,000	400,000	200,000	160,000	10,000	11,000	7,900	11,000	17,500	900,000	30,000	230,000	24,000
Fecal Streptococci	MPN/100 mL	150,000	700,000	100,000	160,000	20,000	50,000	130,000	35,000	70,000	300,000	70,000	125,000	60,000
Temperature	°C	22	20	20	18	17	15	N/A	N/A	N/A	N/A	N/A	N/A	18
Lab pH	Units	7.5	7.7	7.6	7.5	7.4	7.8	N/A	N/A	N/A	N/A	7.4	7.7	7.5
Total Petroleum Hydrocarbons (TPH)	mg/L	N/A	N/A	N/A	<1.0	1	<1.0	N/A	N/A	N/A	N/A	N/A	N/A	<1.0
Cyanide	mg/L	0.01	0.006	0.006	0.01	<0.005	<0.005	N/A	N/A	N/A	N/A	N/A	N/A	0.006
Salmonella	MPN/100 mL	NA	NA	4	2	<2.2	<2.2	<2.2	N/A	N/A	N/A	N/A	N/A	<2.2
Surfactants (MBAS)	mg/L	1.3	0.7	1	0.7	0.6	0.7	N/A	N/A	N/A	N/A	0.32	0.385	0.61
Orthophosphorus-P (OPO4-P)	mg/L	0.15	0.35	0.3	0.15	0.5	0.14	N/A	N/A	N/A	N/A	0.15	0.288	0.19
BOD	mg/L	40	50	50	31	51	31	N/A	N/A	N/A	N/A	N/A	N/A	35
COD	mg/L	300	300	300	160	285	165	N/A	N/A	N/A	N/A	N/A	N/A	230
Apparent Color	ACU	130	200	250	50	125	70	N/A	N/A	N/A	N/A	N/A	N/A	100
Turbidity	NTU	200	300	500	150	375	660	N/A	N/A	N/A	N/A	N/A	N/A	230
Phenol	mg/L	0.04	0.1	0.05	<0.1	<0.01	<0.01	N/A	N/A	N/A	N/A	N/A	N/A	0.02
Total Chlorine	mg/L	<0.10	<0.10	<0.10	<0.01	<0.01	<0.1	N/A	N/A	N/A	N/A	N/A	N/A	<0.1
Chromium	mg/L	0.02	0.02	0.03	<0.01	N/A	N/A	N/A	N/A	N/A	N/A	0.008	0.005	0.015
Mercury	mg/L	0.0003	<.0002	<0.0002	<0.0002	N/A	N/A	N/A	N/A	N/A	N/A	<0.0002	<.0002	<0.0002
Cadmium	mg/L	<0.005	<0.005	<0.005	<0.005	N/A	N/A	N/A	N/A	N/A	N/A	0.0008	<0.0005	<0.005
Silver	mg/L	<0.01	<0.01	<0.01	<0.01	N/A	N/A	N/A	N/A	N/A	N/A	0.0005	0.0006	<0.01
Nickel	mg/L	<0.04	<0.04	0.02	0.02	N/A	N/A	N/A	N/A	N/A	N/A	0.011	0.05	0.026
Arsenic	mg/L	0.03	0.015	0.03	0.005	N/A	N/A	N/A	N/A	N/A	N/A	0.0059	0.0036	0.015
Selenium	mg/L	N/A	<0.01	<0.01	<0.005	N/A	N/A	N/A	N/A	N/A	N/A	0.03	0.015	<0.005

(1) Calculated median of all 1999-2000 data
(2) Calculated median of all 2000-2001 data
(3) Calculated Median of all 2001-2002 data
(4) Calculated median of all 2002-2003 data
(5) Calculated median of all 2003-2004 data
(6) Calculated median of all 1992-2004 data

similar from 1992 to 2004. In comparing the 2003-2004 data with that of previous years, TSS levels were slightly lower than the 1992-2004 average and TDS levels were the same as the term average. The level of surfactants was lower than the 1992 to 2004 average. This year, phosphate concentrations were slightly lower than the overall calculated average and total nitrogen concentrations were higher than the overall average. Fecal coliform levels were higher by one order of magnitude than the overall average, which is a significant increase from the previous year's value. There was also an increase of almost double in the value for fecal streptococci since the previous year, with the level now over double the overall term typical value.

Pesticides and herbicides are reported as detect/non-detect rather than as a specific concentration. In 2003-2004, no herbicides and no pesticides were detected in the Las Vegas Valley washes.

Analysis this year showed eight VOC detections in the wet weather samples in the Las Vegas Wash. At least one VOC was detected at each site. The most commonly detected VOC was 2-butanone. Thirty-one different SOCs were detected in the samples, and a complete list is located at the bottom of **Tables 8-13a** through **8-13c**. At least one SOC was detected at each site, except for Las Vegas Wash at Desert Rose. The most commonly detected chemicals were di(2-ethylhexyl)phthalate and caffeine.

In 2003-2004, dissolved copper was detected in C-1 Channel and Monson Channel, dissolved zinc was detected in Las Vegas Wash, Flamingo Wash, C-1 Channel, Las Vegas Wash, Monson Channel, and Meadows Detention Basin, and dissolved lead was not detected in any sample.

Diquat, paraquat, and endothal were undetected. Levels of paraquat were predominantly undetected at the sampling sites, although a detection was recorded at Meadows Detention Basin.

8.3.5.2 Potential Sources of Bacteria in Wet Weather Flows

High bacteria levels have been recorded in wet weather flows at certain times over the 1992-2004 sampling period. **Table 8-16** summarizes the wet weather fecal coliforms and fecal streptococci data collected over the full monitoring period. Some older studies have found that the ratio of fecal coliform (FC) to fecal streptococci (FS) counts can sometimes be an indicator of the nature of the bacteria source. If FC/FS is greater than 4, the source is likely to be human, whereas if FC/FS is less than 1, the source is likely to be other warm-blooded animals. Ratios between 1 and 4 may be inconclusive. In stormwater monitoring where sampling can occur many days or weeks after the bacteria has been introduced to the environment, the reliability of this approach can decrease significantly and thus it is not recommended. However, because more extensive bacteria tracing procedures have not been incorporated into this study, FC/FS ratios are presented in **Table 8-16** for reference.

In 2001, UNLV reported on the results of two studies investigating the microbiological origins of indicator organisms in Las Vegas Wash and its tributaries. Results are summarized below.

- Fecal coliform counts range from 100 to 10,000 MPN/100 mL in tributary streams and the lower Wash. Fecal counts are similar in magnitude to fecal coliforms.
- Tributaries have similar bacteria counts as Las Vegas Wash.
- No canine, equine or bovine "signal" was detected in streptococci indicators.
- Some human "signal" was found in 67 percent of samples, and high human "signal" was found in some samples. It was hypothesized that this could be from septic systems, homeless populations, or sewer line leaks.
- Significant avian "signal" was found in Duck Creek.
- Higher human "signal" was detected in Duck Creek than in other tributaries.
- High avian "signal" and some human "signal" was detected in plant, sediment and water samples. A reservoir of human-originating fecal streptococci was found in channel sediments.

Table 8-16

Wet Weather Flow Bacteria Data

Location	Date	Fecal Coliform Bacteria MPN/100 mL	Fecal Streptococci MPN/100 mL	FC/FS
Western	08/30/92	>160,000	>16	
Tributary	10/24/92	130,000	300,000	0.43
at Civic	02/08/93	30,000	22,000	1.36
Center	05/14/93	5,000,000	1,700,000	2.94
	08/04/93	30,000	160,000	0.19
	02/04/94	3,000	90,000	0.03
	03/25/94	<2	50,000	<.00004
	07/19/94			
	08/09/94			
	01/24/95	5,000	22,000	0.23
	05/24/95			
	08/12/95	>160,000	>1,600	
	03/13/96	5,000	11,000	0.45
	11/21/96	40,000	50,000	0.80
	07/28/97	160,000	90,000	1.78
	09/01/97	160,000	90,000	1.78
Las Vegas	08/30/92	160,000	>16	
Creek	10/24/92	700,000	500,000	1.40
at Various	10/28/92	80,000	500,000	0.16
Locations	02/08/93	17,000	160,000	0.11
	05/14/93	5,000,000	5,000,000	1.00
	08/04/93	5,000,000	160,000	31.25
	02/04/94	2,200	35,000	0.06
	03/11/95	24,000	160,000	0.15
	05/24/95			
	08/20/95	28,000	90,000	0.31
	05/24/96	11,000	16,000	0.69
	07/15/96	3,000,000	80,000	37.50
	02/24/98	5,000	13,000	0.38
	03/26/98	160,000	90,000	1.78
	02/21/00	8,000	170,000	0.05
	02/12/03	5,000	90,000	0.06
	07/25/03	900,000	500,000	1.80
	08/16/03	1,600,000	240,000	6.67
Duck Creek	08/30/92	50,000	>16	
at Boulder	10/24/92	50,000	30,000	1.67
Highway	02/08/93	400	3,000	0.13
	08/04/93	1,700,000	160,000	10.63
	02/04/94	1,100	8,000	0.14
	03/25/94	3,000	13,000	0.23
	07/19/94	900,000	240,000	3.75
	01/24/95	5,000	17,000	0.29
	02/20/96	3,000	13,000	0.23
	07/14/96	5,000,000	500,000	10.00
	04/02/97	7,000	90,000	0.08
	07/22/97	22,000	17,000	1.29
	02/03/98	1,100	50,000	0.02
	09/08/98	17,000	24,000	0.71
	06/02/99	7,900	130,000	0.06
	09/22/99	160,000	35,000	4.57
	02/16/00	8,000	80,000	0.10
	08/30/00	110,000	90,000	1.22
	07/06/01	900,000	300,000	3.00
	02/12/03	30,000	160,000	0.19
	07/24/03	1,600,000	80,000	20.00

Table 8-16 (Continued)

Wet Weather Flow Bacteria Data

Location	Date	Fecal Coliform Bacteria MPN/100 mL	Fecal Streptococci MPN/100 mL	FC/FS
Flamingo Wash at Nellis	10/24/92	80,000	80,000	1.00
	02/08/93	1,700	90,000	0.02
	06/05/93	8,000	50,000	0.16
	08/05/93	300,000	90,000	3.33
	02/04/94	1,300	22,000	0.06
	03/25/94	24,000	160,000	0.15
	07/19/94			
	08/19/94	170,000	300,000	0.57
	01/24/95	3,000	22,000	0.14
	05/24/95			
	08/12/95	>160,000	>1,600	
	01/31/96	13,000	3,000	4.33
	11/21/96	240	738	0.33
	09/25/97	90,000	160,000	0.56
	02/03/98	5,000	50,000	0.10
	02/24/98	13,000	17,000	0.76
	02/12/03	7,000	17,000	0.41
	04/14/03	130,000	70,000	1.86
	07/24/03	1,600,000	170,000	9.41
	08/16/03	300,000	10,000	30.00
C-1 Channel at Warm Springs	08/30/92	90,000	>16	
	02/08/93	3,000	30,000	0.10
	07/19/94			
	01/24/95	1,700	13,000	0.13
	11/21/96	240	1,230	0.20
	08/10/97	3,000	50,000	0.06
	02/24/98	5,000	24,000	0.21
	02/16/00	13,000	30,000	0.43
	08/16/00	30,000	90,000	0.33
	02/25/03	8,000	2,400	3.33
	09/04/03	17,000	30,000	0.57
	11/12/03	24,000	16,000	1.50
Sloan Channel at Charleston	10/24/92	5,000	130,000	0.04
	02/08/93	1,300	24,000	0.05
	07/19/94	28,000	22,000	1.27
	08/09/94			
	08/19/94	30,000	23,000	1.30
	01/24/95	3,000	17,000	0.18
	08/12/95	>160,000	>1,600	
	11/21/96	240	9,300	0.03
	07/22/97	90,000	90,000	1.00
	08/08/97	5,000	160,000	0.03
	08/14/98	3,000	160,000	0.02
	02/16/00	11,000	30,000	0.37
	02/26/01	5,000	50,000	0.10
	02/12/03	5,000	80,000	0.06

☐ Highlighted entries denote FC/FS>4, indicating higher likelihood of potential significant human waste contribution

These findings are generally consistent with the evaluation of FC/FS ratios, which indicate a moderate potential human influence and a stronger non-human influence.

As Las Vegas Valley is a relatively new community without the aging sanitary sewer systems and/or combined sewer systems, which plague much of the rest of the country, it is believed that cross-connections between the sanitary and storm sewer systems are not a chronic problem for wet weather events. It is possible that human waste contributions are related to the relatively large number of homeless people in Las Vegas Valley who do not have access to sanitation facilities throughout the day. Channel inspections by the CLV staff found evidence of human defecation in Las Vegas Creek during the 1996-1997 and 1997-1998 reporting periods. In recent years, lift station failures have been responsible for raw sewage discharges in Duck Creek.

8.3.5.3 Comparison to Arid Southwest Region Water Quality Data

Several major arid Southwest United States communities were contacted in 1997 to collect wet weather data. Information was collected from Maricopa County, Arizona; City of Tucson, Arizona; Pima County, Arizona; and Albuquerque, New Mexico. Each entity was in the process of negotiating an NPDES municipal stormwater discharge permit with EPA at the time of the contact (January 1997).

Water quality data from these other arid communities shows the same broad range in concentrations as Las Vegas Valley data. Although there is limited sampling data available to date, a cursory inspection of the data in 1997 suggested that there is good general agreement between constituent concentrations in all the Southwest United States communities. It appears that the Las Vegas Valley samples tend to have higher TDS and bacteria concentrations than the other communities. More detailed comparative statistical analyses have not been performed at this time.

Comparisons with nationwide urban runoff water quality data were made in previous annual reports. These comparisons found that Las Vegas Valley wet weather flows tended to be higher in BOD, COD, TSS, TDS, nutrients and bacteria than the national averages, and lower in heavy metals. Generally higher concentrations of organic material, nutrients and solids are attributed to the lower rainfall, fewer storms, and greater constituent washoff per storm in the arid Southwest.

In March 2000, the journal entitled *"Watershed Protection Techniques"* included an article on stormwater quality management in arid and semi-arid regions. **Table 8-17** compares water quality data in that article with data from Las Vegas Valley. Concentrations for all listed constituents are higher in Las Vegas than the national average, but for the most part are similar to other arid and semi-arid areas.

8.3.5.4 Comparison of Wet Weather and Dry Weather Concentrations

Wet weather monitoring results from the 1992-2004 storms were compared to dry weather-sampling data from 1991-2004 at the same locations. Dry weather data collected by SNWA for 2003-2004 was used for this analysis. **Table 8-18** compares the typical dry weather concentrations as developed in the *2001-2002 Dry Weather Field Screening Report* (in Section 3) with the typical wet weather concentrations from **Table 8-14**. **Table 8-18** also shows the relative magnitude of wet weather versus dry weather concentrations. The following observations are drawn.

1. Bacteria counts are about forty times greater in wet weather flows.
2. Total suspended solids are about one order of magnitude higher and turbidity is about 2 orders of magnitude higher in wet weather flows, due to the high sediment loads present in storm flows. Total dissolved solids are about five times lower in wet weather flows. This is attributed to the fact that a large component of dissolved solids in dry weather flows in the high-concentration outfalls (Duck Creek and Flamingo Wash) comes from groundwater recharge to the wash; during runoff conditions this component is diluted by the increased flow volume, resulting in a lower TDS concentration.

Table 8-17

Comparison of Stormwater Pollutant Event Mean Concentrations in Arid and Semi-Arid Regions With National Average Data and Las Vegas Valley Data

Pollutant	National Average	Phoenix, AZ	Boise, ID	Denver, CO	San Jose, CA	Dallas, TX	Las Vegas, NV	Las Vegas Compared to National Average	Las Vegas Compared to Arid/ Semi-Arid Areas
Annual Rainfall (in)	-	7.1	12	13	14	28	6.86	Low	Low
No. of Samples	2 – 3,000	40	15	35	67	32	143	-	-
TSS (mg/L)	78.4	227	116	384	258	663	885	High	High
BOD (mg/L)	14.1	109	89	ND	12.3	12	35	High	Same
COD (mg/L)	52.8	239	261	227	ND	106	230	High	Same
Total N (mg/L)	2.39	3.26	4.13	4.80	ND	2.70	7.3	High	High
Total P (mg/L)	0.32	0.41	0.75	0.80	0.83	0.78	0.96	High	High
Ortho- P (mg/L)	0.13	0.17	0.47	ND	ND	ND	0.19	High	Same
Copper (Total) (ug/L)	14	47	34	60	58	40	44	High	Same
Lead (Total) (ug/L)	68	72	46	250	105	330	86	High	Same
Zinc (Total) (ug/L)	162	204	342	350	500	540	230	High	Lower

ND = No Data

Table 8-18

Comparison of Wet Weather and Dry Weather Pollutant Concentrations in Las Vegas Valley (1991-2004)

Constituent	Typical Dry Weather Concentration	Typical Wet Weather Concentration	Wet/Dry
Biochemical Oxygen Demand (mg/L)	<6	35	>6
Chemical Oxygen Demand (mg/L)	16	230	14
Total Suspended Solids (mg/L)	13	885	73
Total Dissolved Solids (mg/L)	3,050	580	0.19
Oil and Grease (mg/L)	<3.0	<3.0	1.0
Total Petroleum Hydrocarbons (mg/L)	<1.0	<1.0	1.0
Total Kjeldahl Nitrogen (mg/L)	1.0	4.9	4.9
Nitrate -N (mg/L)	3.98	1.74	0.43
Ammonia - N (mg/L)	<0.05	0.60	>12
Total Nitrogen (mg/L)	4.4	7.4	1.7
Orthophosphate - P (mg/L)	<0.05	0.19	>2
Total Phosphorus (mg/L)	0.05	0.96	>20
Cadmium (mg/L)	<0.005	<0.005	1.0
Chromium (mg/L)	<0.01	0.015	>1.5
Copper (mg/L)	<0.01	0.044	>4.2
Lead (mg/L)	<0.002	0.086	>96
Nickel (mg/L)	0.011	0.026	>5.5
Mercury (mg/L)	<0.0002	<0.0002	0.8
Zinc (mg/L)	<0.02	0.230	>10
Arsenic (mg/L)	0.008	0.015	2.5
Boron (mg/L)	0.96	0.24	0.25
Cyanide (mg/L)	<0.005	0.005	>1.0
Turbidity (NTU)	2.16	230	101
PH	8.3	7.5	0.9
Surfactants (mg/L)	0.1	0.61	6.2
Phenol (mg/L)	<0.01	0.02	>2
Total Chlorine (mg/L)	<0.10	<0.10	1.0
Color (ACU)	15	100	6.7
Selenium (mg/L)	0.010	<0.005	0.33
Fecal Coliforms (MPN/100 mL)	625	24,000	26
Salmonella	<2.2	<2.2	1.0

3. Hydrocarbons are somewhat higher in wet weather flows, but are still only slightly above detectable quantities. Surfactants are an order of magnitude higher in wet weather flows.

4. Total nitrogen is about one and a half times higher in wet weather flows, and total phosphorus is about twenty times higher in wet weather flows.

5. Most heavy metals are found in significantly higher concentrations in wet weather flows, but concentrations are still low. Mercury, cadmium, and silver were below detectable levels in most samples of both wet and dry weather flows. Nickel concentrations were one and a half times larger in wet weather versus dry weather flows.

6. BOD and COD are about an order of magnitude higher in wet weather flows.

7. Wet weather flow pH varies more extensively than dry weather flow pH, but remains within an acceptable range of 7.2 to 8.5.

Based on the above findings, wet weather flows are a significantly more important contributor of short-term high pollutant concentrations to receiving waters in Las Vegas Valley than dry weather flows. Of the constituents sampled, only TDS, nitrate, boron and selenium have consistently higher concentrations during dry weather than wet weather.

8.3.5.5 Other Local Water Quality Data

Several other agencies have conducted wet (and dry) weather water quality monitoring programs in Las Vegas Wash, its tributaries, and Lake Mead. These include SNWA, the wastewater dischargers, USGS, and the National Park Service. The Lake Mead Water Quality Forum and SNWA are maintaining water quality data in a computerized database accessible to public and private agencies and investigators. Previous NPDES municipal stormwater data has been included in the database.

Impetus for formation of the Lake Mead Water Quality Forum came in part from published reports of a USGS monitoring effort as part of the NAWQA program which found evidence of endocrine disruption in carp in Las Vegas Bay. It is possible that this may be attributed to synthetic organic compounds and other toxic constituents originating in Las Vegas Valley and found in measurable quantities in Lower Las Vegas Wash and Las Vegas Bay in Lake Mead. Research into these conditions and possible sources of toxic contaminants is continuing.

The Las Vegas Wash Coordination Team, Lake Mead Water Quality Forum and other organizations have worked together to investigate the possible causes of the algae bloom in Las Vegas Bay in 2001-2002. One possible cause is phosphorus contributed by runoff from the Las Vegas Wash watershed, although other sources such as the wastewater treatment plants may also be responsible. Data collected for the NPDES municipal stormwater program may be useful in understanding contributions from wet and dry weather flows, and data collected by other agencies may improve understanding of wet and dry weather runoff water quality characterization.

8.3.6 Summary

Key results and findings of the 2003-2004 Wet Weather Monitoring program for the NPDES stormwater discharge permit for Las Vegas Valley are summarized as follows:

1. Automated sampling equipment was operated at two of the seven designated major outfalls to Las Vegas Wash and at two sites on Las Vegas Wash. Where necessary, flow meters were also operated. Equipment was maintained throughout the year in response to vandalism and other problems, and probes and samplers were adjusted as necessary to assure proper sampling during runoff events.

2. Water quality samples were collected and analyzed for nine storms covering multiple watersheds. One flow-weighted composite sample was analyzed at each site where automated sampling was successful.

3. In general, the Las Vegas Valley data are consistent with runoff quality data collected in other parts of the country, although some constituents tend to be higher and others are lower. The higher concentrations may be attributed to the fewer number of storms in the arid Southwest compared to the rest of the nation.

Reasonably good agreement is found with other arid Southwest wet weather data.

4. The 2003-2004 data are consistent with the water quality data collected from 1992 to 2004 in Las Vegas Valley.
5. A comparison of typical pollutant concentration to watershed characteristics shows that Las Vegas Creek, Western Tributary, Las Vegas Wash and Flamingo Wash tend to have slightly higher concentrations of pollutants most directly related to urban activity.
6. As in previous years, wet weather flows contributed the highest loads of suspended solids, surfactants, BOD/COD, and phosphorus to Las Vegas Wash, while dry weather flows contributed the highest loads of dissolved solids, and boron.
7. Herbicides were detected in both the Las Vegas Creek and Meadows Detention Basin. Detections of pesticides were found in the Las Vegas Creek and Monson Channel.
8. The majority of samples contained detection of VOCs and SOCs. At least one VOC and SOC were detected at each site, except Las Vegas Wash at Desert Rose in which no SOCs were detected. Compared to the previous year, in the 2003-2004 permit year, there was an increase in the number of SOCs detected.
9. Dissolved copper, lead and zinc were analyzed, and a couple samples contained detects of dissolved copper and zinc in the 2003-2004 sampling period.

8.4 EVALUATION OF PREVIOUSLY COLLECTED DATA

8.4.1 Preface

This subsection presents a proposed stormwater monitoring plan in compliance with the MS4 NPDES permit. The stormwater monitoring plan is required by paragraphs 4.4 and 5.1.1 of the permit, and is further prescribed by Section 4 of the adopted MS4 SWMP.

As required by the permit, this subsection presents a summary of the water quality data collected in previous permit years. Based on that data, recommendations are made for wet and dry weather monitoring programs for the remaining four years of the five-year MS4 permit.

8.4.2 History of MS4 Permit Stormwater Monitoring

8.4.2.1 Monitoring Objectives

The first MS4 permit for Las Vegas Valley was issued in December 1990. In the first permit year, a monitoring plan was developed for performing wet and dry weather water quality characterization monitoring. The objectives of this monitoring program were to: (1) characterize the overall quality of storm runoff and base flows in Las Vegas Valley; and (2) screen wet and dry weather flows for possible illegal/illicit discharges to the MS4. These have remained the primary objectives of the monitoring program as it has evolved over the years. In some years additional special monitoring activities have been performed to address specific issues or answer particular questions regarding stormwater quality in Las Vegas Valley.

8.4.2.2 Monitoring Locations

Because the original MS4 permit regulated the discharge from “major stormwater outfalls” and defined these outfalls as the six main tributaries to Las Vegas Wash, these outfalls were selected as the monitoring stations for the wet and dry weather monitoring program. Additional dry weather sites were added near the upstream limit of constant dry weather flow where this point could be readily determined and accessed. The original monitoring stations are listed in **Table 8-19**. In 1997, a cooperative agreement was reached with the USGS to collect and analyze samples at the Las Vegas Wash at Desert Rose Golf Course stream gage site. Because this site is downstream of some of the major tributary confluences, sampling at the upstream sites was discontinued in 1997. In 2001 a second cooperative agreement was reached with SNWA by which MWH would perform wet weather monitoring and sample analysis for the MS4 and SNWA Urban Tributary program, and SNWA would perform dry

Table 8-19

MS4 Monitoring Site Locations and Period of Record

Water Quality Monitoring Sites	Wet Weather Period of Record	Dry Weather Period of Record	Importance
Western Tributary at Civic Center	1992-1997	-	Major Tributary Outfall
Western Tributary at Cheyenne	-	1991-1997	Major Tributary Outfall
Las Vegas Creek at Pecos	1992-2004	1991-2003	Major Tributary Outfall
Flamingo Wash at Nellis Boulevard	1992-2004	1991-2003	Major Tributary Outfall
Flamingo Wash at Swenson Street	-	1991-1997	Upstream End of Baseflow
Sloan Channel at Charleston Boulevard	1992-2004	1994-2003	Major Tributary Outfall
Duck Creek at Boulder Highway	1992-2004	1991-2003	Major Tributary Outfall
Duck Creek at Russell Road	-	1991-2000	Upstream End of Baseflow
C-1 Channel at Warm Springs Road	1992-2004	-	Major Tributary Outfall
Las Vegas Wash at Desert Rose Golf Course	1997-2004	1994-2000	Above Wastewater Plants
Las Vegas Wash below Lake Las Vegas	2003-2004	2000(1)	Below All Urban Contribution
Monson Channel at Stephanie Street	2003-2004	2000(1)	Urban Tributary Outfall
Meadows Detention Basin Outflow	2003-2004	2000(1)	Urban Tributary Outfall

(1) For SNWA Only in 2000; Incorporated With NPDES Program in 2001

weather monitoring and sample analysis for both programs. Because SNWA desired monitoring sites at locations not in the original MS4 program, the program was expanded to include these additional sites. **Table 8-19** lists all of the monitoring sites in the MS4 program and their periods of record.

8.4.2.3 Monitoring Procedures

Wet Weather Monitoring Procedures

In most sampling locations, automated monitoring equipment was installed to collect wet weather samples. Automated samplers were set to activate when the stage in the channel rose to a specified level. The samplers filled up to 24 bottles (depending on the duration of the runoff event) with a new bottle filled each 7 minutes. Flow-weighted composite samples were then prepared and sent to the laboratory for analysis. When automated samplers did not operate properly due to vandalism or other factors, single grab samples were collected and analyzed. In addition, certain constituents require grab samples to minimize contamination by the sample collection equipment.

In the first few years of the MS4 program, an attempt was made to collect samples from three runoff events at each monitoring station. The lack of representative storm events (defined as producing between 0.1 and 0.8 inches of rainfall), combined with problems with sampling equipment, made it impossible to achieve this goal. The target was subsequently reduced to two storms per year at each station.

Dry Weather Monitoring Procedures

The dry weather characterization sampling program performed by MWH consisted of collecting grab samples on two consecutive days, analyzing each sample, then reporting the average of the two samples. Samples were collected in fall and spring at each station in the first few years of the program. When few differences were found between the fall and spring samples, the spring sampling event was discontinued. When SNWA took over the program in 2001, single grab samples were collected four times per year at each station.

8.4.2.4 Constituents

Table 8-20 lists the constituents analyzed over the course of the MS4 permit monitoring program. The constituents analyzed during the first years of the program were selected based on EPA guidelines for MS4 permits. After the first 5 years of monitoring,

Table 8-20

MS4 Monitoring Program Constituents and Periods of Record

Constituent	Wet Weather Period of Record	Dry Weather Period of Record	Constituent	Wet Weather Period of Record	Dry Weather Period of Record
Temperature	1992-1998	1991-2004	VOCs	1992-2004	1998-2000
Oil and Grease	1992-2004	1991-2000	Pesticides	1996-2004	1996-2000
Total Suspended Solids	1992-2004	1991-2004	SOCs	2003-2004	1998-2000
Total Dissolved Solids	1992-2004	1991-2004	Herbicides	1996-2004	1996-2000
Specific Conductance	1992-2004	1991-2004	2-chloroethylvinyl-ether	2002-2004	
pH	1992-2004	1991-2004	Alkalinity	2002-2004	
Surfactants	1992-2004	1991-2004	Aluminum	2002-2004	
Orthophosphate	1992-2004	1991-2004	Anion sum	2002-2004	
Total phosphorous	1992-2004	1991-2004	Cation sum	2002-2004	
Nitrate	1992-2004	1991-2004	Antimony	2002-2004	
Nitrite	2002-2004	1998-2004	Barium	2002-2004	
Ammonia-Nitrogen	1992-2004	1991-2004	Beryllium	2002-2004	
Total Kjeldahl Nitrogen (TKN)	1992-2004	1991-2004	Bicarbonate Alkalinity	2002-2004	
Total Nitrogen	1992-2004	1991-2004	Bromide	2002-2004	
Chromium	1992-2004	1991-2004	Bromate	2002-2004	
Copper	1992-2004	1991-2004	CO2, Free	2002-2004	
Dissolved Copper	1998-2004		Carbonate	2002-2004	
Lead	1992-2004	1991-2004	Calcium	2002-2004	
Dissolved Lead	1998-2004		Chlorate	2002-2004	
Zinc	1992-2004	1991-2004	Chloride	2002-2004	
Dissolved Zinc	1998-2004		Chlorite	2002-2004	
Mercury	1992-2004	1991-1995	Diuron	2003-2004	
Cadmium	1992-2004	1991-1995	Diquat	2003-2004	
Silver	1992-2004	1991-1995	Paraquat	2003-2004	
Nickel	1992-2004	1991-2004	Endothall	2002-2004	
Selenium	1992-2004	1991-2004	Fluoride	2002-2004	
Arsenic	1992-2004	1991-2004	Glyphosate	2002-2004	
Boron	1992-2004	1991-2000	Hardness	2002-2004	
Cyanide	1992-1998	1991-1997	Hydroxide	2002-2004	
BOD	1992-1998	1991-1997	Iron	2002-2004	
COD	1992-1998	1991-1997	Langelier Index	2002-2004	
Color	1992-1998	1991-1997	Magnesium	2002-2004	
Turbidity	1992-1998	1991-2004	Manganese	2002-2004	
Phenol	1992-1998	1991-1997	Potassium	2002-2004	
Petroleum Hydrocarbons	1995-1998	1996-1997	Reactive Silica	2002-2004	
TPH (diesel)	1995		Sodium	2002-2004	
TPH (gasoline)	1995		Sulfate	2002-2004	
Total Chlorine	1992-1998	1991-1997	Thallium	2002-2004	
Fecal Coliform	1992-2004	1991-2004	Total Coliform Bacteria	2002-2004	1992-1995
Fecal Streptococci	1992-2004	1991-2000	Total Organic Carbon	2002-2004	
Salmonella	1994-1998	1994-1998			

several constituents were dropped from the program because they were either never detected or the concentrations were essentially the same in all samples. However, over the years other constituents were added to address specific requests of other agencies (e.g., selenium, salmonella, dissolved metals and organics). In particular, SNWA requested that a broader suite of constituents be analyzed to meet the needs of their program.

8.4.3 Summary of Wet Weather Data

This section summarizes the wet weather water quality data collected over the course of the MS4 permit. Tables and graphs have been prepared to summarize the wet weather characterization data and to assess the variability in data between storm events and between sampling stations. Earlier versions of many of these tables and graphs have been presented in the previous MS4 permit annual reports submitted to NDEP by the permittees.

8.4.3.1 Characterization Data

Table 8-14a/b, as described previously, is an Excel database containing all of the wet weather characterization data collected under the MS4 permit program. In addition to containing the raw data from the lab analyses, the table also includes the calculated mean and median for each constituent at each monitoring station and for the combined Valley-wide data from all stations. Due to the presence of a few high values in many of the data sets, the median is considered a better representation of the central tendency of the data.

Table 8-21 presents the mean, median, maximum and minimum concentrations for selected constituents at the major sampling points. **Figures 8-20** to **8-24** compare concentrations between watershed. **Figures 8-25** through **8-28** are box plots that conveniently summarize the statistics for the Valley-wide wet weather data set for selected constituents. **Figures 8-29** through **8-39** are chronological plots of the available data for several of the key constituents and sampling points for wet weather data.

The following conclusions can be reached by assessing the available MS4 wet weather characterization data.

Comparison of Pollutant Concentrations Between Watersheds

Figures 8-20 through **24** were prepared to compare flow-weighted composite pollutant concentrations between the original seven monitoring sites. Land use maps for major outfall watersheds were prepared in 1997 from the Clark County Comprehensive Planning GIS database. Land use categories were combined into the categories typically used for hydrologic modeling. Major flood control facilities were overlaid on the land use maps to assist in determining land use types contributing to runoff at different points in the stormwater system. Land use maps are contained in Appendix 2-C of the *1996-1997 Annual Report*.

Watershed characteristics related to developed area are shown in **Table 8-22**.

The following tentative conclusions can be drawn by examining **Figures 8-21** through **8-24** in conjunction with **Table 8-22**.

1. **Figure 8-20** shows that although suspended solids have generally been highest on the most undeveloped watersheds (Sloan Channel, Duck Creek, and C-1 Channel), as suspected, other watersheds which are more developed also generated high suspended solids concentrations. This suggests that factors other than level of development, such as storm characteristics, construction activity, or re-suspension of sediment trapped in the drainage system, can have a significant effect on solids concentrations in storm flows.

2. **Figure 8-21** shows that concentrations of pollutants generally associated with urban activity (oil and grease and surfactants) tend to be positively correlated with the level of urban development in the watershed. Las Vegas Creek, Western Tributary Las Vegas Wash, and Flamingo Wash have the highest concentrations of each of these pollutants (although the magnitudes of the concentrations themselves are still not considered high), and they have the highest level of urbanization of the six watersheds.

Table 8-21

11 by 17 Pullout

Table 8-21

Wet Weather Data Analysis

Sampling Sites	1992 to 2004	Copper No. Samples	Copper Conc (mg/L)	Lead No. Samples	Lead Con (mg/L)	Zinc No Samples	Zinc Con (mg/L)	Total P No Samples	Total P Conc (mg/L)	Orthophosphate No. Samples	Orthophosphate Conc (mg/L)	Boron No. Samples	Boron Conc (mg/L)
Las Vegas Creek	Median		0.0489		0.0715		0.29		0.94		0.27		0.19
	Mean		0.061		0.067172		0.34		1.26		0.75		0.19
	Min	19	0.01	18	0.008	19	0.075	17	0.05	16	0.06	14	0.05
	Max		0.22		0.28		1		7		6.5		0.43
Duck Creek	Median		0.04		0.1		0.14		0.58		0.08		1.2
	Mean		0.072		0.175		0.25		1.55		0.28		1.313
	Min	21	0.01	20	0.004	21	0.035	19	0.06	14	0.04	21	0.08
	Max		0.24		0.22		0.91		5.6		2.26		3
Flamingo Wash	Median		0.066		0.093		0.32		1.05		0.19		0.32
	Mean		0.082		0.07		0.416		1.21		0.28		0.346
	Min	20	0.02	20	0.014	20	0.094	17	0.66	18	0.05	20	0.05
	Max		0.32		0.13		1.5		2.94		0.84		0.97
C-1 Channel	Median		0.033		0.093		0.32		1.05		0.19		0.09
	Mean		0.068		0.07		0.416		1.21		0.28		0.103
	Min	13	0.01	13	0.055	13	0.08	11	0.38	9	0.05	13	0.05
	Max		0.27		0.22		0.89		6.8		1.5		0.27
Sloan Channel	Median		0.037		0.075		0.185		1		0.18		0.14
	Mean		0.05		0.052		0.234		1.44		0.25		0.19
	Min	14	0.012	14	0.011	14	0.054	13	0.26	11	0.05	14	0.05
	Max		0.15		0.21		0.62		4.7		0.64		0.93
Las Vegas Wash at Desert Rose	Median		0.055		0.1		0.28		1.06		0.13		0.36
	Mean		0.075		0.064		0.376		1.23		0.2		0.371
	Min	15	0.01	15	0.01	15	0.071	14	0.42	5	0.04	15	0.05
	Max		0.39		0.18		0.89		2.4		0.55		0.7
Monson Channel	Median		0.053		0.034		0.21		1.51		0.67		0.26
	Mean		0.046		0.054		0.223		1.51		0.67		0.193
	Min	3	0.028	3	0.009	3	0.13	2	0.69	2	0.36	3	0.028
	Max		0.058		0.12		0.33		2.32		0.98		0.29
Meadows Detention Basin	Median		0.031		0.014		0.15		0.58		0.2		0.052
	Mean		0.056		0.04		0.253		0.58		0.2		0.069
	Min	3	0.026	3	0.012	3	0.1	2	0.32	2	0.19	3	0.05
	Max		0.11		0.04		0.51		0.84		0.2		0.13

Sampling Sites	1992 to 2004	TSS No. Samples	TSS Conc (mg/L)	TDS No. Samples	TDS Conc (mg/L)	NO3 No Samples	NO3 Con (mg/L)	NO2 No. Samples	NO2 Conc (mg/L)	TKN No. Samples	TKN Conc (mg/L)	Total N No. Samples	Total N Conc (mg/L)	Fecal Coliform No. Samples	Fecal Coliform Conc (MPN/100mL)	Fecal Streptococci No. Samples	Fecal Streptococci Conc (MPN/100mL)
Las Vegas Creek	Median		480		470		1.35		0.13		6.5		6.6		160,000		160,000
	Mean		548		439		1.44		0.14		6.67		7.96		1,109,880		570,268
	Min	19	42	19	100	18	0.1	3	0.1	19	1	19	0.6	15	2,200	15	13,000
	Max		1,570		1,070		4.3		0.23		10		20.93		5,000,000		6,000,000
Duck Creek	Median		1,080		2,450		2.8		0.17		5.8		7.85		18,500		60,000
	Mean		2,012		2,596		2.73		0.13		6.21		8.1		171,453		80,609
	Min	21	23	21	230	21	1	2	0.5	21	1	21	2.5	20	400	20	8,000
	Max		8,420		4,700		4.6		1.8		11		13.3		5,000,000		500,000
Flamingo Wash	Median		1,850		910		1.8		0.17		5.8		7.85		18,500		60,000
	Mean		3,104		946		1.84		0.13		6.21		8.1		171,453		80,609
	Min	20	324	20	260	20	0.3	4	0.1	20	1	20	1.4	16	240	16	738
	Max		19,200		2,290		4.3		0.5		19		20.7		1,600,000		300,000
C-1 Channel	Median		1,190		240		0.8		0.1		2.4		3		10,500		27,000
	Mean		2,848		264		1.5		0.05		3.58		5.14		19,324		27,365
	Min	13	77	13	62	13	0.3	1	0.1	13	1	13	1.3	10	240	10	1,230
	Max		17,800		930		5.2		0.1		8.3		11.53		90,000		90,000
Sloan Channel	Median		2,680		235		1.2		0.1		2.6		4.4		5,000		50,000
	Mean		3,434		261		1.8		0.1		3.2		5		16,685		70,755
	Min	14	79	14	110	14	0.2	1	0.1	14	1	14	1.4	11	240	11	9,300
	Max		16,200		510		8.7		0.1		8		11.2		90,000		160,000
Las Vegas Wash at Desert Rose	Median		1,315		1,120		2		0.7		5.4		7.5		8,000		33,000
	Mean		1,854		1076		2.02		0.66		5.56		7.04		272,411		281,222
	Min	14	110	14	100	14	0.63	4	0.2	15	1	15	1	9	1,600	9	1,600
	Max		5,980		2,430		3.9		2.5		8.73		11.8		1,600,000		1,600,000
Monson Channel	Median		800		540		2.9		0.25		7.9		10.49		50,000		220,000
	Mean		4203		483		3		0.33		5.73		9.06		559,333		616,000
	Min	3	210	3	170	3	1.3	3	0.18	3	0.69	3	5.74	3	28,000	3	28,000
	Max		11,600		740		4.8		0.56		8.6		10.98		1,600,000		1,600,000
Meadows Detention Basin	Median		100		140		1.8		0.1		2.2		2.72		7,000		30,000
	Mean		228		187		1.9		0.07		3.8		5.27		56,400		549,000
	Min	3	100	3	110	3	0.6	3	0.1	3	1.6	3	2.2	3	2,200	3	17,000
	Max		490		310		3.3		0.2		7.6		10.9		160,000		1,600,000

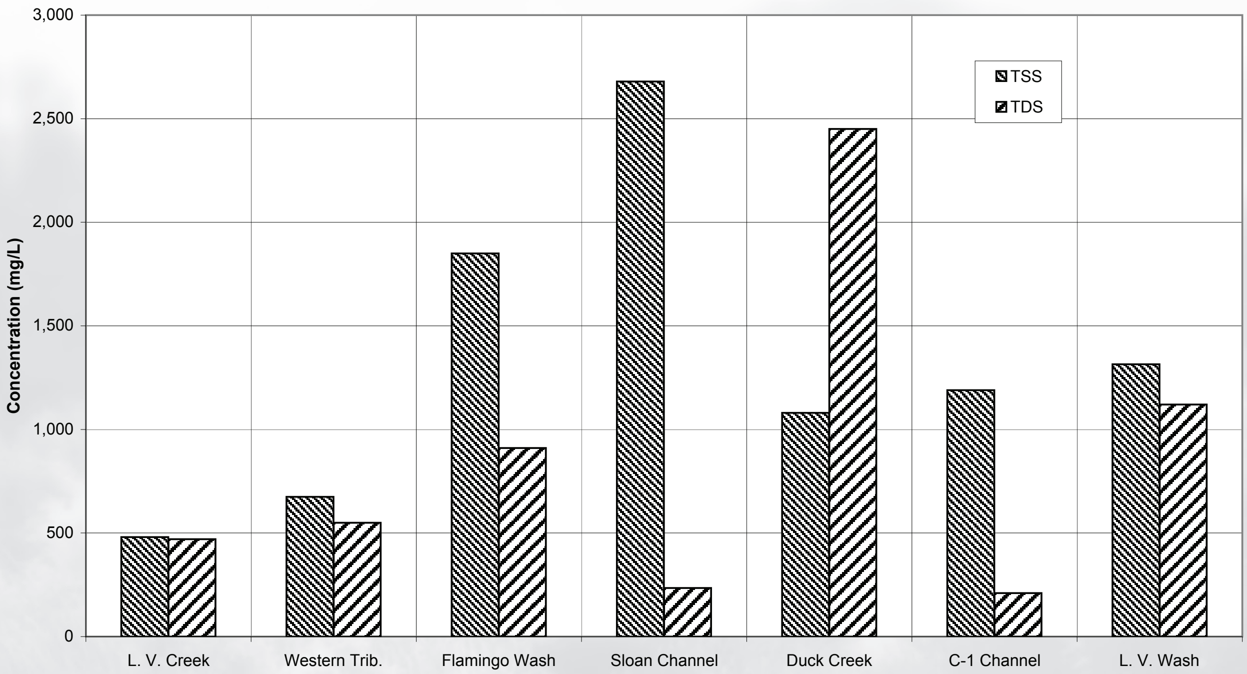
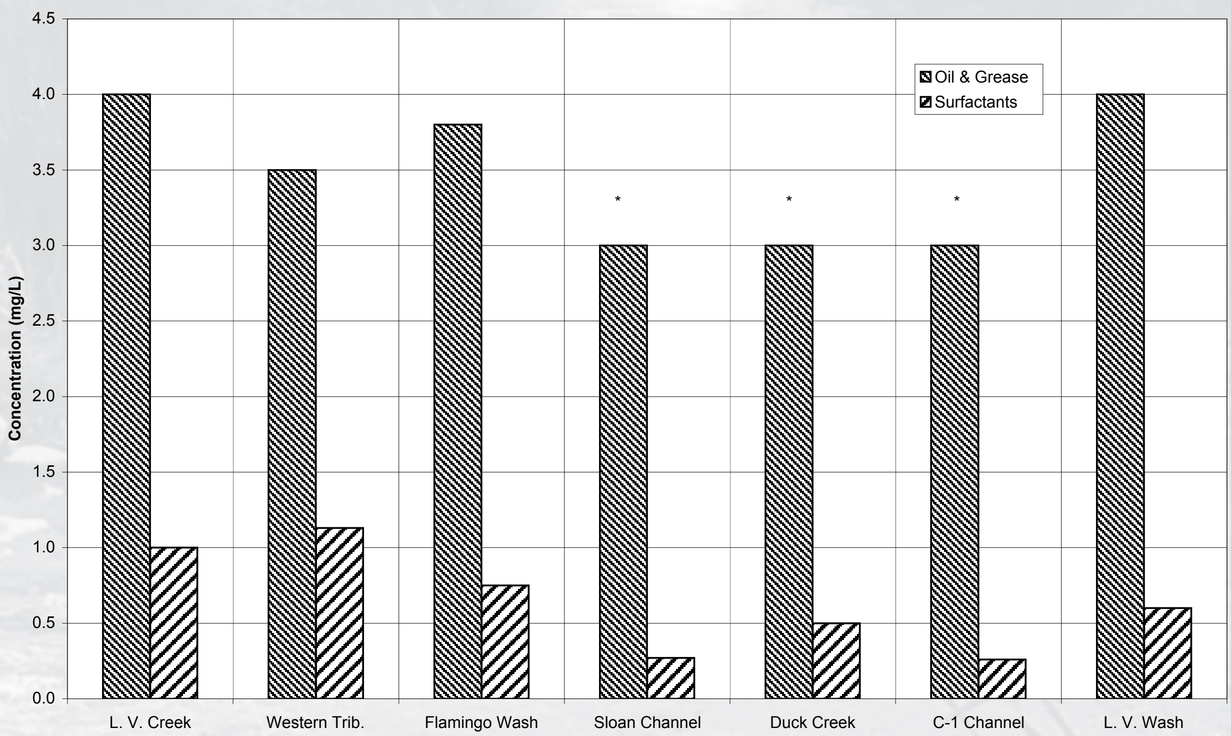


Figure 8-20
Comparison of Solids Concentrations Between Watersheds
1992-2004



* - Detection Limit

Figure 8-21
Comparison of Urban Pollutants Between Watersheds
1992-2004

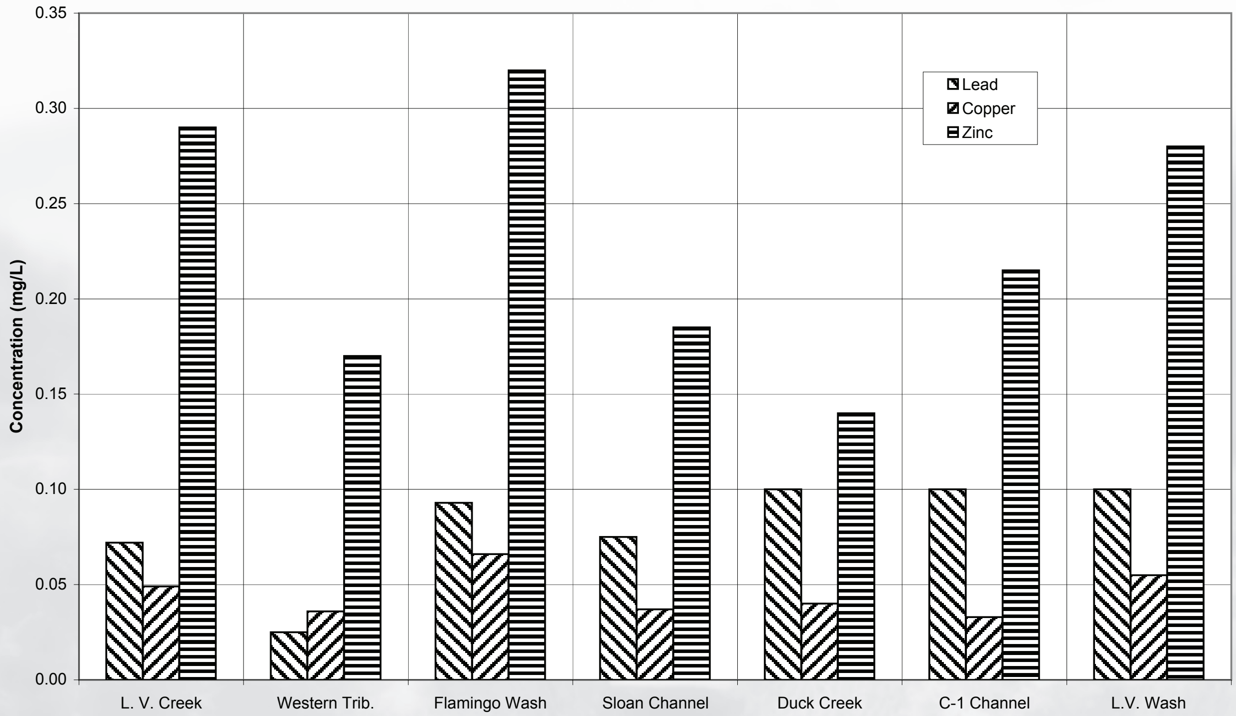


Figure 8-22
Comparison of Total Metals Concentrations Between Watersheds
1992-2004

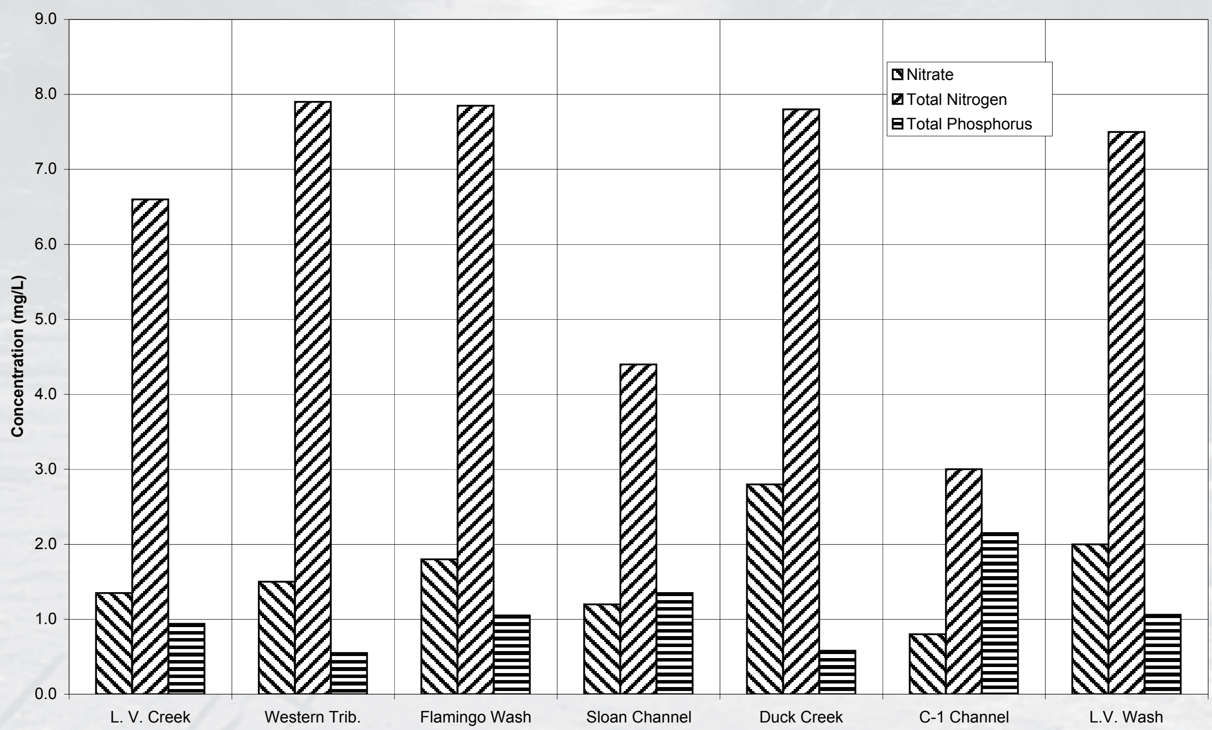


Figure 8-23
Comparison of Nutrients Concentrations Between Watersheds
1992-2004

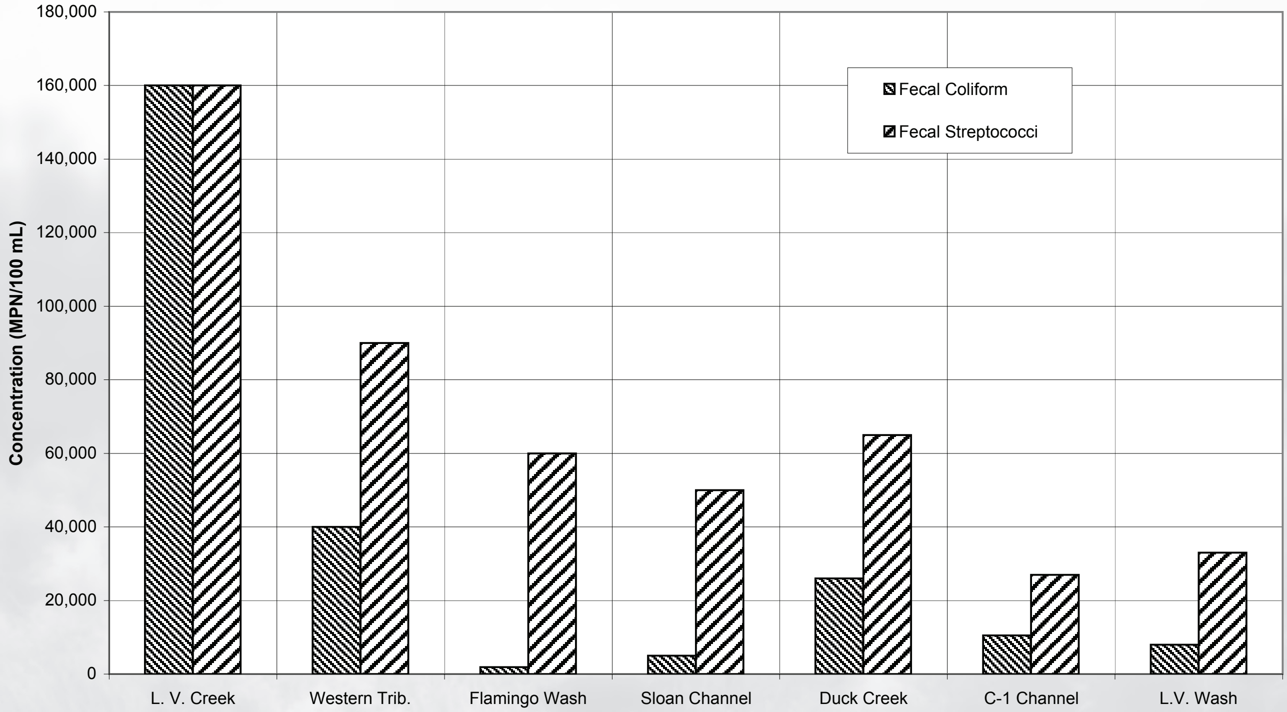


Figure 8-24
Comparison of Bacteria Concentrations Between Watersheds
1992-2004

3. **Figure 8-22** indicates that metal concentrations have been generally independent of the level of urban development in the watershed.

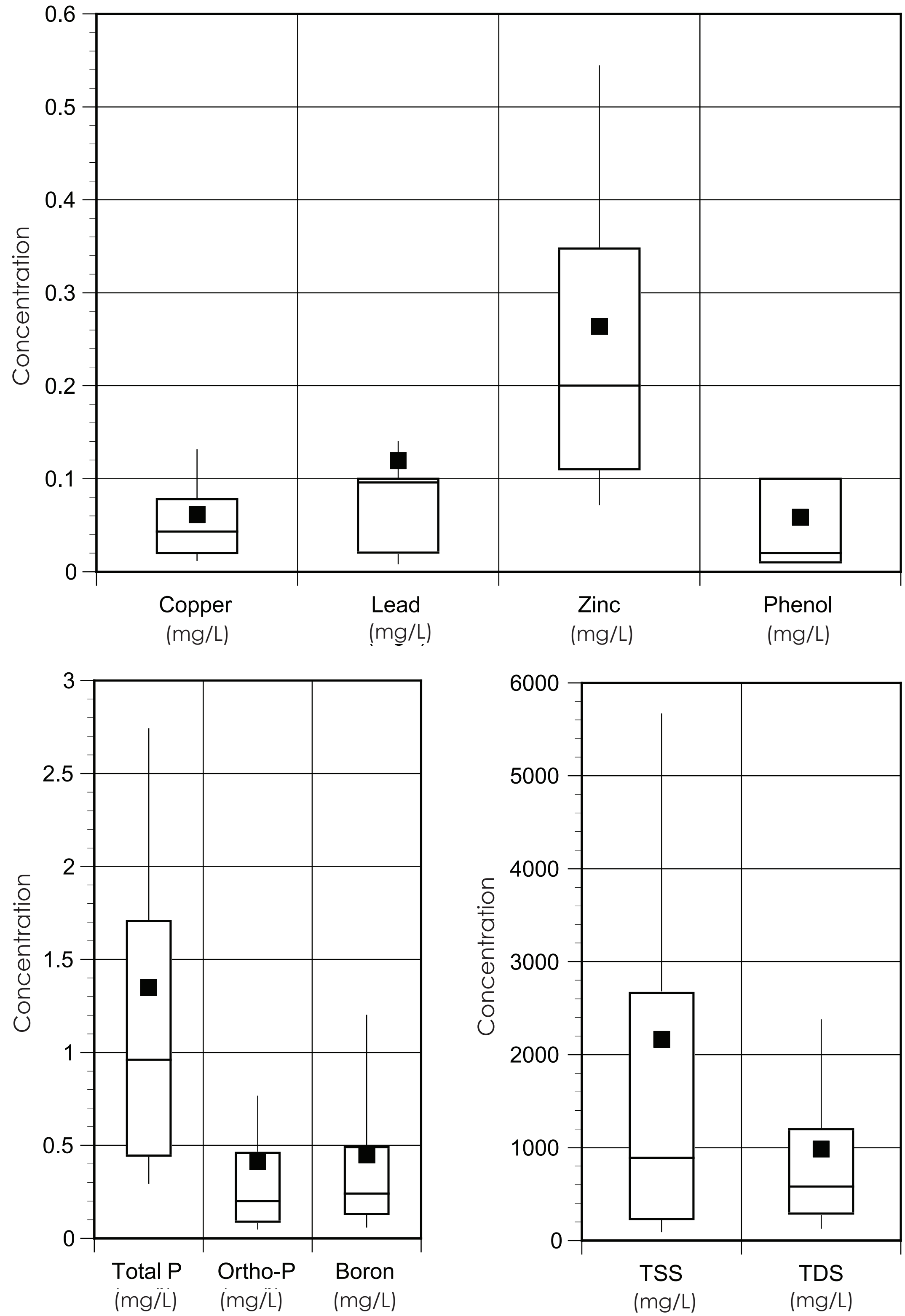
4. **Figure 8-23** suggests that nutrients in Las Vegas Valley urban runoff such as nitrogen and phosphorus show a mixed response to watershed characteristics.

5. **Figure 8-24** provides a comparison of bacteria concentrations between watersheds for the period 1992-2003. The data presented indicates a strong correlation between bacteria levels and extent of urbanization. Las Vegas Creek, which is substantially more developed than any other watershed, also shows substantially higher bacteria levels. Similarly, C-1 Channel, which is the least urbanized, shows the least amount of bacteria levels relative to the other watersheds.

Variability of Wet Weather Data

The box plots shown in **Figures 8-25** through **8-28** depict the variability in the entire wet weather data set for selected constituents. The following conclusions can be reached from these plots.

- For most of the constituents, the majority of the data (between the 25th and 75th percentiles) falls within a fairly narrow range.
- Consitutents that show a wide range even in the 25th to 75th percentile range include TSS and bacteria.
- There are isolated high values in the data sets for all constituents, leading to many high 90th percentile values compared to the medians for many of the constituents.
- The mean (average) statistic is nearly always higher than the median statistic, indicating the



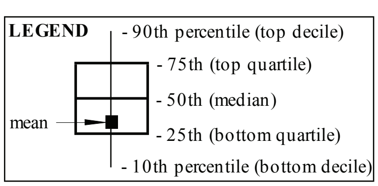
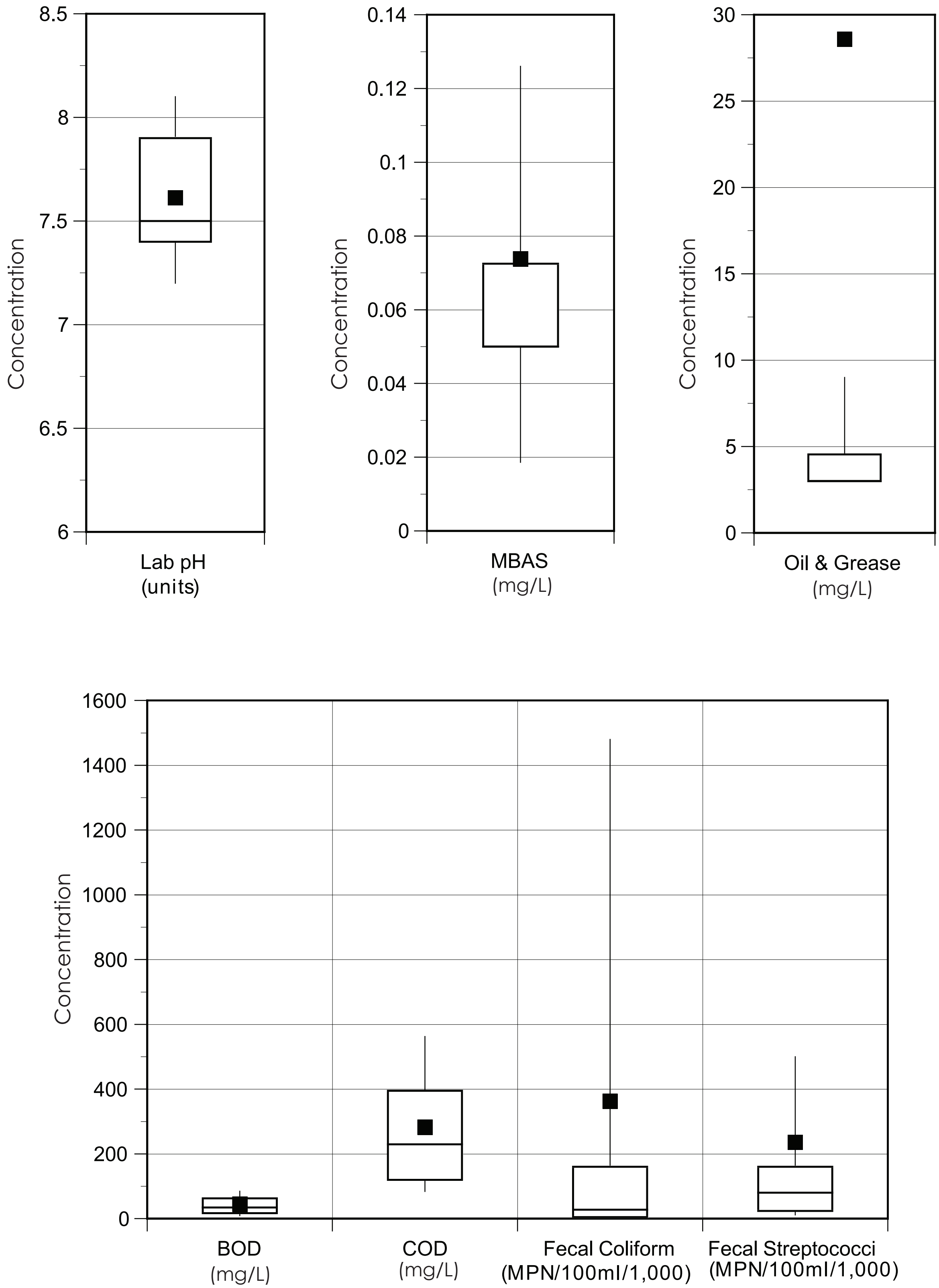


Figure 8-25
Variability in Valley-wide
1991-2004 Wet Weather Monitoring Data



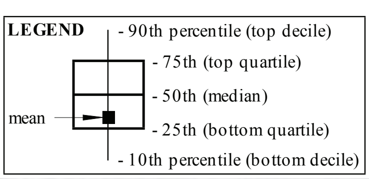
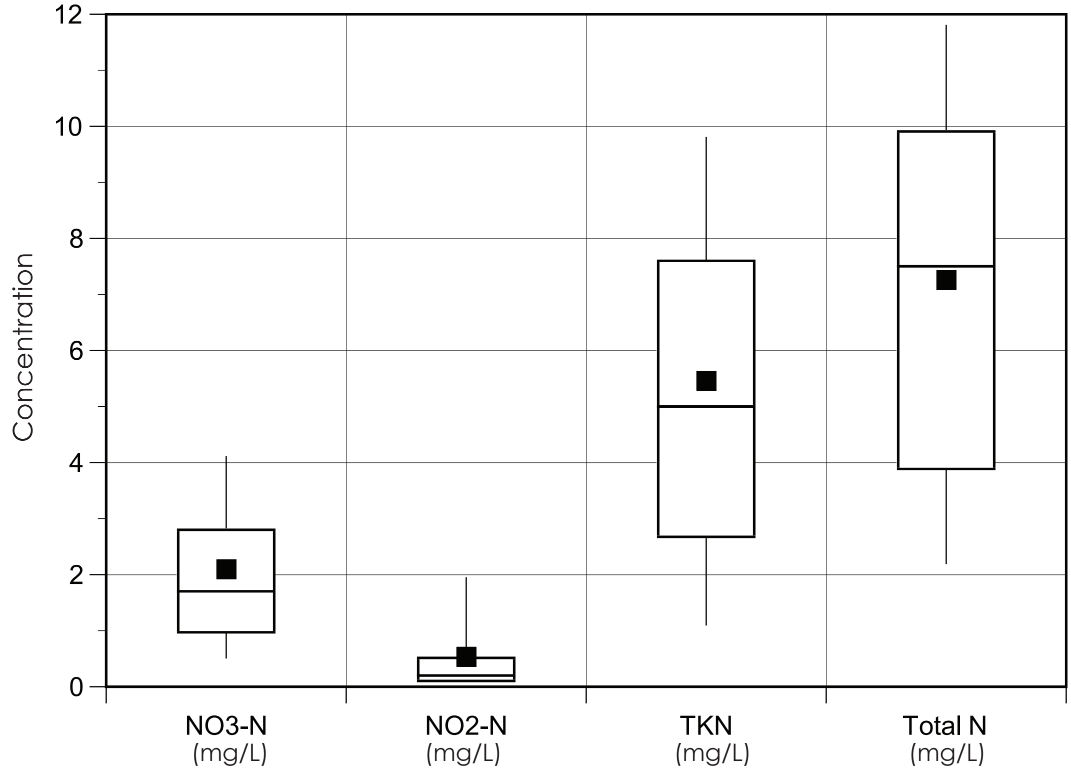


Figure 8-26
Variability in Valley-wide
1991-2004 Wet Weather Monitoring Data



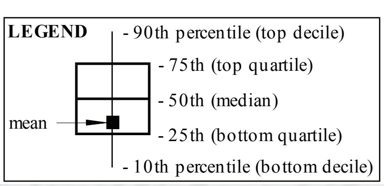
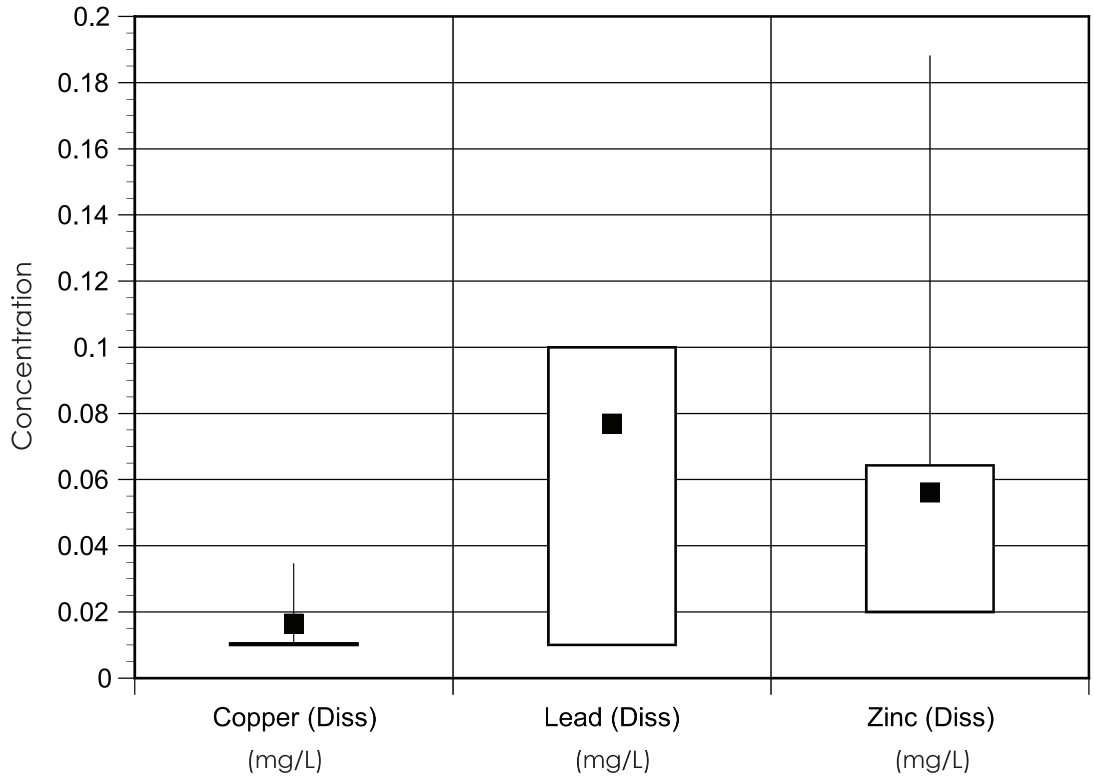


Figure 8-27
Variability in Valley-wide
1991-2004 Wet Weather Monitoring Data



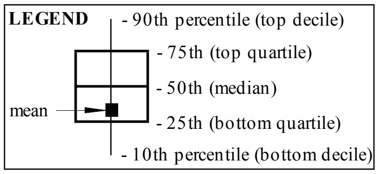


Figure 8-28
Variability in Valley-wide
1991-2004 Wet Weather Monitoring Data

Figure 8-29
Wet Weather - Total Dissolved Solids (TDS) Concentration

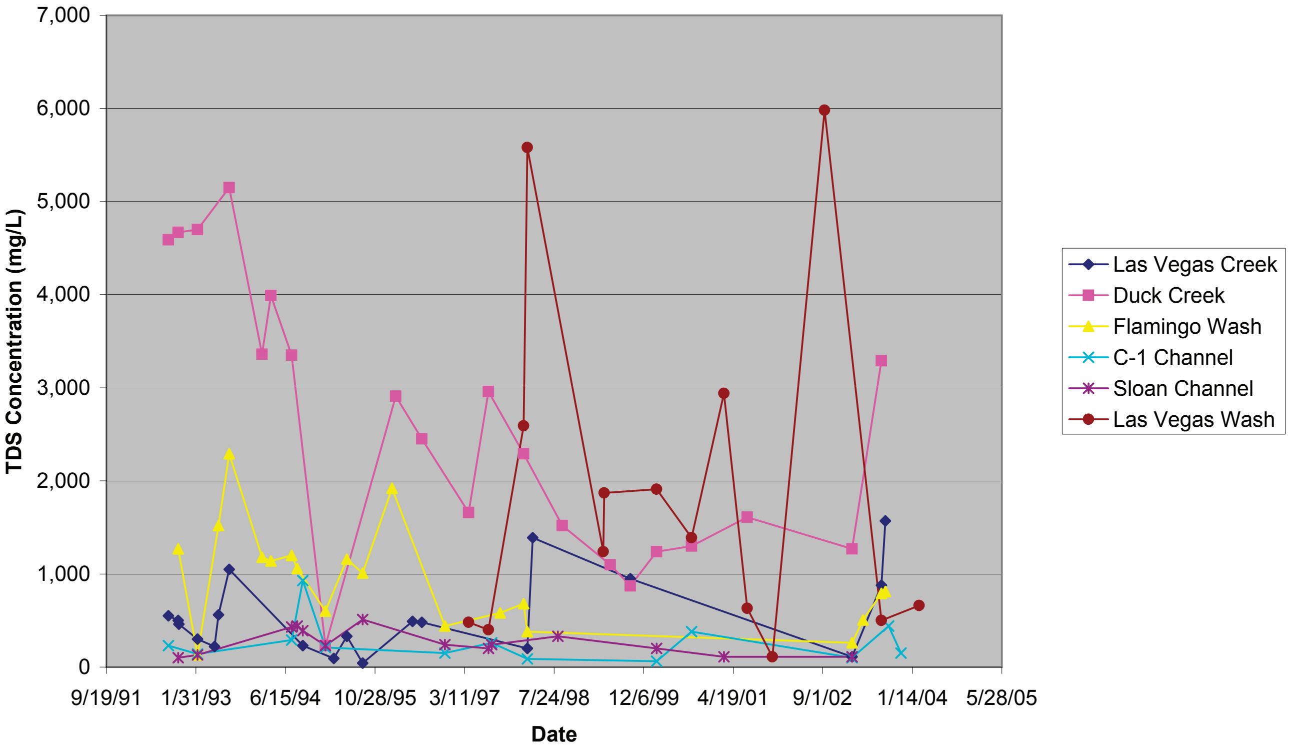


Figure 8-30
Wet Weather - Surfactants Concentration

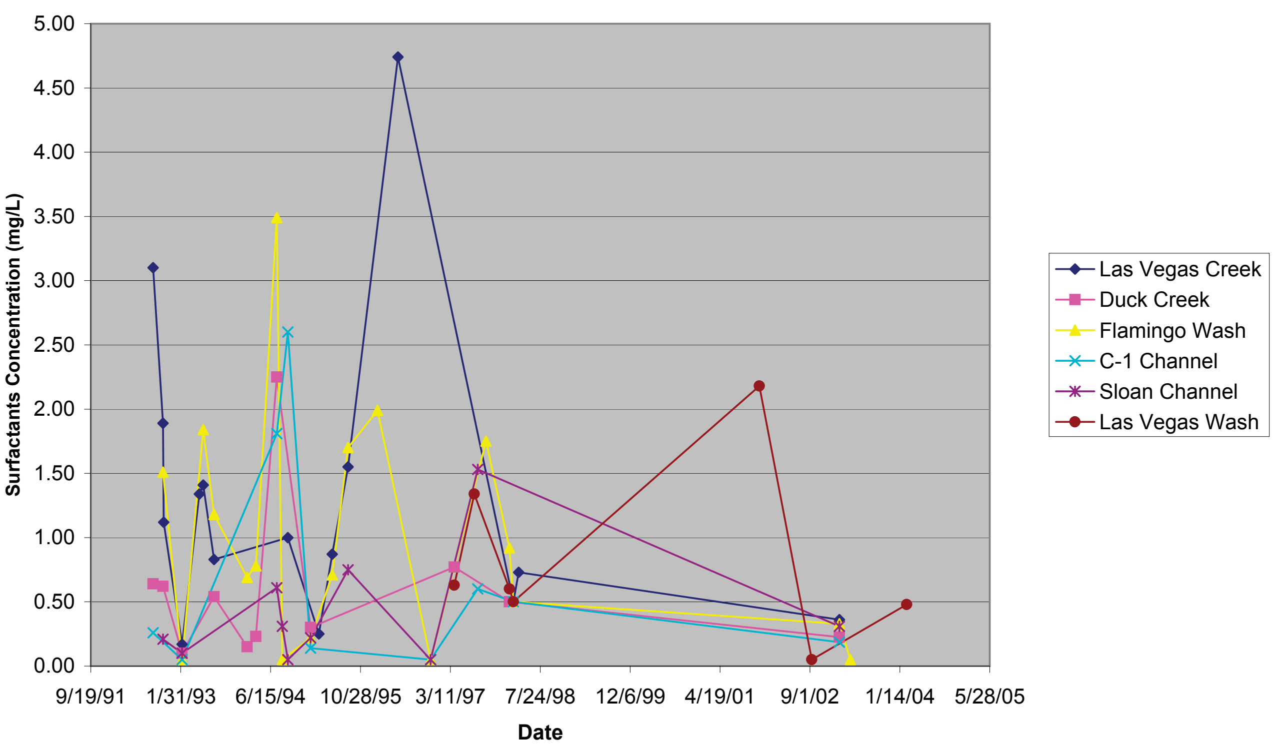


Figure 8-31
Wet Weather - TKN Concentration

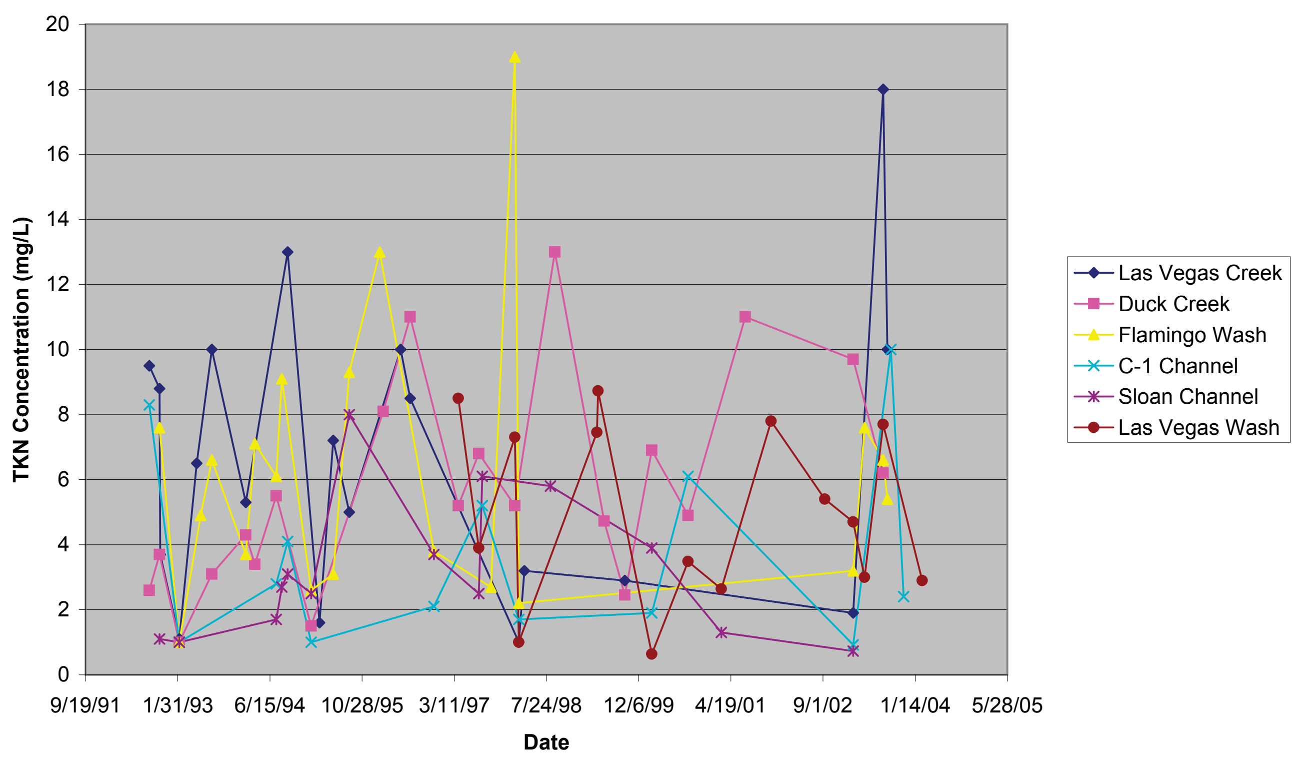
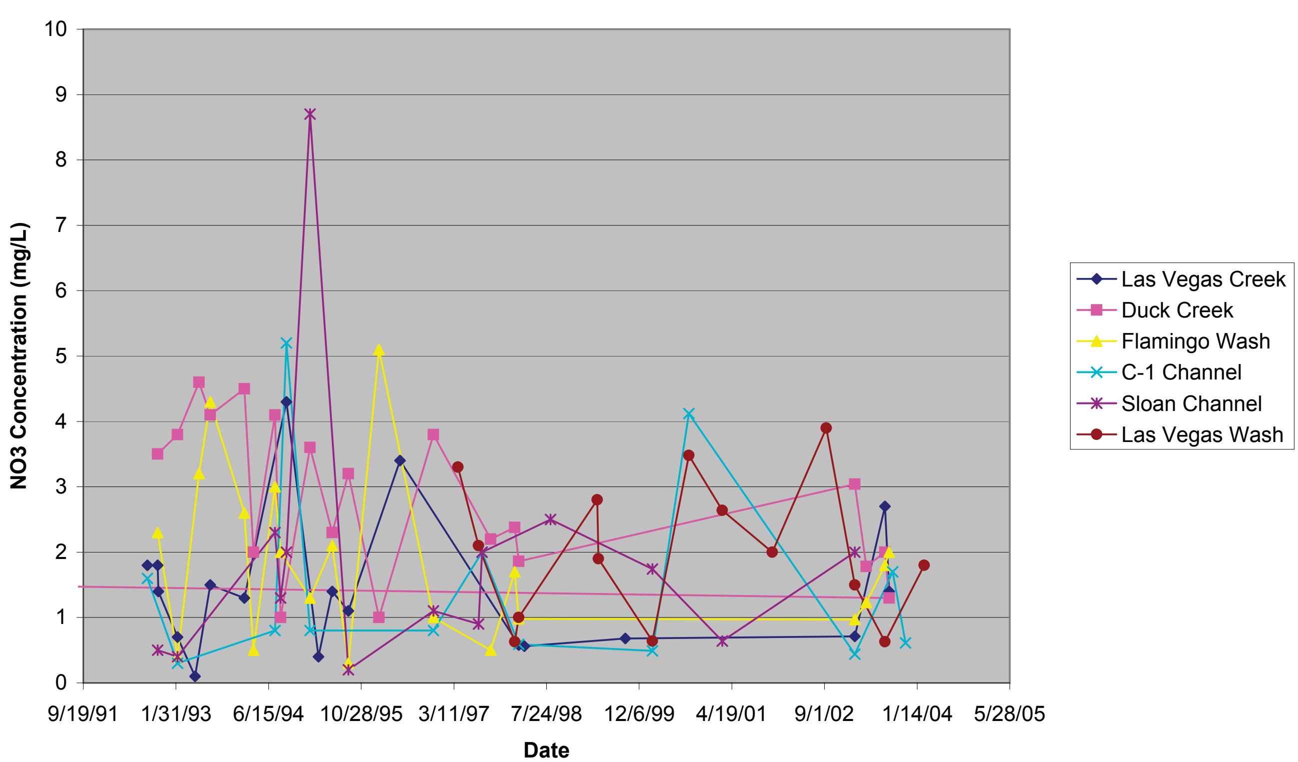


Figure 8-32
Wet Weather - Nitrate (NO3) Concentration



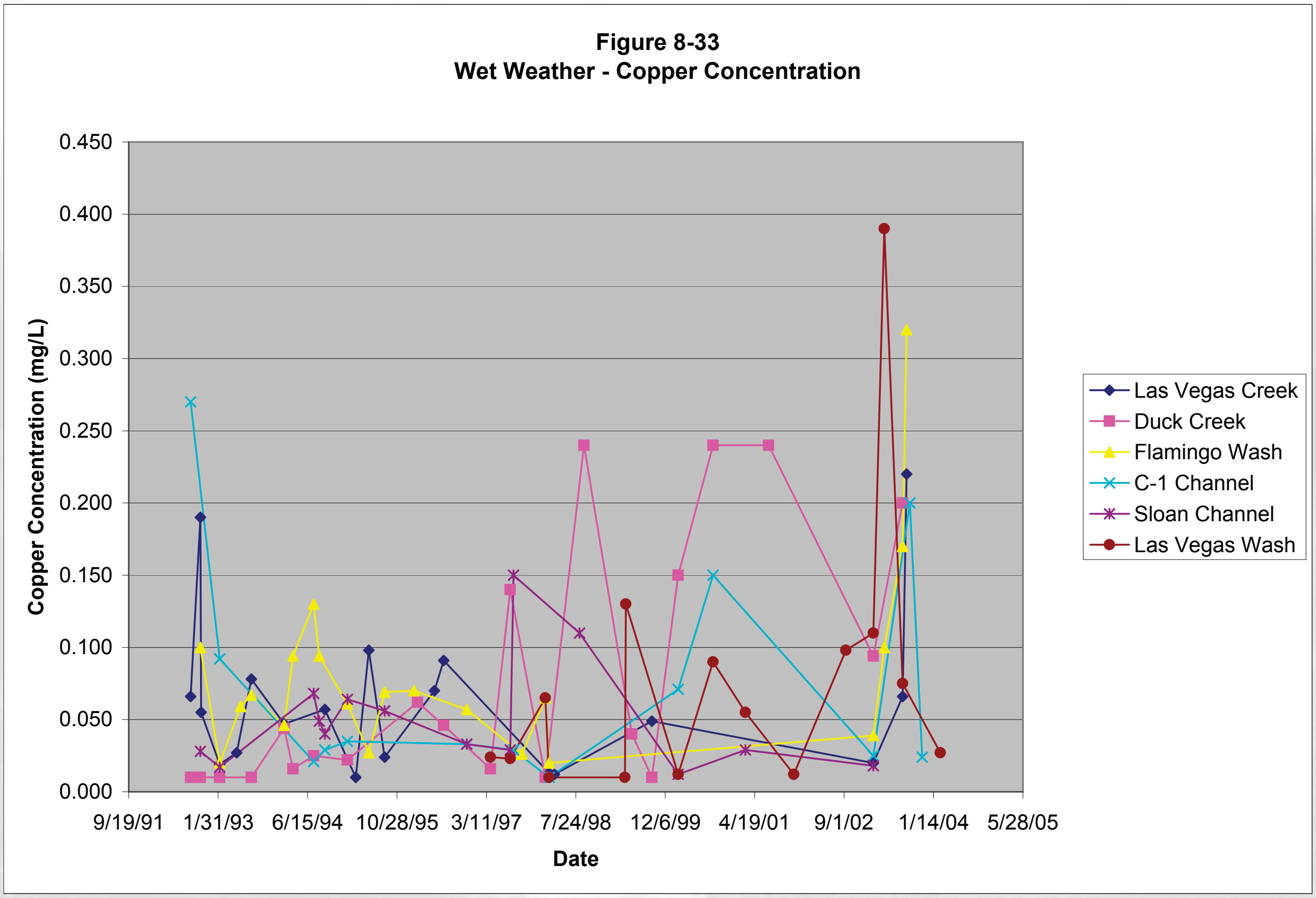


Figure 8-33
Wet Weather - Copper Concentration
Copper Concentration (mg/L)
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
9/19/91
1/31/93
6/15/94
10/28/95
3/11/97
7/24/98
12/6/99
4/19/01
9/1/02
1/14/04
5/28/05
Date
Las Vegas Creek
Duck Creek
Flamingo Wash
C-1 Channel
Sloan Channel
Las Vegas Wash

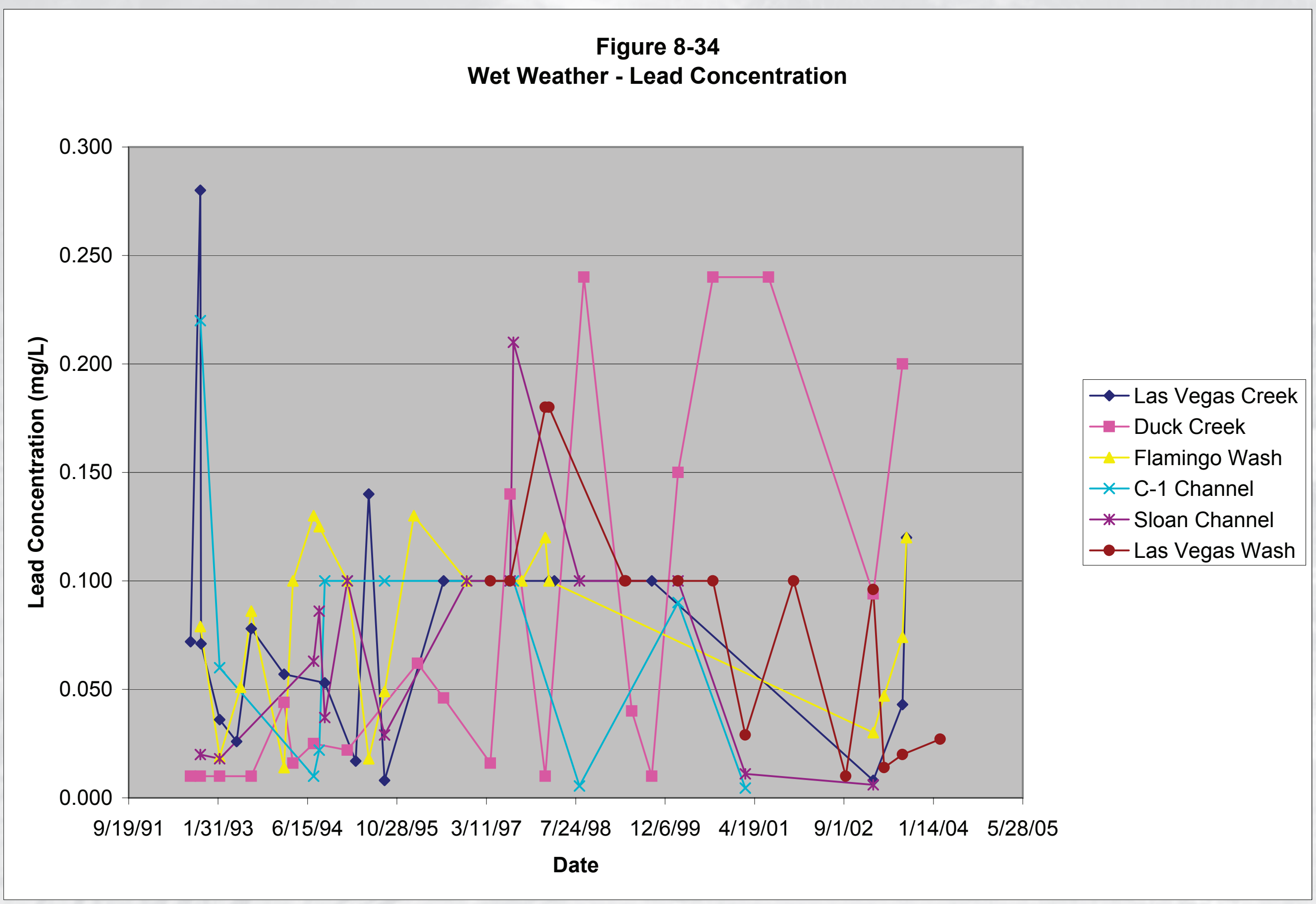


Figure 8-34
Wet Weather - Lead Concentration
Lead Concentration (mg/L)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
9/19/91
1/31/93
6/15/94
10/28/95
3/11/97
7/24/98
12/6/99
4/19/01
9/1/02
1/14/04
5/28/05
Date
Las Vegas Creek
Duck Creek
Flamingo Wash
C-1 Channel
Sloan Channel
Las Vegas Wash

Figure 8-35
Wet Weather - Zinc Concentration

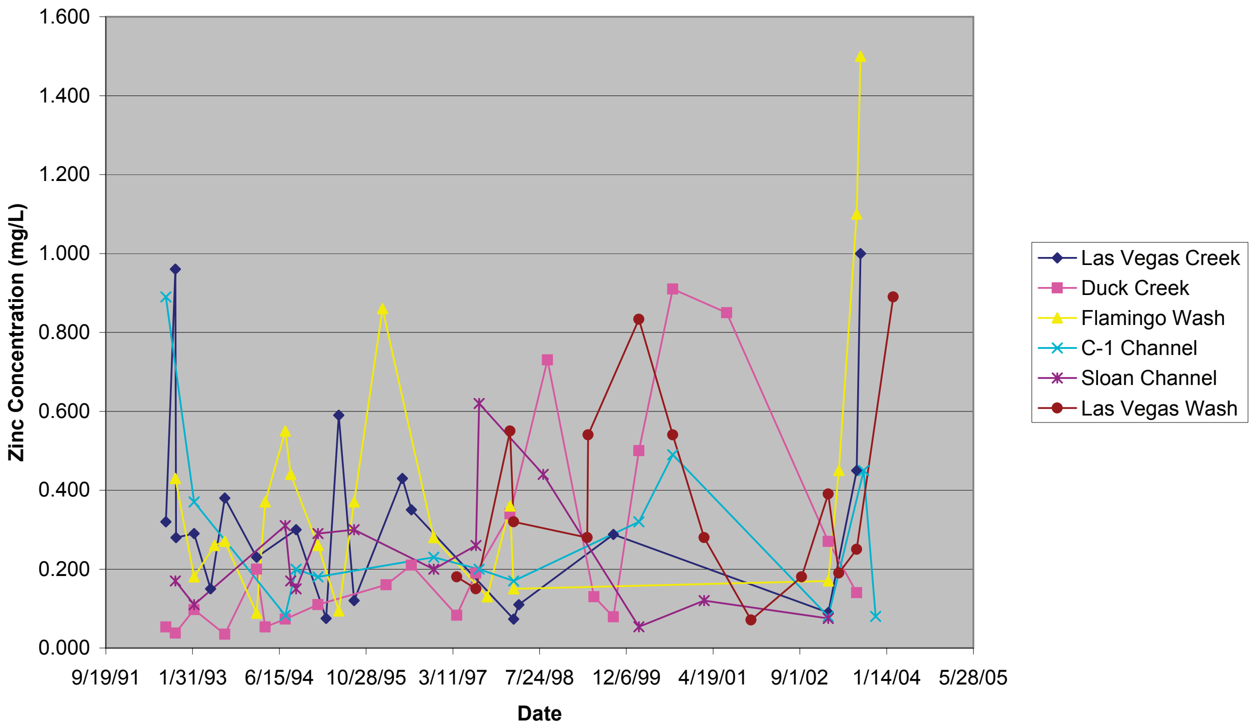


Figure 8-36
Wet Weather - Boron Concentration

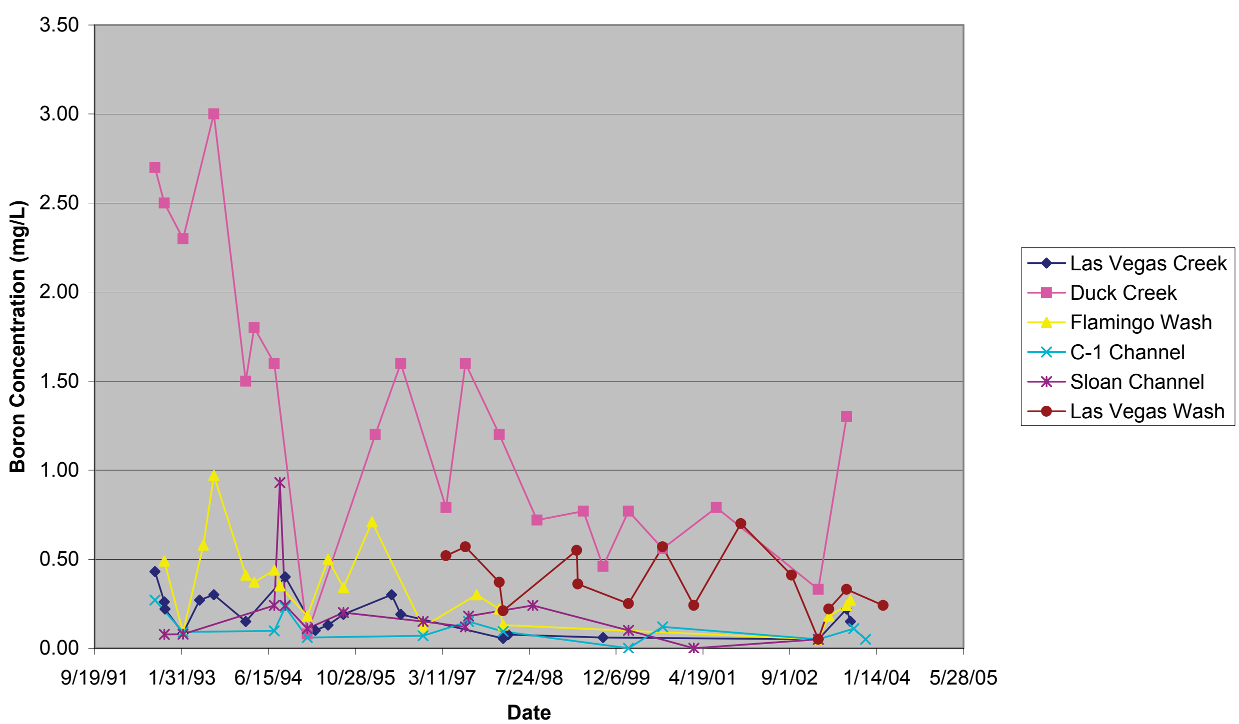


Figure 8-37
Wet Weather - COD Concentration

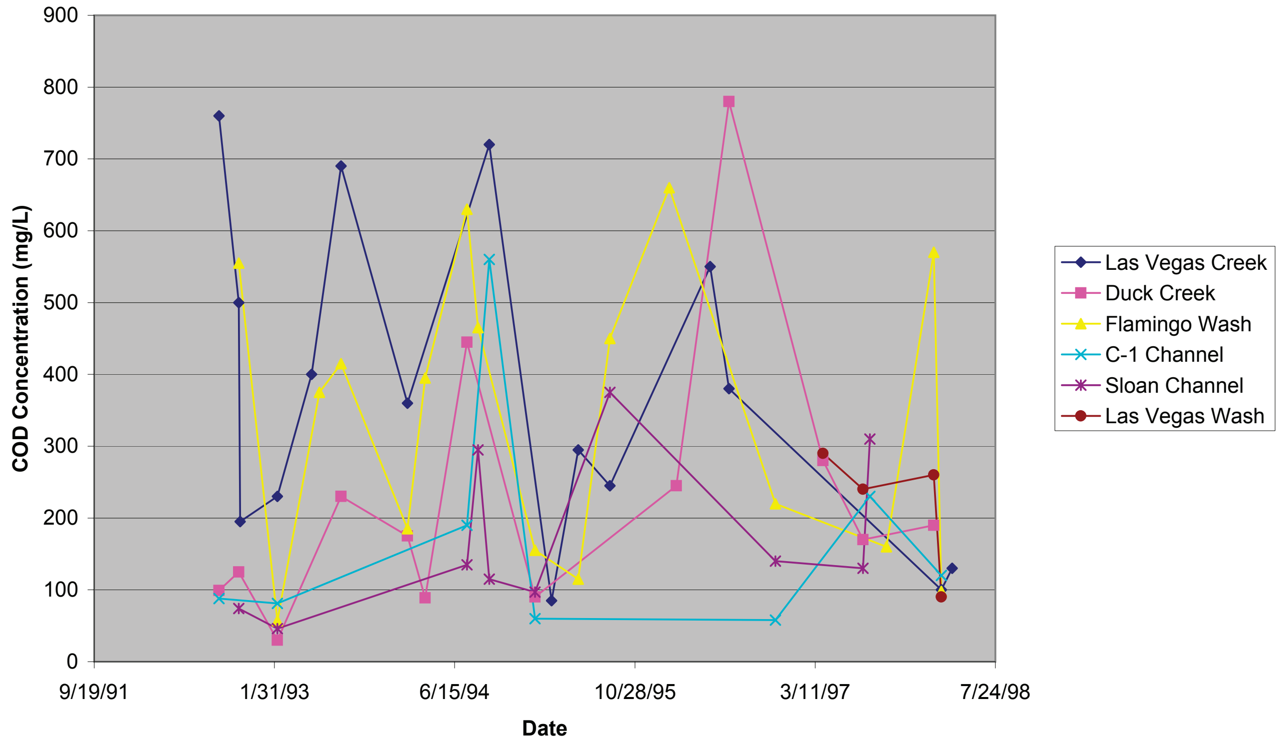
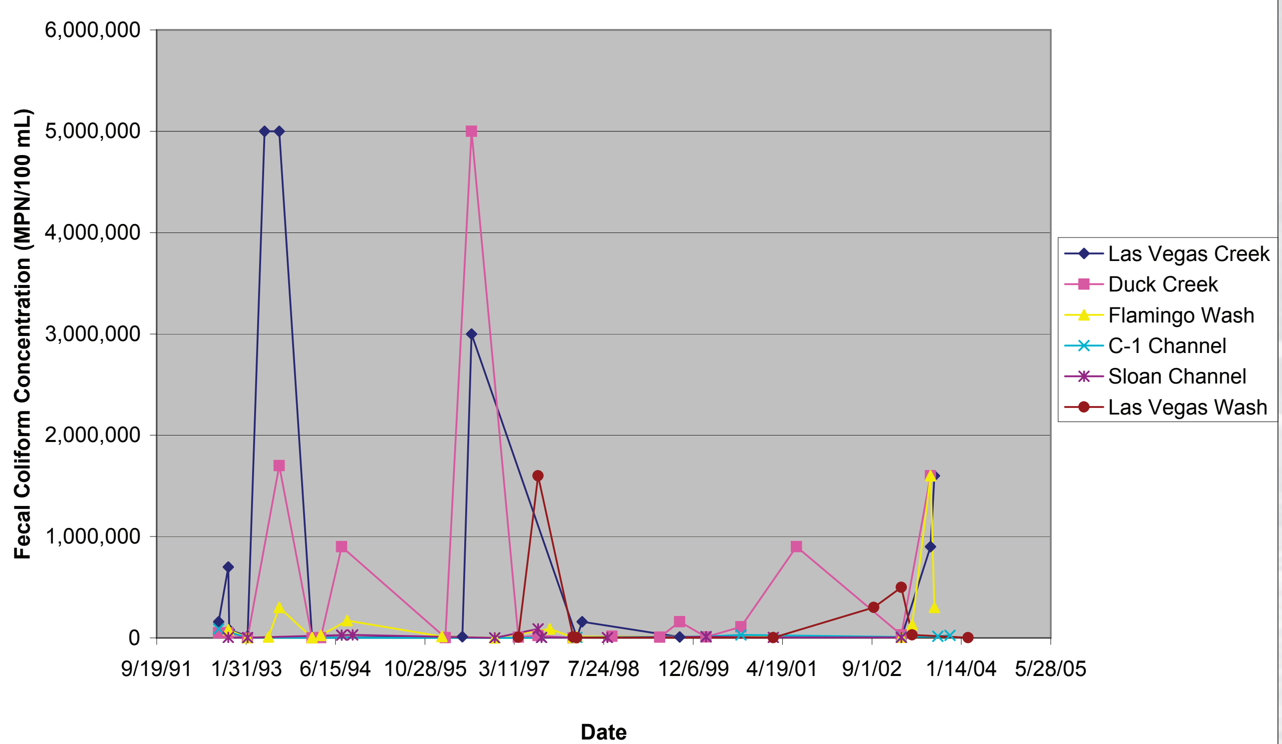


Figure 8-38
Wet Weather - Fecal Coliform Concentration



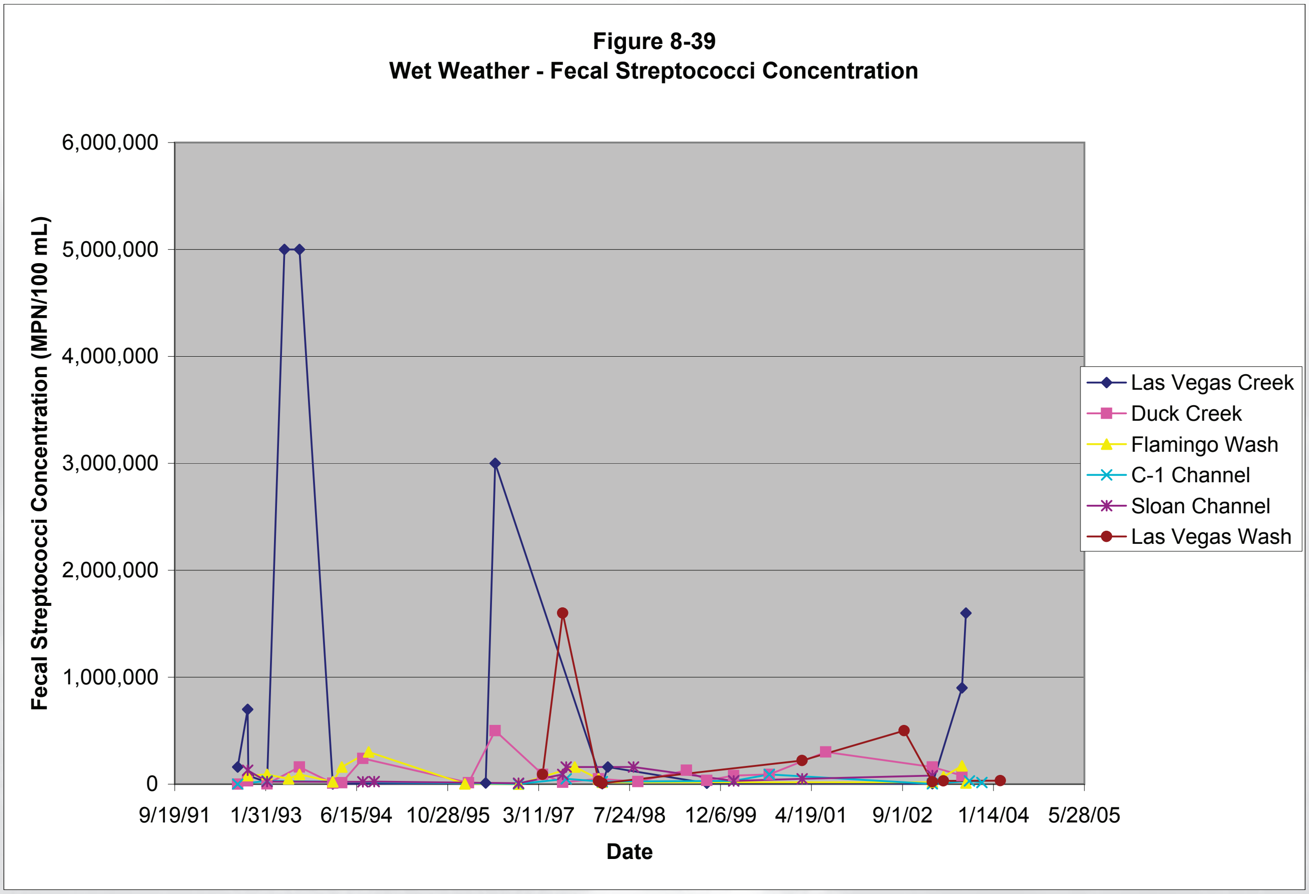


Table 8-22

Distribution of Land Uses in Las Vegas Valley Watersheds (1995)

Watershed	Total Drainage Area (sq mi)	Acres of Urban Development	Percent of Urban Development	Acres of Industrial Land Use	Percent of Industrial Land Use
Western Tributary	205	21,278	16	994	1
Las Vegas Creek	24	12,730	81	863	6
Flamingo Wash	156	22,578	23	1,397	1
Range Wash	96	6,298	10	1,038	2
Duck Creek	344*	11,580	5	954	0
C-1 Channel	43	2,630	9	13	0
Upper Las Vegas Wash	643	9,649	2	568	0.1
Unsampled Areas	23	6,425	49	2,173	15

* Includes Portion of Pittman Wash Watershed Which is Tributary to Duck Creek

influence of a few very high values in each data set that affect the mean but not the median.

Trends in Wet Weather Data

The chronological data plots in **Figures 8-29** to **8-39** can be used in investigate potential trends in wet weather data over the course of the MS4 monitoring program. The following conclusions can be reached from these plots.

- There is often significant variability in pollutant concentrations from storm event to storm event. Localized storm characteristics (rainfall intensity, antecedent rainfall conditions, etc.) and a myriad of watershed factors have a strong effect on runoff quality.
- Overall, there have been no clear upward or downward trends in wet weather water quality in Las Vegas Valley over the past 12 years. Although individual constituents at individual sites may show a rough upward or downward trend (e.g., TDS on Flamingo Wash, lead on Duck Creek, boron on Duck Creek) the scatter in the data is such that it would probably not be possible to show that these trends are statistically significant at a high confidence level.

8.4.3.2 Flamingo Wash Bacteria Investigation

In 1998-2000, a special monitoring program was conducted to determine whether monitoring could be used to isolate portions of the urbanized Flamingo Wash watershed that contribute high bacteria loads. Monitoring sites were established at eight locations along the channel between Valley View Boulevard and Las Vegas Wash, and flow travel times between sites were determined. Samples were collected for three storm events and four dry weather events, and the timing of sample collection at each site was determined based on the objective of sampling the same slug of water as it moved downstream through the channel. Samples were analyzed for fecal coliform, fecal streptococci and E. coli.

Results of the special monitoring study were as follows:

- There are no clear trends in the spatial distribution of bacteria concentrations along the portion of Flamingo Wash that was sampled. Dry and wet weather concentrations tend to be higher downstream of the dense commercial area around Las Vegas Boulevard, but this is not a consistent occurrence.
- The high degree of variability in the data does not allow specific source areas of bacteria to be isolated.
- Human contributions to wet and dry weather bacteria concentrations appear to be small compared to non-human contributions. Specific contributors (e.g., wildlife, pets) could not be identified. Bacteria sources appear to be ubiquitous in the Flamingo Wash watershed.
- Wet weather bacteria concentrations in representative storms are about one order of magnitude higher than dry weather concentrations. Severe storms produce bacteria concentrations about one order of magnitude higher than typical storms.

Based on these results, bacteria source identification monitoring was not conducted for other channels in Las Vegas Valley.

8.4.3.3 Relationships Between Flow, Total Suspended Solids and Total Phosphorus

NPDES Permit Data

The NPDES wet and dry weather data for total phosphorus was evaluated in an attempt to identify possible relationships between TP, TSS and discharge, and to understand possible sources and transport mechanisms for phosphorus through the Las Vegas drainage system. The objective of the evaluation was to test the following hypotheses:

- Particulate phosphorus is thought to be adsorbed to sediments in flowing waters. If this is the case, there should be a positive correlation between TP and TSS in wet weather samples, and possibly in dry weather samples as well.

- Phosphorus is thought to be washed off urban surfaces and re-entrained from bed sediments. If this is the case, higher flow rates should generate higher concentrations of phosphorus, and there should be a positive correlation between TP and flow rate.

- If the above relationships can be determined, it may be possible to estimate, or even predict, phosphorus loads based on easily measured flow conditions.

Results of this evaluation are summarized in this section.

1. Wet Weather TP Data vs Time – All Stations. All NPDES wet weather data at all stations was plotted chronologically from 1992 to 2002, along with population in Las Vegas Valley over that period. Results are shown in **Figure 8-40**. The population doubled, but no increase in TP concentrations is evident. Thus increased urban development over the past decade has not increased TP concentrations in stormwater runoff in Las Vegas Wash and the major tributaries.

2. Wet Weather Orthophosphate Data vs Time – All Stations. Wet weather orthophosphate data was plotted chronologically for all stations, over the 1992-1998 period for which data is available. This is shown in **Figure 8-41**. Similar to TP, orthophosphate does not show an increase in concentration over the sampling period, despite the significant increase in urbanized area.

3. Wet Weather TSS vs Time – All Stations. This data, which is plotted in **Figure 8-42**, shows no obvious trend. There is no statistical evidence that TSS concentrations have increased in Las Vegas Valley storm runoff, despite the widespread construction activities that disturb large watershed areas.

4. Wet Weather TSS vs Time – Individual Stations. Some stations show possible upward or downward trend, but most data appears randomly distributed.

5. Wet Weather TP vs Flow. Wet weather TP concentrations were plotted against flow rate for each wet weather station to determine if the data supports a positive correlation between TP and flow rate. Results are shown composited for all stations in **Figure 8-43**. Theoretically, higher flows should carry more sediment load and therefore higher TP loads. Only data for the Duck Creek shows a possible positive correlation; at all other sites there is no apparent correlation (either positive or negative) between TP and discharge.

6. Wet Weather TP vs TSS – All Data. TP was plotted versus TSS for all wet weather samples combined to see if the data support the theoretical assumption that significant phosphorus is adsorbed to sediments in storm runoff. The combined data plot (**Figure 8-44**) shows that in general TP does increase with increasing TSS, but the relationship is not strong and is not consistent.

7. Wet Weather TP vs TSS – Individual Stations. TP was plotted against TSS for wet weather samples collected at each sampling station. It was thought that relationships between TSS and TP might be stronger when individual station data is used. This is generally not the case. Most stations show a general increase in TP with increasing TSS, but the relationship is poor, and is generally of about the same confidence as the combined data plot. Las Vegas Wash appears to show the strongest statistical relationship between TP and TSS.

8. Wet Weather TP vs Orthophosphate – All Stations. Wet weather orthophosphate data was plotted against TP data for all storms and all stations. It was thought that a consistent relationship between the orthophosphate (dissolved) and TP (dissolved + particulate) phosphorus might be evident. This is shown in **Figure 8-45**. In fact the plot shows no consistent relationship between orthophosphate and TP, although the higher orthophosphate concentrations do tend to occur for the higher TP concentrations.

9. Wet Weather TSS vs Flow – All Stations. Wet weather TSS data was plotted against discharge for all stations and all storms combined.

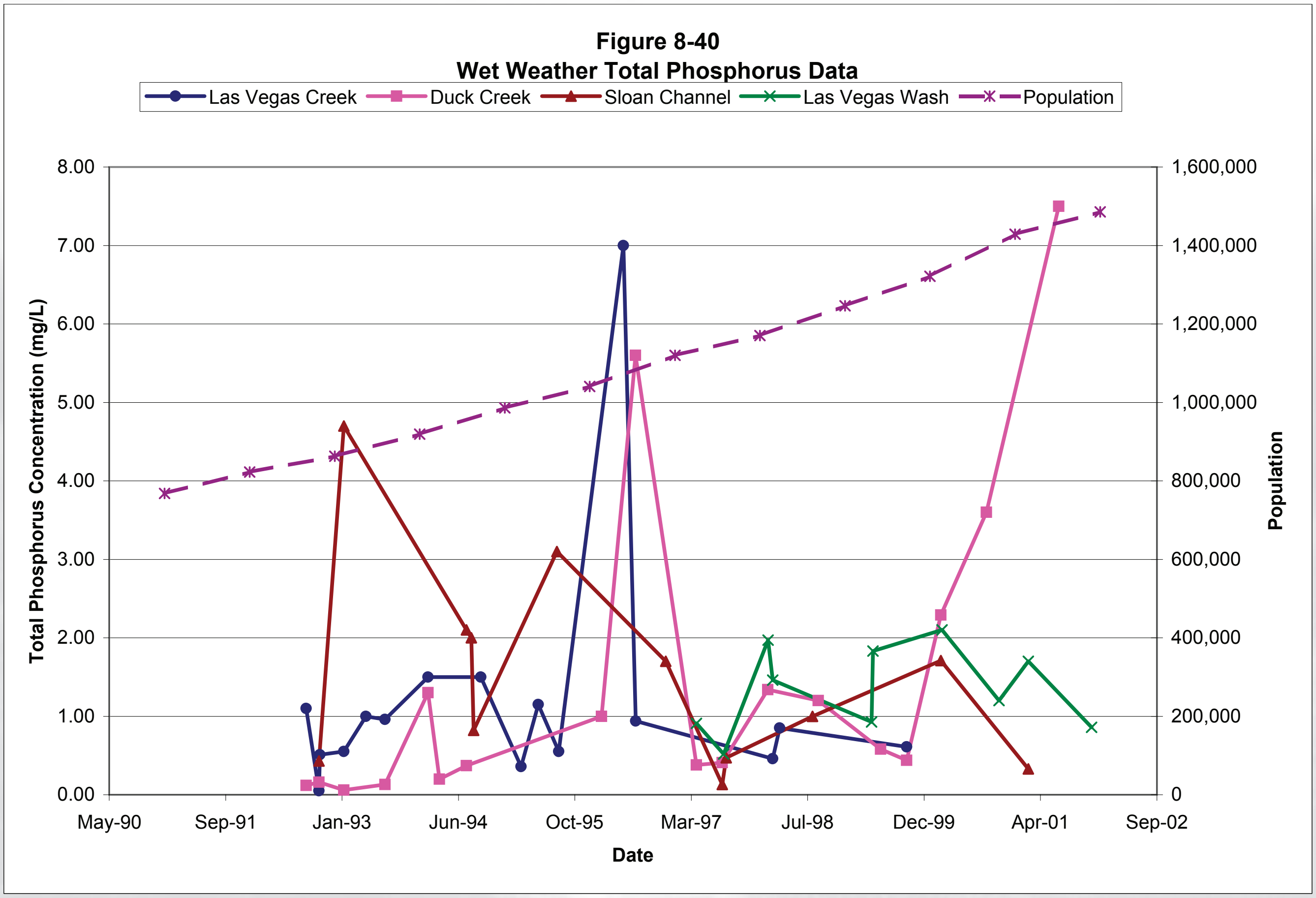


Figure 8-40
Wet Weather Total Phosphorus Data
Las Vegas Creek
Duck Creek
Sloan Channel
Las Vegas Wash
Population
Total Phosphorus Concentration (mg/L)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Population
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Date

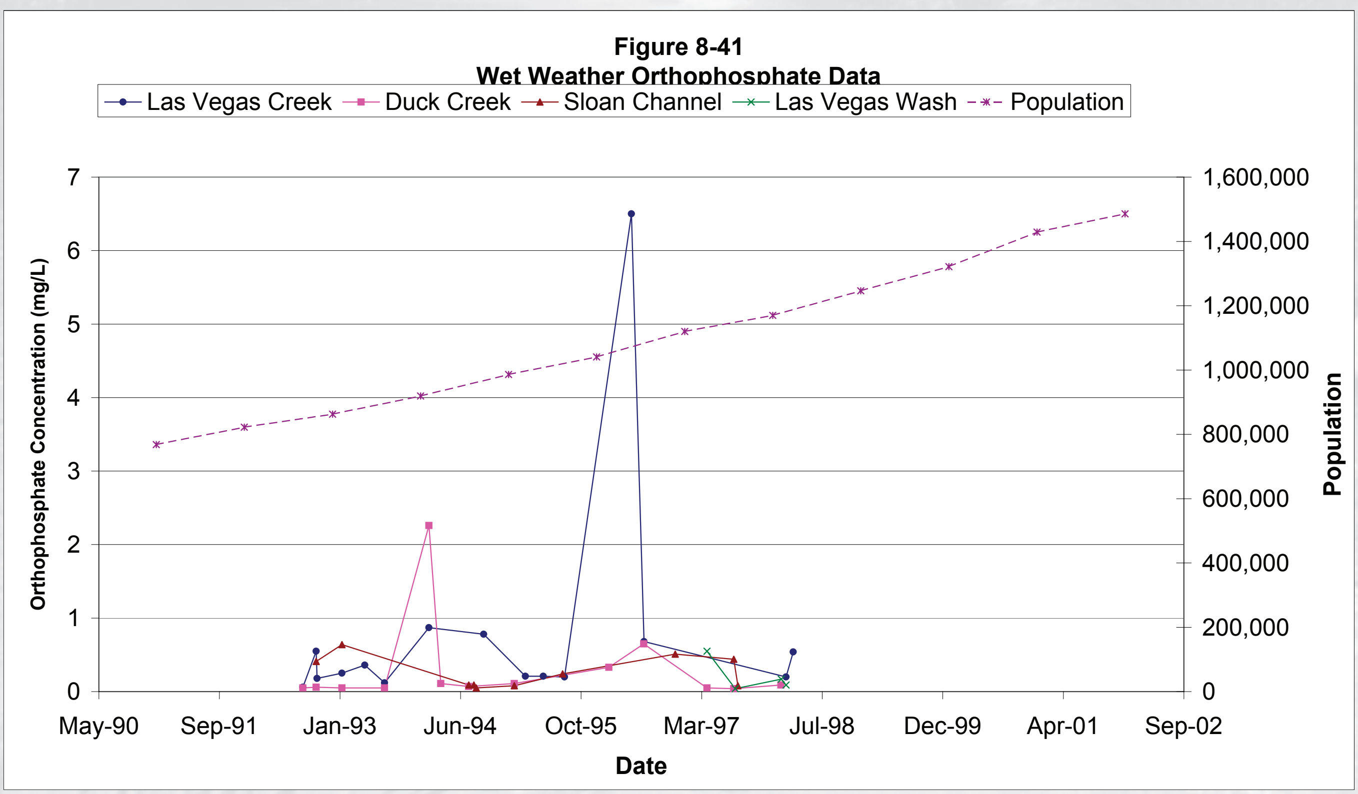


Figure 8-41
Wet Weather Orthophosphate Data
Las Vegas Creek
Duck Creek
Sloan Channel
Las Vegas Wash
Population
Orthophosphate Concentration (mg/L)
7
6
5
4
3
2
1
0
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Population
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Sep-02
Date

Figure 8-42
Wet Weather Total Suspended Solids (TSS) Data

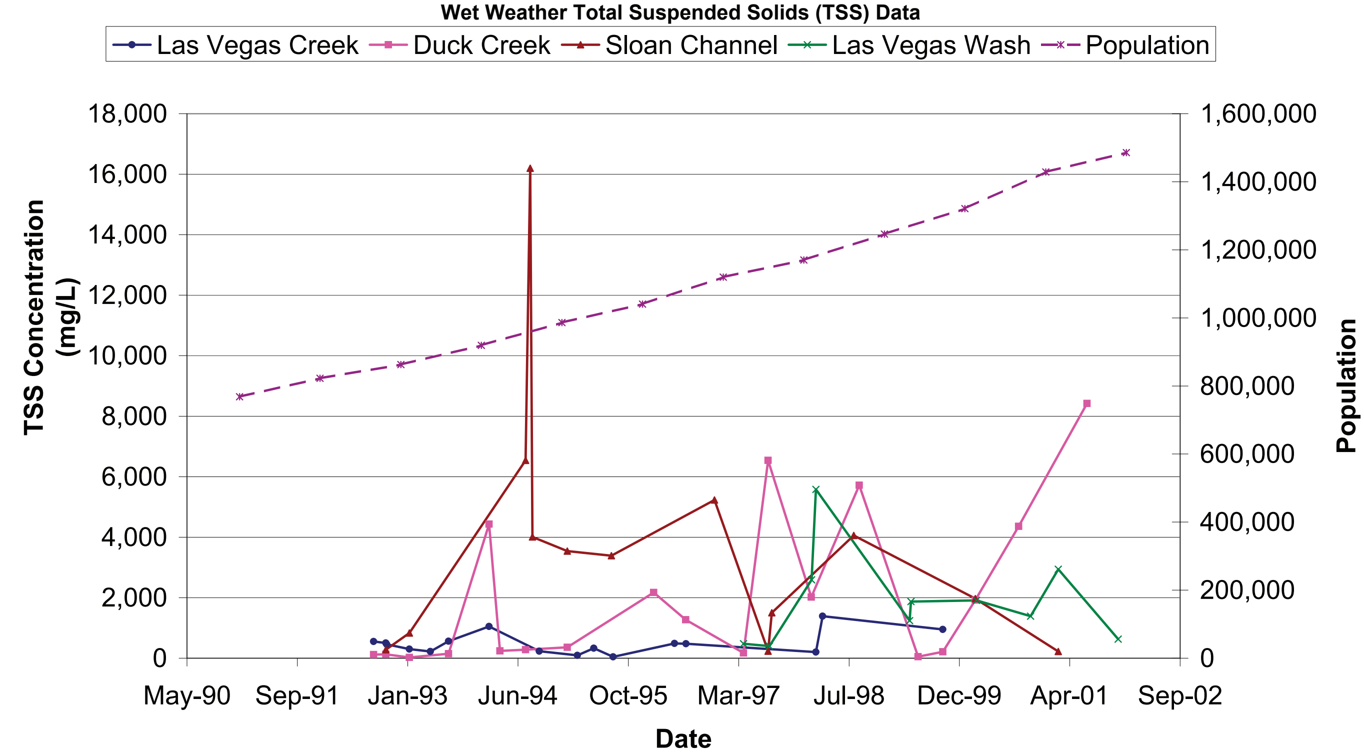


Figure 8-43
Wet Weather Total Phosphorus vs Discharge - All Stations Combined

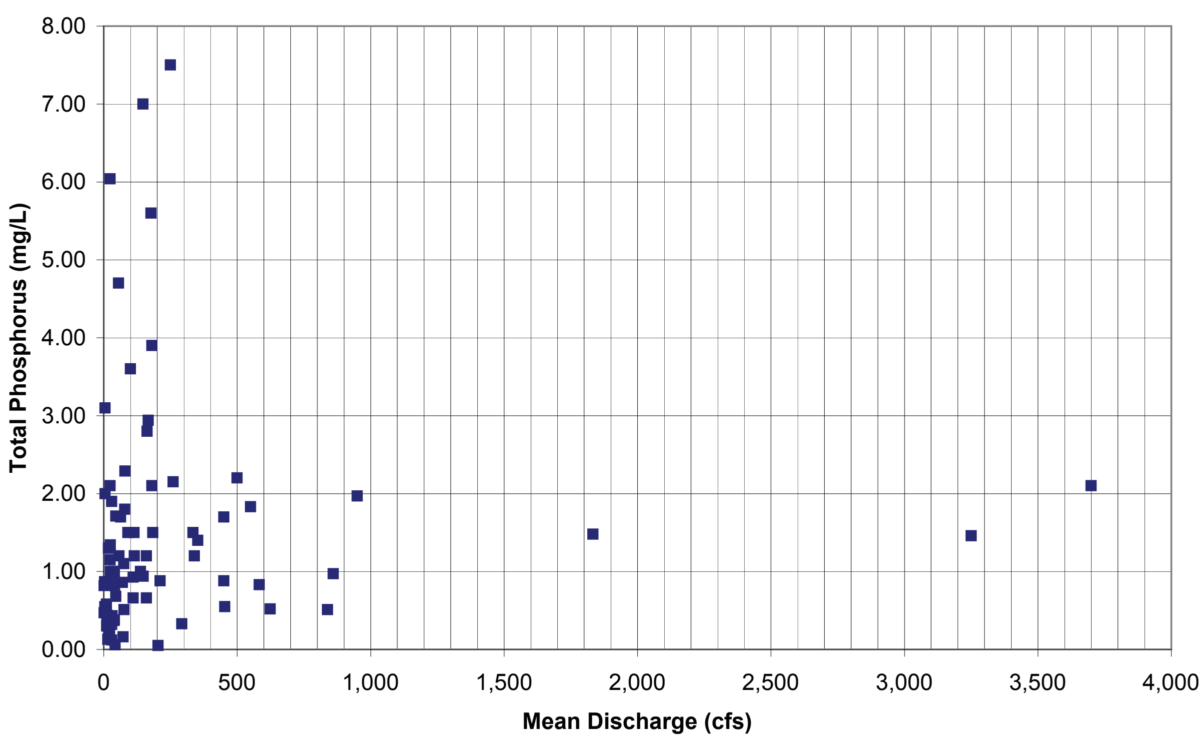


Figure 8-44
Wet Weather Total Phosphorus vs TSS for Seven Tributaries

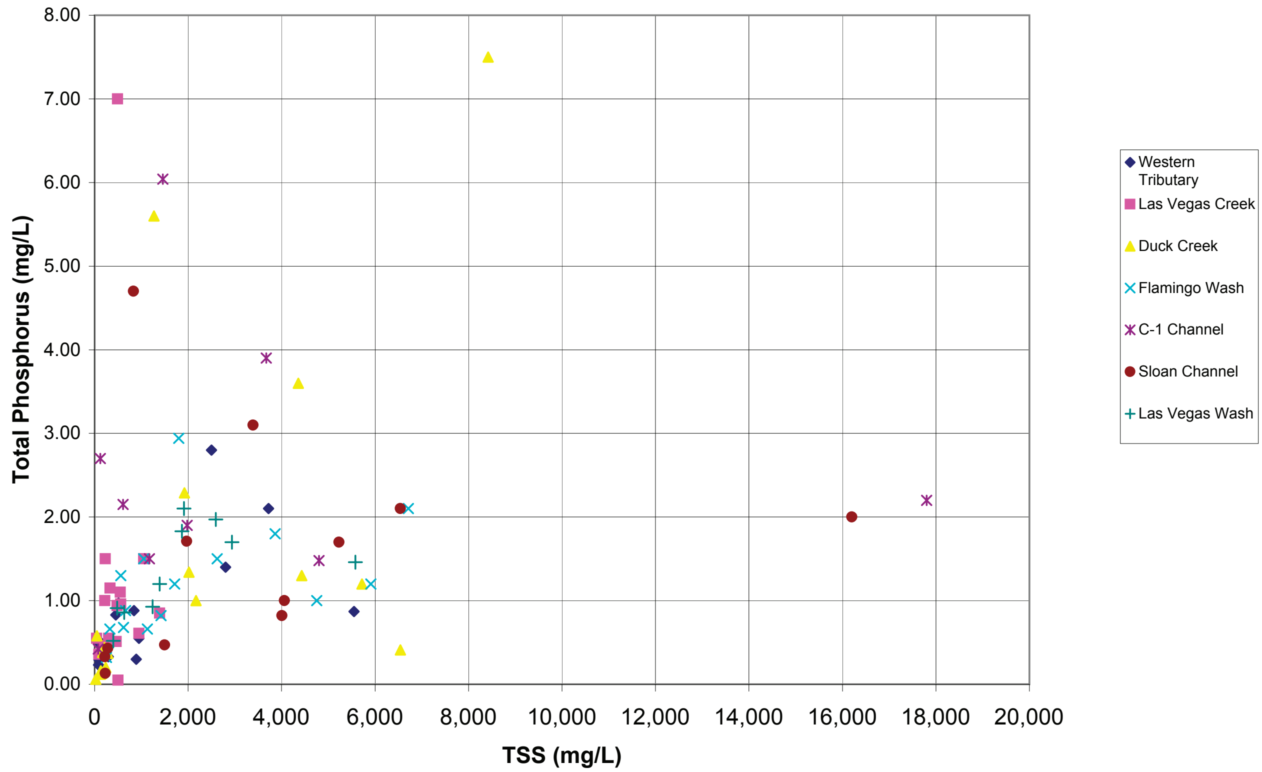
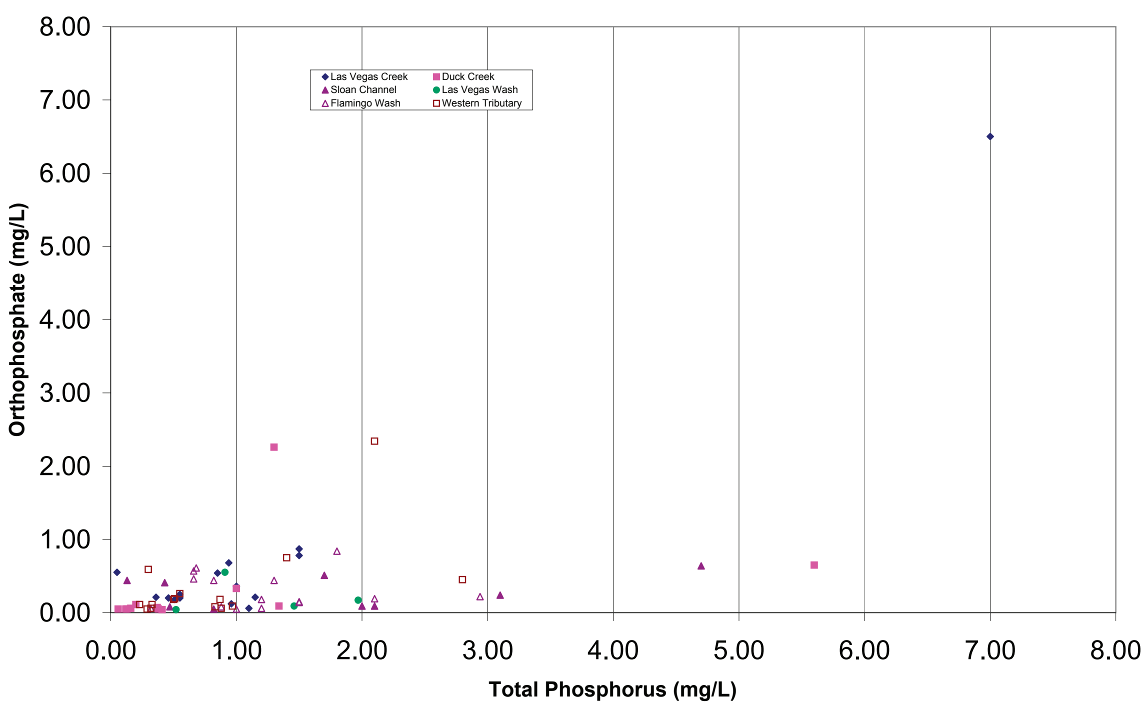


Figure 8-45
Orthophosphate vs Total Phosphorus for Wet Weather Data



Theoretically, the higher flow rates should carry higher TSS concentrations. As shown in **Figure 8-46**, the data does not support this. In fact, most of the higher TSS concentrations occurred at lower flow rates and most of the higher flow rates produced relatively low TSS concentrations. This suggests that although high flows may produce more TSS washoff from the land surface and channel erosion, the higher flow rates may also be contributing a dilution effect that keeps TSS concentrations relatively low.

10. Wet Weather TSS vs Flow – Individual Stations. Wet weather TSS data was plotted against discharge for each individual station. The individual station plots reinforce the conclusion from the plot of all stations together – i.e., most higher TSS concentrations occurred at lower flow rates, and most high flow rates did not produce correspondingly high TSS concentrations, suggesting that a dilution effect may be at work.

11. Dry Weather TP vs Time. Dry Weather TP data was plotted chronologically for all stations. This is shown in **Figures 8-47a** and **8-47b**. No trends over time are evident.

12. Dry Weather TSS vs Time – All Stations. Dry weather TSS was plotted chronologically for all stations and all sampling events combined. This is shown in **Figure 8-48a** and **8-48b**. Although urbanization doubled over this time, TSS concentrations do not show an overall increase or decrease.

13. Dry Weather TSS vs Time – Individual Stations. Dry weather TSS was plotted chronologically for each station from 1992 to 2002. Data at some stations shows a possible upward trend (Las Vegas Creek, Western Tributary, Flamingo Wash at Swenson), while data at other stations shows a possible downward trend (Duck Creek at Callahan), and still other stations show no trend.

14. Dry Weather TP vs Orthophosphate – All Stations. Dry weather TP data was plotted against orthophosphate to determine if a strong correlation exists. Results are shown in **Figure 8-49**. This shows that, as expected, higher orthophosphate concentrations are generally related to higher total phosphorus concentrations.

15. Dry Weather TP vs Flow – All Stations. Dry weather TP data was plotted against flow rate for all stations and all samples combined. This is shown in **Figure 8-50**. In general, the data shows that higher flow rates produce lower TP concentrations, possibly suggesting a dilution effect.

16. Dry Weather TP vs TSS – All Stations. Dry weather TP was plotted against TSS for all stations. As shown in **Figure 8-51**, the data is almost random, showing very little relationship between TP and TSS at most stations for dry weather flows.

17. All Wet and Dry Weather Data for TP vs Flow. Wet and dry weather data sets were combined and all total phosphorus data was plotted against corresponding flow rates. These results are shown in **Figure 8-52**. This shows a general positive trend between TP and flow rate, but it is not a particularly strong trend.

18. All Wet and Dry Weather Data for TSS vs Flow. Wet and dry weather data sets were combined and all TSS data was plotted against corresponding flow rates. These results are shown in **Figure 8-53**. Like the TP vs discharge relationship, this shows a general positive trend between TSS and discharge.

Other Data Sources

USGS TP Data at Pabco Road

USGS data for TP on Las Vegas Wash at Pabco Road from 1972 to 2002 was plotted chronologically. This is shown in **Figure 8-54**. The data includes a combination of dry and wet weather samples, but shows the effects of nutrient removal at the wastewater treatment plants starting in the mid-1970s, and further nutrient removal upgrades in the 1990s.

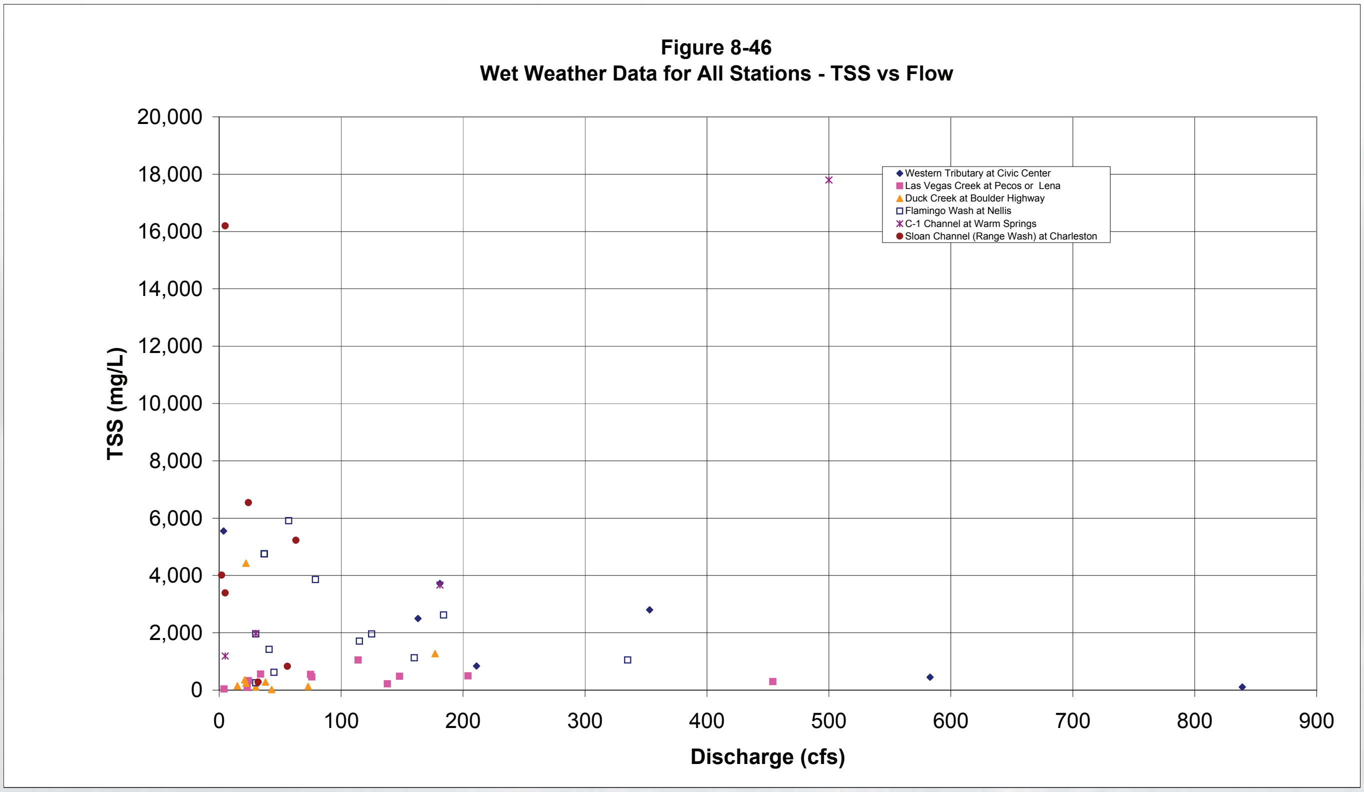


Figure 8-46
Wet Weather Data for All Stations - TSS vs Flow
TSS (mg/L)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
100
200
300
400
500
600
700
800
900
Discharge (cfs)
Western Tributary at Civic Center
Las Vegas Creek at Pecos or Lena
Duck Creek at Boulder Highway
Flamingo Wash at Nellis
C-1 Channel at Warm Springs
Sloan Channel (Range Wash) at Charleston

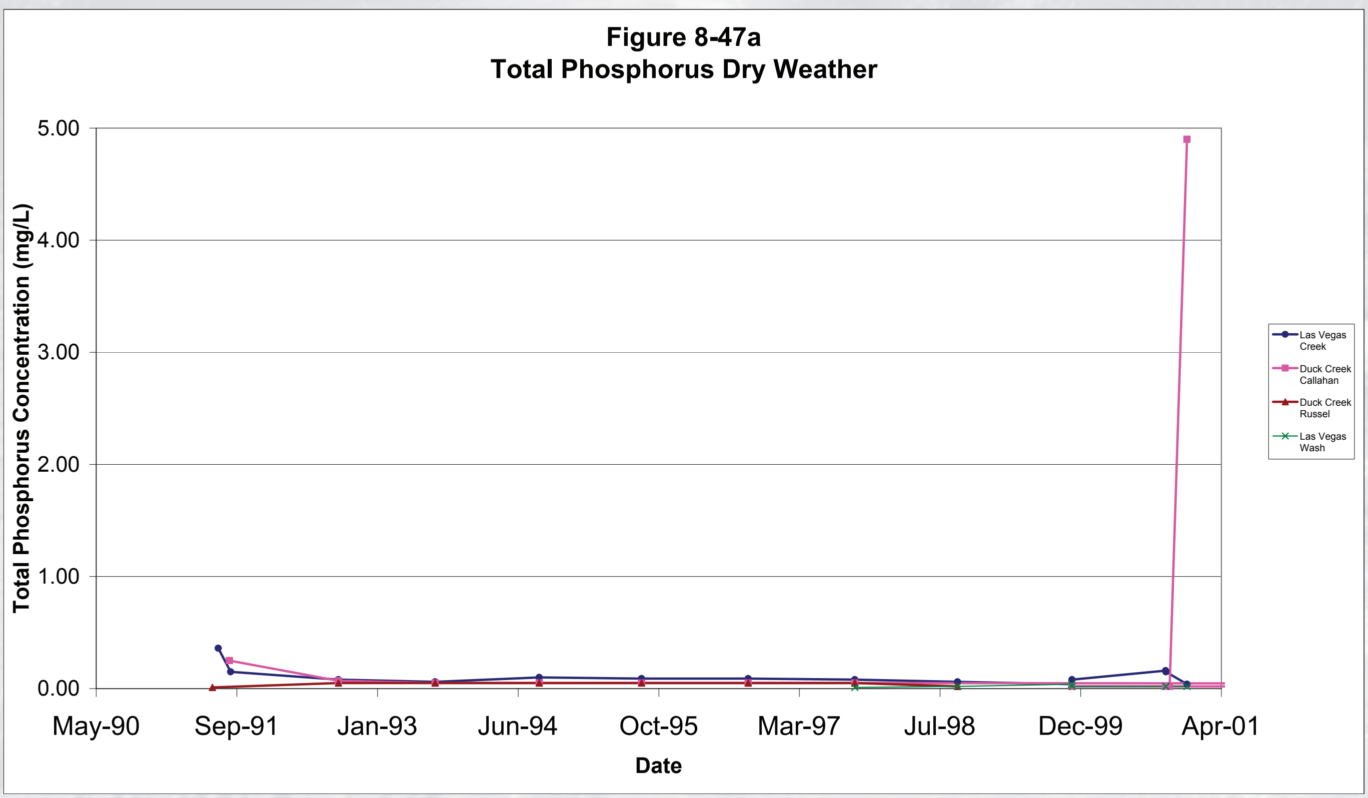


Figure 8-47a
Total Phosphorus Dry Weather
Total Phosphorus Concentration (mg/L)
5.00
4.00
3.00
2.00
1.00
0.00
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Date
Las Vegas Creek
Duck Creek Callahan
Duck Creek Russel
Las Vegas Wash

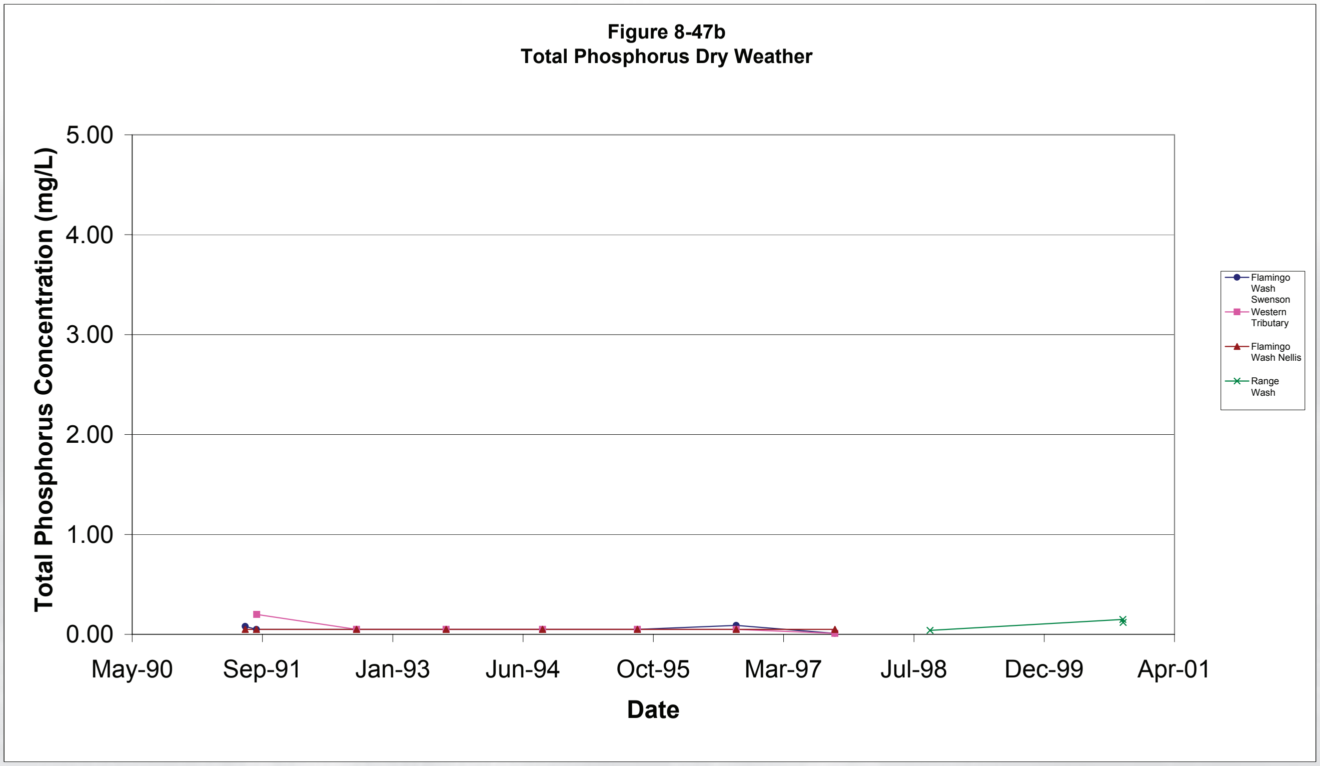


Figure 8-47b
Total Phosphorus Dry Weather
Total Phosphorus Concentration (mg/L)
5.00
4.00
3.00
2.00
1.00
0.00
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Date
Flamingo Wash Swenson
Western Tributary
Flamingo Wash Nellis
Range Wash

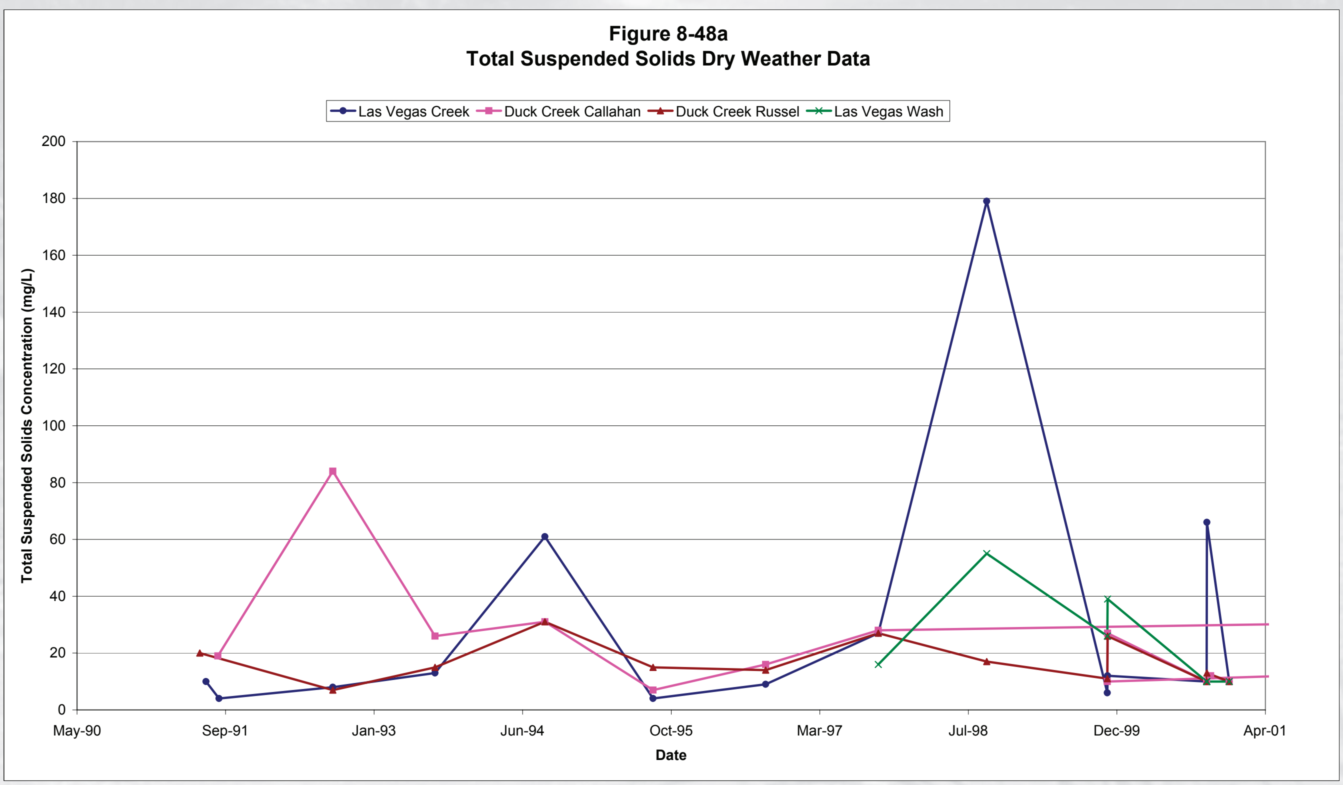


Figure 8-48a
Total Suspended Solids Dry Weather Data
Las Vegas Creek
Duck Creek Callahan
Duck Creek Russel
Las Vegas Wash
Total Suspended Solids Concentration (mg/L)
200
180
160
140
120
100
80
60
40
20
0
May-90
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Jul-98
Dec-99
Apr-01
Date

Figure 8-48b
Total Suspended Solids Dry Weather

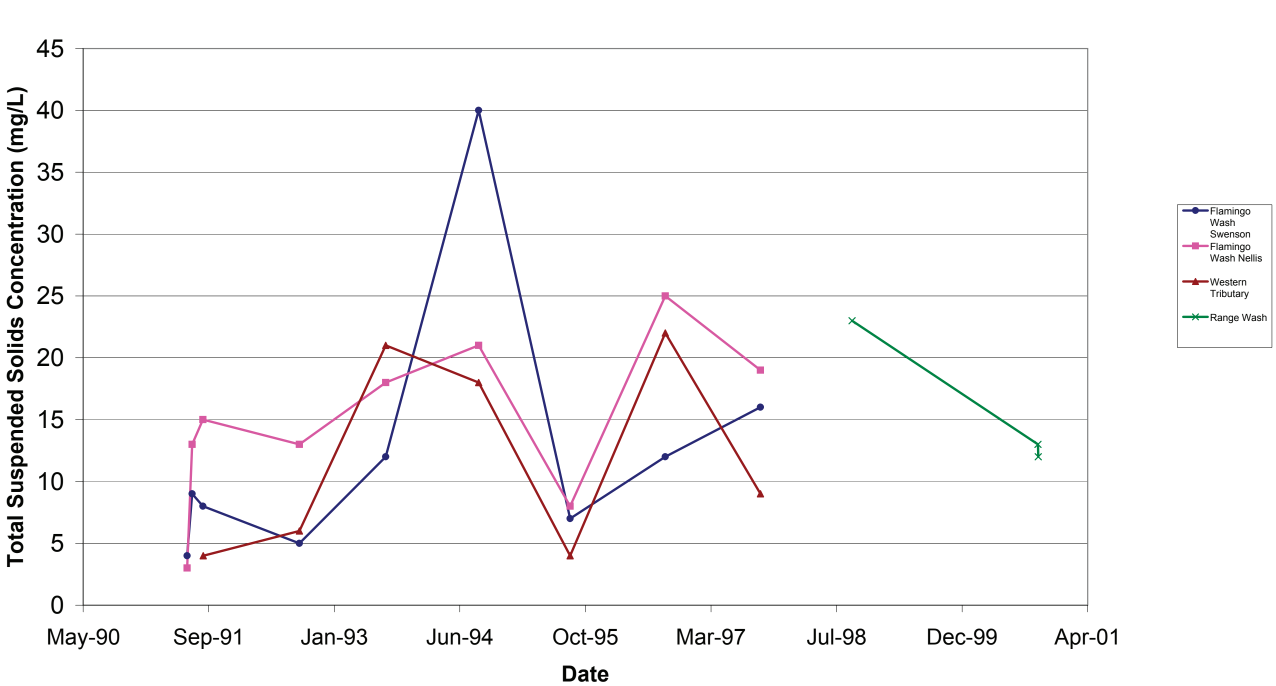


Figure 8-49
Orthophosphate vs Total Phosphorus for Selected Dry Weather Data

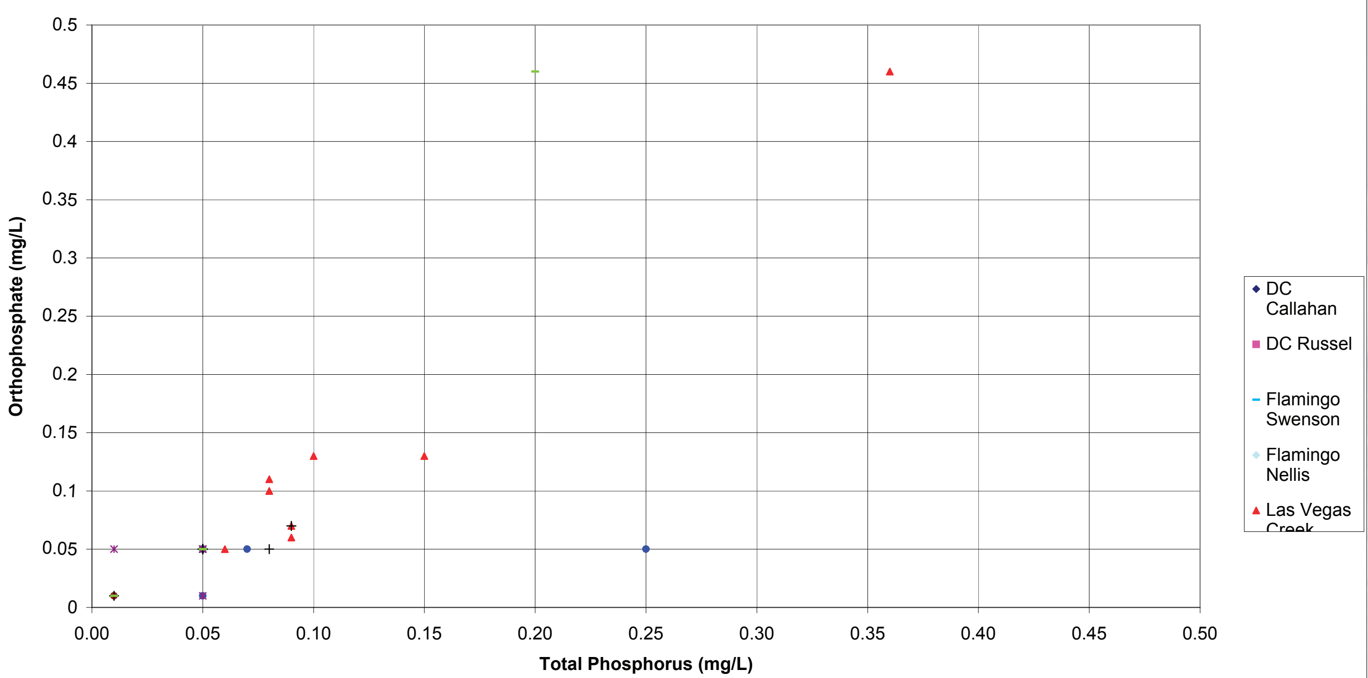


Figure 8-50
All Stations Dry Weather Data - Total Phosphorus vs Flow

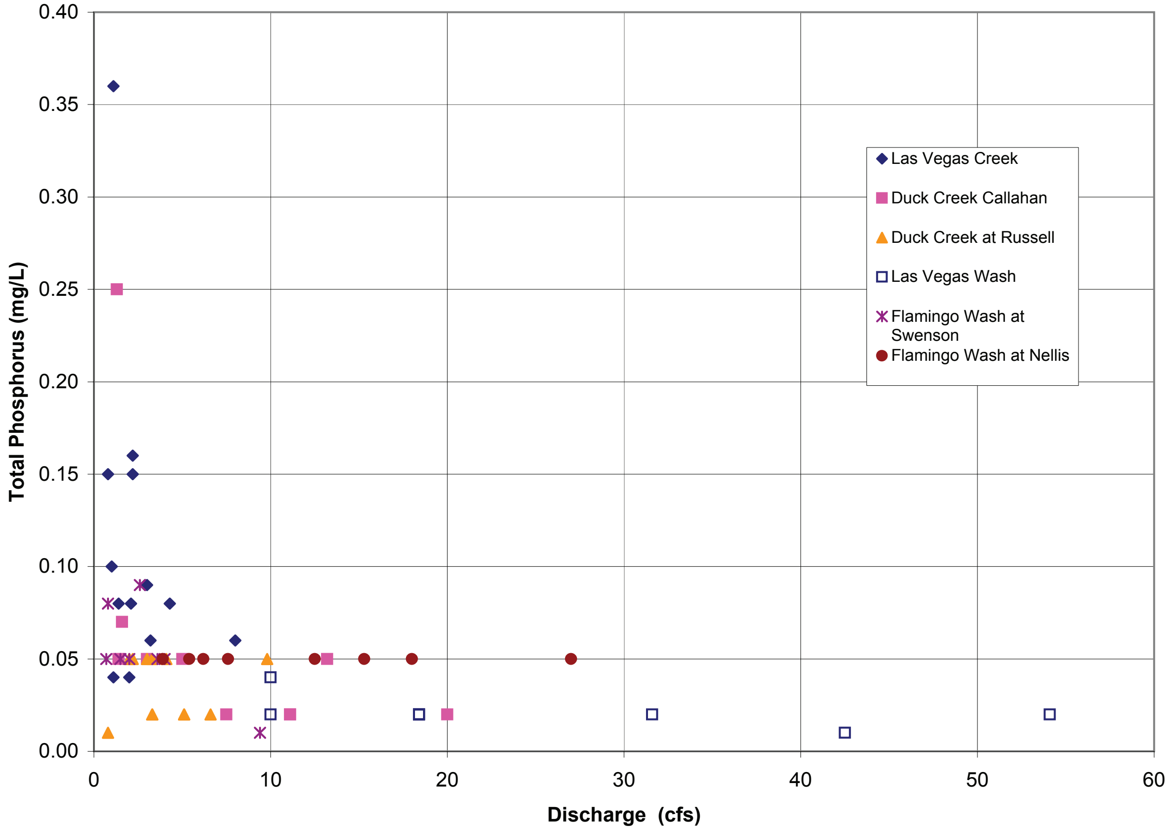


Figure 8-51
Dry WeatherTotal Phosphorus vs TSS

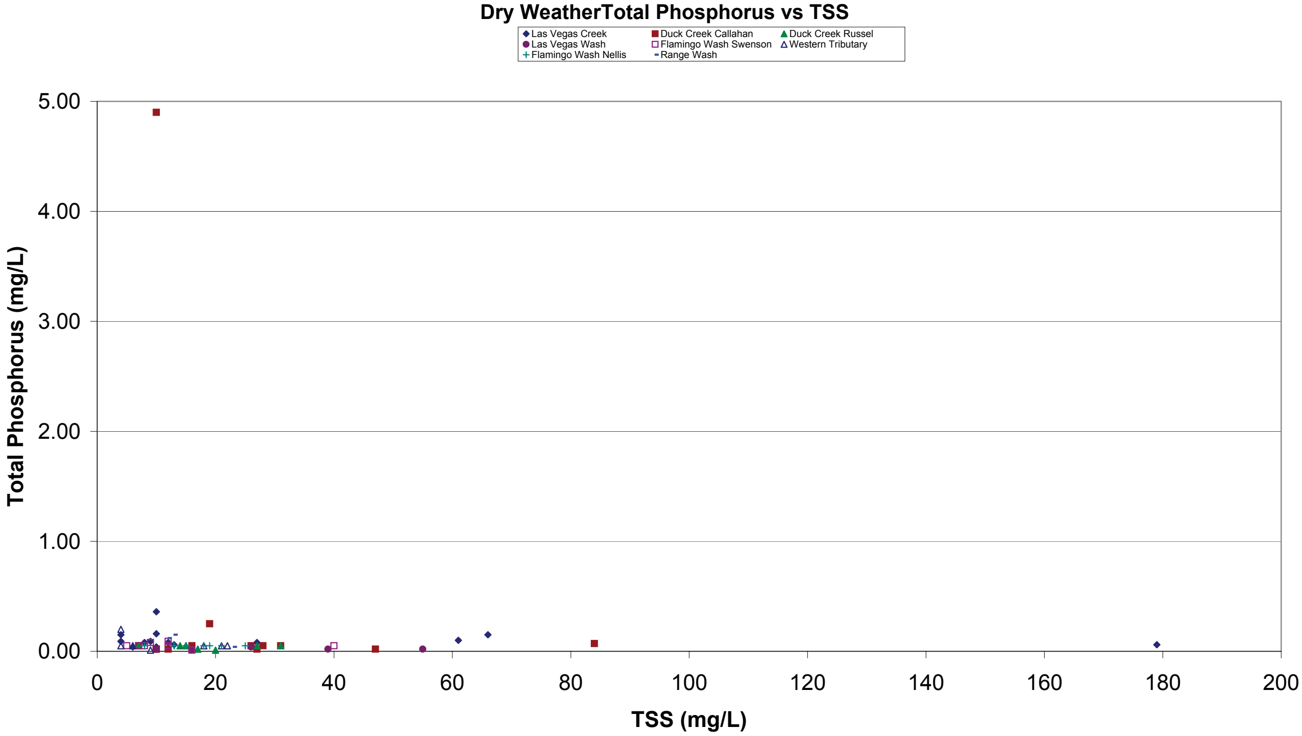


Figure 8-52
TP vs Flow - Combined Wet and Dry Weather Data, All Stations and All Events

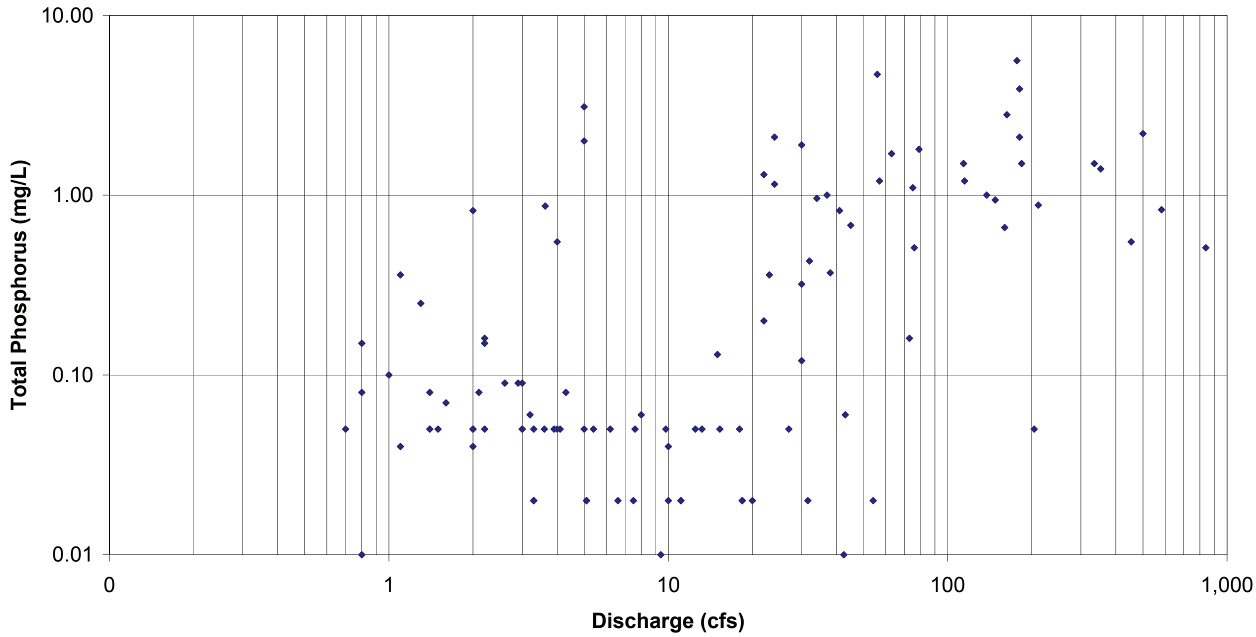
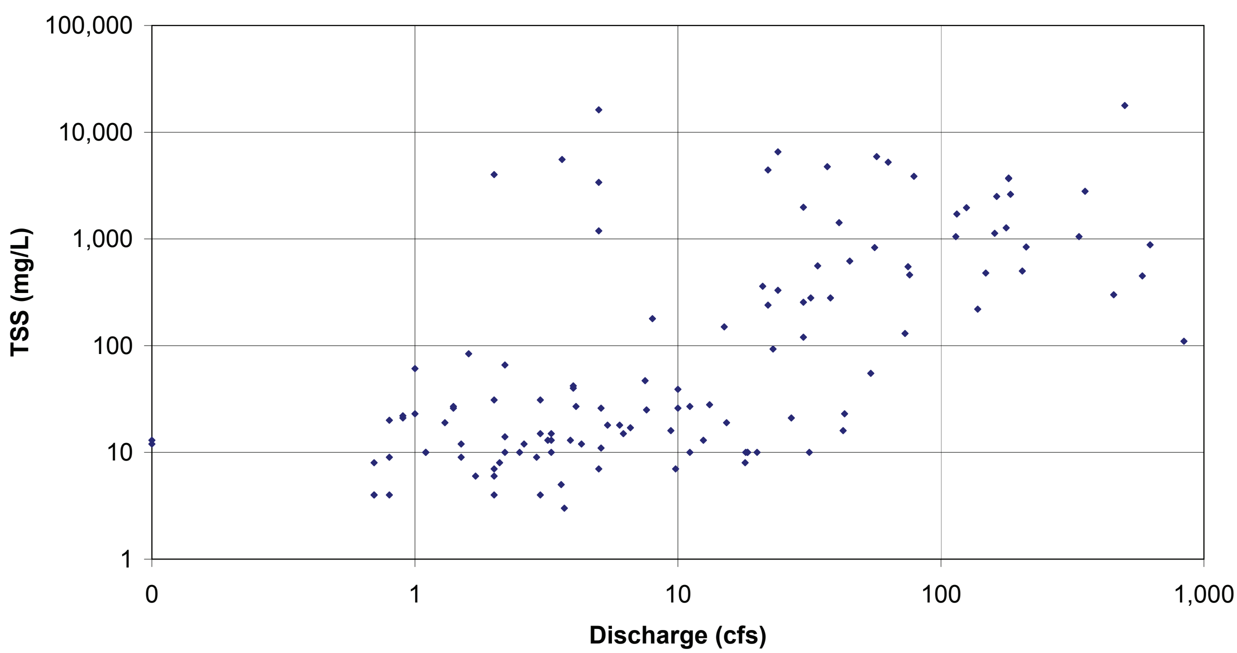
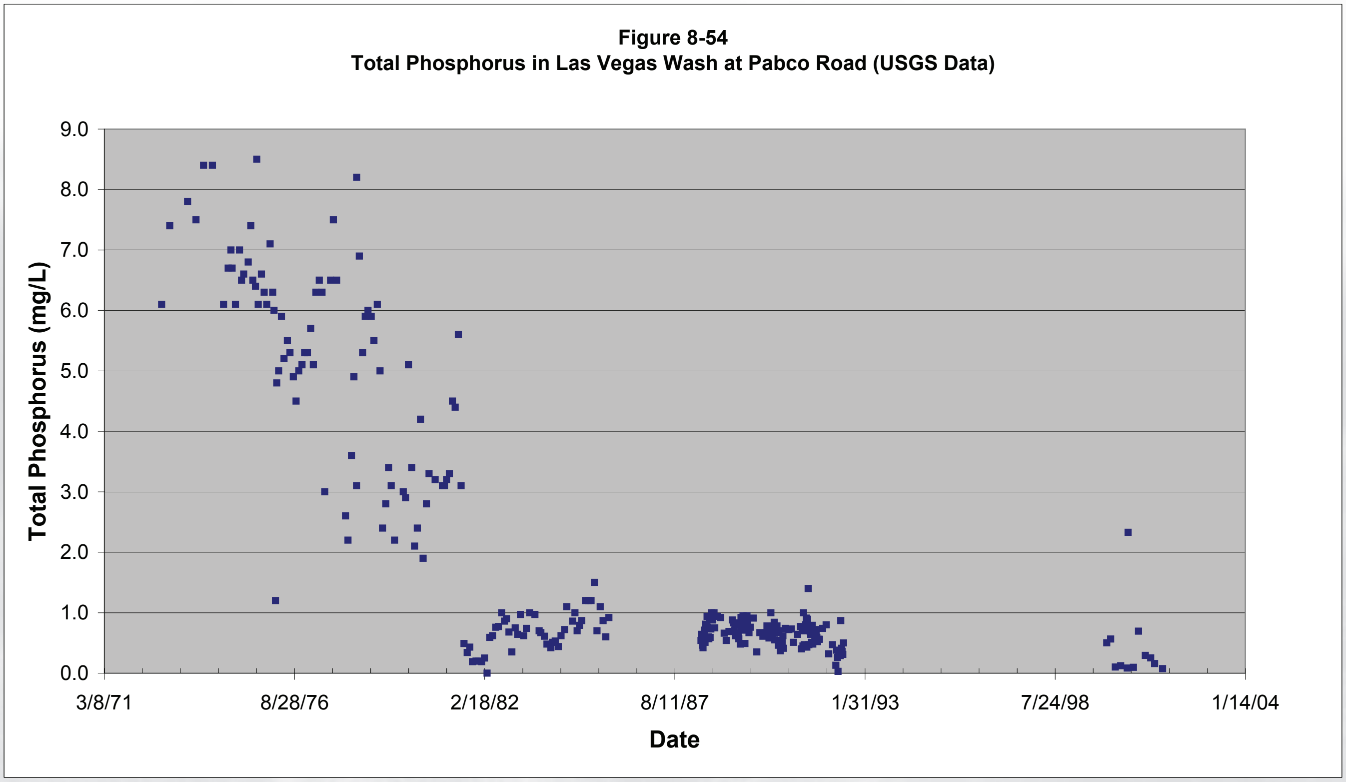


Figure 8-53
TSS vs Flow - All Wet and Dry Data, All Sites





City of Henderson Data

The COH has collected water quality samples below Lake Las Vegas on a bi-weekly basis since 1994. Water quality data was plotted chronologically for flow, TP and orthophosphate in **Figure 8-55**. This shows that in general the higher concentrations of TP and orthophosphate are related to higher flow periods. However, there are pulse flows that did not have correspondingly higher phosphorus concentrations, and there are spikes in phosphorus concentration that did not correlate directly with a flow increase.

Figures 8-56 and **8-57** plot TP and orthophosphate, respectively, against discharge. These plots represent the entire water quality database collected by COH, and combine dry and wet weather flow periods. The results show that there is not a strong relationship to flow for either TP or orthophosphate. Higher discharges to not guarantee higher phosphorus concentrations. This finding agrees with the previously described analysis of the NPDES water quality data.

Phosphorus Relationship Conclusions

Results of the phosphorus data evaluation show that there are weak statistical relationships between TP and discharge and between TP and TSS. The analysis somewhat supports the hypothesis that TP should be positively correlated to discharge and TSS, but the evidence is not consistent from site to site. It would not be possible to predict TP concentrations from known flow rates or TSS concentrations under either dry or wet weather conditions with any acceptable accuracy. The interactions between TP, orthophosphate, TSS, flow rate, and other conditions in the Las Vegas Wash environment are complex and not easily reduced to simple relationships. In addition, wet weather data shows wide variability from storm to storm depending on many factors including rainfall intensity, storm location and antecedent rainfall conditions, all of which can affect both pollutant washoff from urban land surfaces as well as pollutant transport through drainage systems.

Figure 8-55
Las Vegas Wash Below Lake Las Vegas (LW0.55)
Henderson Data

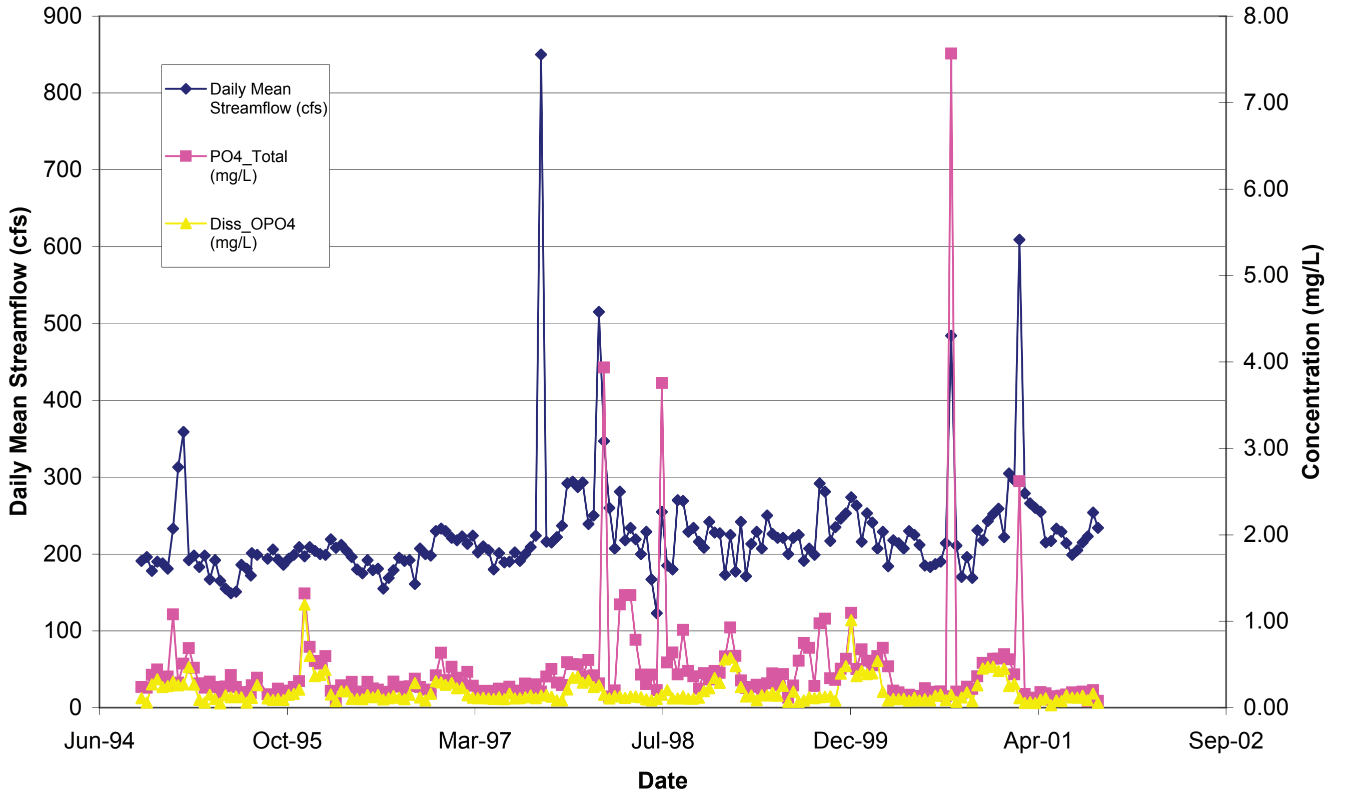
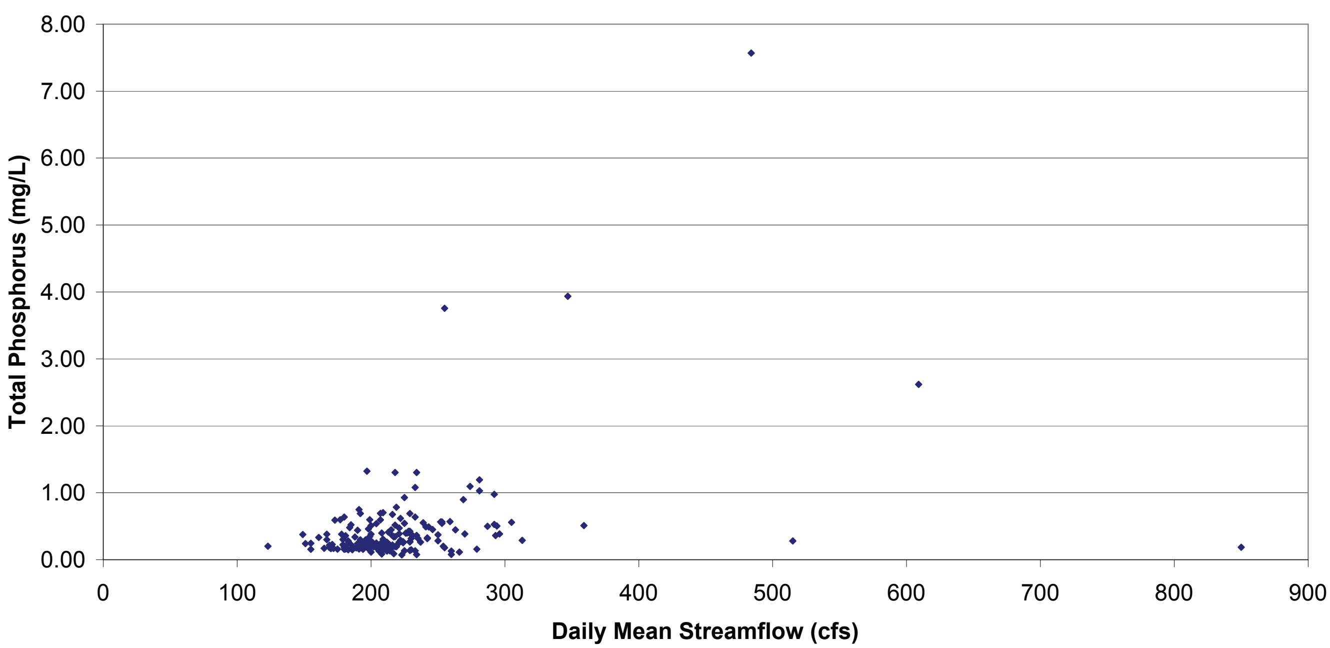
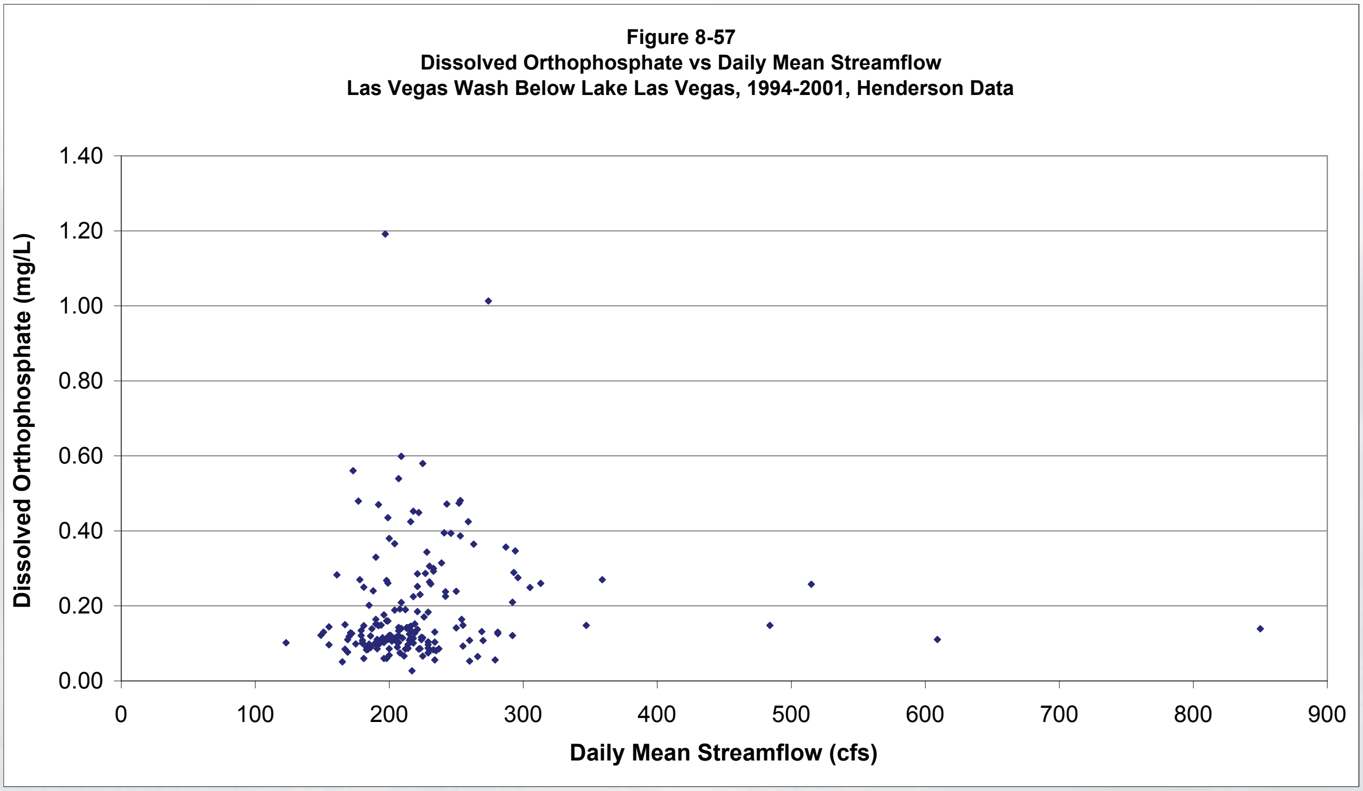


Figure 8-56
Total Phosphorus vs Daily Mean Streamflow
Las Vegas Wash Below Lake Las Vegas, 1994-2001, Henderson Data





8.4.4 Summary of Dry Weather Data

8.4.4.1 Dry Weather Characterization Data

The previously presented **Table 8-1** contains all the dry weather monitoring data collected over the course of the MS4 permit monitoring program.

Figures 8-58 through **8-61** are box plots that conveniently summarize the statistics for the Valley-wide dry weather data set for selected constituents.

Figures 8-62 through **Figures 8-72** are chronological plots of the available data for several of the key constituents and sampling points for dry weather data.

The following conclusions are evident from the box plots and chronological plots.

- Most constituent concentrations show strong consistency throughout the data set. Exceptions are lead, boron, TDS and bacteria.
- For nearly all constituents, dry weather concentrations show less variability than wet weather concentrations. Exceptions are boron, TDS, and nitrate.
- There are no strong time trends evident in the data sets. Most constituent concentrations vary within a consistent range throughout the sampling period, although some extreme values are apparent (e.g., TKN on Sloan Channel in 2002). Nitrate is the one constituent for which an upward trend in concentration may be statistically significant at some monitoring stations (Las Vegas Creek, Sloan Channel). Apparent downward trends in metals concentrations are due instead to a reduction in the detection limit for the analytical method used in the laboratory.

8.4.5 Other Related Water Quality Monitoring Programs

8.4.5.1 SNWA Las Vegas Wash and Tributaries Program

SNWA currently implements a monitoring program to characterize the water quality of Las Vegas Wash and its primary tributaries. This program is coordinated with the MS4 permit monitoring program. As described in Section 8.3 of this report, SNWA conducts the dry weather monitoring portion of the program (quarterly samples at each station) and shares results with the MS4 permit team. CCRFCD

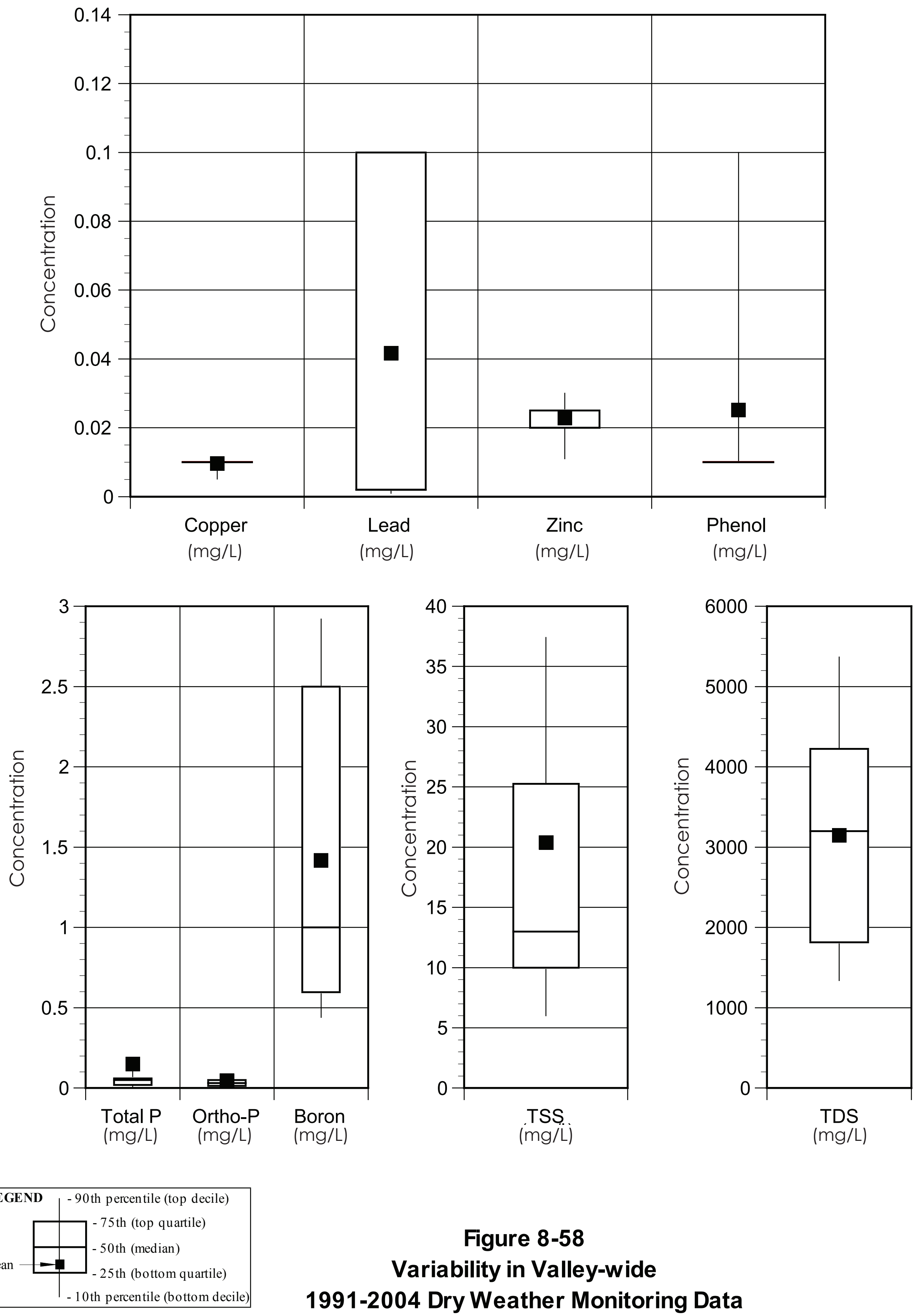
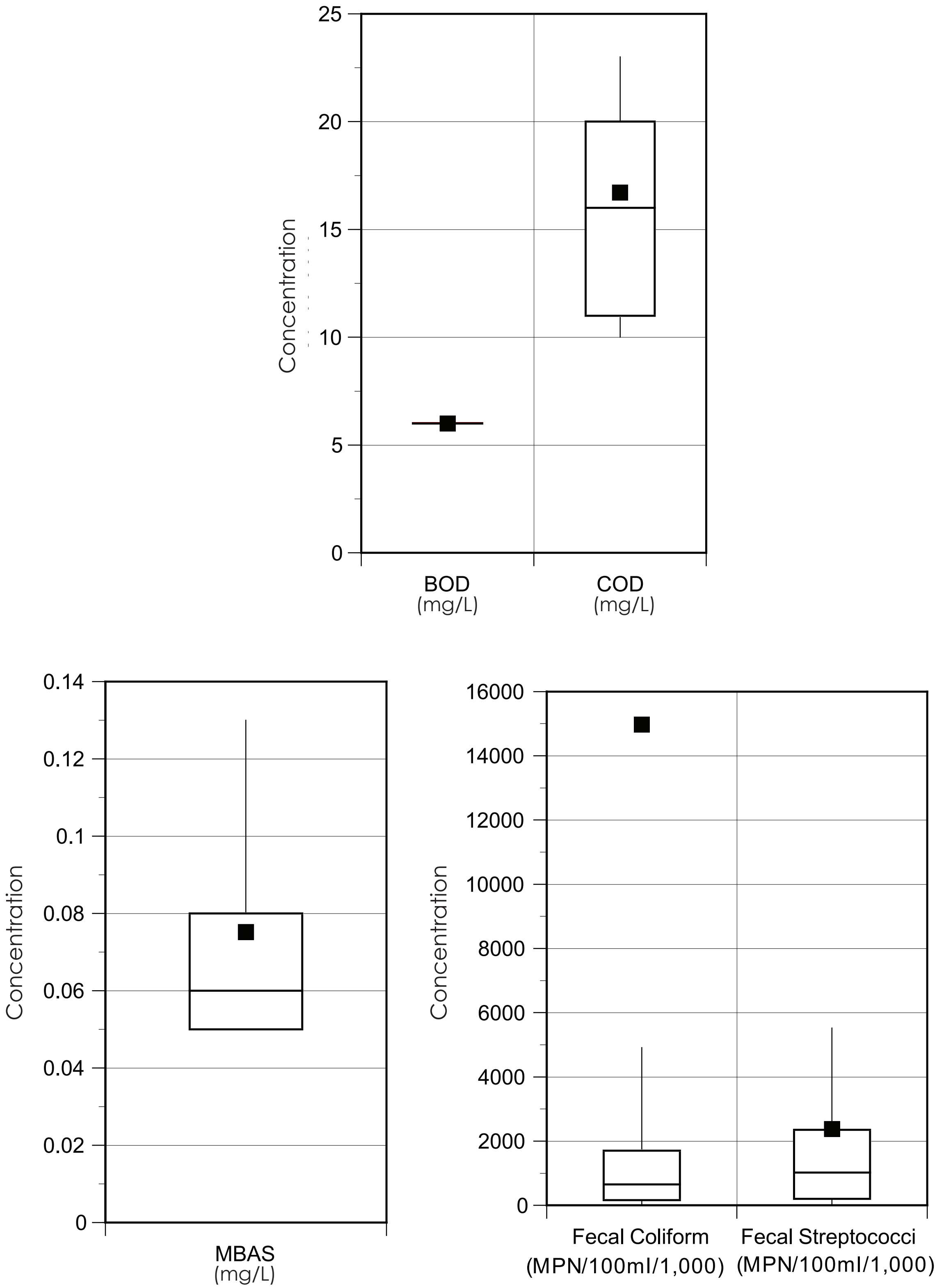


Figure 8-58
Variability in Valley-wide
1991-2004 Dry Weather Monitoring Data



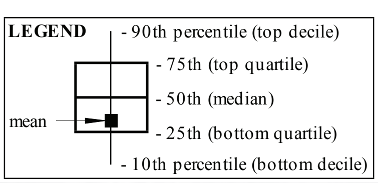
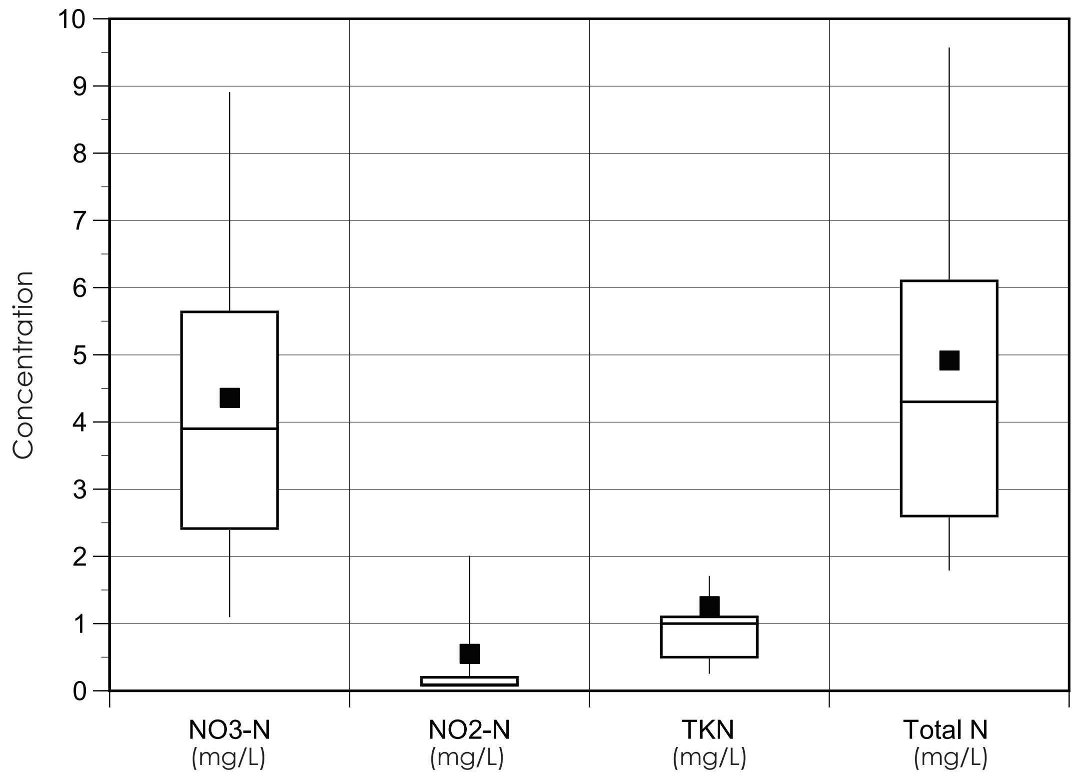


Figure 8-59
Variability in Valley-wide
1991-2004 Dry Weather Monitoring Data



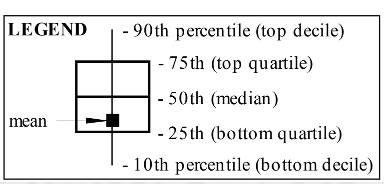
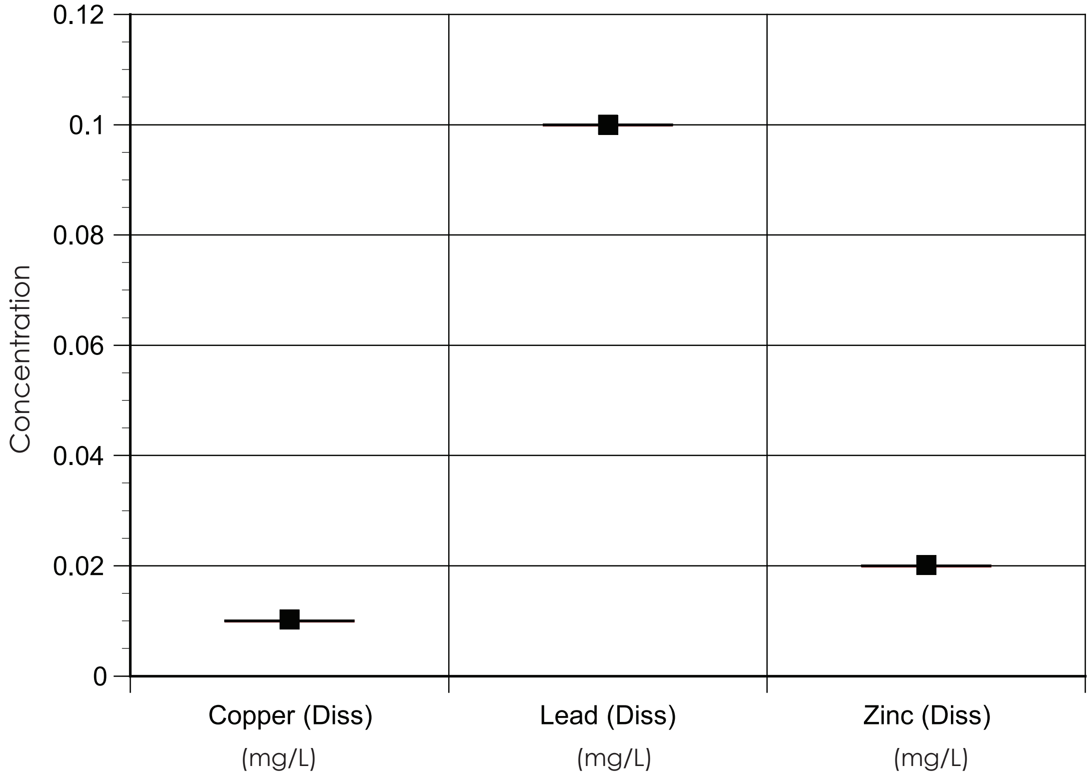


Figure 8-60
Variability in Valley-wide
1991-2004 Dry Weather Monitoring Data



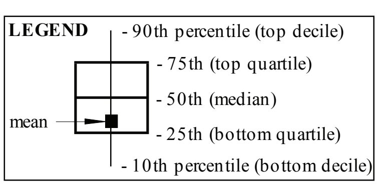


Figure 8-61
Variability in Valley-wide
1991-2004 Dry Weather Monitoring Data

Figure 8-62
Dry Weather - Total Dissolved Solids (TDS) Concentration

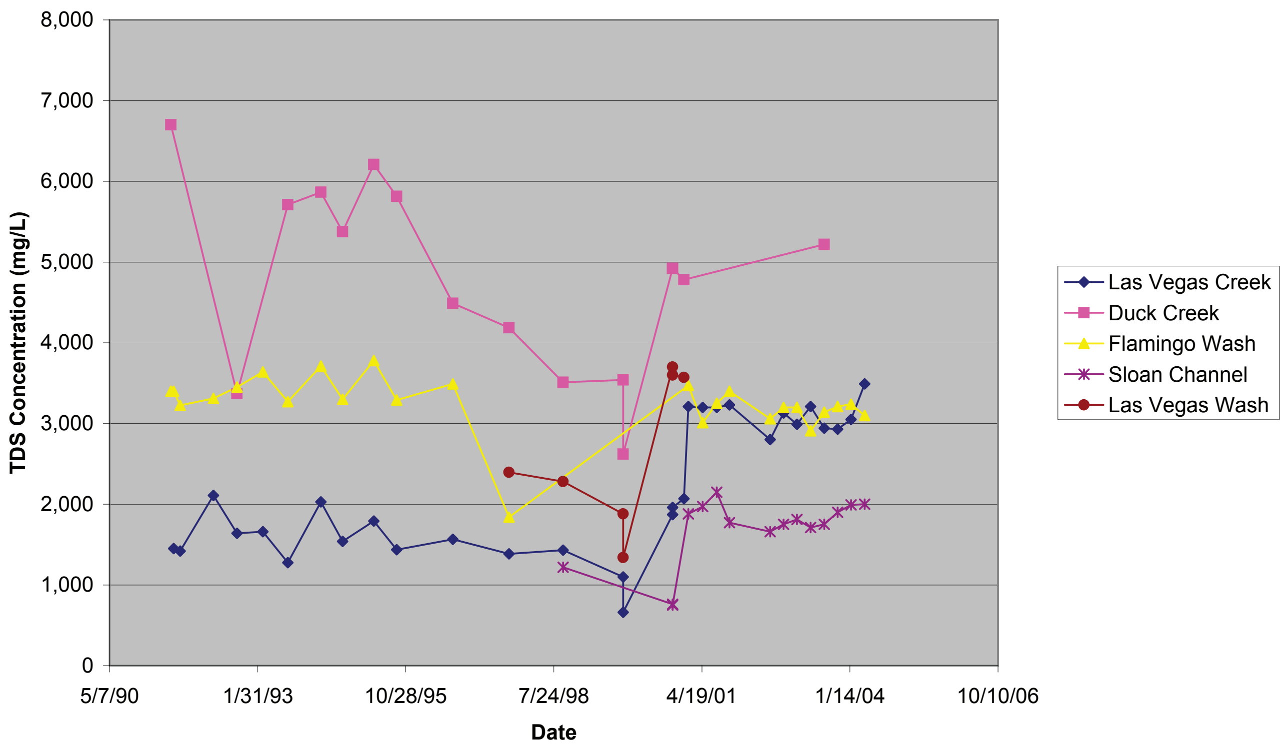
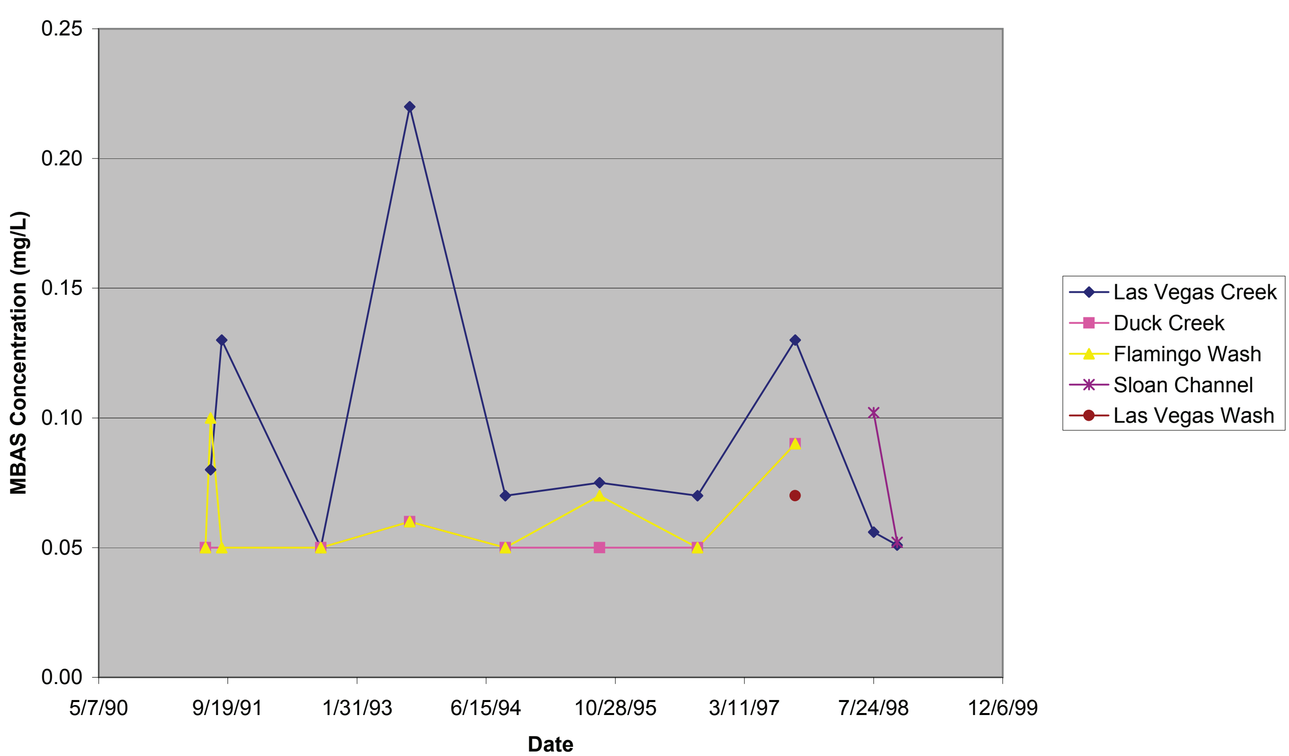


Figure 8-63
Dry Weather - Surfactants (MBAS) Concentration



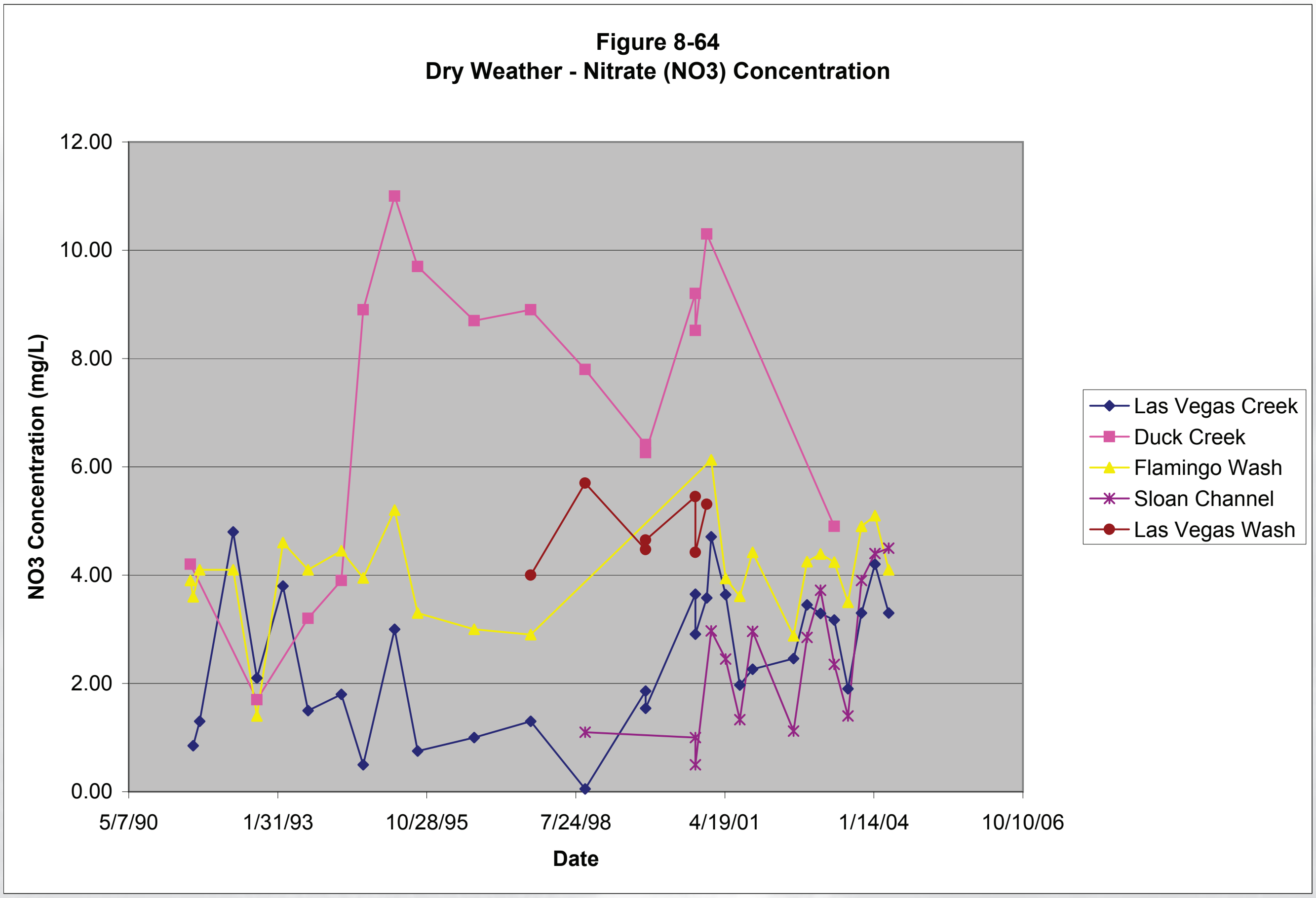


Figure 8-64
Dry Weather - Nitrate (NO3) Concentration
NO3 Concentration (mg/L)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
Date
Las Vegas Creek
Duck Creek
Flamingo Wash
Sloan Channel
Las Vegas Wash

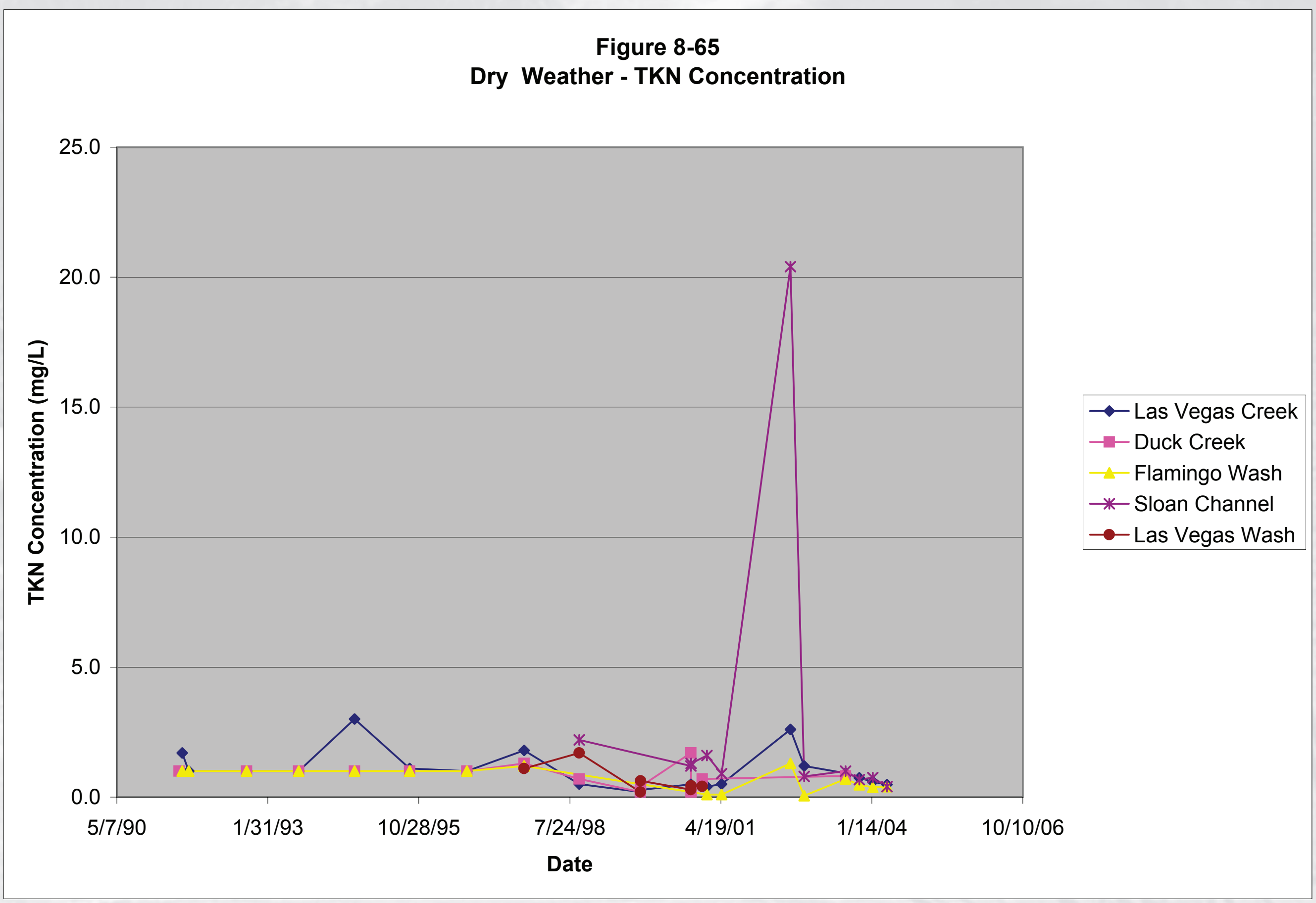


Figure 8-65
Dry Weather - TKN Concentration
TKN Concentration (mg/L)
25.0
20.0
15.0
10.0
5.0
0.0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
Date
Las Vegas Creek
Duck Creek
Flamingo Wash
Sloan Channel
Las Vegas Wash

Figure 8-66
Dry Weather - Copper Concentration

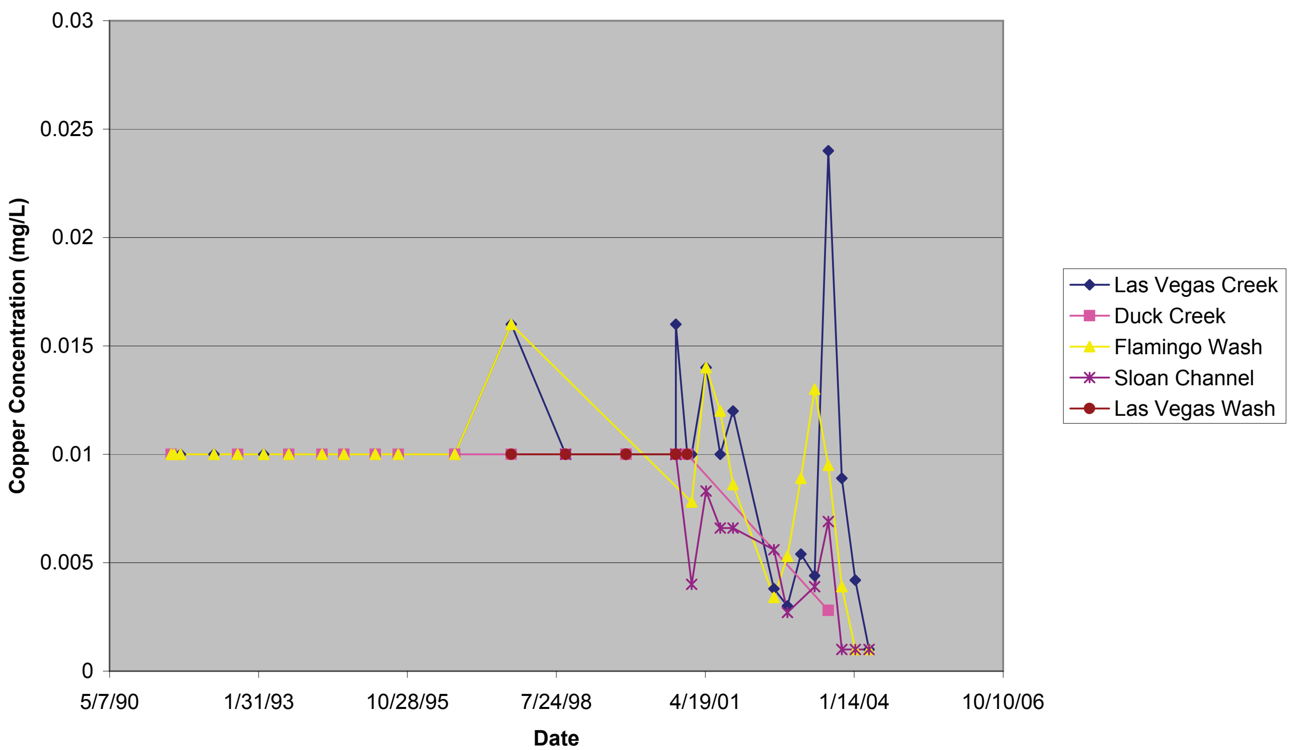


Figure 8-67
Dry Weather - Lead Concentration

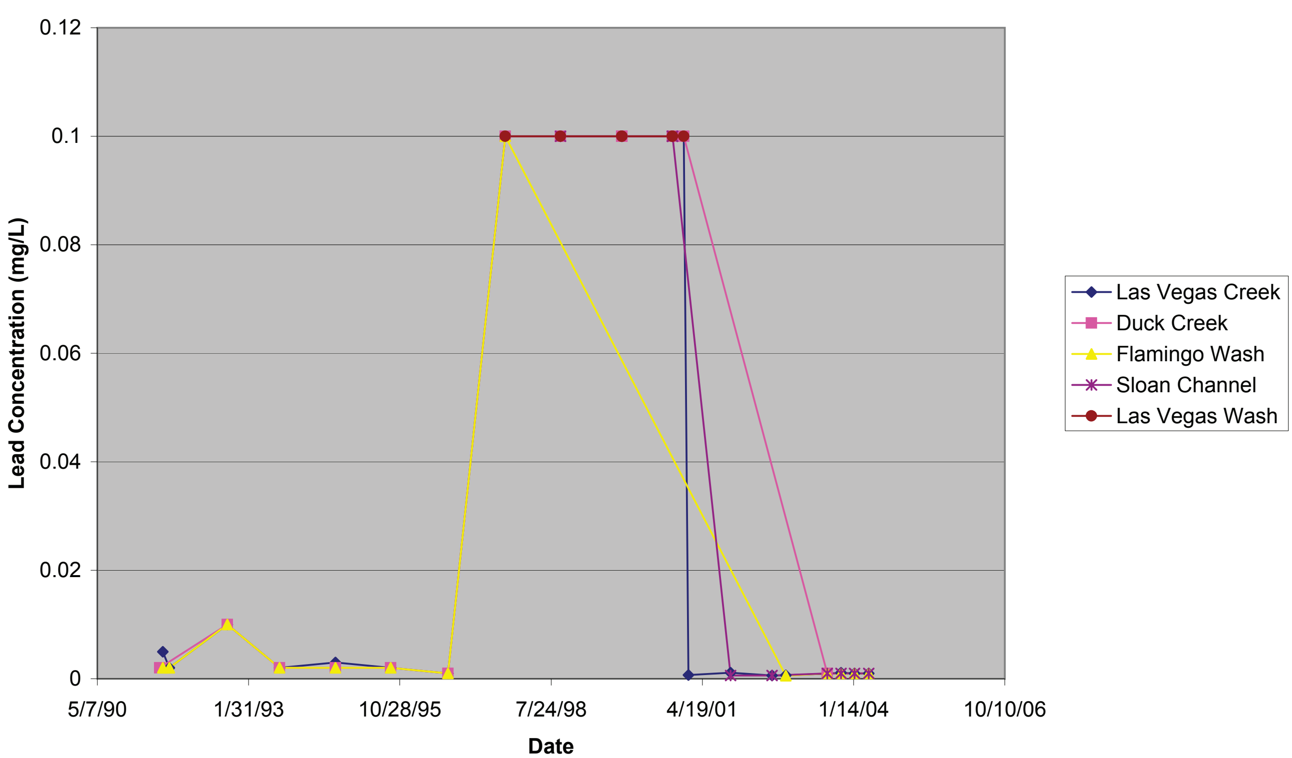


Figure 8-68
Dry Weather - Zinc Concentration

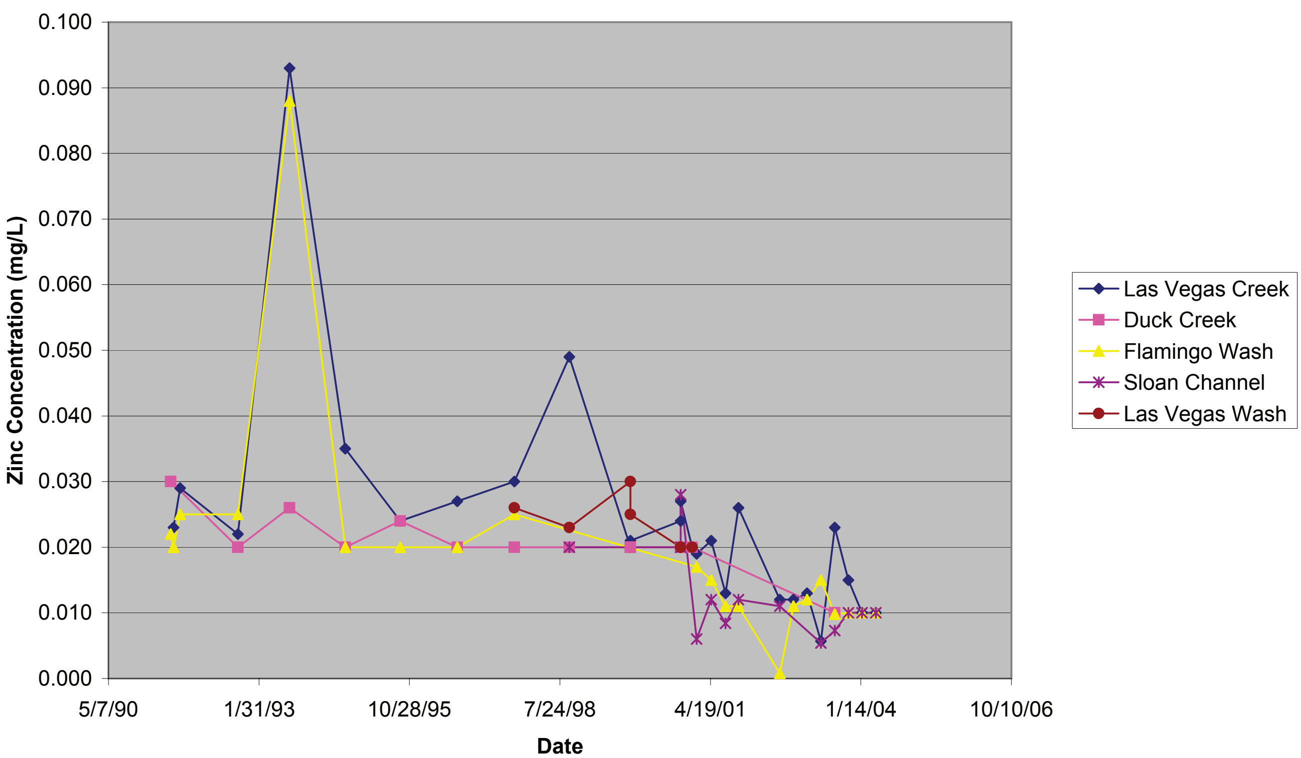


Figure 8-69
Dry Weather - Boron Concentration

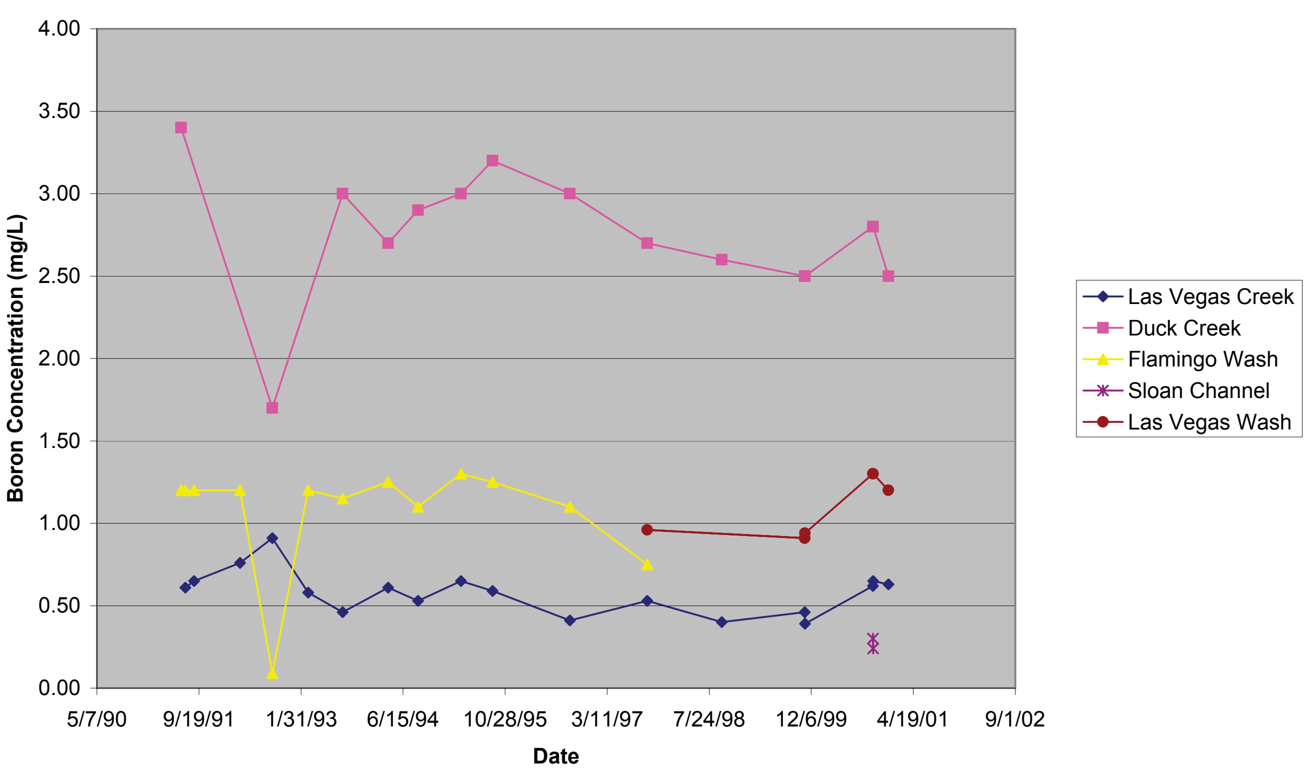


Figure 8-70
Dry Weather - COD Concentration

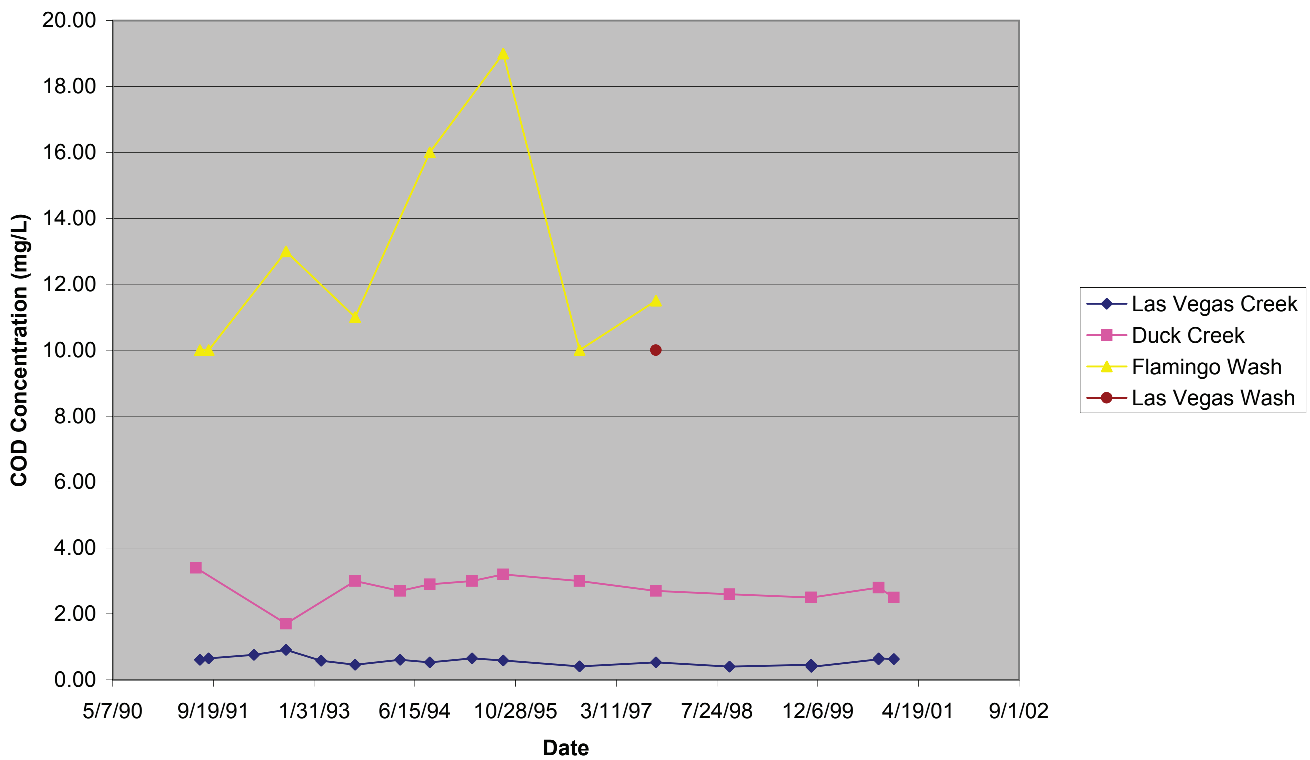
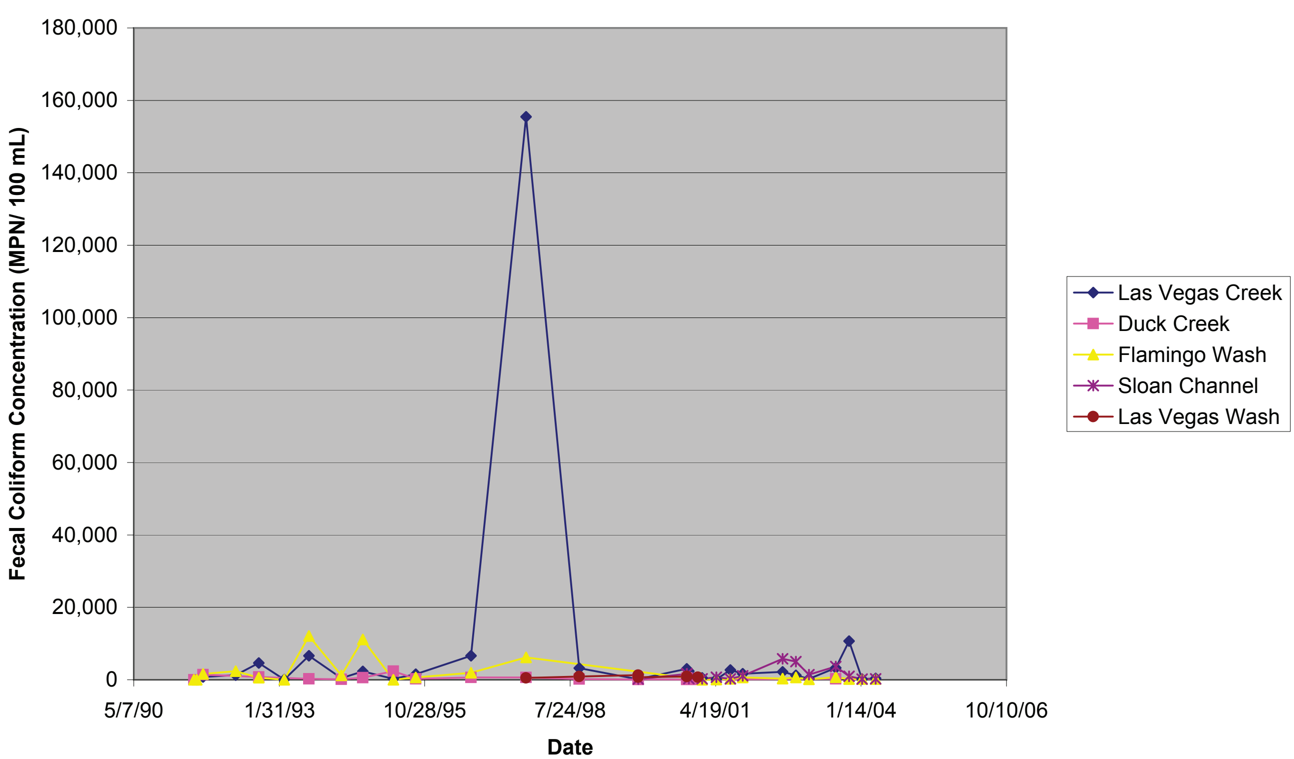
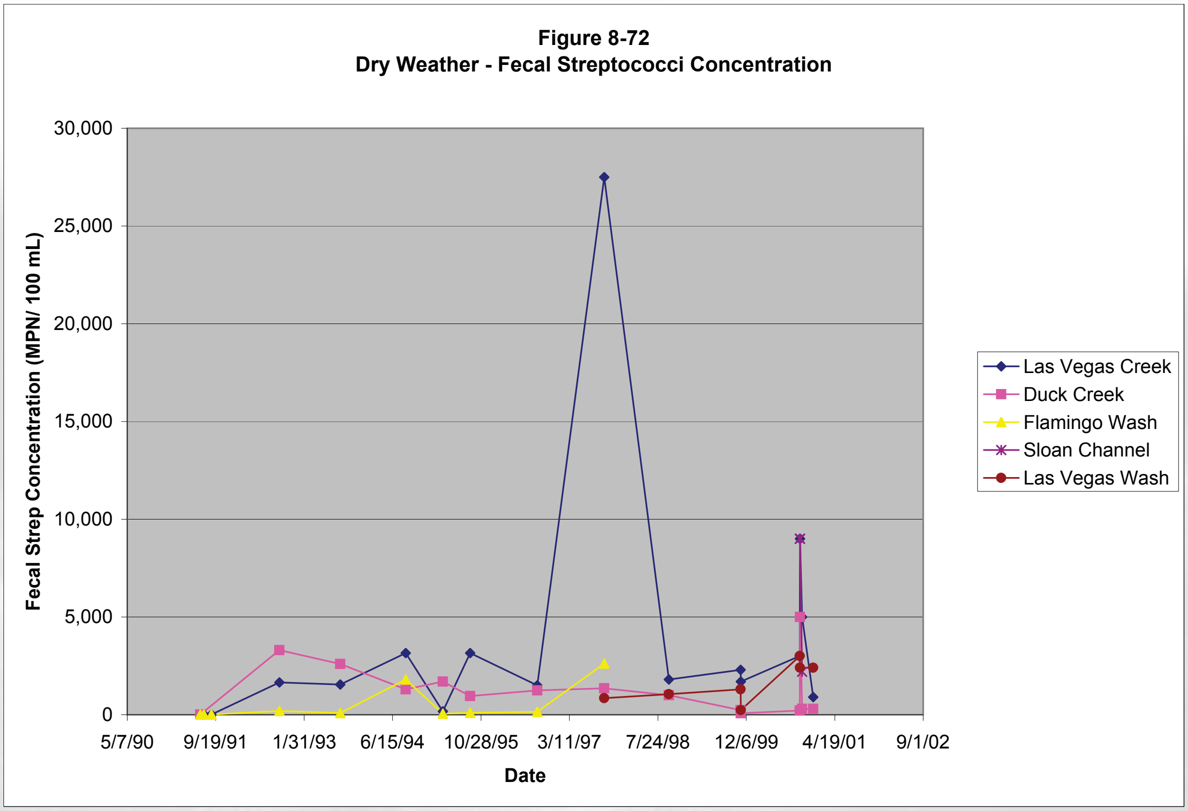


Figure 8-71
Dry Weather - Fecal Coliform Concentration





conducts the wet weather monitoring portion of the program (up to three storms per year at each station) and shares results with SNWA. SNWA has expressed a commitment to continuing this program even if the MS4 permit program changes in the future.

8.4.5.2 City of Henderson Las Vegas Wash Program

The COH collects bi-weekly samples from Las Vegas Wash at Lake Las Vegas to comply with wastewater discharge permit requirements. Samples have been collected since 1994 and analyzed for a short list of constituents. The database from this program consists of a mixture of dry weather and wet weather flow conditions, depending on the hydrology present at the time of the scheduled sample collection. This database provides an overview of the quality of water entering Lake Mead from the combination of urban runoff, urban base flows and wastewater treatment plant discharges.

8.5 PROPOSED STORMWATER MONITORING PLAN

8.5.1 Stormwater Monitoring Program Goals

Paragraph 4.4 of the MS4 permit states:

> *"The SWMP shall evaluate, and if necessary update, characterization data previously submitted to include additional data collected in the same manner, and evaluate whether existing data collection programs should be modified to improve characterization of stormwater discharges, effects of BMPs, or ambient water quality."*

Paragraph 5.1.1 of the MS4 permit expands this requirement, stating:

> *"The Permittees shall submit to NDEP a stormwater monitoring plan for the following year on or before October 1 each year. In developing the plan, the Permittees must evaluate and update as necessary how monitoring may assist in making*

decisions about program compliance, the appropriateness of identified best management practices, and progress toward achieving identified measurable goals."

In summary, the stormwater monitoring plan should, as necessary, meet the following needs:

- Characterize stormwater discharges and ambient water quality
- Assess the effectiveness of BMPs
- Assess progress toward achieving measurable goals from the SWMP

Each of these potential goals of the stormwater monitoring program is discussed below in the context of how well they would be met by the previous monitoring activities.

8.5.1.1 Characterize Stormwater Discharges and Ambient Water Quality

The foregoing summary of wet and dry weather data collected over the past 12 to 13 years by the MS4 monitoring program, demonstrates that the past monitoring effort has adequately characterized storm runoff and base flow water quality in Las Vegas Wash and at the confluences of its major tributaries. The wet and dry weather sampling data adequately describes baseline water quality conditions in terms of the central tendency (e.g., mean, median) and typical range of concentrations for important parameters. Although large increases in population and urbanized area have occurred upstream of the monitoring points during the sampling period, these changes have not resulted in increases in constituent concentrations that are evident in the sampling results.

It is concluded that additional sampling of typical wet weather and dry weather conditions at the same sampling locations will not substantially improve the understanding of stormwater quality at these points.

The current MS4 sampling points cover the major tributaries to Las Vegas Wash, as well as the two key locations on the Wash (i.e., upstream of the wastewater treatment plants, and downstream of all the urbanized area). Although information at other locations could be of general interest, these are the critical points for understanding the contribution of stormwater runoff water quality in Las Vegas Wash.

The critical water body for the Las Vegas Wash watershed is Lake Mead. The Lake supplies the region's drinking water, and is also the primary regional recreation amenity. Therefore, it may be desirable to continue monitoring at the Las Vegas Wash below Lake Las Vegas site in order to continue to assess potential water quality impacts of Las Vegas Wash watershed runoff on Lake Mead.

8.5.1.2 Assess the Effectiveness of BMPs

The past monitoring program sampled runoff from large watersheds with mixed land uses and complex rainfall-landscape interactions. The program was not formulated to isolate the effects of individual BMPs or classes of BMPs. The BMPs currently being implemented in Las Vegas Valley include public education, street sweeping, drain inlet cleaning, storm drain and channel maintenance, detention basin maintenance, illegal discharge detection and elimination, construction site management, industrial site management, and detention basin construction. Most of these BMPs are programmatic activities that are being implemented Valley-wide. Site-specific structural BMPs consist of regional and local detention basins, and structural BMPs implemented at construction sites.

Characterization monitoring over the past 12 years has shown that despite a 90 percent increase in Las Vegas Valley population, pollutant concentrations have not shown a statistically significant upward trend. This might suggest that past BMPs have been reasonably effective, but there is no demonstrated cause-and-effect between these two factors.

8.5.1.3 Assess Progress Toward Achieving Measurable Goals From the SWMP

Measurable goals from the SWMP do not include any specific numerical standards for water quality or flow that could be tracked using stormwater sampling. This is discussed in the above subsection. The SWMP contains many requirements for inspections, reporting, data collection and other similar activities. Specific methods of monitoring the performance of these BMPs through database development, activity tracking, etc., were specified in the pertinent program descriptions. Therefore, stormwater monitoring is not recommended as a means of assessing progress toward achieving specific measurable goals from the SWMP.

8.5.2 Proposed Stormwater Monitoring Program

Based on the above discussion of stormwater monitoring program goals, the proposed stormwater monitoring program has the following elements. **Section 9** shows how stormwater sampling will be integrated into an overall monitoring program for the SWMP.

8.5.2.1 Characterization Monitoring of Las Vegas Wash

Wet weather characterization monitoring will continue at the two existing Las Vegas Wash monitoring sites: Las Vegas Wash at Desert Rose Golf Course and Las Vegas Wash below Lake Las Vegas (or similar location). This will allow for continued tracking of the contribution of urban pollutants and other constituents from Las Vegas Wash to Lake Mead. The Desert Rose Golf Course site is upstream of any wastewater treatment plant discharges so represents only urban runoff and natural base flows. Monitoring at the sites on the major tributaries will be discontinued.

Dry weather characterization monitoring conducted specifically for the NPDES program will be continued at the Desert Rose site. Data collected by SNWA for its Urban Tributaries program and by the COH on Lower Las Vegas Wash will be assembled and evaluated to continue to characterize dry weather flows in Las Vegas Wash and the major tributaries.

Proposed characterization monitoring elements are summarized in **Table 8-23**.

Table 8-23

Characterization Monitoring Plan Elements

Program Element	Description
Sampling Locations	Las Vegas Wash at Desert Rose Golf Course Las Vegas Wash below Lake Las Vegas
Sampling Method	Automated Sampler
Number of Wet Weather Samples	All significant storm events, up to 10 per year
Number of Dry Weather Samples	• Two events at Desert Rose Golf Course • Number of events at Lake Las Vegas determined by SNWA and Henderson program requirements
Constituents	• All constituents in Table 2-2 for one storm/year • Conventionals, nutrients and bacteria for all other storms

8.5.2.2 Detention Basin Pollutant Removal Performance Monitoring

Detention basins are important structural controls for reducing sediment loads delivered to Las Vegas Wash. However, there is no data demonstrating the effectiveness of Las Vegas Valley detention basins in reducing loads of sediment or other pollutants. A monitoring program will be implemented to sample representative detention basin inflow and outflow, and compute the pollutant reduction provided. **Table 8-24** summarizes the proposed detention basin monitoring program.

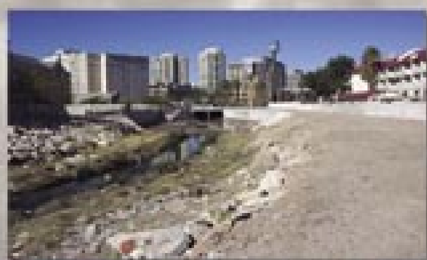
Table 8-24

Detention Basin Monitoring Plan Elements

Program Element	Description
Sampling Locations	Approximately three detention basins, to be determined
Sampling Method	Automated Sampler or Grab Sampling, depending on logistics
Number of Wet Weather Samples	Three storms per basin per year
Number of Dry Weather Samples	None
Constituents	Total suspended solids, total dissolved solids, turbidity, total copper, total lead, total zinc, dissolved copper, dissolved lead, dissolved zinc, total phosphorus, orthophosphate, nitrate, fecal coliforms, fecal streptococci, E. coli

8.6 PRIORITIES AND MEASURABLE GOALS FOR 2003-2004

Measurable Goal/ Milestone	Status
• Review and analyze existing wet and dry weather data for stormwater system	Completed
• Approved monitoring program for Year 2	Submitted with this report


Section 9

Stormwater Management Plan

9.1 INTRODUCTION

The permit (paragraph 4.1) requires that the permittees develop, implement and enforce a SWMP. The SWMP that applies to the 2003-2004 permit year was submitted to NDEP on September 29, 2003.

The SWMP was approved by NDEP with comments and additions on October 21, 2003. See **Appendix B** for the approval letter.

9.2 ANNUAL UPDATE TO SWMP

Permit paragraph 4.11.1 requires that the permittees complete an annual review of the SWMP as part of the annual report. This section satisfies that requirement.

In the first year of the new MS4 permit the SWMP required development of programs for public education and outreach, structural and source controls, illegal discharge detection and elimination, industrial sites and construction sites. Based on the currently proposed programs, it is not anticipated that significant modifications to the SWMP will be required in the second permit year. However, these programs are subject to NDEP approval, and it is recognized that changes may be necessary in response to NDEP comments. A new edition of the SWMP will be produced that incorporates the individual management programs as approved by NDEP, so all the stormwater management information is in a single document.

The NDEP approval letter for the current SWMP contained several comments regarding the proposed management plans and suggestions for clarification. A revised SWMP will be produced to incorporate specific comments as follows:

- The location of documentation maintained by each permittee regarding permit activities will be specified.
- Clarification will be provided as to whether specific measurable goals will be accomplished by individual permittees or by the group as a whole.
- The process for handling reports of illegal/illicit discharges within each MS4 will be described.
- An acceptable time table for municipal maintenance staff training and field inspections will be presented.
- It will be clearly stated that the industrial site and construction site programs are local programs to meet local objectives, and are not being implemented solely to support NDEP with its permitting programs.
- A local construction site inspection program will be described.

9.3 SUMMARY OF SWMP MONITORING PROGRAM

The MS4 permit requires development of a monitoring program to measure the effectiveness of the SWMP activities and programs in addressing urban stormwater impacts to receiving waters. The monitoring program should, to the extent possible, link the various BMP activities adopted and implemented by the MS4 permittees to the desired water quality effects. If the monitoring program does not or can not demonstrate the desired water quality benefits, this feedback would be used to modify pertinent elements of the SWMP programs or the monitoring program itself.

Activity tracking and stormwater sampling activities related to each aspect of the SWMP are described in the previous Annual Report sections. This section shows how the tracking and sampling programs combine to represent a comprehensive monitoring program for the SMWP. This discussion is organized around the primary objectives of the SWMP.

Objective: Inform and influence the public about water quality issues in order to reduce activities that have a negative impact on the quality of stormwater runoff.

Monitoring Activities:

- Document the number of community outreach events at which stormwater education materials are distributed.
- Document the number of public service announcements that are produced and aired.
- Document the number of brochures, handouts, and other printed materials that are published and distributed.
- Document the number of presentations made in public schools.
- Conduct stormwater sampling on Las Vegas Wash at Desert Rose Golf Course and below Lake Las Vegas to determine whether changes in concentrations of constituents related to activities of the general public (e.g., surfactants, oil and grease, pesticides/herbicides, bacteria) are evident.

Objective: Implement maintenance practices for public drainage systems and streets to reduce their contribution of pollutants to stormwater runoff

Monitoring Activities:

- Document the number of catch basins and drain inlets inspected and/or cleaned, and the frequency with which a typical catch basin or inlet is inspected.
- Document the number of lane miles swept by street sweepers, and the frequency with which a typical paved street is swept.
- If possible, document the volume of material removed by storm drain system maintenance and street sweeping on an annual basis, and determine if this volume is increasing or decreasing over time.
- Document the number of detention basins that were inspected, and the number from which sediment was removed.
- If possible, document the volume of material removed from detention basins, and determine if this volume is increasing or decreasing over time.
- Conduct stormwater sampling on Las Vegas Wash at Desert Rose Golf Course and below Lake Las Vegas to determine whether changes in concentrations of constituents related to urban streets and storm drains (e.g., TSS, oil and grease, total metals) are evident.

Objective: Control urban and natural contributions of runoff to water quality in downstream channels using regional detention basins

Monitoring Activities:

- Conduct a stormwater sampling program to determine the pollutant removal effectiveness of existing regional detention basins.

Objective: Eliminate illegal discharges and illicit connections to the storm drain system

Monitoring Activities:

- Conduct dry weather stormwater sampling on a quarterly basis on Las Vegas Wash at Desert Rose Golf Course and below Lake Las Vegas to look for evidence of illegal non-stormwater discharges.
- Conduct semi-annual channel inspections (“wash walks”) of all significant open channels affected by urban runoff to look for evidence of illegal non-stormwater discharges.

Objective: Eliminate non-stormwater discharges from industrial sites

Monitoring Activities:

- Document inspections of industrial sites by local industrial pre-treatment program inspectors
- Conduct stormwater sampling on Las Vegas Wash at Desert Rose Golf Course and below Lake Las Vegas to determine whether changes in concentrations of constituents related to common

industrial activities (e.g., SOCs, VOCs, metals) are evident.

Objective: Eliminate non-stormwater discharges from construction sites

Monitoring Activities:

- Document inspections of construction sites by local inspectors.
- Conduct stormwater sampling on Las Vegas Wash at Desert Rose Golf Course and below Lake Las Vegas to determine whether changes in concentrations of constituents related to common construction activities (e.g., TSS, sediment) are evident.
- If possible, document the volume of sediment and debris removed from detention basins, catch basins, and via street sweeping, and determine if this volume is increasing or decreasing over time.

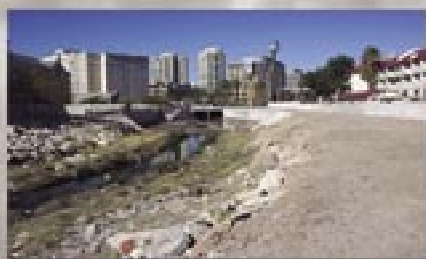
9.4 PERMIT YEAR 2 GOALS

Table 9-1 shows goals to be completed for Permit Year 2 (July 2004 – June 2005).

Table 9-1

Permit Year 2
Measureable Goals and Milestones

Section	Measurable Goal/Milestone
Legal Authority	If necessary, develop plan for addressing deficiencies in current legal authority
Source Identification	If necessary, update Stormwater System Map
Public Outreach and Education Program	Attend three community events and distribute materials
	Produce flood channel documentary
	Produce or update one PSA
	Maintain Las Vegas Valley stormwater website
	Make five presentations in public schools
Structural and Source Control Measure Program	Implement storm drain system cleaning program developed in Permit Year 1
	Implement street sweeping program developed in Permit Year 1
	Conduct study of regional flood control facilities and new development impacts proposed in Permit Year 1
Illicit Discharge Detection Program	Conduct dry weather monitoring per Section 4 of the SWMP
	Conduct semi-annual field inspections of open channels
	Implement training program for municipal maintenance staffs
Industrial Facility Monitoring and Control Program	Update industrial facility map
	Develop training materials for inspectors
	Summarize potential industrial problem areas
	Assess potential impacts of landfill runoff on water quality
Construction Site Program	Conduct semi-annual inspections and post-storm inspections
	Prepare contractor education and training materials
Stormwater Monitoring Program	Approve monitoring program for Permit Year 3



Appendix A

APPENDIX A

LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER SYSTEM NPDES PERMIT

Clark County MS4 Permit

Permit No. NV0021911

National Pollutant Discharge Elimination System

Permit for Discharges from Municipal Separate Storm Sewer Systems

Authorization to Discharge under the National Pollutant Discharge Elimination System

In compliance with the provisions of the Clean Water Act (CWA), as amended, (33 U.S.C. 1251 et. seq.), except as provided in Part 1.3 of this permit, and Chapter 445A of the Nevada Revised Statutes, the following Permittees are authorized to discharge municipal stormwater runoff to the Las Vegas Wash, its tributaries, and other waters of the United States in accordance with the conditions and requirements set forth herein:

> The City of Henderson, City of Las Vegas, City of North Las Vegas, Clark County, Clark County Regional Flood Control District, and the Nevada Department of Transportation (Permittees)

This permit becomes effective on JUNE 19, 2003.

This permit and the authorization to discharge expire at midnight, JUNE 18, 2008.

Signed and issued this 19th day of JUNE, 2003.

Clifford M. Lawson.

Clifford M. Lawson
Staff II Associate Engineer
Bureau of Water Pollution Control

1 Coverage under this Permit

1.1 Permit Area

1.1.1 This permit covers discharges into receiving waters of the United States within the City of Henderson, City of Las Vegas, City of North Las Vegas, and Clark County not including Boulder City, Laughlin, Mesquite, and Nellis Air Force Base.

1.2 Coverage

1.2.1 This permit authorizes discharges of stormwater from the Permittees municipal separate storm sewer system (MS4s), as defined in 40 Code of Federal Regulations (CFR) §122.26. The Permittees are authorized to discharge in accordance with the terms and conditions of this permit.

1.2.2 The following are types of authorized discharges:

1.2.2.1 *Stormwater discharges.* This permit authorizes stormwater discharges to waters of the United States from the Permittees MS4s identified in Section 1.2.1, except as excluded in Section 1.3.

1.2.2.2 *Non-stormwater discharges*. The Permittees are authorized to discharge the following non-stormwater sources provided that the Nevada Division of Environmental Protection (NDEP) has not determined these sources to be substantial contributors of pollutants to the Permittees MS4:

- Water line flushing
- Diverted stream flows
- Rising ground waters
- Uncontaminated ground water infiltration (infiltration is defined as water other than wastewater that enters a sewer system, including sewer service connections and foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.)
- Discharges from potable water sources
- Foundation drains
- Footing drains
- Air conditioning condensate
- Irrigation water (to include lawn watering and landscape irrigation)
- Springs
- Water from crawl space pumps
- Individual residential car washing
- Flows from riparian habitats and wetlands
- Dechlorinated swimming pool discharges
- Street wash water
- Discharges or flows from fire fighting activities

1.3 Limitations on Coverage

1.3.1 This permit does not cover the following:

1.3.1.1 Discharges of non-stormwater, whether or not mixed with stormwater, unless such non-stormwater discharges are:

1.3.1.1.1 Currently covered under a separate National Pollutant Discharge Elimination System (NPDES) permit, or

1.3.1.1.2 Included in 1.2.2.2 or determined not to be a substantial contributor of pollutants to waters of the U.S. by NDEP.

1.3.1.2 Stormwater discharges currently covered under another permit.

1.3.1.3 Discharges that do not comply with the Nevada's anti-degradation policy for water quality standards.

1.3.2 Stormwater discharges associated with industrial activity as defined in 40 CFR §122.26(b)(14)(i)-(ix) and (xi) are identified and permitted through a separate NPDES General Industrial Activity permit.

1.3.3 Stormwater discharges associated with construction activity as defined in 40 CFR §122.26(b)(14)(x) or 40 CFR §122.26(b)(15) are identified and permitted through a separate NPDES General Construction Activity permit.

1.3.4 If it is determined that Permittees discharges cause or contribute to instream exceedances of water quality standards, NDEP may require corrective action or an application for a separate individual permit or alternative permit if an MS4 is determined to cause an instream exceedance of water quality standards.

1.4 Annual Fee

1.4.1 The Permittees shall remit an annual review and services fee in accordance with Nevada Administrative Code 445A.232 starting July 1, 2004 and every year thereafter until the permit is terminated.

2 Reapplication Requirements

2.1 Deadlines for Reapplication

2.1.1 The Permittees shall submit an application, or other form of written correspondence requesting permit coverage, not later than 180 days before this permit expires.

2.1.2 *Additional Designations after the Date of Permit Issuance.* Public entities not covered by this permit may apply for coverage as an additional Permittee. Following authorization by existing Permittees, the entity shall submit an application to NDEP along with a written request for inclusion. NDEP reserves the right to take appropriate enforcement actions for any unpermitted discharges.

2.1.3 *Submitting a Late Application*. The Permittees are not prohibited from submitting an application after the dates provided in 2.1. NDEP reserves the right to take appropriate enforcement actions for any unpermitted discharges.

2.2 Contents of the Application

2.2.1 The Application must be signed in accordance with Part 6.7 of this permit and must include the following information:

2.2.2 *Information on the Permittees*:

2.2.2.1 The name of the Permittees municipal entity/state agency/federal agency, mailing address, and telephone number;

2.2.3 *Information on the Municipal Separate Storm Sewer System:*

2.2.3.1 The name of the major receiving water(s) and an indication of whether any of the Permittees receiving waters are on the latest CWA §303(d) list of impaired waters.

2.2.3.2 Information on the Permittees' chosen best management practices (BMPs) and measurable goals, the Permittees timeframe for implementing each of the BMPs, and the person or persons responsible for implementing or coordinating the Permittees' Stormwater Management Program (SWMP).

2.3 Where to Submit

2.3.1 The Permittees are to submit the application, or other form of written correspondence requesting permit coverage, signed in accordance with the signatory requirements of Section 6.7 of this permit, to NDEP at the following address:

Stormwater Coordinator
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
333 West Nye Lane
Carson City, NV 89706-0851

2.4 Permittees under a Single Permit

2.4.1 The Permittee may partner with other MS4s to develop and implement the Permittees SWMP. The description of the Permittees' SWMP must clearly describe which Permittees are responsible for implementing each of the control measures.

3 Special Conditions

3.1 Discharges to Water Quality Impaired Waters

3.1.1 *Applicability*: Based upon the year 2002-303(d) list and subsequent updates, the Permittees must evaluate whether stormwater discharge from any part of the MS4 significantly contributes directly or indirectly to the listing of a waterbody on the 303(d) list (i.e., impaired waterbody). If Permittees have discharges meeting this criterion, the Permittees must comply with Part 3.1.2; if the Permittees do not have discharges meeting this criterion, Part 3.1 does not apply.

3.1.2 If the Permittees have "303(d)" discharges described above, the Permittees must also determine whether a TMDL has been developed and approved by NDEP for the listed waterbody. If there is a TMDL, the Permittees must comply with Part 3.1.3; if no TMDL has been approved, the Permittees must comply with Part 3.1.4.

3.1.3 When a TMDL has been established as described in paragraph 3.1.2, the Permittees must notify NDEP if the TMDL includes a wasteload allocation applicable to stormwater discharges covered by this permit.

3.1.3.1 *Consistency with Total Maximum Daily Load (TMDL) Allocations*. If a TMDL is approved for any waterbody into which the Permittees discharge, the Permittees must:

3.1.3.1.1 Determine or report whether the approved TMDL is for a pollutant likely to be found in stormwater discharges from the Permittees MS4;

3.1.3.1.2 Determine or report whether the TMDL includes a pollutant load allocation (LA) or other performance requirements specifically for stormwater discharge from the Permittees MS4;

3.1.3.1.3 Determine or report whether the TMDL addresses a flow regime likely to occur during periods of stormwater discharge;

3.1.3.1.4 After the determinations above have been made and if it is found that the Permittees MS4 must implement specific LA provisions under the TMDL, assess whether the LAs are being met through implementation of existing stormwater control measures or if additional control measures are necessary;

3.1.3.1.5 Document all control measures currently being implemented or planned to be implemented. Also include a schedule of implementation for all planned controls. Document the calculations or other evidence that shows that the LA will be met;

3.1.3.1.6 Describe a monitoring program to determine whether the stormwater controls are adequate to meet the LA; and,

3.1.3.1.7 If the evaluation shows that additional or modified controls are necessary, describe the type and schedule for the control additions/revisions, and an analysis that demonstrates the overall effectiveness.

3.1.4 When a TMDL has not been established as described in paragraph 3.1.2, the Permittees must include a section in the annual report describing the condition for which the water has been listed, evaluating possible BMPs that might practicably be implemented, examining whether these BMPs would have a substantial effect on achieving compliance, and identifying any BMPs that are selected for implementation.

3.1.5 The SWMP shall identify additional BMPs, if appropriate, to help achieve the TMDL for phosphorus or ammonia loadings into Lake Mead and shall be submitted in accordance with section 4.1.2.

4 Stormwater Management Program. Permittees must comply with the following:

4.1 General Requirements: Develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the Permittees MS4 to the maximum extent practicable (MEP) to protect water quality, and to satisfy the appropriate water quality requirements of the CWA;

4.1.1 Submit the SWMP to NDEP no later than October 1, 2003;

4.1.2 Fully implement the SWMP within three (3) years of the authorization date of this permit;

4.1.3 Identify the best management practices (BMPs) that the Permittees or another entity will implement;

4.1.4 Identify the measurable goals for BMPs, as appropriate, including the months and years in which the Permittees will undertake required actions;

4.1.5 Provide a rationale for how and why the Permittees selected each of the BMPs and measurable goals for the SWMP.

4.1.6 Implementation of best management practices consistent with the provisions of the stormwater management program as required by this permit constitutes compliance with the standard of reducing pollutants to the “maximum extent practicable”.

4.1.7 The scope and coverage of the SWMP shall extend at least to the limits of the urbanized area in Las Vegas Valley.

4.1.8 The management program shall include a description of staff and resources available to implement the program elements.

4.1.9 Separate proposed programs, or one or more joint programs, may be submitted by each co applicant.

4.1.10 Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls.

4.1.11 Proposed management programs shall describe priorities for implementing controls and shall be based on Public Outreach and Education; Illicit Discharge and Detection; Industrial Facility Monitoring and Control; and a Construction Site BMP Program.

4.1.12 Implement other BMPs identified in this permit.

4.1.13 Pending submittal of the SWMP, the Permittees shall continue to implement current BMPs.

4.2 ***Adequate legal authority:***

4.2.1 DEP has previously reviewed and approved the Permittees legal authority and interlocal agreements, in some cases after modifications. The SWMP shall include an update on the status of the Permittees’ legal authority, established by statute, ordinance or series of contracts which authorizes or enables the applicant to:

4.2.1.1 Prohibit through ordinance, order, or similar means, illicit discharges to the municipal separate storm sewer;

4.2.1.2 Control through ordinance, order, or similar means the discharge to a municipal separate storm sewer from spills, dumping or disposal of materials other than stormwater;

4.2.1.3 Require compliance with conditions in ordinances, permits, contracts or orders; and

4.2.1.4 Carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with the prohibition of illicit discharges to the MS4s.

4.2.2 The Permittees shall provide written notice to NDEP of any formal proposal to modify the ordinances regulating stormwater discharges into the municipal storm sewers. Before any ordinance is modified, NDEP shall have an opportunity to comment on the proposed modification.

4.3 ***Source identification:***

4.3.1 The SWMP shall provide, at a minimum: updated maps of the Permittees' MS4s, including the location of any major outfall that discharges to waters of the United States that was not previously reported.

4.3.2 If requested, the Permittees shall assist DEP in developing lists of industrial facilities subject to stormwater permitting requirements within their boundaries.

4.4 ***Characterization data:***

4.4.1 The SWMP shall evaluate, and if necessary update, characterization data previously submitted to include additional data collected in the same manner, and evaluate whether existing data collection programs should be modified to improve characterization of stormwater discharges, effects of BMPs, or ambient water quality. This information shall be submitted for approval as part of the annual monitoring plan required in section 5.1.1.

4.5 ***Public Outreach and Education, and Intergovernmental Coordination:***

4.5.1 The management program covering the duration of the permit shall include a section which involves public outreach and education, and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate.

4.6 ***Best Management Practices*:**

4.6.1 A description of structural and source control measures expected to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with a discussion of the basis for the expected reduction of pollutant loads and a proposed schedule for implementing such controls. At a minimum, the description shall include:

4.6.1.1 A description of maintenance activities and a maintenance schedule to reduce pollutants in discharges from MS4s;

4.6.1.2 A description of planning procedures including a plan to reduce the discharge of pollutants from MS4s which receive discharges from areas of new development and significant redevelopment;

4.6.1.3 A description of practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems;

4.6.1.4 A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from stormwater is feasible;

4.6.1.5 A description of a program to evaluate and as necessary monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste; and

4.6.1.6 A description of a program to evaluate and as necessary reduce pollutants in discharges from MS4s associated with the application of pesticides, herbicides, and fertilizer.

4.7 **Illicit Discharge and Detection:**

4.7.1 A description of a program, including a schedule, to detect and remove illicit discharges and improper disposal into the MS4. The proposed program shall include:

4.7.1.1 A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the MS4 This program description shall address all types of illicit discharges, however the following category of non-stormwater discharges or flows shall only be addressed where such discharges are identified by the Permittee as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (program descriptions shall address discharges or flows from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States);

4.7.1.2 A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens;

4.7.1.3 A description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-stormwater ;

4.7.1.4 A description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer;

4.7.1.5 A description of a program to facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from MS4s;

4.7.1.6 A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials; and

4.7.1.7 An assessment of whether the procedures otherwise implemented in response to this paragraph are sufficient to identify instances of exfiltration from the sanitary sewer to the storm sewers, and if not a description of additional activities to be undertaken to control exfiltration

4.8 **Industrial Facility Monitoring and Control:**

4.8.1 A description of a program to monitor and control pollutants in stormwater discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system. The program shall:

4.8.1.1 Identify priorities and procedures for inspections and establishing and implementing control measures for such discharges; and,

4.8.1.2 Describe a monitoring program for stormwater discharges associated with the industrial facilities identified in this section, to be implemented during the term of the permit in accordance with the monitoring programs defined in section 5.1.1.

4.9 **Construction Site BMP Program:**

4.9.1 A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in stormwater runoff from construction sites to the municipal storm sewer system, which shall include:

4.9.1.1 A description of procedures for notifying developers of properties of one acre or more of requirements applicable to stormwater runoff;

4.9.1.2 A description of nonstructural and structural best management practices for construction sites; and

4.9.1.3 A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;; and,

4.9.1.4 A description of appropriate educational and training measures for construction site operators.

4.10 **Sharing Responsibility:**

4.10.1 The Permittees may either share responsibility or assign responsibility to one or more Permittees, and may implement BMPs individually, as a group, or through consultants. The SWMP shall include a description of how responsibilty is being shared or assigned.

4.11 **Reviewing and Updating Stormwater Management Programs**

4.11.1 The Permittees must complete an annual review of the SWMP in conjunction with preparation of the annual report required under Part 5.3

4.11.2 The Permittees may change the SWMP during the life of the permit in accordance with the following procedures:

4.11.2.1 Changes adding (but not subtracting or replacing) components, controls, or requirements to the SWMP may be made at any time upon written notification to NDEP.

4.11.2.2 Requests for changes replacing an ineffective, unfeasible, or inappropriate BMP specifically identified in the SWMP with an alternate BMP may be submitted to NDEP for approval at any time. If request is denied, NDEP will send the Permittees a written response giving a reason for the decision. The Permittees modification requests must include the following:

4.11.2.2.1 An analysis of why the BMP is ineffective, infeasible (including cost prohibitive), or otherwise should be revised or replaced, and

4.11.2.2.2 An analysis of why the replacement BMP is expected to be more effective, feasible, or approriate than the BMP to be replaced.

4.12 **Changes by NDEP:**

4.12.1 Formal changes requested by NDEP must be made in writing, set forth the time schedule for the Permittees to develop the changes, and offer the Permittees the opportunity to propose alternative program changes to meet the objective of the requested modification. If the Permittees do not agree to the requested changes, changes required by NDEP will be made in accordance with 40 CFR 124.5, 40 CFR 122.62, or as appropriate 40 CFR 122.63.

4.12.2 NDEP may request formal changes to the SWMP as needed to:

4.12.2.1 Address impacts on receiving water quality caused, or contributed to, by discharges from the Municipal Separate Storm Sewer System;

4.12.2.2 Include more stringent requirements necessary to comply with new Federal statutory or regulatory requirements; and,

4.12.2.3 Include such other conditions deemed necessary by NDEP to comply with the requirements of the Clean Water Act.

4.13 **Responsibility for Stormwater Management Program Implementation:**

4.13.1 The Permittees must implement the SWMP on all new areas added to the Permittees portion of the MS4 (or for which the Permittees become responsible for implementation of stormwater quality controls) not later than one year from addition of the new areas.

4.13.2 Information on all new annexed areas and any resulting updates required to the SWMP must be included in the annual report.

5 Monitoring, Recordkeeping, and Reporting

5.1 Monitoring

5.1.1 The Permittees shall submit to NDEP a stormwater monitoring plan for the following year on or before October 1 each year. In developing the plan, the Permittees must evaluate and update as necessary how monitoring may assist in making decisions about program compliance, the appropriateness of identified best management practices, and progress toward achieving identified measurable goals. Pending submittal of the annual monitoring plan, the Permittees shall continue to implement the existing monitoring plan.

5.1.2 When the Permittees conduct monitoring at the Permittees permitted MS4, the Permittees is required to comply with the following:

5.1.2.1 Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. This requirement does not prevent Permittees from analyzing or reporting samples that are representative of a limited situation (e.g. concentration at peak flow).

5.1.2.2 Test procedures for the analysis of pollutants shall conform to regulations (40 CFR, Part 136) published pursuant to Section 304(h) of the Act, unless other procedures are approved by NDEP.

5.1.3 Records of monitoring information shall include:

5.1.3.1 The date, exact place, and time of sampling or measurements;

5.1.3.2 The names(s) of the individual(s) who performed the sampling or measurements;

5.1.3.3 The date(s) analyses were performed;

5.1.3.4 The names of the individuals who performed the analyses;

5.1.3.5 The analytical techniques or methods used; and

5.1.3.6 The results of such analyses.

5.1.4 Analyses shall be performed by a State of Nevada certified laboratory. Laboratory reports shall be provided if requested by NDEP.

5.1.5 If the Permittees perform stormwater monitoring more frequently than required by the stormwater monitoring plan the results of such monitoring shall be reported.

5.2 Record keeping

5.2.1 The Permittees must retain records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, a copy of the NPDES permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the termination date of this permit. This period may be extended at the direction of NDEP at any time.

5.2.2 The Permittees must submit the records to NDEP only when specifically asked to do so. The Permittees must retain a copy of the SWMP required by this permit (including a copy of the permit language) at a location accessible to NDEP. The Permittees must make the records, including a copy of the SWMP, available to the public if requested to do so in writing.

5.2.3 For public requests of records, the Permittees may impose a reasonable fee for personnel time and copying expenses.

5.3 Reporting

5.3.1 Beginning one year after the submission of the SWMP, Permittees must submit annual reports to NDEP by October 1 of each year of the permit term. Each annual report shall cover the period beginning July of the previous year through June of the current year.

5.3.2 Each year, Permittees shall review the program defined under section 4 of this permit, and report to NDEP on the status of the program, whether Permittees have identified any modifications, and the plans for implementing those modifications.

5.3.3 At a minimum the Annual Report shall include:

5.3.3.1 Status of the Permittees compliance with permit conditions;

5.3.3.2 An assessment of the appropriateness of the identified BMP’s, and revisions to previous assessments if appropriate;

5.3.3.3 Progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP;

5.3.3.4 Status of the achievement of measurable goals;

5.3.3.5 Results of information collected and analyzed, if any, during the reporting period, including monitoring data used to assess the success of the program at reducing the discharge of pollutants to the MEP, a description of any identified improvements to or degradation in water quality attributable to the program, and a description of any identified effects on attainment of water quality standards attributable to the program;

5.3.3.6 A summary of the stormwater activities the Permittees plan to undertake during the next reporting cycle (including an implementation schedule and a fiscal analysis);

5.3.3.7 Changes to the SWMP, including changes to any BMPs or any identified measurable goals that apply to the program elements;

5.3.3.8 Notice that the Permittees are relying on another government entity to satisfy some of the permit obligations (if applicable); and

5.3.3.9 Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal stormwater quality management program. The assessment shall also identify known impacts of stormwater controls on ground water.

5.3.4 A summary of inspections performed and enforcement activity taken during the report cycle.

5.3.5 Annual expenditures for the reporting period, with a breakdown for the major elements of the Stormwater Management Program, and the budget for the year following each annual report.

5.3.6 An original signed copy of all reports and plans required herein shall be submitted to the State at the following address:

Stormwater Coordinator
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
333 West Nye Lane
Carson City, NV 89706-0851

6 Standard Permit Conditions

6.1 Duty to Comply

6.1.1 The Permittees must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of CWA and is grounds for enforcement action; permit termination; revocation and reissuance; modification; or for denial of a permit renewal application. Each Permittee is responsible for its own compliance with this permit, but not for any noncompliance of another Permittee. No Permittee shall be held liable for the violation of this permit by another Permittee.

6.2 Continuation of the Expired Permit

6.2.1 If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedures Act and remain in force and effect. Any Permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

6.2.1.1 Reissuance or replacement of this permit; or

6.2.1.2 Issuance of another individual permit for the Permittees discharges.

6.3 Need to Halt or Reduce Activity Not a Defense

6.3.1 It shall not be a defense for the Permittees in an enforcement action that it would have been necessary to halt or reduce the permitted activity under the Permittees control in order to maintain compliance with the conditions of this permit.

6.4 Duty to Mitigate

6.4.1 The Permittees must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

6.5 Duty to Provide Information

6.5.1 The Permittees must furnish to NDEP any information that is requested by NDEP and needed to determine compliance with this permit or other information.

6.6 Other Information

6.6.1 If the Permittees becomes aware that the Permittees have failed to submit any relevant facts in the Permittees application or submitted incorrect information in the application or in any other report to NDEP, the Permittees must promptly submit such facts or information.

6.7 Signatory Requirements

6.7.1 All applications, reports, certifications, or information submitted to NDEP, or that this permit requires be maintained by the Permittees shall be signed and certified as follows:

6.7.1.1 *Applications*. All applications shall be signed by either a principal executive officer or ranking elected official.

6.7.1.2 *Reports and other information.* All reports required by the permit and other information requested by NDEP or authorized representative of NDEP shall be signed by a person described above from the lead agency (Clark County Regional Flood Control District) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

6.7.1.2.1 *Signed authorization*. The authorization is made in writing by a person described above and submitted to NDEP.

6.7.1.2.2 *Authorization with specified responsibility.* The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility for environmental matter for the regulated entity.

6.7.2 *Changes to authorization*. If an authorization is no longer accurate because a different operator has the responsibility for the overall operation of the MS4, a new authorization satisfying the requirement of (6.7.2.2) above must be submitted to NDEP prior to or together with any reports, information, or applications to be signed by an authorized representative.

6.8 Property Rights

6.8.1 The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations

6.9 Proper Operation and Maintenance

6.9.1 The Permittees must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittees to achieve compliance with the conditions of this permit.

6.10 Inspection and Entry

6.10.1 The Permittees shall allow NDEP or an authorized representative (including an authorized contractor acting as a representative of the Administrator) upon the presentation of credentials and other documents as may be required by law, to do any of the following:

6.10.1.1 Enter the Permittees premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

6.10.1.2 Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit;

6.10.1.3 Inspect at reasonable times any facilities or equipment (including monitoring and control equipment) practices, or operations regulated or required under this permit; and

6.10.1.4 Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

6.11 Permit Actions

6.11.1 This permit may be modified, revoked and reissued, or terminated for cause. The Permittees filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

6.12 Permit Transfers

6.12.1 This permit is not transferable to any person except after notice to NDEP. NDEP may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the CWA.

6.13 Anticipated Noncompliance

6.13.1 The Permittees must give advance notice to NDEP of any planned changes in the permitted MS4 or activity which may result in noncompliance with this permit.

6.14 State Environmental Laws

6.14.1 Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittees from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by section 510 of the CWA.

6.14.2 No condition of this permit releases the Permittees from any responsibility or requirements under other environmental statutes or regulations.

6.15 Severability

6.15.1 The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

6.16 Procedures for Modification or Revocation

6.16.1 Permit modification or revocation will be conducted according to 40 CFR 122.62, 122.63, 122.64 and 124.5.

6.17 Requiring a Separate Individual Permit or an Alternative General Permit

6.17.1 *Request by NDEP.* NDEP may require any person authorized by this permit to apply for and/or obtain either a separate individual NPDES permit or an alternative NPDES general permit. Any interested person may petition NDEP to take action under this paragraph. Where NDEP requires the Permittees to apply for an individual NPDES permit, NDEP will notify the Permittees in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the Permittees to file the application, and a statement that on the effective date of issuance or denial of the individual NPDES permit or the alternative general permit as it applies to the individual Permittee, coverage under this general permit shall automatically terminate. Applications must be submitted to NDEP. NDEP may grant additional time to submit the application upon request of the applicant. If the Permittee fails to submit in a timely manner an individual NPDES permit application as required by NDEP under this paragraph, then the applicability of this permit to the Permittee is automatically terminated at the end of the day specified by NDEP for application submittal.

6.17.2 *Request by Permittee.* Any discharger authorized by this permit may request to be excluded from the coverage of this permit by applying for a separate individual permit. In such cases, the Permittee must submit an individual application, with reasons supporting the request, to NDEP at the address for the appropriate Regional Office. The request may be granted by issuance of any individual permit or an alternative general permit if the reasons cited by the Permittee are adequate to support the request.

6.17.3 *Permit termination*. When an individual NPDES permit is issued to a discharger otherwise subject to this permit, or the Permittee is authorized to discharge under an alternative NPDES general permit, the applicability of this permit to the individual NPDES Permittee is automatically terminated on the effective date of the separate individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. When an individual NPDES permit is denied to an operator otherwise subject to this permit or the operator is denied for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES Permittee is automatically terminated on the date of such denial, unless otherwise specified by NDEP.

6.18 Availability of Reports

6.18.1 Except for data determined to be confidential under NRS 445A.665, all reports and plans submitted in accordance with the terms of this permit shall be available for public inspection at the office of NDEP. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NRS 445A.710.

6.19 Furnishing False Information and Tampering with Monitoring Devices

6.19.1 Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document submitted or required to be maintained by the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, or who falsifies, tampers with or knowingly renders inaccurate any monitoring device or method required to be maintained under the provisions of NRS 445A.300 to 445A.730, inclusive, or by any permit, rule, regulation or order issued pursuant thereto, is guilty of a gross misdemeanor and shall be punished by a fine of not more than $10,000 or by imprisonment. This penalty is in addition to any other penalties, civil or criminal, pursuant to NRS 445A.300 to 445A.730, inclusive.

6.20 Penalty for Violation of Permit Conditions

6.20.1 NRS 445A.675 provides that any person who violates a permit condition is subject to administrative and judicial sanctions as outlined in NRS 445A.690 through 445A.710.

6.21 Permit Modification, Suspension or Revocation

6.21.1 After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

6.21.1.1 Violation of any terms or conditions of this permit;

6.21.1.2 Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

6.21.1.3 A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

6.21.1.4 To impose specific requirements for BMPs or annual reporting requirements in accordance with 40 CFR § 122.62 or §122.63.

6.21.2 Any Permittee may request that NDEP reopen and modify this permit.

7 Definitions

7.1 All definition contained in Section 502 of the CWA and 40 CFR 122 shall apply to this permit and are incorporated herein by reference. For convenience, simplified explanations of some regulatory/statutory definitions have been provided, but in the even of a conflict, the definition found in the Statute or Regulation takes precedence.

7.2 *Best Management Practices (BMPs)* means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

7.3 *Control Measure* as used in this permit, refers to any Best Management Practice or other method used to prevent or reduce the discharge of pollutants to waters of the United States.

7.4 *CWA or The Act* means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 et.seq.

7.5 *Discharge*, when used without a qualifier, refers to “discharge of a pollutant” as defined at 40 CFR 122.2.

7.6 *Illicit Connection* means any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer.

7.7 *Illicit Discharge* is defined at 40 CFR 122.26(b)(2) and refers to any discharge to a municipal separate storm sewer that is not entirely composed of stormwater, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire fighting activities.

7.8 *Indian Country*, as defined in 18 USC 1151, means (a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation; (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same. This definition includes all land held in trust for an Indian tribe.

7.9 *MEP* is an acronym for "Maximum Extent Practicable,” the technology-based discharge standard for Municipal Separate Storm Sewer Systems to reduce pollutants in stormwater discharges that was established by CWA §402(p).

7.10 *MS4* is an acronym for "Municipal Separate Storm Sewer System" and is used to refer to either a Large, Medium, or Small Municipal Separate Storm Sewer System (e.g. "the Clark County MS4"). The term is used to refer to either the system operated by a single entity or a group of systems within an area that are operated by multiple entities (e.g., the Clark County MS4 includes MS4s operated by the City of Las Vegas, the City of North Las Vegas, the City of Henderson, the Nevada Department of Transportation, the Clark County Regional Flood Control District, and Clark County).

7.11 *Municipal Separate Storm Sewer* is defined at 40 CFR 122.26(b)(8) and means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

7.12 *Permitting Authority* means the Nevada Division of Environmental Protection.

7.13 *Small Municipal Separate Storm Sewer System* is defined at 40 CFR 122.26(b)(16) and refers to all separate storm sewers that are owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States, but is not defined as “large”' or “medium” MS4. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

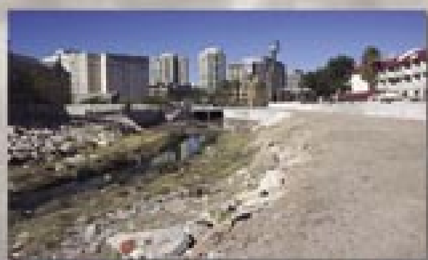
7.14 *Stormwater* is defined at 40 CFR 122.26(b)(13) and means stormwater runoff, snowmelt runoff, and surface runoff and drainage.

7.15 *Stormwater Management Program (SWMP)* refers to a comprehensive program to manage the quality of stormwater discharged from the MS4.

7.16 *SWMP* is an acronym for “Stormwater Management Program.”

ACRONYMS

BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NAC	Nevada Administrative Code
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
NRS	Nevada Revised Statute
SARA	Superfund Amendments and Reauthorization Act
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load
USC	United States Code



Appendix B

APPENDIX B

- **LAS VEGAS VALLEY STORM WATER MANAGEMENT PLAN FOR MUNICIPAL SEPARATE STORM SEWER SYSTEM**

- **NDEP APPROVAL LETTER**

Las Vegas Valley Storm Water Management Plan for Municipal Separate Storm Sewer System

September 2003

prepared by the

Las Vegas Valley Stormwater Quality Mangement Committee




Table of Contents

SECTION 1

Introduction

1.1 Purpose

The purpose of this Storm Water Management Plan (SWMP) is to describe the programs, practices and responsibilities adopted by the Las Vegas Valley Municipal Separate Storm Sewer System (MS4) permittees to implement the current NPDES Permit No. NV0021911. The SWMP describes the activities that will be performed to comply with the MS4 permit conditions, provides measurable goals for key activities, and outlines staffing and funding responsibilities for the permittees. The SWMP will apply to the 5-year duration of the current MS4 permit. Annual updates will be provided if necessary as part of the required annual reports to address changes in proposed program elements or in conditions in the permit area.

1.2 Authorization

This SWMP was prepared by the Las Vegas Valley MS4 permittees - Clark County Regional Flood Control District (CCRFCD), Clark County, the City of Las Vegas, the City of North Las Vegas, and the City of Henderson. Funding for development of the SWMP was provided by CCRFCD and Nevada Department of Transportation (NDOT).

1.3 Area of Coverage

The area of coverage is defined in paragraph 1.1 of the MS4 permit:

> *"This permit covers discharges into receiving waters of the United States within the City of Henderson, City of Las Vegas, City of North Las Vegas, and Clark County not including Boulder City, Laughlin, Mesquite, and Nellis Air Force Base."*

However, the focus is on the discharge of municipal storm water runoff into "Las Vegas Wash, its tributaries, and other waters of the United States" as authorized on the cover page of the permit. Consistent with this focus, the activities described in the SWMP will be conducted within the urbanized area of Las Vegas Valley.

NDOT has been a permittee for the Las Vegas Valley MS4 permit since 1990. NDOT is currently in the process of obtaining its own MS4 permit with Nevada Division of Environmental Protection (NDEP). Once NDOT is issued its own permit, it will withdraw from the present MS4 permit. Because this is expected to occur early in the first permit year, and because NDOT is expected to submit its own SWMP, this SWMP does not address NDOT issues.

1.4 Period of Performance

This SWMP applies to the 5-year effective period of the MS4 permit, or from July 2003 to June 2008. The SWMP refers to Permit Years when specifying when various activities are scheduled to occur. Permit Years are defined as follows:

Permit Year	Start	End
Permit Year 1	July 1, 2003	June 30, 2004
Permit Year 2	July 1, 2004	June 30, 2005
Permit Year 3	July 1, 2005	June 30, 2006
Permit Year 4	July 1, 2006	June 30, 2007
Permit Year 5	July 1, 2007	June 30, 2008

SECTION 2

Legal Authority

2.1 Introduction and Rationale

This section addresses the MS4 permit requirements in paragraph 4.2 dealing with legal authority of the permittees to implement the various aspects of the proposed Storm Water Management Plan and other requirements of the permit. The objective is to provide documentation that the permittees either currently have adequate legal authority to conduct all necessary activities, or have a plan for obtaining that authority. The adopted activities satisfy the specific requirements of the permit in this category.

2.2 Existing Legal Authority

Documentation will be provided to update the status of the legal authority of each permittee to conduct the following types of activities.

- Prohibit illicit discharges to the municipal separate storm sewer system.
- Control spills, dumping or disposal of materials other than storm water to the storm sewer system.
- Require compliance with conditions in ordinances related to storm water discharges.
- Carry out inspection and monitoring procedures necessary to determine compliance with the prohibition on illicit discharges to the storm sewer system.

Copies of current ordinances will be assembled and summarized by the permittees.

2.3 Additional Required Legal Authority

If the review of current regulations and ordinances identifies deficiencies in the ability to implement SWMP programs, a plan for addressing those deficiencies will be developed.

2.4 Priorities and Measurable Goals

Existing legal authority will be documented first, followed by development of a plan to address any deficiencies in current ordinances, etc. Measurable goals are defined below.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	Assemble and summarize existing legal authority
End of Permit Year 2	If necessary, develop plan for addressing deficiencies in current legal authority
End of Permit Year 3	None
End of Permit Year 4	None
End of Permit Year 5	None

2.5 Staffing and Funding

Funding for review of legal authority will be provided by CCRFCD. Staffing for review of legal authority will be provided by CCRFCD.

SECTION 3

Storm Water System Maps

3.1 Introduction and Rationale

This section describes the adopted plan for satisfying the MS4 permit requirement in paragraph 4.3.1 to prepare a storm water system map for the permitted area of Las Vegas Valley. A storm water system map will be valuable to the permittees, regulatory agencies and others in determining where potential storm water quality problems may exist or originate. The adopted plan relies on existing computerized inventory information from CCRFCD, which is adequate to describe the existing drainage and flood control system.

3.2 Storm Water System Map

A map of the existing regional storm drain system will be prepared to document locations and contributing areas of major outfalls to receiving waters in Las Vegas Valley. The map will be prepared using information in the CCRFCD GIS system that was developed for the Las Vegas Valley Flood Control Master Plan Update (2002). The map will show locations of major regional storm drains (e.g., 36-inch and larger) and regional detention basins.

3.3 Priorities and Measurable Goals

There is only one activity in this category; it will be conducted in Permit Year 1, as defined below.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	Prepare regional storm water system infrastructure map
End of Permit Year 2	None
End of Permit Year 3	None
End of Permit Year 4	None
End of Permit Year 5	None

3.4 Staffing and Funding

Funding for the storm water system infrastructure map will be provided by CCRFCD. Staffing for map preparation will be provided by CCRFCD.

SECTION 4

Monitoring Program

4.1 Introduction and Rationale

This section describes the adopted plan for preparing a monitoring program for wet and dry weather discharges, as required by the MS4 permit (paragraphs 4.4 and 5.1.1). The monitoring program will be related to Las Vegas Valley water quality problems identified by previous sampling by CCRFCD and others. CCRFCD has implemented a storm water characterization monitoring program since 1991, in which characterization data are updated annually. The proposed monitoring program will be coordinated annually with other regional monitoring programs to make the best use of resources and to avoid duplication of effort.

4.2 Evaluation of Previously Collected Data

Monitoring results from previous sampling activities for the NPDES program and other monitoring programs will be summarized and compared to water quality objectives and other stream standards. Constituents contributing to water quality problems or concerns will be identified. Regional water quality concerns in the Las Vegas Wash Basin will be summarized. Based on the data review, constituents and locations of concern will be identified.

4.3 Proposed Monitoring Program

Based on the data summary, regional water quality concerns, and EPA guidelines for storm water permit monitoring, a wet and dry weather sampling program will be developed. The program will be coordinated with other Las Vegas Valley sampling programs to avoid duplication of effort and make the maximum use of monitoring resources.

The monitoring program will be revised annually to adapt to changing conditions, new information, and opportunities to coordinate with other monitoring programs. An annual monitoring program will be submitted to NDEP for review and approval at the beginning of each permit year.

The annual monitoring program will include activities required by the other SWMP program elements. This may include monitoring of detention basins, structural BMPs, landfills, or other facilities as required by the plans and programs developed for other SWMP elements.

The wet and dry weather monitoring programs currently being implemented by the permittees will continue to be followed until a new program is approved by NDEP.

4.4 Priorities and Measurable Goals

The first activity will be to review and analyze existing characterization data. Based on this analysis, a monitoring plan will be developed and submitted for approval. The monitoring plan will be updated in subsequent years, as defined below.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	• Review and analyze existing wet and dry weather data for storm water system • Approved monitoring program for Year 2
End of Permit Year 2	Approved monitoring program for Year 3
End of Permit Year 3	Approved monitoring program for Year 4
End of Permit Year 4	Approved monitoring program for Year 5
End of Permit Year 5	Approved monitoring program for Year 1 of next permit cycle

4.5 Staffing and Funding

Studies of water quality data, development of annual monitoring plans, and execution of those plans will be funded by CCRFCD. Staffing will be provided by CCRFCD.

SECTION 5

Public Outreach and Education

5.1 Introduction and Rationale

This section describes the public education and outreach activities adopted by the permittees in response to the MS4 permit requirements for such a program (paragraph 4.5). The rationale for the program is to inform the general public as to the importance of storm water quality issues, and to influence behavior in a way that benefits regional water quality. Activities were selected to take advantage of existing programs, and to target specific water quality problems and audiences that are important in Las Vegas Valley.

5.2 Public Outreach and Education Program Elements

5.2.1 Objectives for Public Education and Outreach

The overall objectives of the Public Education and Outreach Program are to:

- Inform the general public in Las Vegas Valley about important water quality issues related to storm water runoff;
- Influence behavior of the general public to reduce activities that have a negative impact on storm water runoff quality and increase activities that have a positive impact on storm water runoff quality.

5.2.2 Public Education and Outreach Activities

The following activities will be part of the public education and outreach program.

a) **Community Events.** Permittees will continue to use major community events related to environmental awareness and regional water issues as opportunities for education and outreach. Booths will be staffed by volunteers from the permittees and/or other local organizations (e.g., Conservation District of Southern Nevada), who will hand out informational materials and answer questions.

b) **Media Materials.** Permittees will continue to produce or distribute media materials to disseminate public education and outreach information. Media materials will include: (1) a program (The Flood Channel) for local public television including general information on storm water quality issues; (2) Public Service Announcements for targeted messages and audiences; (3) occasional billboards with targeted messages.

c) **Printed Materials.** Permittees will continue to develop, produce or distribute printed materials (e.g., brochures, flyers, promotional items) for specific topics related to storm water quality. Older printed materials will be updated as necessary.

d) **Section 319 Grants.** Permittees will continue to pursue opportunities for obtaining Section 319 Nonpoint Source Management grants through NDEP for specific projects addressing storm water quality issues. This will be done in cooperation with Conservation District of Southern Nevada and other regional planning and management agencies.

e) **Website.** Permittees will continue to maintain and update a website to provide information to the public on storm water permitting, Las Vegas Valley water quality issues, BMPs, and links to other related websites.

f) **School Programs.** Permittees will continue to conduct outreach activities in public schools in Las Vegas Valley to promote awareness of water quality issues and basic watershed principles.

g) **Involvement in Other Organizations.** Permittees will continue to be active in other organizations in Las Vegas Valley that promote inter-agency cooperation and have outreach and education functions. These include the Lake Mead Water Quality Forum and the Las Vegas Wash Coordination Committee.

h) **Construction and Industrial Program.** Permittees will conduct education and outreach activities targeting construction industry organizations (developers, contractors, engineers) and permitted industries. These activities are described in the respective sections of the SWMP.

5.3 Priorities and Measurable Goals

All outreach and education activities have similar priorities, and all will be conducted in each permit year. Measurable goals are defined in the following table.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	• Attend three community events and distribute materials • Produce Flood Channel documentary • Produce or update one Public Service Announcement (PSA) • Maintain LVV storm water website • Make five presentations in public schools
End of Permit Year 2	• Attend three community events and distribute materials • Produce Flood Channel documentary • Produce or update one PSA • Maintain LVV storm water website • Make five presentations in public schools
End of Permit Year 3	• Attend three community events and distribute materials • Produce Flood Channel documentary • Produce or update one PSA • Maintain LVV storm water website • Make five presentations in public schools
End of Permit Year 4	• Attend three community events and distribute materials • Produce Flood Channel documentary • Produce or update one PSA • Maintain LVV storm water website • Make five presentations in public schools
End of Permit Year 5	• Attend three community events and distribute materials • Produce Flood Channel documentary • Produce or update one PSA • Maintain LVV storm water website • Make five presentations in public schools

5.4 Staffing and Funding

CCRFCD has an annual budget for public education and outreach. This will provide funding for producing PSAs, Flood Channel documentaries, printed material, billboards, and other outreach and education materials. CCRFCD funds a staff position that will coordinate these education and outreach activities, and assist in developing long-term education and outreach strategies and methods. CCRFCD also funds staff time to make presentations in public schools every spring.

Attendance of permittee staff members at community outreach events, where part of staff employment responsibilities, will be funded by the individual permittees. Staff may also volunteer time at some of these events.

SECTION 6
Structural and Source Control Measures

6.1 Introduction and Rationale

This section describes the various structural BMPs and source control measures that will be applied to existing and new development to mitigate the effects of urbanization on storm water quality. These practices and measures address the miscellaneous requirements described in paragraph 4.6 of the MS4 permit. Specific activities and programs were selected because of their link to existing permittee activities (e.g., for street and storm sewer system maintenance) and their relevance to the arid desert environment. Emphasis is on enhancing and documenting existing programs and activities. Information on a plan to address anticipated pollutant reduction from adopted BMPs is described in Section 10.4.

6.2 Storm Sewer Maintenance Program Elements

Appropriate frequencies will be determined for cleaning catch basins, inlets and storm drains. Cleaning frequency goals will be adopted by all permittees.

Common procedures for tracking and reporting storm sewer system maintenance activities by all the permittees will be established. This will include standardization of the data that will be collected, and how it will be reported.

6.3 New Development Planning Procedures

6.3.1 Regional Drainage and Flood Control Improvements

CCRFCD has a comprehensive flood control program for Las Vegas Valley that includes numerous detention basins spread throughout the Valley. Many of these regional detention basins have already been constructed (these will be shown on the map to be prepared as part of SWMP Element 3.1). Runoff from most areas of new development and significant redevelopment will be captured by existing or proposed detention basins. These basins provide water quality benefits by settling out sediment and settlable solids and the pollutants commonly adhering to those solids (e.g., phosphorus, metals).

In areas of new development, CCRFCD will evaluate whether new structural regional flood control facilities, including detention basins, may provide useful storm water quality management benefits. CCRFCD will continue to plan, design and construct these facilities. For information about monitoring studies to determine effectiveness of structural and other BMPs, see section 4.

6.3.2 CCRFCD Design Manual Best Management Practices

The current CCRFCD Hydrologic Criteria and Drainage Design Manual (HCDDM) includes a section on recommended design criteria for structural BMPs that could be applied to new development and redevelopment. The HCDDM includes criteria for extended detention ponds, oil-grit separators, grassed swales, and other BMPs. If improved structural BMPS are developed, the manual will be reviewed and updated to include the improved BMPs.

6.4 Street Maintenance Program Elements

Appropriate frequencies will be determined for sweeping local and arterial streets. Cleaning frequency goals will be adopted by all permittees. Air quality regulations also affect street sweeping goals, and will be considered when developing street sweeping guidelines.

Common procedures for tracking and reporting street sweeping activities by all the permittees will be established. This will include standardization of the data that will be collected, and how it will be reported.

6.5 Flood Control Structure Review Program Elements

6.5.1 Water Quality Benefits of Existing Flood Control Structures

A desktop study will be conducted to assess the water quality benefits of existing detention basins and flood control channels in Las Vegas Valley. It is anticipated that this study will include the following tasks.

- Collect records for the amount of sediment removed from regional detention basins and channels (e.g., for past 10 years), and any testing that may have been performed on that sediment.
- Ensure future records are maintained for sediment removed from detention basins and channels.
- Collect data for total miles of hard-lined channels and total capacity and design sediment storage of CCRFCD detention basins.
- Collect available data on sediment loading to Lake Mead during relevant times.
- Use available pollutant load models (e.g. those developed by MWH, UNLV) to estimate changes in concentrations and loads of TSS and other indicator pollutants attributable to development.
- Use analysis of available data to estimate effect of detention basins and other structural BMPs in controlling sediment.
- Consider need for additional data.
- Research published estimates of historical sediment production from LVV watersheds and channels, and extrapolate to current conditions.
- Determine appropriate baseline for comparison of potential construction impacts.

If necessary based on the results of the desktop study, water quality monitoring of detention basin inflows and outflows will be conducted to document pollutant reduction benefits of existing regional detention basins.

6.5.2 Potential Flood Control Structure Retrofits for Water Quality Improvement

If warranted based on the results of the investigations, the availability of additional BMPs and proposed structural modifications, the cost of additional BMPs or modifications, the benefits of additional BMPs or modifications, and the relative costs and benefits of other programs for structural storm water improvements, a program will be evaluated for retrofitting existing flood control structures to increase water quality benefits.

6.6 Municipal Landfill and Waste Disposal Management Program Elements

See section 8 for program elements. Monitoring programs are described in section 4.

6.7 Pesticide, Herbicide and Fertilizer Management Program Elements

Current monitoring data shows very few detections of pesticides, herbicides and organic compounds associated with fertilizers in wet or dry weather flows. Data will be reviewed and summarized to assess the potential impacts of pesticides, herbicides and fertilizers on Las Vegas Wash water quality.

Proper handling and application of pesticides, herbicides and fertilizers will be the subject of public education and outreach activities described in Section 5.

Las Vegas Valley communities are implementing water conservation plans that have guidelines and ordinances addressing outdoor landscape irrigation. The plans are aimed at reducing water waste through overwatering. This will also reduce the contribution of pesticides, herbicides and fertilizers to downstream receiving waters.

6.8 Priorities and Measurable Goals

The first priority is to coordinate the desired maintenance frequencies and tracking/reporting procedures among the permittees in the first year, in order to establish goals for following years. The next priority will be to prepare and execute a work plan to assess the water quality benefits of existing flood control facilities. These and other measurable goals are listed below.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	• Establish expected frequency of cleaning catch basins, inlets and storm drains • Establish procedures for tracking and reporting of storm drain system maintenance • Establish expected frequency of street sweeping • Establish procedures for tracking and reporting of street sweeping • Develop study work plan to assess water quality benefits of existing regional flood control facilities and potential benefits of structural BMPs in areas of new development • Summarize available pesticide, herbicide and fertilizer monitoring data and existing management programs
End of Permit Year 2	• Implement storm drain system cleaning program developed in Permit Year 1 • Implement street sweeping program developed in Permit Year 1 • Conduct study of regional flood control facilities and new development impacts proposed in Year 1
End of Permit Year 3	• Implement storm drain system cleaning program developed in Permit Year 1 • Implement street sweeping program developed in Permit Year 1 • Based on results of Year 2 study, evaluate whether to modify program for implementing structural BMPs
End of Permit Year 4	• Implement storm drain system cleaning program developed in Permit Year 1 • Implement street sweeping program developed in Permit Year 1
End of Permit Year 5	• Implement storm drain system cleaning program developed in Permit Year 1 • Implement street sweeping program developed in Permit Year 1

6.9 Staffing and Funding

Studies required to assess existing water quality conditions and propose appropriate levels of management activities will be funded by CCRFCD. Staffing will be provided by CCRFCD and the entities.

Staffing and funding for source control measures (storm sewer maintenance, street maintenance, O&M manuals, plan reviews) will be provided by each individual permittee. Funding for source control measures for regional flood control facilities storm sewer systems will be provided by CCRFCD.

SECTION 7

Illicit Discharge Detection and Elimination

7.1 Introduction and Rationale

This section describes the elements of the Illicit Discharge Detection and Elimination Program required by the MS4 permit in paragraph 4.7. Preventing illegal and illicit discharges to the storm water system is a key factor in the permittees' obligation to prevent the discharge of non-storm water to the regional drainage system. Program elements implemented by the permittees in previous years of the past MS4 permits have been successful in detecting and eliminating significant illegal and illicit discharges to the storm water system. Therefore, the proposed elements are based on formalizing and documenting activities that are presently conducted by the permittees.

7.2 Legal Authority

See section 2 for legal authority.

7.3 Field Screening Program Elements

Dry weather screening will be conducted to improve understanding of dry weather water quality from urban areas and background water quality of receiving waters. Existing dry weather water quality data will be summarized to identify data gaps. Specific monitoring program elements are described in Section 4.

7.4 Inspection Program Elements

Municipal separate storm sewer systems will be formally inspected two times per year by visually observing open channel sections in which dry weather flow persists and looking for evidence of non-storm water discharges. Emphasis will be on those areas that, based on the results of field screening or other appropriate information, indicate a reasonable potential of containing illicit discharges, exfiltration from the sanitary sewer system, or other sources of non-storm water. Inspections will be performed by permittee staffs or designated representatives. Problems will be reported to the proper authorities.

Municipal maintenance staffs for streets and storm drains from each permittee will be trained to look for evidence of non-storm water discharges to the drainage system during their normal duties. A process for reporting potential problems will be established. See Section 8.2 for industrial facility program elements.

7.5 Spill Prevention and Response Program Elements

All entities currently have spill prevention and response regulations and programs in place through their fire departments and contracts with special emergency response contractors. No additional program elements are required.

7.6 Public Reporting Program Elements

Public reporting of illegal discharges or other water quality problems is currently available through the following avenues:

- Calls to the Clark County Public Response Office (CCPRO) hotline
- Calls to Clark County Health District, which is in the process of establishing a hotline phone number
- Calls directly to the entities and CCRFCD
- Entries to the lvstorm water.com web site

These procedures have proven adequate in the past for public reporting of illegal discharges or dumping. No new program elements are necessary.

7.7 Household Hazardous Waste Disposal Program Elements

Republic Silver State Services has an exclusive franchise agreement to manage a valley-wide household hazardous waste disposal program. Bi-annual curb-side pickup days and weekly Wednesday through Saturday drop-off opportunities are provided for residents to dispose of hazardous materials or other similar items. Promotion is provided by Republic Silver State Services and the entities.

Several of the public education and outreach elements of Section 5 address household hazardous waste disposal.

No additional program elements are required.

7.8 Priorities and Measurable Goals

In addition to the annual activities of dry weather monitoring and field inspections (which are continuations of present programs), the first priority will be to identify existing inspection programs that are conducted by municipal maintenance staff, followed by the development of training materials and a training program. These and other measurable goals are defined below.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	• Develop and conduct dry weather monitoring per Section 4 • Conduct semi-annual field inspections of open channels • Develop training materials for municipal maintenance staffs
End of Permit Year 2	• Conduct dry weather monitoring per Section 4 • Conduct semi-annual field inspections of open channels • Implement training program for municipal maintenance staffs
End of Permit Year 3	• Conduct dry weather monitoring per Section 4 • Conduct semi-annual field inspections of open channels
End of Permit Year 4	• Conduct dry weather monitoring per Section 4 • Conduct semi-annual field inspections of open channels
End of Permit Year 5	• Conduct dry weather monitoring per Section 4 • Conduct semi-annual field inspections of open channels

7.9 Staffing and Funding

Funding for dry weather monitoring will be provided by CCRFCD. Staffing for dry weather monitoring will be provided by CCRFCD or by SNWA under an existing cooperative agreement with CCRFCD.

Staffing and funding for field inspection activities, spill response programs, and follow-up to reported incidents will be provided by each individual entity.

SECTION 8

Industrial Facility Monitoring and Control Program

8.1 Introduction and Rationale

This section describes the Industrial Facility Monitoring and Control Program required in paragraph 4.8 of the MS4 permit. Industrial sites can be potential sources of urban pollutants, and are particularly identified by the EPA for regulation under the NPDES storm water discharge permit program. The BMP program consists of inventorying industrial facilities in categories specifically called out in the permit, and developing an inspection program to assist NDEP in implementing its industrial permitting program. Because comprehensive industrial pretreatment programs and other inspection programs are currently conducted in all Las Vegas Valley entities, these existing programs will serve as the basis for identifying any industrial storm water pollution problems.

8.2 Industrial Facilities Covered

The following industrial facilities in Las Vegas Valley will be identified using best available information.

- Municipal landfills
- Hazardous waste treatment, disposal and recovery facilities
- Industrial facilities subject to Section 313 of Title III of Superfund Amendments and Reauthorization Act of 1986
- Industrial facilities that could contribute a substantial pollutant load to the municipal storm sewer system

Facilities identified above will be shown on a map. Current permit requirements and available information about onsite BMPs will be identified, and any monitoring activities will be summarized. The industrial facility map will be updated annually.

8.3 Industrial Facility Inspection Program Elements

Existing inspection programs that visit industrial sites (e.g., Industrial Pretreatment Programs, etc.) will be identified.

A training program for existing inspectors to identify and report potential, industrial, site-storm water management deficiencies during their normal duties will be developed and implemented. Materials will be prepared for a training workshop for existing inspectors. A process will be developed for existing inspectors to report identified problems.

A process will be adopted to manage forms and information received from inspectors. Problems identified from inspector reports and information gathered in Element 8.1 will be summarized. Reported problems will be forwarded to NDEP for follow-up.

An inventory of operating or closed municipal landfills and other treatment, storage and disposal facilities for municipal waste will be prepared. Documentation will be gathered for existing permits, management plans and monitoring programs that were or are implemented at the identified facilities. Potential impacts of storm water runoff from these facilities will be assessed.

8.4 Industrial Facility Monitoring Program Elements

A program to track inspection reports and follow-up activities for problems reported at industrial sites covered under Element 8.2 will be developed and implemented.

8.5 Priorities and Measurable Goals

The first priority is to prepare the inventory of industrial sites covered by the MS4 permit. The second priority is to identify existing programs that currently inspect industrial sites and implement a training program for these inspectors. Other measurable goals are defined below.

8.6 Staffing and Funding

Staffing and funding for identifying covered industries will be provided by CCRFCD and the entities.

Development of inspection program training materials will be funded by CCRFCD. Training

Completed by	Measureable Goal/Milestone
End of Permit Year 1	• Identify (map and description) all industrial facilities covered under this section of the permit • Identify existing industrial site inspection programs • Develop program for tracking inspection reports and follow-up activities • Prepare inventory of operating and closed municipal waste landfills and treatment, storage and disposal facilities
End of Permit Year 2	• Update industrial facility map • Develop training materials for inspectors • Summarize potential industrial problem areas • Assess potential impacts of landfill runoff on water quality
End of Permit Year 3	• Update industrial facility map • Implement program for tracking inspection reports and follow-up activities
End of Permit Year 4	• Update industrial facility map • Continue program for tracking inspection reports and follow-up activities
End of Permit Year 5	• Update industrial facility map • Continue program for tracking inspection reports and follow-up activities

SECTION 9

Construction Site BMP program

9.1 Introduction and Rationale

This section describes the construction site BMP program required by paragraph 4.9 of the MS4 permit. Construction activity was singled out by the EPA as a potential source of pollutants that require special permitting attention. The proposed program includes activities intended to provide guidance to public and private groups in Las Vegas Valley regarding appropriate construction practices, as well as activities intended to support NDEP in implementing its construction permitting program. The adopted BMPs are suited to the arid Las Vegas Valley environment.

9.2 Developer Notification Program Elements

A brief description of the development review/approval process will be prepared for each community. A process will be developed and adopted for notifying developers in each entity of the requirements of the NDEP construction site permitting program. The goal will be to provide notification to the developer of every property of one acre or more.

9.3 Construction Site BMP Elements

Existing construction site BMP manuals developed for Nevada and Las Vegas Valley will be reviewed. This will include the CCRFCD Hydrologic Criteria and Drainage Design Manual (HCDDM), the State of Nevada Best Management Practices Manual, and the BMP manual developed by Northern Nevada MS4 permittees. A summary of practices recommended for Las Vegas Valley will be prepared, referencing these manuals. If necessary based on the review of current construction practices, BMP designs in one or more of these manuals will be modified to be more applicable to local Southern Nevada conditions.

9.4 Construction Site Inspection Program Elements

a) The list of State-permitted construction sites will be requested from NDEP. This, combined with local information and other tools, will be used to identify areas of high construction activity in Las Vegas Valley.

b) Information available from the entities regarding construction projects (e.g., size, location, date, ownership) will be identified. If information is available that would be useful to NDEP in conducting inspections for its construction site permit program, this information can be provided to NDEP.

c) Semi-annual inspections of washes and open channels will be conducted by the permittees for the purpose of identifying locations of heavy sediment loads that may be associated with construction site runoff. Inspected channel reaches will include the dry weather flow reaches identified in section 7.3, plus reaches downstream of areas with high construction activity as identified in section 9.3(a). If problems are found, these will be reported for follow-up.

d) Routinely after significant storm events, priority detention basins and channels subject to storm flows will be inspected. If during the course of this inspection, it is determined that construction sites may not be maintaining their BMP's, the appropriate NDEP authorities will be contacted.

e) The information developed from (a) through (d) above will be used to develop a procedure for identifying priorities for inspecting construction areas.

9.5 Contractor Education and Training Program Elements

The permittees will support NDEP in conducting local construction site permit program workshops for developers, contractors and engineers. This will include providing venues for workshops, handling local logistics, assisting with advertising, and providing staff to assist with workshop activities.

Printed outreach and education materials for the construction site management program will be prepared with assistance from NDEP. Possible examples include NDEP Construction Site Permit Program, How to Prepare a Storm Water Pollution Prevention Plan, and Proper Selection and Installation of Construction Site BMPs. Printed materials will be distributed to developers and contractors during the land use application process, and will also be available to NDEP and permittee staff to distribute at construction sites during field visits.

9.6 Priorities and Measurable Goals

All of the program set-up activities are given high priority and scheduled in Permit Year 1. The contractor education and training program is delayed to Year 2 because it is dependent on the results of the BMP manual review scheduled for Year 1. Other measurable goals are defined below.

Completed by	Measureable Goal/Milestone
End of Permit Year 1	* Develop process for notifying developers in each community of construction site permit program * Develop process for identifying high construction activity areas * Develop program for post-storm inspections * Review existing BMP manuals and modify for local conditions if necessary
End of Permit Year 2	* Conduct semi-annual inspections and post-storm inspections * Prepare contractor education and training materials
End of Permit Year 3	* If necessary, modify standard BMP designs for local conditions * Conduct semi-annual inspections and post-storm inspections
End of Permit Year 4	* Conduct semi-annual inspections and post-storm inspections
End of Permit Year 5	* Conduct semi-annual inspections and post-storm inspections

9.7 Staffing and Funding

CCRFCD will be responsible for preparation of materials and development of a process with each entity for notifying developers of NDEP requirements. Post-storm inspections for significant events will be the responsibility of the entities. CCRFCD will provide staff resources and printing costs for producing contractor education and training materials.

CCRFCD will work with individual permittees to summarize and develop a process to distribute materials in their jurisdictions. The entities will also provide to CCRFCD any information they normally collect that would be useful in preparing an inventory of construction sites.

SECTION 10

SWMP Implementation Responsibilities

10.1 Introduction and Rationale

This section describes how the responsibilities for implementing the adopted SWMP programs will be shared among the various MS4 permittees. This complies with the requirement in paragraph 4.10 of the MS4 permit. Responsibilities are assigned to permittees that currently have the authority and/or funding capability to implement them, and have been discussed by members of the Las Vegas Valley Storm water Quality Management Committee.

10.2 Implementation Responsibilities

Responsibility for implementing the various elements of the SWMP will be shared among the permittees as described in the Staffing and Funding portions of the previous sections. In general, CCRFCD provides overall program oversight, funding, and staffing for activities that are common to all permittees (e.g., storm water monitoring, public education and outreach, annual reports), while municipalities are responsible for activities specific to their jurisdictions (e.g., storm system inspections, maintenance BMPs).

Implementation responsibilities and activities will be coordinated through the Las Vegas Valley Storm water Quality Management Committee (SQMC). The SQMC meets monthly, and is comprised of representatives of all permittees as well as other interested organizations.

10.3 Implementation in New Areas

The programs outlined in this SWMP will be applied to areas within Las Vegas Valley that become urbanized during the period of the current MS4 permit. Maintenance and management BMPs will be extended to new urban areas with a goal of implementation within one year of development. Information on new annexed areas and any resulting updates to the SWMP will be included in annual reports.

10.4 Anticipated Pollutant Load Reductions

Anticipated pollutant load reductions resulting from implementation of the BMPs as part of this SWMP will be estimated using one of the following approaches:

- Published information from storm water BMP research
- Experience of other communities in implementing similar BMPs
- Desktop calculations using the Las Vegas Valley storm water quality monitoring database
- Application of GIS-based pollutant load models for Las Vegas Valley developed by MWH and UNLV
- Analysis of data collected within Las Vegas Valley
- Engineering judgement

SECTION 11

Year 1 Measurable Goals

This section summarizes the measurable goals proposed in the previous sections for Year 1 of the 5-year permit. Many activities are proposed for Year 1 that will establish a foundation for future BMPs, monitoring programs, etc.

Year 1 measurable goals are summarized in the following table.

Program Category	Measureable Goal/Milestone
Legal Authority	• Assemble and summarize existing legal authority
Storm Water System Map	• Prepare regional storm water system infrastructure map
Monitoring Program	• Review and analyze existing wet and dry weather data for storm water system • Approved monitoring program for Year 2
Public Outreach and Education	• Attend three community events and distribute materials • Produce Flood Channel documentary • Produce or update one PSA • Maintain LVV storm water website • Make five presentations in public schools
Structural and Source Control Measures	• Establish expected frequency of cleaning catch basins, inlets and storm drains • Establish procedures for tracking and reporting of storm drain system maintenance • Establish expected frequency of street sweeping • Establish procedures for tracking and reporting of street sweeping • Develop study work plan to assess water quality benefits of existing regional flood control facilities and potential benefits of structural BMPs in areas of new development • Summarize available pesticide, herbicide and fertilizer monitoring data and existing management programs
Illicit Discharge Detection and Elimination Program	• Develop and conduct dry weather monitoring per Section 4 • Conduct semi-annual field inspections of open channels • Develop training materials for municipal maintenance staffs
Industrial Facility Monitoring and Control Program	• Identify (map and description) all industrial facilities covered under this section of the permit • Identify existing industrial site inspection programs • Develop program for tracking inspection reports and follow-up activities • Prepare inventory of operating and closed municipal waste landfills and treatment, storage and disposal facilities
Construction Site BMP Program	• Develop process for notifying developers in each community of construction site permit programs • Develop process for identifying high construction activity areas • Develop program for post-storm inspections • Review existing BMP manuals and modify for local conditions if necessary

ALLEN BIAGGI, *Administrator*

(775) 687-4670

Administration
Facsimile 687-5856

Water Pollution Control
Facsimile 687-4684

Mining Regulation and
Reclamation
Facsimile 684-5259

STATE OF NEVADA
KENNY C. GUINN
Governor

R. MICHAEL TURNIPSEED, *Director*

Waste Management
Corrective Actions
Federal Facilities

Air Pollution Control
Air Quality Planning
Water Quality Planning

Facsimile 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

333 W. Nye Lane, Room 138
Carson City, Nevada 89706

October 21, 2003

Kevin Eubanks, P.E.
Assistant General Manager
Regional Flood Control District
600 S Grand Central Parkway, Ste 300
Las Vegas, NV 89106-4511

Dear Mr. Eubanks:

RE: MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)
STORM WATER MANAGEMENT PLAN (SWMP)

The Nevada Division of Environmental Protection (NDEP) has received and reviewed the Clark County MS4 submittal of the SWMP dated September 29, 2003. With the following comments and conditions, the SWMP meets the minimum terms outlined in NPDES Permit # NV0021911.

General Comments:

- While this permits supercedes the previous permit, all permit practices and procedures in place prior to this issuance of the permit must continue until the appropriate current New Permit requirement has been implemented.
- For each section with respect to each MS4 permittee, provide the location of where the documentation will be housed and maintained.
- Are the measurable goals to be performed by each co-permittee or the group as a whole?
- This permit and the programs defined within it are the responsibility of the Clark County MS4.

Section 4 – Monitoring Program

- All data, to avoid duplication, must be collected and compared in accordance with permit items 5.1.2.2 and/or 5.1.3.

Section 6 Structural and Source Control Measures

- Detention basins can be used as part of sequential system for the MS4 but cannot be the sole source of structural control. Structural controls must address any pollutant that enters the Clark County MS4.

> 40 CFR 122.26(b)(8), "***municipal separate storm sewer*** means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):
>
> (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State
> law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States.
>
> (ii) Designed or used for collecting or conveying storm water;
>
> (iii) Which is not a combined sewer; and
>
> (iv) Which is not part of a Publicly Owned Treatment Works
> (POTW) as defined at 40 CFR 122.2."

Section 7 – Illicit Discharge Detection and Elimination

- Describe the formal process that is followed once the MS4 receives a report of illegal / Illicit discharge.

- The training program and implementation time frame for municipal maintenance staff and field inspections are not acceptable. With both the input from Clark and Washoe Counties, NDEP's committed on September 5, 2002 to EPA a time frame of two years for implementation of an inspection and enforcement program.

Section 8 – Industrial Facility Monitoring and Control Program

- This BMP program is not to assist NDEP with its Industrial Permitting program but a required program for the MS4 to develop, implement and maintain.

- It appears that part of the text is missing from the last paragraph.

Section 9 - Construction Site BMP Program

- An acceptable program must include elements that address the construction activity while in process. Referring to NDEP for inspections does not remove the MS4 of its responsibility of ensuring that there are no pollutants entering their site as a result of the construction activity. NDEP can be notified to assist in the MS4 enforcement of the program to protect their system.

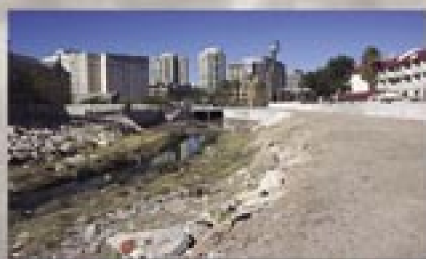
- As stated previously, this program is not to assist or support NDEP with its Permitting program but a required program for the MS4 to develop, implement and maintain.

Should you have any questions, I can be reached at (775) 687-9429.

Sincerely,

Clifford M. Lawson
Staff II Associate Engineer
Bureau of Water Pollution Control

Cc: Jon Palm
Darrell Rasner



Appendix C

APPENDIX C

MUNICIPAL CODES

- **City of Henderson**
- **City of Las Vegas**
- **City of North Las Vegas**
- **Clark County**

Title 13 UTILITIES

Chapter 13.16 REGULATION OF INDUSTRIAL WASTEWATER AND PRETREATMENT PROGRAM

Section 13.16.020 Wastewater regulations and limitations.

A. Waste or any matter having the following characteristics shall, under no conditions, be discharged into or be allowed to enter the wastewater system, the stormwater system, or the waters of the state, except that those discharges contained in subsection (A)(6) of this section shall only be prohibited from the wastewater system:

1. Any gasoline, benzene, naphtha, solvent, fuel oil or any liquid, solid or gas that would cause or tend to cause flammable or explosive conditions to result in the sewage system;

2. Any waste containing conventional pollutants, toxic or poisonous solids, liquids or gases in such quantities that alone, or in combination with other waste substances, may create a hazard for humans, animals or the local environment; interfere detrimentally with wastewater treatment processes; disruption of sludge use or disposal; which could cause a violation of the city's NPDES permit; cause a public nuisance or cause any hazardous condition to occur in the city wastewater collection system or any waste flow that could create a pass-through;

3. Any waste having a pH lower than 5.5 or having any corrosive or detrimental characteristic that may cause injury to wastewater treatment or maintenance personnel or may cause damage to structures, equipment or other physical facilities of the sewage system, except an excursion not to fall below a pH of 5.0 subject to Section 13.16.015 of this document;

4. Any wastes with a pH greater than 9.5 units or high enough to cause alkaline incrustations on sewer walls or other adverse effects on the wastewater system, except an excursion not to exceed a pH of 11.0 subject to Section 13.16.015 of this document;

5. Any solids or viscous substances of such size or in such quantity that they may cause obstruction to flow in the sewer or be detrimental to proper wastewater treatment plant operations. These objectionable substances include but are not limited to: asphalt, dead animals, offal, ashes, sand, mud, straw, industrial process shavings, metal, glass, rags, feathers, tar, plastics, wood, whole blood, paunch manure, bones, hair and fleshings, entrails, paper, dishes, paper cups, milk containers, or other similar paper products, either whole or ground;

6. Any rainwater, stormwater, groundwater, street drainage, subsurface drainage, roof drainage, yard drainage water from yard fountains, ponds or lawn sprays or any other uncontaminated water;

7. Any water added for the purpose of diluting wastes which would otherwise exceed applicable maximum concentration limitations;

8. Any petroleum or mineral based cutting oils, commonly called soluble oil and which form persistent water emulsions;

9. Any nonbiodegradable oil, petroleum oil or refined petroleum products in concentrations over one hundred mg/L;

10. Any dispersed biodegradable oils, fats and greases such as lard, tallow or vegetable oil in concentrations over two hundred fifty mg/L;

11. Any strongly odorous waste or waste tending to create odors;

12. Any waste having a temperature of sixty degrees Celsius (one hundred forty degrees Fahrenheit) or higher;

13. Any waste producing excessive discoloration of wastewater or treatment plant effluent;

14. Any wastes containing excessive quantities of iron, boron, chromium, phenols, plastic resins, copper, nickel, other objectionable materials toxic to humans, animals, the local environment or to biological or other wastewater treatment processes;

15. Any excessive quantities of radioactive material wastes;

16. Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the city's wastewater treatment works.

B. Prohibitions on Storm Drainage, Groundwater and Unpolluted Water. Rainwater, stormwater, groundwater, street drainage, subsurface drainage, roof drainage, yard drainage, water from yard fountains, ponds or lawn sprays or any other unpolluted water will not be discharged through direct or indirect connections to a public sewer. The director may approve the discharge of such water only when no reasonable alternative method of disposal is available. If a permit is granted for the discharge of such water into a public sewer, the user shall pay an applicable user charge and fee and meet such other conditions as required by the director. No discharge shall be made to the storm drain system or the waters of the state that would cause a violation of the NPDES stormwater permit.

C. Limitations on Point of Discharge. No person or user shall discharge any substances directly into a manhole or other opening in a public sewer except through an approved sewer connection unless, upon written application by the user, a temporary permit for such direct discharge is issued by the director.

D. Limitations on Wastewater Strength. No person or user shall discharge wastewater containing constituents in excess of the following:

Pollutant	Maximum Influent Concentration (ug/L)	Pretreatment Standard (ug/L)
Nonpriority Pollutants		
Aluminum	5,000	--
Barium	1,000	--
Boron	750	--
Cobalt	500	--
Fluoride	1,000	--
Iron	5,000	25,000
Lithium	2,500	--
Manganese	1,000	5,300
Molybdenum	100	--
Vanadium	100	
Organic Priority Pollutants		
Total Volatile Organics	100	--
Total Phenols	100	350
Other Priority Pollutants		
Antimony	150	1,500

Arsenic	100	420
Asbestos	1	--
Beryllium	100	--
Cadmium	10	50
Chromium	100	540
Copper	500	1,800
Cyanide	40	210
Lead	200	1,000
Mercury	2	10
Nickel	500	1,900
Selenium	10	40
Silver	50	500
Thallium	20	50
Zinc	2,000	5,000

Note: No discharger or user shall discharge wastewater with concentrations exceeding the pretreatment standard or wastewaters which would cause the influent to the city of Henderson wastewater treatment facility to exceed the maximum influent concentrations. Limitations promulgated by federal law shall apply in any instance where those limitations are more stringent than those in this chapter. In reference to pretreatment standards in this subsection, the ordinance limitations promulgated may be exceeded when said limitation is unattainable based on best available technology, with the approval of the director (40 CFR 401.12(b)).

E. Revision of Wastewater Regulations. Limitations promulgated by the Act or regulations and guidelines promulgated thereunder shall apply in any instance where they are more stringent than those in this chapter. Limitations on wastewater strength in subsection D of this section may be supplemented with more stringent limitations:

1. If the city determines that the limitations in subsection D of this section may not be sufficient to protect the operation of the city's treatment works; or

2. If the city determines that the limitations in subsection D of this section may not be sufficient to enable the city's treatment works to comply with water quality standards or effluent limitations specified in the city's National Pollutant Discharge Elimination System (NPDES) permit.

F. Accidental Discharges. Appropriate means of protecting against spills and accidental discharges shall be taken by the city. Industrial and nondomestic users shall be required to install, at their expense, containment facilities to protect the city treatment works from accidental spills of toxic or hazardous materials. Users shall notify the city immediately upon accidentally discharging wastes in violation of this chapter to enable the city to take proper measures to reduce the impacts of the discharge. This notification must be followed by a detailed, written statement within fifteen days of the date of the occurrence. (Ord. 2011 § 5, 2000; Ord. 1719 § 2, 1997; Ord. 1494 § 2, 1994; Ord. 1355 § 2, 1992)

Title 14 PUBLIC SERVICES
Chapter 14.17 WASTEWATER COLLECTION AND TREATMENT

Stormwater Discharges are discussed in Paragraphs D and E.

14.17.120 Discharge of certain materials expressly prohibited.

(A) It is unlawful for any user to discharge or cause to be discharged into the system any of the following materials in concentrations sufficient to cause pass through or interference, or in concentrations that violate any regulation promulgated in accordance with Section 307(b), (c) or (d) of the Act;

(1) Gasoline, mercury, total identifiable chlorinated hydrocarbons, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, solvents, pesticides or jet fuel;

(2) Acids, caustics, sulfides, concentrated chloride and fluoride compounds and substances which will react with water to form acidic products;

(3) Liquids, solids or gases which, by reason of their nature or quantity, are flammable, reactive, explosive, corrosive or radioactive or by interaction with other materials could result in a fire, explosion or injury;

(4) Wastewater from industrial facilities that contain floatable fats, wax, grease or oils;

(5) Non-biodegradable cutting oils, commonly called soluble oil, which form persistent water emulsions;

(6) Floatable material which is readily removable;

(7) Any waste with a closed-cup flashpoint of less than one hundred forty degrees Fahrenheit (sixty degrees Celsius) using the test methods specified in 40 CFR 261.21.

(B) Except as expressly allowed in a wastewater contribution permit, it is unlawful for any user to discharge or cause to be discharged into the system any of the following materials:

(1) Solid or viscous material which could cause an obstruction to the flow or cause an interference to the operation of the system or the City's storm drain system, including without limitation grease, garbage with particles that are greater than one-half of an inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshing, entrails, feathers, ashes, cinders, sand, spent lime, stone marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas tar, asphalt residues, residues from the refining or processing of fuel, lubricating oil, mud, glass grinding or polishing wastes, any wastewater that has a pH of less than 5.0 or more than 11.0 or any wastewater that has any other corrosive property that is capable of causing damage or hazard to the structures, equipment, or personnel of the City;

(2) Toxic pollutants in a sufficient quantity to injure or interfere with any wastewater treatment process, constitute a hazard or cause injury to human, animal or plant life or cause to be exceeded any limitation that is set forth in this Chapter;

(3) Noxious or malodorous liquids, gases or solids in a sufficient quantity, either alone or by interaction with other materials, to create a nuisance or which result in toxic gases, vapors or fumes within the system in a quantity that may cause acute worker health and safety problems;

(4) Any material in a sufficient quantity to interfere with any wastewater treatment process, render any product thereof unsuitable for reclamation and reuse or cause the City to be in non-compliance with the sludge use or disposal criteria, guidelines or regulations in connection with Section 405 of the Act, the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act or other Federal or State criteria that are applicable to the sludge management method that is being used;

(5) Material which will cause the City to be in violation of its NPDES permit or any applicable Federal and State statute, rule or regulation;

(6) Wastewater that contains pigment which is not removed in the ordinary wastewater treatment process and which creates a visual contrast with the material appearance of the City's discharge when it is observed at the point of the discharge;

(7) Wax, grease or oil concentration of mineral or petroleum origin (nonliving sources) of more than one hundred milligrams per liter, whether emulsified or not, or which contain substances which may solidify or become viscous at temperatures between thirty-two degrees Fahrenheit and one hundred fifty degrees Fahrenheit (zero degree Celsius and sixty-five degrees Celsius) at the point of its discharge into the system;

(8) Total fat, wax, grease or oil concentration of animal or vegetable origin (biodegradable living sources) of more than two hundred fifty milligrams per liter, whether emulsified or not, or which contain substances which may solidify or become viscous at temperatures between forty degrees Fahrenheit and one hundred degrees Fahrenheit (four degrees Celsius and thirty-seven degrees Celsius) at the point of its discharge into the system.

(9) Waste containing substances that may precipitate, solidify or become viscous at temperatures between forty degrees Fahrenheit and one hundred degrees Fahrenheit (four degrees Celsius and thirty-seven degrees Celsius) at the point of its discharge into the system;

(10) Wastewater that has a heat content in such a quantity that the temperature of the wastewater at the introduction into the wastewater treatment plant exceeds one hundred four degrees Fahrenheit (forty degrees Celsius);

(11) Pollutants, including without limitation oxygen-demanding pollutants, that are released at a flow rate or a pollutant concentration which will cause or contribute to an interference with the wastewater treatment process;

(12) Single pass cooling water; provided, however, that the blowdown or bleedoff from cooling towers or other evaporative coolers may be accepted into the system as long as it does not exceed one-third of the makeup of the water and is expressly authorized in the user's wastewater contribution permit;

(13) Wastewater which constitutes a hazard or causes injury to human, animal or plant life or creates a public nuisance;

(14) Recognizable portions of the human or animal anatomy;

(15) Wastewater which constitutes a hazard or causes injury to human, animal or plant life or creates a nuisance;

(16) Water that is added for the purpose of diluting wastes which would otherwise exceed the applicable maximum concentration limitations;

(17) Excessive amounts of organic phosphorous type compounds;

(18) Excessive amounts of deionized water, steam condensate or distilled water;

(19) Rainwater, stormwater, groundwater, street drainage, surface drainage, roof drainage, yard drainage, water from yard fountains, ponds, lawn sprays or any other uncontaminated water;

(20) Industrial waste which does not comply with the applicable Federal pretreatment standards, as the same are set forth in Section 307(b) and (c) of the Act and any applicable regulation thereunder, including without limitation those that are promulgated in 40 CFR Chapter I, Subpart N, Parts 401 to 471. The most stringent standards will apply whenever Federal, State and local standards overlap.

(C) In no case shall LVMC 14.17.120(B) be interpreted to allow a discharge that is not in compliance with any regulation promulgated in accordance with Section 307(b), (c) or (d) of the Act.

(D) It is unlawful for any person to discharge wastewater in any form, other than stormwater, into the storm drains of the City of Las Vegas.

(E) It is unlawful for any person to discharge any pollutant, as defined in the Act, into surface waters within the City of Las Vegas without first obtaining an NPDES permit from the State of Nevada or the U.S. Environmental Protection Agency.

(F) At no time shall two successive readings on an explosion hazard meter, at the point of discharge into the system, or at any point in the system, exceed five percent, nor shall any single reading exceed ten percent of the lower explosive limit of the meter.
(Ord. 3713 § 14, 1993: Ord. 3447 § 102, 1989)

Title 13 PUBLIC SERVICES
Chapter 13.28 WASTEWATER COLLECTION AND TREATMENT

Stormwater Discharges are discussed in Paragraphs D and E.

13.28.120 Discharge of certain materials expressly prohibited.

A. It is unlawful for any user to discharge or cause to be discharged into the system any of the following materials in concentrations sufficient to cause pass through or interference, or in concentrations that violate any regulation promulgated in accordance with Section 307(b), (c) or (d) of the Clean Water Act:

1. Gasoline, mercury, total identifiable chlorinated hydrocarbons, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, solvents, pesticides or jet fuel;

2. Acids, caustics, sulfides, concentrated chloride and fluoride compounds and substances which will react with water to form acidic products;

3. Liquids, solids or gases which, by reason of their nature or quantity, are flammable, reactive, explosive, corrosive, or radioactive or by interaction with other materials could result in a fire, explosion or injury;

4. Wastewater from industrial facilities that contain floatable fats, wax, grease or oils;

5. Nonbiodegradable cutting oils, commonly called soluble oil, which form persistent water emulsions;

6. Floatable material which is readily removable;

7. Any waste with a closed-cup flashpoint of less than 140 degrees Fahrenheit (60 degrees Celsius) using the test methods specified in 40 CFR 261.21.

B. Except as expressly allowed in a wastewater contribution permit, it is unlawful for any user to discharge or cause to be discharged into the system any of the following materials:

1. Solid or viscous material which could cause an obstruction to the flow or cause an interference to the operation of the system or the city's storm drain system, including without limitation grease, garbage with particles that are greater than one-half of an inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshing, entrails, feathers, ashes, cinders, sand, spent lime, stone marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas tar, asphalt residues, residues from the refining or processing of fuel, lubricating oil, mud, glass grinding or polishing wastes, any wastewater that has a pH of less than 5.0 or more than 11.0 or any wastewater that has any other corrosive property that is capable of causing damage or hazard to the structures, equipment, or personnel of the city;

2. Toxic pollutants in a sufficient quantity to injure or interfere with any wastewater treatment process, constitute a hazard or cause injury to human, animal or plant life, or cause any limitation that is set forth in this chapter to be exceeded;

3. Noxious or malodorous liquids, gases or solids in a sufficient quantity, either alone or by interaction with other materials, to create a nuisance or which result in toxic gases, vapors or fumes within the system in a quantity that may cause acute worker health and safety problems;

4. Any material in a sufficient quantity to interfere with any wastewater treatment process, render any product thereof unsuitable for reclamation and reuse or cause the city of Las Vegas or Clark County sanitation district to be in noncompliance with the sludge use or disposal criteria, guidelines, or regulations in connection with Section 405 of the Act, the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act, or other federal or state criteria that are applicable to the sludge management method that is being used;

5. Material which will cause the city of Las Vegas or Clark County sanitation district to be in violation of its NPDES permit or any applicable federal and state statute, rule or regulation;

6. Wastewater that contains pigment which is not removed in the ordinary wastewater treatment process and which creates a visual contrast with the material appearance of the city's discharge when it is observed at the point of the discharge;

7. Wax, grease or oil concentration of mineral or petroleum origin (non-living sources) of more than 100 milligrams per liter, whether emulsified or not, or which contain substances which may solidify or become viscous at temperatures between 32 degrees Fahrenheit and 150 degrees Fahrenheit (0 degree Celsius and 65 degrees Celsius) at the point of its discharge into the system;

8. Total fat, wax, grease, or oil concentration of animal or vegetable origin (biodegradable living sources) of more than 250 milligrams per liter, whether emulsified or not, or which contain substances which may solidify or become viscous at temperatures between 40 degrees Fahrenheit and 100 degrees Fahrenheit (4 degrees Celsius and 37 degrees Celsius) at the point of its discharge into the system;

9. Waste containing substances that may precipitate, solidify or become viscous at temperatures between 40 degrees Fahrenheit and 100 degrees Fahrenheit (4 degrees Celsius and 37 degrees Celsius) at the point of its discharge into the system;

10. Wastewater that has a heat content in such a quantity that the temperature of the wastewater at the introduction into the wastewater treatment plant exceeds 104 degrees Fahrenheit (40 degrees Celsius);

11. Pollutants, including without limitation oxygen demanding pollutants, that are released at a flow rate or a pollutant concentration which will cause or contribute to an interference with the wastewater treatment process;

12. Single pass cooling water; provided, however, that the blow down or bleed off from cooling towers or other evaporative coolers may be accepted into the system as long as it does not exceed one-third of the makeup of the water and is expressly authorized in the user's wastewater contribution permit;

13. Wastewater which constitutes a hazard or causes injury to human, animal, or plant life or creates a public nuisance;

14. Recognizable portions of the human or animal anatomy;

15. Wastewater which constitutes a hazard or causes injury to human, animal, or plant life or creates a nuisance;

16. Water that is added for the purpose of diluting wastes which would otherwise exceed the applicable maximum concentration limitations;

17. Excessive amounts of organic phosphorous type compounds;

18. Excessive amounts of deionized water, steam condensate or distilled water;

19. Rainwater, stormwater, groundwater, street drainage, surface drainage, roof drainage, yard drainage, water from yard fountains, ponds, lawn sprays or any other uncontaminated water;

20. Industrial waste which does not comply with the applicable federal pretreatment standards, as the same are set forth in Section 307 (b) and (c) of the Act and any applicable regulations thereunder, including without limitation those that are promulgated in 40 CFR Chapter I, Subpart N, Parts 401 to 471. The most stringent standards will apply whenever federal, state and local standards overlap.

C. In no case shall Section 13.28.120B be interpreted to allow a discharge that is not in compliance with any regulation promulgated in accordance with Section 307(b), (c) or (d) of the Act.

D. It is unlawful for any person to discharge any waste water in any form, other than stormwater, into the storm drains of the city.

E. It is unlawful for any person to discharge any pollutant, as defined in the Act, into surface waters within the city without first obtaining an NPDES permit from the state of Nevada or the U. S. Environmental Protection Agency.

F. At no time shall two successive readings on an explosion hazard meter, at the point of discharge into the system or at any point in the system, exceed five percent, nor shall any single reading exceed ten (10) percent of the lower explosive limit of the meter. (Ord. 1098 § 2 (part), 1993: prior code § 4.14.120)

Title 24 WATER, SEWAGE AND OTHER UTILITIES
Chapter 24.40 STORMWATER SYSTEM DISCHARGE

24.40.010 Definitions.

The following words and phrases used in this chapter shall have the meanings hereinafter set forth in this section:

(a) "Discharge permit" means any permit issued by the state of Nevada pursuant to Chapter 445A of the Nevada Revised Statutes.

(b) "Storm sewer" means any sewer designed or intended to convey only stormwater, surface runoff, street wash waters, and drainage, and not intended for sanitary sewage and industrial wastes other than unpolluted cooling water. The portion of a sewer intended to carry stormwater only, which begins at the gutter and grating where water enters said sewer, through the sewer and other conduits to the outlet structure where the water enters a channel or natural watercourse.

(c) "Stormwater system" means all constructed facilities and natural watercourses and drainage ways, under the ownership or within the jurisdiction of the county, used for collecting and conducting stormwater to, through and from drainage areas to the point of final outlet, including, but not limited to, any and all of the following: inlets, conduits and appurtenant features, creeks, channels, catch basins, ditches, streams, culverts, washes, retention or detention basins and pumping stations.

(d) "Stormwater facilities" means various stormwater and drainage works within the county which may include inlets, conduits, pipes, pumping stations, manholes, structures, channels, other structural components and equipment designed to transport, move, or regulate stormwater. (Ord. 1957 § 1 (part), 1997)

24.40.020 Discharge of wastewater to stormwater system prohibited.

It shall be unlawful for any person to discharge or cause to be discharged any wastewater in any form, other than stormwater, into the stormwater system, stormwater facilities, storm sewer, or, onto the curb, gutter, highway, or other area which may drain to the stormwater system, within the county without first obtaining a discharge permit from the state of Nevada. (Ord. 1957 § 1 (part), 1997)

24.40.030 Discharge of pollutant to storm sewer prohibited.

It shall be unlawful for any person to discharge or cause to be discharged any pollutant, as defined in NRS 445A.400, into the stormwater system, stormwater facilities, or storm sewer, or, onto the curb, gutter, highway, or other area which may drain to the stormwater system within the county, without first obtaining a discharge permit from the state of Nevada. (Ord. 1957 § 1 (part), 1997)

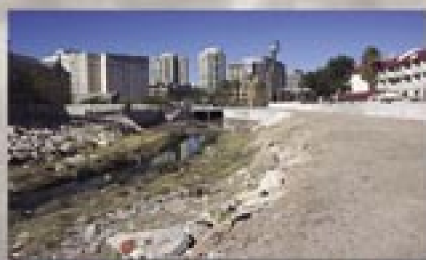
24.40.040 Discharge of solid or viscous material to stormwater system prohibited.

It shall be unlawful for any person to discharge or cause to be discharged any solid or viscous material which could cause an obstruction to the flow, or cause an interference to the operation of the stormwater system, stormwater facilities, or storm sewer; or any waste which is capable of damage or hazard to the stormwater facilities, including structures, equipment; or personnel of the county. (Ord. 1957 § 1 (part), 1997)

24.40.050 Violation -- Penalties.

(a) Any person who violates or aids or abets in the violation of any provision of Sections 24.40.020 to 24.40.040, inclusive, is guilty of a misdemeanor and upon conviction shall be punished by imprisonment in the county jail for not more than six months, or by a fine of not more than one thousand dollars, or by both imprisonment and fine. A separate offense shall be deemed committed on each day during or on which a violation occurs or continues.

(b) In addition to the penalty provided in subsection (a) of this section, the county may recover from the person actual damages to the county resulting from the violation of Sections 24.40.020 to 24.40.040, inclusive. (Ord. 1957 § 1 (part), 1997)



Appendix D

APPENDIX D

BMP REPORTS FROM PERMITTEES

Department of Public Works

500 S Grand Central Pky • PO Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

M.J. Manning, Director • E-Mail: mjm@co.clark.nv.us

August 19, 2004

Mr. Chip Paulson
Montgomery Watson Harza
1801 California Street, 29th Floor
Denver, Colorado 80202-1244

NDPES 2003-2004 ANNUAL REPORT INFORMATION – REFERENCE #1327227.01180203

Dear Mr. Paulson:

I am writing in response to your request for information for the 2003-2004 Annual Report for the Las Vegas Valley Municipal Stormwater Discharge NPDES Permit. The following information is provided.

Between July 1, 2003 and June 18, 2004, Clark County spent the following miscellaneous amounts in the various listed categories:

Drop Inlet Cleaning $210,453.15	Drop Inlet Construction $7,632.56	Drop Inlet Maintenance $20,026.97
Sidewalk plate inventory as of June 18, 2004 of 2,387; sidewalk plates cleaned 13,338 Curb and drop inlet inventory of 4,460; curb and drop inlets cleaned 24,633		
Street Sweeping $2,073,211.65 Curb mile inventory: 2,273 Curb miles swept: 57,038 Cubic yards of debris removed: 18,676		
Drain Pipe Cleaning $40,401.52	Drain Pipe Construction $48,977.30	Drain Pipe Maintenance $81,748.55

Disposal of sediment and other materials removed from catch basins, drop inlets, storm drains and channels as a result of maintenance operations is transported to the Silver State Disposal facility.

Clark County Public Works currently maintains an inventory of twelve detention basins in the Las Vegas Valley.

Other departments provide additional report information. Should you have any questions or concerns, or wish to discuss any of these items further, please call me at (702) 455-7540. The office hours are Monday through Friday, 6:30 a.m. to 3:00 p.m.

M. J. MANNING
DIRECTOR OF PUBLIC WORKS

BY: ______________________________
GIL SUCKOW
Senior Construction Management Inspector
Maintenance Management Division

GS:djt

cc: Carrie Stowers
M. J. Manning
L. Cameron Harper

A Place To Call Home

CITY OF HENDERSON
240 Water Street
P. O. Box 95050
Henderson, NV 89009

August 17, 2004

Mr. Chip Paulson, P.E.
Montgomery Watson Harza
1801 California Street, 29th Floor
Denver, CO 80202-1244

RE: NPDES Stormwater Discharge Permit Annual Report

This is to provide you with information from the City of Henderson for the NPDES Stormwater Discharge Permit report for the period July 2003 to June 2004.

Catch Basin, Storm Drain, and Local Channel Cleaning and Maintenance

The total man hours for these activities in the reporting period was 8,056 hours.

Street Sweeping

The City has expended 20,956 man-hours on street sweeping during the reporting period. The City has seven street sweepers in operation, the same as in past years.

Flood Control Facilities Maintenance

The City inspects and maintains regional flood control facilities under a maintenance agreement with the Clark County Regional Flood Control District. The City billed the District $324,590.30 during the report period for this maintenance.

Local Ordinances

No local ordinances relating to NPDES activities have been enacted during the reporting period.

BMP Implementation

The City of Henderson's responsibility for the first year measurable goals are outlined below:

Establish expected frequency of street sweeping. Sweep curbed and paved public city streets once every 30 days.

Establish procedures for tracking and reporting street sweeping. We have divided the City of Henderson into 6 areas. Each day, street sweeper operators color in the streets that were swept that day. When all the streets in the area have been swept, a new map is started and the process is repeated. We have already started using the maps and have so far met our goals.

Establish expected frequency of cleaning catch basins, inlets and storm drains. Inspect/clean 20 percent of drop inlets once per year and clean as appropriate.

Establish procedures for tracking and reporting cleaning of catch basins, inlets and storm drains. We will use the street sweeping areas mentioned above and will inspect/clean 1-2 areas per year.

Sediment Disposal

Sediment and other material removed from storm drains, drop inlets, and lined channels, is deposited at our Warm Springs maintenance yard. From there it is transferred to the landfill at Apex. Material removed from unlined channels is placed on the side of the channel.

Enforcement Actions

We received 6 reports of NPDES violations during the report period. Two of the reports were determined to be not in violation of code, two were given a warning, and two were new owners that had purchased property with an existing condition and the condition was corrected.

Partially Completed Storm Drains

The City of Henderson has a number of partially completed storm drains; however, none of them are designed specifically to cause the water to infiltrate. In some cases, the discharge is to the natural ground where it evaporates, percolates, or supports vegetation.

Drinking Water Discharges

A report on drinking water discharges was submitted separately to the EPA.

Please let me know if you require any additional information or detail for the completion of your report.

Sincerely,

Curt Chandler

Curt Chandler, P.E.
Land Development Manager
City of Henderson

Cc: Kevin Eubanks, CCRFCD

Mayor
Michael L. Montandon

Council Members
William E. Robinson
Stephanie S. Smith
Shari Buck
Robert L. Eliason

City Manager
Gregory E. Rose

Assistant City Manager
Dan Tarwater

CITY OF
NORTH LAS VEGAS

Your Community of Choice

Utilities Department
2829 Fort Sumter Dr • North Las Vegas, Nevada 89030
Telephone: (702) 633-1276 • Fax: (702) 649-9784
www.cityofnorthlasvegas.com

May 27, 2004

Edwin G. "Chip" Paulson, P.E.
MWH
1801 California Street, Suite 2900
Denver, CO 80202

RE: City of North Las Vegas Stormwater Management Plan (SWMP) Compliance

Dear Chip:

This letter provides information on the City of North Las Vegas' efforts to comply with the SWMP as required by the Municipal Separate Storm Sewer System Permit No. NV0021911. The City of North Las Vegas is a co-permittee of this permit. The letter is formatted to include each of the major headings that the City of North Las Vegas must comply with; a short narrative on City Division responsibility and how that responsibility is met; measurable goal for the responsibility; area where the records are maintained; and how the information will be communicated to the Clark County Regional Flood Control District's consultant for annual reporting requirements to the Nevada Division of Environmental Protection (NDEP).

Construction Site Inspection

The City is presuming that the Clark County Department of Air Quality and Environmental Management (DAQEM) will be conducting initial inspections on a certain percentage of new construction sites. The DAQEM inspector will complete an inspection form to determine if any sediment is entering the City's right of way. The DAQEM inspection shall forward on any inspection reports that require further follow up to the City. When the City receives these inspection reports, the Public Works Department's Construction Services Inspector shall inspect the site and inform the contractor that they are required to clean up any sediment in the City right of way by a certain time. The Construction Services Inspector shall follow up at that site to ensure the required work was completed in a timely manner. If the required work was not completed, the City shall forward the inspection report and action shall be taken pursuant to the NDEP for enforcement action.

Inspections performed by the City staff shall be maintained at the Public Works Department's, Development and Flood Control Division. This Division shall also notify the NDEP of enforcement actions needed for inaction on construction sites at the monthly Stormwater Quality Management Committee meetings.

Developer Notification of Need for NDEP Construction Permit
The City shall provide a standard comment on the Drainage Study Review Letter notifying the developer of the need for a NDEP Construction Permit. The City will also provide a standard general condition for construction plans or specifications assigning the owner or contractor the responsibility to obtain a NDEP Construction Permit.

Detention Basin Maintenance
The City's Utility Department's Environmental Section shall perform semi-annual inspection of the detention basins in the months of April and October. The Public Works Department's Development and Flood Control Division shall perform inspections of the detention basin outfalls after each major storm event. The Public Works Department Roadway Division shall be notified if debris/sediment needs removal from these inspections by the originating Department/Division. Records shall be maintained of inspection performed, at the originating Department/Division. Reporting of inspections and any debris removed, including the quantities shall be provided in the semi-annual wash walk report (April and October). This report is provided at the Stormwater Quality Management Committee meetings in the months of May and November.

Drop Inlet and Storm Pipeline Cleaning
The City's Utility Department's Field Services Section shall perform drop inlet inspection and cleaning as well as storm pipeline inspection and cleaning. The measurable goals shall be to inspect and clean 20% of the total amount of drop inlets in the City. The measurable goal for the storm pipelines is also to inspect and clean 20% of the total inventory. Records shall be maintained at the Utility Department and reporting shall be provided on a monthly basis at the Stormwater Quality Management Committee meeting. Reporting shall include the number of drop inlets inspected and cleaned and the amount of debris removed.

Industrial Site Inspection
The City's Utility Department's Environmental Section shall perform industrial site inspections. The inspections shall be divided into two categories: the first being 313 Facilities and the second being other commercial/industrial businesses. The measurable goals to inspect these facilities is to perform inspections for all of the identified 313 Facilities each year, and to perform inspections on 50% of the other commercial/industrial businesses each year. Records of the inspections shall be maintained at the Utilities Department and a monthly summary of inspections performed shall be provided at the monthly Stormwater Quality Management Committee meetings.

Pesticide/Herbicide Program
The City's Parks Department and the City's Public Works Department's Roadway Division apply herbicides in their daily work duties. No pesticides are used by City staff. The herbicides used by the City are: Roundup Pro, Roundup, Surflan and Barricade. The Roadway Division uses the herbicides according to manufacturer's directions. The Parks Department staff requires that all of their staff retain a State of Nevada Herbicide/Pesticide License. They are also required to maintain the license through periodic refresher courses.

Public Outreach
The City's Utilities Department's Environmental Section shall perform three public outreach events each year. Records shall be maintained at the Utilities Department and the attended events shall be reported on a monthly basis at the Stormwater Quality Management Committee meeting.

Semi-Annual Wash Walks
The City's Utilities Department's Environmental Section shall perform the semi-annual wash walk twice each year in the months of April and October. The results of the wash walk shall be reported in the standard reporting format and a standard route will also be followed during the inspection. The detention basins shall also be inspected during the wash walk. Records of the wash walks shall be maintained at the Utilities Department. Reports of the wash walks shall be submitted at the Stormwater Quality Management Committee during the meetings of May and November. Any follow up reporting for noted items during the wash walk shall also be provided at the Stormwater Quality Management Committee meetings.

Street Sweeping
The City's Public Works Roadway Division shall be responsible to perform the street sweeping duties on all City maintained streets. The measurable goals for this duty is to sweep the City maintained streets every 14 days. The amount of debris collected from street sweeping shall be noted on the daily work order. The records of street sweeping shall be maintained at the City's Public Works Department, Roadway Division. Reporting of the lane miles of street sweeping performed shall be provided to Jennifer Doody at the end of each month. The amount of debris collected from street sweeping shall also be provided to Jennifer Doody in the monthly reports. Jennifer Doody shall provide the street sweeping information and the amount of debris collected at the monthly Stormwater Quality Management Committee.

If you have any questions regarding the above stated compliance measures to be taken by the City of North Las Vegas, please contact Jennifer Doody at (702)633-2088.

Sincerely,

Leslie Long

Leslie Long, P.E.

Technical Services Manager

cc: Kevin Eubanks, P.E., Clark County Regional Flood Control District
David Bereskin, P.E.
Kelly Chuma, P.E.
Ray Burke
Lenny Badger, P.E.
Kirk Medina
John Runiks
Jennifer Doody, P.E.
Dennis Scott
Thomas Rura

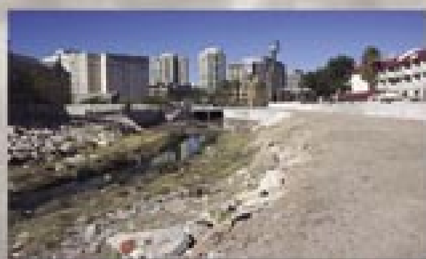
City of Las Vegas BMP Report

MEASUREMENT	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	CUM	FY 02/03
Streets & Sanitation														
Street Sweeping														
Streets Swept (miles)	17,028	21,388	26,544	19,151	17,522	18,995	15,557	18,318	24,350	17,304	19,882		216,039	255,929
Miles Swept per Operator	17,683	823	1,021	737	674	731	598	705	937	666	763		25,335	9,855
# of Complaints Received	17	32	21	19	20	25	22	19	21	18	23		237	168
Storm Drain Maintenance														
# of Inlets & Walk Through Drains Cleaned	5,208	4,668	4,932	4,268	4,667	4,036	4,291	4,956	4,308	6,364	3,212		50,910	52,968
Trash Hauled to Apex Landfill (cubic yards)	2,243	1,976	*4,014	3,451	2,362	3,536	2,472	1,771	3,215	1,735	2,561		25,322	47,919
Sanitation Collection System														
Sewer Mains Cleaned (miles)	77	72	88	72	49	66	66	44	72	70	52		728	849
Sewer Main Televised (feet) - contracted	3,674	40,898	32,841	24,733	12,799	32,471	20,775	16,088	28,675	36,742	37,663		287,359	329,238
Sewer Laterals Televised (feet) - in-house	-	-	-	-	2	-	1	1	2	3	-		9	143
Reportable Sanitary Sewer Overflows - overcapacity	6	7	3	70	-	-	-	12	6	6	3		113	78
Reportable Sanitary Sewer Overflows - all other	-	7	3	-	7	4	9	12	6	-	-		48	
Nonreportable Sanitary Sewer Overflows	2	-	-	-	-	-	-	-	-	-	-		2	12
Street Rehabilitation														
Drainage Repairs (linear feet of curb & gutter)	10,664	3,255	1,842	6,878	3,123	3,059	3,424	3,377	92	-			35,714	76,153
Asphalt Reconstruction (square yards)	20,469	23,776	11,189	22,019	20,459	4,071	7,541	4,070	26,062	22,496			162,152	192,828
Pavement Surface Treatment (square yards)	-	-	359,415	418,831	273,292	-	-	-	-	230,759			1,282,297	3,366,985
Pavement Crack Seal (lbs)	-	-		11,684	28,345	-	194,151	142,182	153,832	160,515			690,709	525,769
Asphalt Overlay (square yards)	-	-	-	196,641	-	-	-			-	-		196,641	73,165

Notes:

Performance measures will fluctuate month to month dependent upon construction phasing/scheduling, weather limitations and overall program scheduling.

*1,521 of this total was from the August Flood. These figures were reported after the August monthly performanc stats were submitted.



Appendix E

APPENDIX E

- INSPECTION REPORTS
- TRAINING MATERIALS

Department of Public Works

500 S Grand Central Pky • PO Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

M.J. Manning, Director • E-Mail: mjm@co.clark.nv.us

December 3, 2003

Chip Paulson
Montgomery Watson Harza
1801 California Street, 29th Floor
Denver, Colorado 80202

NPDES 2003 SEMI-ANNUAL INSPECTION REPORT

Dear Mr. Paulson:

Provided for your use is the Fall 2003 semi-annual NPDES Stormwater Discharge Inspection Report.

Should you have any additional questions or concerns, please let me know.

M. J. MANNING
DIRECTOR OF PUBLIC WORKS

BY: ________________________________
GIL SUCKOW
Senior Construction Management Inspector
Maintenance Management Division

MJM:GS:djt

Attachments

cc: Kevin Eubanks, Regional Flood Control District
M. J. Manning
Denis Cederburg

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Flamingo Detention Basin to Hacienda Avenue	Side Inlets	None	
	Hacienda Avenue Bridge	Street Inlets	None	
	Hacienda Avenue to Rainbow Boulevard	18" R.C.P.	Nuisance	Periodic – Spanish Trails on-site drain west of the Rainbow Boulevard Bridge
	Rainbow Boulevard Bridge	24" Drain south side	Nuisance	Rainbow drain to Hacienda Avenue USACOE pumping
	Rainbow Boulevard Bridge	24" Drain north side	None	Rainbow drain to Tropicana Avenue
	Rainbow Boulevard to Tropicana Avenue		Nuisance	
	Tropicana Avenue Bridge	Street Inlet southeast side	None	On-site Casa Mesa Apartments
	Tropicana Avenue Bridge	Street Inlet	None	
	Tropicana Avenue Bridge	24" R.C.P. southwest side	None	Tropicana Avenue southwest side drainage
	Tropicana Avenue Bridge	24" R.C.P. northwest side	Nuisance	Tropicana Avenue northwest side drainage
	Tropicana Avenue to Torrey Pines Drive	24" Drain northwest side	Nuisance	Shelter Lane drainage
	Tropicana Avenue to Torrey Pines Drive	12" Drain	None	Periodic on-site Los Verdes Condominiums

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Tropicana Avenue to Torrey Pines Drive	12" Drain	Nuisance	Periodic on-site Los Verdes Condominiums
	Torrey Pines Drive Bridge	Street Inlets	None	
	Torrey Pines Drive Bridge	12" Drain north side	None	
	Torrey Pines Drive to Jones Boulevard	24" Drain north side	None	
	Torrey Pines Drive to Jones Boulevard	30" Drain south side	Nuisance	South Torrey Pines Drive drain
	Torrey Pines Drive to Jones Boulevard	18" R.C.P. north side	None	Explorer Drive - residential drain
	Jones Boulevard Bridge	Street Inlets	None	
	Jones Boulevard to Lindell Road	24" Drain south side	Nuisance	Jones Boulevard drain
	Jones Boulevard to Lindell Road	7 Side Inlets, north side	None	Periodic on-site - Las Vegas Jacees Senior Community Mobile Home Park
	Jones Boulevard to Lindell Road	36" R.C.P. south side	None	Periodic on-site - Tropicana Village Mobile Home Park
	Jones Boulevard to Lindell Road	3 - 12" Drains south side	None	Periodic on-site - Tropicana Village Mobile Home Park
	Lindell Road at Tropicana Avenue	2 - 3x6 Culvert	Nuisance	From Lindell Road and Tropicana Avenue to Reno Avenue and Jones Boulevard
	Lindell Road to Fordham Road	12" Drain north side	None	Opulence Condominiums
	Fordham Road	Street Inlet	None	Periodic nuisance

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Fordham Road to Decatur Boulevard		None	Unimproved
	Decatur Boulevard Bridge	Street Inlets	None	
	Decatur Boulevard	24" R.C.P. south side	None	Decatur Boulevard drainage
	Decatur Boulevard to Cameron Street		None	Confined space
	Cameron Street Bridge	Street Inlet east side	None	Inlets plugged by The Orleans
	Cameron Street Bridge	12" R.C.P. south side	None	Cameron Street drain
	Cameron Street to Arville Street		Nuisance	Confined space The Orleans
	Arville Street Bridge	Street Inlets	None	
	Arville Street Bridge	36" R.C.P. southeast side	Nuisance	Arville Street drain
	Arville Street to Wynn Road	6' Channel	Nuisance	Harmon Avenue drain
	Arville Street to Wynn Road	12" R.C.P. north side	None	Periodic on-site from Foremost Business Park
	Arville Street to Wynn Road	6 Side Inlets	None	Roof Drains south side
	Wynn Road to Valley View Boulevard	18" PVC north side	None	Rancho Del Sol Apartments, 4201 Rochelle Avenue - on-site

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Wynn Road to Valley View Boulevard	18" R.C.P. south side	None	
	Wynn Road to Valley View Boulevard	4' Flume south side	None	
	Wynn Road to Valley View Boulevard	60" R.C.P. north side	None	Rochelle Avenue and Wynn Road drain
	Wynn Road to Valley View Boulevard	24" R.C.P. south side	None	Periodic on-site from Wind River
	Wynn Road to Valley View Boulevard	24" Flume north side	None	
	Wynn Road to Valley View Boulevard	12" R.C.P. south side.	None	Periodic on-site Wind River
	Valley View Boulevard Bridge	Street Inlet	None	
	Valley View Boulevard Bridge	24" R.C.P. north side	None	Periodic nuisance from North Valley View Boulevard
	Valley View Boulevard to UPPR	24" R.C.P. north side	None	
	Valley View Boulevard to UPPR	3 Side Inlets south side	None	Periodic on-site
	Valley View Boulevard to UPPR	3 Side Inlets north side	None	Periodic on-site
	Flamingo Road Industrial Connection	24" R.C.P. south side	None	Periodic on-site nuisance
	Flamingo Road Industrial Connection	48" R.C.P. north side	None	Flamingo Road drainage on south side of street

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	South UPPR Drainage	Native	None	
	Rio Culvert - Flamingo Road Drainage	RCB	Nuisance	Includes Valley View/Twain Avenue drain and Flamingo Road drain
	North UPPR Drainage	Native	None	
	UPPR to Industrial Road	Side Inlet	None	Commercial development
	UPPR to Industrial Road		None	
	Industrial Road	RCB	None	Permit required - confined space
	Industrial Road to I-15	RCB	None	Permit required - confined space
	Industrial Road to I-15	Side Inlet	None	Periodic on-site runoff from center point commercial development
	I-15	RCB	None	NDOT
	I-15 to Las Vegas Boulevard	RCB	None	Private - Caesars Palace
	Las Vegas Boulevard	RCB	Nuisance	NDOT
	Las Vegas Boulevard to Imperial Palace Hotel	RCB	Nuisance	Private - Imperial Palace, Mirage, Caesars Place - groundwater pumping
	Audrie Street Inlet Works	Inlets	None	
	Inlet works at Audrey Street	Street Grate	None	
	Inlet works at Audrey Street	48" R.C.P.	Nuisance	Imperial Palace - groundwater pumping
	Inlet works at Audrey Street	18" R.C.P.	Nuisance	
	Inlet works at Audrie Street	RCB	Nuisance	Permit required confined space
	Winnick Street	Inlets	Nuisance	Permit required confined space

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Winnick Street	Grates	Nuisance	Permit required - confined space
	Inlet works at Koval Lane	Inlets	None	
	Koval Lane	Side Inlet	Nuisance	
	Koval Lane	36" Lo-Hed	Nuisance	South Koval Lane drainage
	Koval Lane	48" R.C.P.	None	North Koval Lane drainage
	Koval Lane	RCB	Nuisance	
	Koval Lane to Manhattan Street	Open Channel	Nuisance	
	Koval Lane to Manhattan Street	12" R.C.P. south side	Nuisance	Hughes Center - The Meridian Periodic on-site
	Koval Lane to Manhattan Street	12" R.C.P. south side	Nuisance	Hughes Center - The Meridian Periodic on-site
	Koval Lane to Manhattan Street	Side Inlet	None	Hughes Center - The Meridian Periodic on-site
	Koval Lane to Manhattan Street	12" R.C.P. south side	Nuisance	Hughes Center - The Meridian Periodic on-site
	Manhattan Street to Howard Hughes Parkway	18" R.C.P.	Nuisance	Periodic on-site
	Manhattan Street to Howard Hughes Parkway	10'x5' RCB north side	Nuisance	Sands Avenue drain - groundwater pumping - north side
	Manhattan Street to Howard Hughes Parkway	RCB	Nuisance	Permit required - confined space
	Howard Hughes Parkway to Paradise Road	18" R.C.P. north side	Nuisance	Periodic on-site Hughes Center

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Howard Hughes Parkway to Paradise Road	18" R.C.P. north side	None	Periodic on-site Hughes Center
	Howard Hughes Parkway to Paradise Road	18" R.C.P. north side	None	Periodic on-site Hughes Center
	Paradise Road	RCB	Nuisance	
	Paradise Road to Palos Verdes Street	18" R.C.P. north side	None	Paradise Road drainage
	Paradise Road to Palos Verdes Street	18" R.C.P. south side	None	Paradise Road drainage
	Palos Verdes Street Bridge	18" R.C.P. northeast side	None	Palos Verde Street drainage
	Palos Verdes to Swenson Street	Block Wall north side	None	Periodic on-site Palos Verdes Townhomes
	Palos Verdes to Swenson Street	Side Inflow south side	None	Periodic on-site Woodbridge Apartments
	Swenson Street Bridge	Street Inlet	None	
	Swenson Street Bridge	36" R.C.P.	Nuisance	Continue to monitor - includes Desert Inn Pump Station
	Swenson Street to Cambridge Street		Nuisance	Unimproved
	Cambridge Street Bridge	Street Inlets	Nuisance	
	Cambridge Street to Maryland Parkway	12" R.C.P.	None	Northeast corner, Cambridge Street drainage
	Cambridge Street to Maryland Parkway	18" HDPE north side	None	Cambridge Recreation Center

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Cambridge Street to Maryland Parkway	Side Inlet south side	None	Periodic on-site Flamingo Executive Park
	Cambridge Street to Maryland Parkway	Side Inlet north side	None	Periodic on-site Sigmund Center
	Maryland Parkway Bridge	18" R.C.P. northwest side	None	
	Maryland Parkway Bridge	18" R.C.P. southwest side	None	
	Maryland Parkway Bridge	Street Inlet west side	None	
	Maryland Parkway Bridge	18" R.C.P. northeast	None	
	Maryland Parkway Bridge	Street Inlets east side	None	
	Maryland Parkway Bridge	48" R.C.P. southeast side	None	South Maryland Parkway drainage
	Maryland Parkway to Algonquin Street	Side Inlet south side	Nuisance	Periodic on-site - Mission Center
	Maryland Parkway to Algonquin Street	Side Inlet north side	None	Periodic on-site - Best Center
	Maryland Parkway to Algonquin Street	Side Inlet south side	None	Periodic on-site - Mission Center
	Maryland Parkway to Algonquin Street	Side Inlet south side	None	Periodic on-site - Oasis Plaza

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Maryland Parkway to Algonquin Street	Side Inlet north side	None	Periodic on-site - Shopping Center
	Maryland Parkway to Algonquin Street	15" R.C.P. north side	None	Periodic on-site - Villas De Mission
	Maryland Parkway to Algonquin Street	24" R.C.P. north side	None	Katie Street drain
	Maryland Parkway to Algonquin Street	Side Inlet south side	None	Algonquin Street inlet
	Maryland Parkway to Algonquin Street	Side Inlet north side	None	Periodic on-site - Viking Villas
	Algonquin Street to Spencer Street	Side Inlet north side	None	Periodic on-site - Viking Villas
	Algonquin Street to Spencer Street	Side Inlet south side	None	Periodic on-site - Viking Villas
	Algonquin Street to Spencer Street	Side Inlet north side	None	Periodic on-site - Oasis Bay
	Algonquin Street to Spencer Street	12" R.C.P. (2) south side	None	Periodic on-site Southern Cove Apartments
	Spencer Street Bridge	24" R.C.P. southwest side	Nuisance	
	Spencer Street Bridge	18" R.C.P. northeast side	None	
	Spencer Street Bridge	18" R.C.P. northeast side	None	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Spencer Street to Eastern Avenue		Nuisance	Private Golf Course
	Spencer Street to Eastern Avenue	Drop Inlet 18" PVC	None	Ottowa Street drain
	Eastern Avenue Bridge	Street Inlets	Nuisance	
	Eastern Avenue Bridge	36" R.C.P.	Nuisance	Eastern Avenue drain
	Eastern Avenue to Pecos-MeLeod Drive	Side Inlet	None	Twain Avenue Low Flow Side In Flow
	Eastern Avenue to Pecos-McLeod Drive	36" R.C.P.	None	Twain Drain at Laguna Verde Townhomes
	Eastern Avenue to Pecos-McLeod Drive	RCB	Nuisance	Van Buskirk Channel Outfall at McLeod Drive
	Pecos-McLeod Bridge		Nuisance	
	Pecos-McLeod Drive to Desert Inn Road	Side Inlet east side	None	Sego Road
	Pecos-McLeod Drive to Desert Inn Road	12" R.C.P. west side	None	Cinema 8 Plaza
	Desert Inn Road Bridge	Street Inlet	None	
	Desert Inn Road to Mohave Road	60" R.C.P.	Nuisance	Desert Inn Road drain
	Desert Inn Road to Mohave Road	12" R.C.P. west side	None	
	Desert Inn Road to Mohave Road	Side Inlet east side	None	Periodic on-site - Sierra Pines Apartments

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Desert Inn Road to Mohave Road	12" R.C.P. west side	None	
	Desert Inn Road to Mohave Road	Side Inlet east side	None	Periodic on-site - Sierra Pines Apartments
	Desert Inn Road to Mohave Road	12" R.C.P. west side	None	
	Desert Inn Road to Mohave Road	15" CMP west side	None	
	Desert Inn Road to Mohave Road	2 - 18" CMP west side	Nuisance	
	Mohave Road Bridge		Nuisance	
	Mohave Road to Vegas Valley Drive	12" R.C.P. southeast side	Nuisance	
	Mohave Road to Vegas Valley Drive	RCB	Nuisance	Van Buskirk Channel Outlet Works
	Mohave Road to Vegas Valley Drive	Street Inlet	None	Van Buskirk Channel Outlet Works
	Mohave Road to Vegas Valley Drive	Side Inlets east side	None	Las Casitas Town Homes
	Mohave Road to Vegas Valley Drive	18" R.C.P. west side	None	2950 Spokane Drive drain
	Mohave Road to Vegas Valley Drive	Street Inlet	None	Spokane Drive and Bridgeport Drive easement
	Mohave Road to Vegas Valley Drive	Street	None	Vegas Valley Drive

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Mohave Road to Vegas Valley Drive	48" R.C.P.	Nuisance	Vegas Valley Drive drainage
	Vegas Valley Drive to Boulder Highway	Channels	Nuisance	Private - under construction
	Vegas Valley Drive to Boulder Highway	12" R.C.P.	None	Karen Avenue inlet - 120' west of Boulder Highway
	Boulder Highway Bridge	Channel	Nuisance	NDOT
	Boulder Highway to I-515	Channel	Nuisance	
	Boulder Highway to I-515	RCB	Nuisance	Sahara/Boulder drainage
	I-515 Bridge	Channel	Nuisance	NDOT
	I-515 Bridge	12" R.C.P. north side	None	NDOT
	I-515 to Lamb Boulevard	48" R.C.P. south side	Nuisance	NDOT
	I-515 to Lamb Boulevard	36" CMP south side	None	Sand Creek Mobile Home P ark
	I-515 to Lamb Boulevard	12" R.C.P. south side	None	
	Lamb Boulevard Bridge	Street Inlets	None	
	Lamb Boulevard Bridge	48" R.C.P. southeast side	None	Lamb Boulevard drain
	Lamb Boulevard to Nellis Boulevard	Side Inlet north side	None	Periodic on-site

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Lamb Boulevard to Nellis Boulevard	Side Inlet north side	None	
	Lamb Boulevard to Nellis Boulevard	24" R.C.P. south side	None	Theater drainage
	Lamb Boulevard to Nellis Boulevard	Side Inlet north side	None	Periodic on-site
	Lamb Boulevard to Nellis Boulevard	Side Inlet north side	None	
	Lamb Boulevard to Nellis Boulevard	Side Inlet north side	None	
	Lamb Boulevard to Nellis Boulevard	39" Elliptical north side	Nuisance	Sahara Avenue/Arden Street storm drain
	Lamb Boulevard to Nellis Boulevard	Side Inlet south side	None	
	Lamb Boulevard to Nellis Boulevard	24" PVC north side	None	Periodic on-site - Sahara Gardens
	Lamb Boulevard to Nellis Boulevard	24" PVC north side	None	Periodic on-site - Sahara Gardens
	Lamb Boulevard to Nellis Boulevard	24" PVC north side	None	Periodic on-site - Sahara Gardens
	Lamb Boulevard to Nellis Boulevard	18" R.C.P. south side	None	
	Lamb Boulevard to Nellis Boulevard	Side Inlet	None	
	Lamb Boulevard to Nellis Boulevard		Nuisance	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash	Nellis Boulevard Bridge	48" Elliptical	None	
	Nellis Boulevard Bridge	60" Elliptical	None	
	Nellis Boulevard to Desert Rose Golf Course		Nuisance	
	Desert Rose Golf Course	12" R.C.P.	None	2560 Champion Lane
	Desert Rose Golf Course	24" R.C.P.	None	5309 Masters Avenue
	Desert Rose Golf Course	2-12" R.C.P.	None	Winterwood Drive and Clubhouse Drive
	Desert Rose Golf Course	12" PVC	None	Clubhouse Drive and Alfa Circle - low flow
	Desert Rose Golf Course	R.C.P.	Nuisance	Walton Heath Avenue and Moortown Street

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Flamingo Wash North Fork	Jones Boulevard Inlet	114" R.C.P.	Nuisance	
	Jones Boulevard to Harmon Avenue	18" R.C.P. south side	None	Periodic on-site – Jubilee Condominiums/Palermo Avenue
	Jones Boulevard to Harmon Avenue	18" R.C.P. north side	None	Periodic on-site - Silverstream Apartments and Rochelle Street drainage
	Jones Boulevard to Harmon Avenue	18" Lo-Hed north side	None	Silverstream Apartments
	Jones Boulevard to Harmon Avenue	Block	None	Silverstream Apartments on-site drainage
	Jones Boulevard to Harmon Avenue			Monitor - Sewer Pump Station Silver Stream Apartments
	Jones Boulevard to Harmon Avenue	24" R.C.P. east side	None	Lindell Road and Harmon Avenue drainage
	Jones Boulevard to Harmon Avenue		None	Harmon drainage
	Harmon Avenue to Confluence	24" R.C.P. west side	None	Harmon Avenue west side drainage

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Wash	Lake Mead Bridge		Nuisance	
	Lake Mead Boulevard Bridge	48" R.C.P.	Nuisance	City of North Las Vegas
	Lake Mead Boulevard Bridge	12" R.C.P. southeast side	None	
	Lake Mead Boulevard to Sandy Lane		Nuisance	
	Lake Mead Boulevard to Sandy Lane	12" C.M.P. north side	None	Periodic on-site - Pecos Terrace Apartments
	Lake Mead Boulevard to Sandy Lane	12" C.M.P. north side	None	Periodic on-site - Pecos Terrace Apartments
	Lake Mead Boulevard to Sandy Lane	Side Overflow north side	None	Periodic on-site - Pecos Terrace Apartments
	Lake Mead Boulevard to Sandy Lane	60" R.C.P. west side	None	Pecos Road/Owens Avenue drain
	Lake Mead Boulevard to Sandy Lane	4' Side Inlet south side	None	Periodic on-site – Pecos and Owens Court
	Sandy Lane to Owens Avenue		Nuisance	
	Sandy Lane to Owens Avenue	48" R.C.P.	None	Walnut Road drainage (outlet below channel flow line)
	Owens Avenue Bridge		Nuisance	
	Charleston Boulevard Bridge		Nuisance	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Wash	Charleston Boulevard Bridge	12" R.C.P. southeast side	None	
	Charleston Boulevard to Nellis Boulevard	Street Drainage west side	None	California Street drainage
	Charleston Boulevard to Nellis Boulevard	Street Drainage west side	Nuisance	Colorado Street drainage
	Charleston Boulevard to Nellis Boulevard	12" R.C.P. east side	None	Periodic nuisance from on-site Villas de Mission East Apartments.
	Charleston Boulevard to Nellis Boulevard	12" R.C.P. west side	None	Periodic discharge from on-site Pacific Legends
	Charleston Boulevard to Nellis Boulevard	Channel	None	Nellis Boulevard - side drainage
	Nellis Boulevard Bridge		Nuisance	
	Nellis Boulevard to Desert Rose Golf Course	36" R.C.P.	None	Periodic nuisance from Mervyns/Target drain
	Desert Rose Golf Course	60" R.C.P.	Nuisance	Charleston Boulevard drain
	Desert Rose Golf Course	Side Inlet 2-24" R.C.P.	Nuisance	Christy Lane drainage
	Desert Rose Golf Course	R.C.P.	Nuisance	Sahara Avenue drain
	Desert Rose Golf Course to Las Vegas Range Wash Confluence		Nuisance	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Wash	Desert Rose Golf Course to Las Vegas Range Wash Confluence	48" R.C.P.	None	Sloan Lane drain
	Desert Rose Golf Course to Las Vegas Range Wash Confluence	5 - 18" R.C.P north side	None	
	Desert Rose Golf Course to Las Vegas Range Wash Confluence	36" R.C.P. north side	None	
	Las Vegas Range Wash Confluence to Vegas Valley Drive		Nuisance	
	Vegas Valley Drive to Sanitation District	48" R.C.P. south side	None	Vegas Valley Drive drainage
	Vegas Valley Drive to Sanitation District	Side Inlet	Treated	City of Las Vegas Sanitation District

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Range Wash	Lamb Boulevard to Alexander Road		None	
	Alexander Road Bridge	Street Inlet	None	
	Alexander Road to Las Vegas Boulevard, north		None	
	Las Vegas Boulevard, East Branch to Marion Drive		None	
	Marion Drive to Nellis Boulevard		None	
	Nellis Boulevard Bridge	48" R.C.P. elip	None	Northeast corner of Nellis Boulevard Bridge (under Nellis Boulevard)
	Nellis Boulevard to I Street		None	
	I Street to Weir Confluence		None	
	Weir Confluence to Detention Basin		None	
	Weir Confluence to Carey Avenue		None	
	Carey Avenue to Judson Avenue		None	
	Judson Avenue to Lake Mead Boulevard		None	
	Lake Mead Boulevard to Owens Avenue	48" R.C.P.	None	East Lake Mead Boulevard drainage

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Range Wash	Lake Mead Boulevard to Owens Avenue	54" Lo-Hed	None	Lake Mead Boulevard/Luddington Avenue drainage
	Lake Mead Boulevard to Owens Avenue	Side Inlet east side	None	
	Owens Avenue to Washington Street	48" Nuisance east side	None	Owens Avenue east drain
	Owens Avenue to Washington Street	24" R.C.P. west side	None	
	Owens Avenue to Washington Street	24" R.C.P. east side	Nuisance	Sunrise View Drive drainage, fire hydrant construction runoff
	Owens Avenue to Washington Street		None	
	Owens Avenue to Washington Street	24" R.C.P.	None	
	Washington Bridge		None	
	Washington Street to Bonanza Road	R.C.B.	Nuisance	Washington Avenue storm drain
	Washington Street to Bonanza Road	Dip section	Nuisnace	Halehaven Drive
	Washington Street to Bonanza Road	36" R.C.P. east side	None	From 2-21' inlets on Sloan Lane
	Washington Street to Bonanza Road	24" R.C.P. east side	None	Northeast corner of Bonanza Road
	Bonanza Road to Stewart Avenue	56"x90" Lo-Hed R.C.P.	Nuisance	Southeast side of Bonanza Road Bridge Bonanza Road storm drain

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Range Wash	Bonanza Road to Stewart Avenue	18" R.C.P.	None	East side 900' south of Bonanza Road
	Bonanza Road to Stewart Avenue	4 - 6'x2' Gated boxes	Nuisance	Southern Nevada Water Authority on-site discharge
	Stewart Avenue Bridge	18" R.C.P. northwest	None	
	Stewart Avenue Bridge	18" R.C.P. southwest	Nuisance	
	Stewart Avenue to Charleston Boulevard	68"x42" R.C.P. southeast side	None	Stub-out for East Stewart
	Stewart Avenue to Charleston Boulevard	18" R.C.P. west side	Nuisance	
	Stewart Avenue to Charleston Boulevard	2-24" R.C.P. west side	None	
	Stewart Avenue to Charleston Boulevard	24" R.C.P. west side	None	175' north of Charleston Boulevard
	Stewart Avenue to Charleston Boulevard	24" R.C.P. east side	None	20' north of Charleston Boulevard
	Charleston Boulevard Bridge		None	
	Charleston Boulevard to Sahara Avenue	48" R.C.P. east side	None	South side of Charleston Boulevard Bridge
	Charleston Boulevard to Sahara Avenue	36" R.C.P. west side	None	South side of Charleston Boulevard Bridge

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Range Wash	Charleston Boulevard to Sahara Avenue	3'x6' R.C.B.	None	South side along Charleston Boulevard
	Charleston Boulevard to Sahara Avenue	18" CMP east side	None	Off-site drainage - east side
	Charleston Boulevard to Sahara Avenue	Dip section east side	None	Orchards development drain - Flowering Plum Avenue
	Charleston Boulevard to Sahara Avenue	Side Inlet west side	None	Autumn Harvest Avenue and Angel Falls Street
	Charleston Boulevard to Sahara Avenue	Side Inlet west side	None	Alcott Avenue
	Charleston Boulevard to Sahara Avenue	Side Inlet west side	None	Emerald Canyon Drive
	Charleston Boulevard to Sahara Avenue	Side Inlet west side	None	Bonita Canyon Drive
	Charleston Boulevard to Sahara Avenue	Side Channel east side	Nuisance	Orchards Channel
	Charleston Boulevard to Sahara Avenue	Side Inlet west side	Nuisance	Commodore Cove Drive
	Charleston Boulevard to Sahara Avenue	Side Channel east side	Nuisance	Peach Orchard Road
	Charleston Boulevard to Sahara Avenue	Side Inlet west side	None	Woodfield Drive
	Sahara Avenue Bridge	Side Inlet	None	
	Sahara Avenue Bridge	36" R.C.P. east side	None	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Las Vegas Range Wash	Sahara Avenue Bridge	36" R.C.P. west side	None	
	Sahara Avenue Bridge	Side Inlet	None	
	Sahara Avenue to Confluence		Nuisance	
	Sahara Avenue to Confluence	24" R.C.P. west side	None	
	Sahara Avenue to Confluence	Side Inlet east side	None	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Bermuda Road to Pebble Road		None	
	Bermuda Road to Pebble Road	60" R.C.P. north side	None	Pebble Road drainage
	Bermuda Road to Pebble Road	42" R.C.P. south side	Nuisance	
	Bermuda Road to Pebble Road	24" R.C.P. north side	None	Haviland Road
	Bermuda Road to Pebble Road	30" R.C.P. south side	None	Fontane Avenue
	Bermuda Road to Pebble Road	24" R.C.P. north side	None	
	Bermuda Road to Pebble Road	30" R.C.P. east side	None	
	Pebble Road	24" R.C.P. southwest side	None	Pebble Road
	Pebble Road	72" R.C.P. northwest side	Nuisance	Pebble Road
	Pebble Road	36" R.C.P. northeast side	None	Pebble Road drainage
	Pebble Road	24" R.C.P. southeast side	Nuisance	
	Pebble Road to Pollock Drive	18" R.C.P. south side	None	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Pebble Road to Pollock Drive	18" R.C.P. south side	None	
	Pebble Road to Pollock Drive	18" R.C.P. south side	None	
	Pebble Road to Pollock Drive	18" R.C.P. south side	None	
	Pebble Road to Pollock Drive	36" R.C.P. north side	None	
	Pebble Road to Pollock Drive	Side Inlet	None	
	Pebble Road to Pollock Drive	48" R.C.P. south side	None	
	Pebble Road to Pollock Drive	Side Inlet	None	
	Pebble Road to Pollock Drive	Side Inlet	None	
	Pebble Road to Pollock Drive	36" R.C.P. north side	None	McBrey Street
	Pebble Road to Pollock Drive	Side Inlet	None	
	Pebble Road to Pollock Drive	Side Inlet south side	Nuisance	
	Pebble Road to Pollock Drive	Side Inlet north side	Nuisance	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Pollock Bridge	24" R.C.P. southwest side	None	
	Pollock Drive to Windmill Road		None	
	Pollock Drive to Windmill Road	Side Inlet east side	None	
	Pollock Drive to Windmill Road	Side Inlet 12" R.C.P. east side	Nuisance	
	Pollock Drive to Windmill Road	24" R.C.P. east side	None	
	Pollock Drive to Windmill Road	24" R.C.P. west side	Nuisance	
	Pollock Drive to Windmill Road	Side Inlet southeast side	None	at Windmill Lane Bridge
	Windmill Road Bridge		Nuisance	
	Windmill Road Bridge	Inlets	None	
	Windmill Road to Maryland Parkway		None	
	Windmill Road to Maryland Parkway	Side Channel	None	Windmill Lane Channel
	Windmill Road to Maryland Parkway	24" R.C.P. west side	None	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Windmill Road to Maryland Parkway	Side Inlet 24" R.C.P. west side	None	
	Maryland Parkway to Robindale Road		None	
	Maryland Parkway to Robindale Road	48" R.C.P. south side	Nuisance	
	Maryland Parkway to Robindale Road	18" R.C.P. south side	None	
	Maryland Parkway to Robindale Road	8" PVC south side	Nuisance	
	Maryland Parkway to Robindale Road	Side Inlet north side	None	
	Maryland Parkway to Robindale Road	Access Road	None	
	Maryland Parkway to Robindale Road	Side Channel	None	Robindale Road Channel
	Maryland Parkway to Robindale Road	Side Channel	None	Beltway Channel
	Maryland Parkway to Robindale Road	12" R.C.P. north side	None	Beltway
	Maryland Parkway to Robindale Road	48" R.C.P. south side	None	Beltway
	Robindale Road Bridge		None	
	Robindale Road to Spencer Street		Nuisance	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Spencer Street Bridge		None	
	Spencer Street to Sur Este Street		None	
	Sur Este Street to Eldorado Lane		None	Private - undeveloped
	Eldorado Lane to Eastern Avenue	30" R.C.P.	Nuisance	Periodic on-site - Airata Apartments
	Eldorado Lane to Eastern Avenue	24" R.C.P.	Nuisance	Periodic on-site - Airata Apartments
	Eldorado Lane to Eastern Avenue	24" R.C.P.	None	Periodic on-site - Airata Apartments
	Eastern Avenue Bridge		None	
	Eastern Avenue Bridge	2-24" R.C.P.	None	Eastern Avenue Bridge inlets
	Eastern Avenue Bridge	36" R.C.P.	None	Eastern Avenue Storm drain
	Eastern Avenue to Topaz Street		None	
	Topaz Street to Warm Springs Road		None	
	Warm Springs Road		None	
	Warm Springs Road to UPRR	36"x60" Lo-Hed R.C.P.	None	West Warm Springs Road drainage
	UPRR to Vista Del Sol Avenue		None	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Vista Del Sol Avenue to Tomiyasu Drive		None	
	Tomiyasu Bridge		None	
	Tomiyasu Bridge	12" R.C.P. north side	None	North Tomiyasu Lane drainage
	Tomiyasu Bridge	12" R.C.P. south side	None	South Tomiyasu Lane drainage
	Tomiyasu to Pecos Road		None	
	Tomiyasu to Pecos Road	6" PVC north side	Nuisance	Groundwater pumping Sultan of Brunei property
	Tomiyasu to Pecos Road	6" PVC south side	None	
	Tomiyasu to Pecos Road	24" R.C.P. north side	None	Groundwater
	Tomiyasu to Pecos Road	4' x 8' RCB south side	None	
	Pecos Road Bridge		Nuisance	
	Pecos Road to Pama Lane	36" R.C.P. south side	None	Henderson
	Pecos Road to Pama Lane	12" R.C.P. north side	None	County field inlet
	Pecos Road to Pama Lane	12" R.C.P. south side	Nuisance	Henderson
	Pecos Road to Pama Lane	12" R.C.P. south side	Nuisance	Henderson

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Pecos Road to Pama Lane	2-24" R.C.P. north side	None	
	Pecos Road to Pama Lane	12" R.C.P. south side	None	Henderson
	Pecos Road to Pama Lane	2-24" R.C.P. north side	None	
	Pecos Road to Pama Lane	Side Inlet south side	None	Periodic nuisance
	Sunset Bridge		Nuisance	
	Sunset Bridge	48" R.C.P.	Nuisance	
	Sunset Road to Green Valley Parkway/Patrick Interconnect	24" R.C.P. east side	None	Henderson - Green Valley Town Country Shopping Center
	Sunset Road to Green Valley Parkway/Patrick Interconnect	24" R.C.P. east side	None	Henderson - Green Valley Town Country Shopping Center
	Sunset Road to Green Valley Parkway/Patrick Interconnect	Side Inlet west side	None	Henderson - Green Valley Town Country Shopping Center
	Sunset Road to Green Valley Parkway/Patrick Interconnect	2-3" PVC west side	None	On-site - Echo Glenn Condos
	Sunset Road to Green Valley Parkway/Patrick Interconnect	Side Inlet west side	None	On-site - Storage One

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Sunset Road to Green Valley Parkway/Patrick Interconnect	48" R.C.P. east side	None	Henderson - Green Valley Town and Country Shopping Center
	Sunset Road to Green Valley Parkway/Patrick Interconnect	18" HDPE west side	None	West Post Road drain
	Green Valley/Patrick Lane Bridge		Nuisance	
	Patrick Lane to Lamb Boulevard		Nuisance	
	Patrick Lane to Lamb Boulevard	48" R.C.P.	Nuisance	
	Patrick Lane to Lamb Boulevard	72" R.C.P.	Nuisance	
	Lamb Boulevard to Mountain Vista Road		Nuisance	Native Channel
	Mountain Vista Bridge		Nuisance	
	Mountain Vista Road to Russell Road		Nuisance	
	Mountain Vista Road to Russell Road	4x6 R.C.P.	Nuisance	Russell Road, west drain
	Russell Road Bridge		Nuisance	
	Russell Road to I-515		Nuisance	
	Russell Road to I-515		Nuisance	Rawhide Channel

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	I-515 to Nellis Boulevard		Nuisance	
	I-515 to Nellis Boulevard	24" R.C.P. NDOT northwest side	Nuisance	
	Nellis Boulevard to Morris Street		Nuisance	
	Morris Street to Denning Street		Nuisance	
	Denning Street to Stephanie Street		Nuisance	
	Denning Street to Stephanie Street	24" R.C.P. north side	Nuisance	Denning Street/Hacienda Avenue drainage - groundwater
	Denning Street to Stephanie Street	12" R.C.P. north side	Nuisance	Tunis Avenue drainage
	Denning Street to Stephanie Street	36" R.C.P. north side	Nuisance	English Avenue and Andover Drive drainage
	Stephanie Street Bridge		Nuisance	
	Stephanie Street to Emerald Avenue	60" R.C.P. north side	None	Hacienda Street drainage
	Stephanie Street to Emerald Avenue	30" R.C.P. south side	None	South Stephanie Street drainage
	Stephanie Street to Emerald Avenue		Nuisance	

NPDES STORMWATER DISCHARGE INSPECTIONS

Facility	Reach	Drainage	Discharge	Comments
Duck Creek Channel	Emerald Avenue to Boulder Highway		Nuisance	
	Boulder Highway to Hollywood Boulevard		Nuisance	
	Hollywood Boulevard to Rebel Road		Nuisance	

Department of Public Works

500 S Grand Central Pky • PO Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

M.J. Manning, Director • E-Mail: mjm@co.clark.nv.us

August 3, 2004

Chip Paulson
Montgomery Watson Harza
1801 California Street, 29th Floor
Denver, Colorado 80202

NPDES 2003 SEMI-ANNUAL INSPECTION REPORT

Dear Mr. Paulson:

Provided for your use is the Spring 2004 Semi-annual NPDES Stormwater Discharge Inspection Report.

Should you have any additional questions or concerns, please call me at 702-455-7540. The office hours are Monday through Friday, 6:30 a.m. to 3:00 p.m.

M. J. MANNING
DIRECTOR OF PUBLIC WORKS

BY: ______________________________
GIL SUCKOW
Senior Construction Management Inspector
Maintenance Management Division

MJM:GS:djt

Attachments

cc: M. J. Manning
Denis Cederburg

Clark County

Storm Channel Inspection Report
Spring 2004

CLARK COUNTY
PUBLIC WORKS

FIRST IN ACCREDITATION
LEADERS IN SERVICE

LAS VEGAS VALLEY MS4 NPDES PERMIT

LAS VEGAS VALLEY MS4 NPDES PERMIT

PART I – INSPECTION SUMMARY

During the period May 14, 2004, through June 4, 2004, Gil Suckow, Clark County Public Works, inspected open channels and detention basins located within the Las Vegas Valley under the jurisdiction of Clark County.

The purpose of the inspections was to inspect the channels and basins looking for illicit discharges or illegal connections along the facilities that contain dry weather flow.

Inspections are required to be conducted semi-annually by the Las Vegas NPDES Municipal Stormwater Permit. Co-permittees to this permit include the Clark County Regional Flood Control District, City of North Las Vegas, City of Las Vegas, City of Henderson, Clark County, and the Nevada Division of Transportation.

Weather during the period was generally clear with temperatures ranging from 87 to 107 degrees. No rainfall was recorded.

The report identifies the channels and detention basins that were inspected and observations made. The report has been distributed throughout the Public Works Department to make them aware of the findings. Each division, as necessary, will determine follow-up actions.

Part II of the report identifies the channels and detention basins that were inspected (in alphabetical order). Part III of the report details the inspection findings. The attached map shows all of the storm conveyances that affect the County. Part IV identifies potential problems observed, actions taken and recommended follow-up activities.

PART II – CHANNELS/BASINS INSPECTED

Duck Creek Channel

From the Lower Duck Creek Detention Basin to the Wetlands boundary at Rebel Road.

Flamingo Wash

From the Flamingo Detention Basin to the confluence of the Las Vegas Wash.

Las Vegas Wash

From Lake Mead Boulevard to Owens Avenue; and,

From Charleston Boulevard to Vegas Valley Drive.

Las Vegas Range Wash

From Lamb Boulevard to the confluence of the Las Vegas Wash.

PART III – INSPECTION FINDINGS

Duck Creek Channel

From the Lower Duck Creek Detention Basin to the Wetlands boundary at Rebel Road.

The basin was dry. There was minor dry weather flow but no visible evidence of illicit discharges or illegal connections. The channel had groundwater discharge downstream of Tomiyasu Lane from a groundwater pump.

Duck Creek Channel from Emerald Avenue to Rebel Road was under construction.

Flamingo Wash

From the Flamingo Detention Basin to the confluence of the Las Vegas Wash.

The basin had some dry weather flow but no visible evidence of illicit discharges or illegal connections. The channel was dry from the basin to the Imperial Palace. The channel had dry weather flow from several casino groundwater-pumping facilities, which continued with minor inflows to the confluence of the Las Vegas Wash. Flamingo Wash from Boulder Highway to I-15 was under construction.

Las Vegas Wash

Lake Mead Boulevard to Owens Avenue.

There was minor dry weather flow but no visible evidence of illicit discharges or illegal connections.

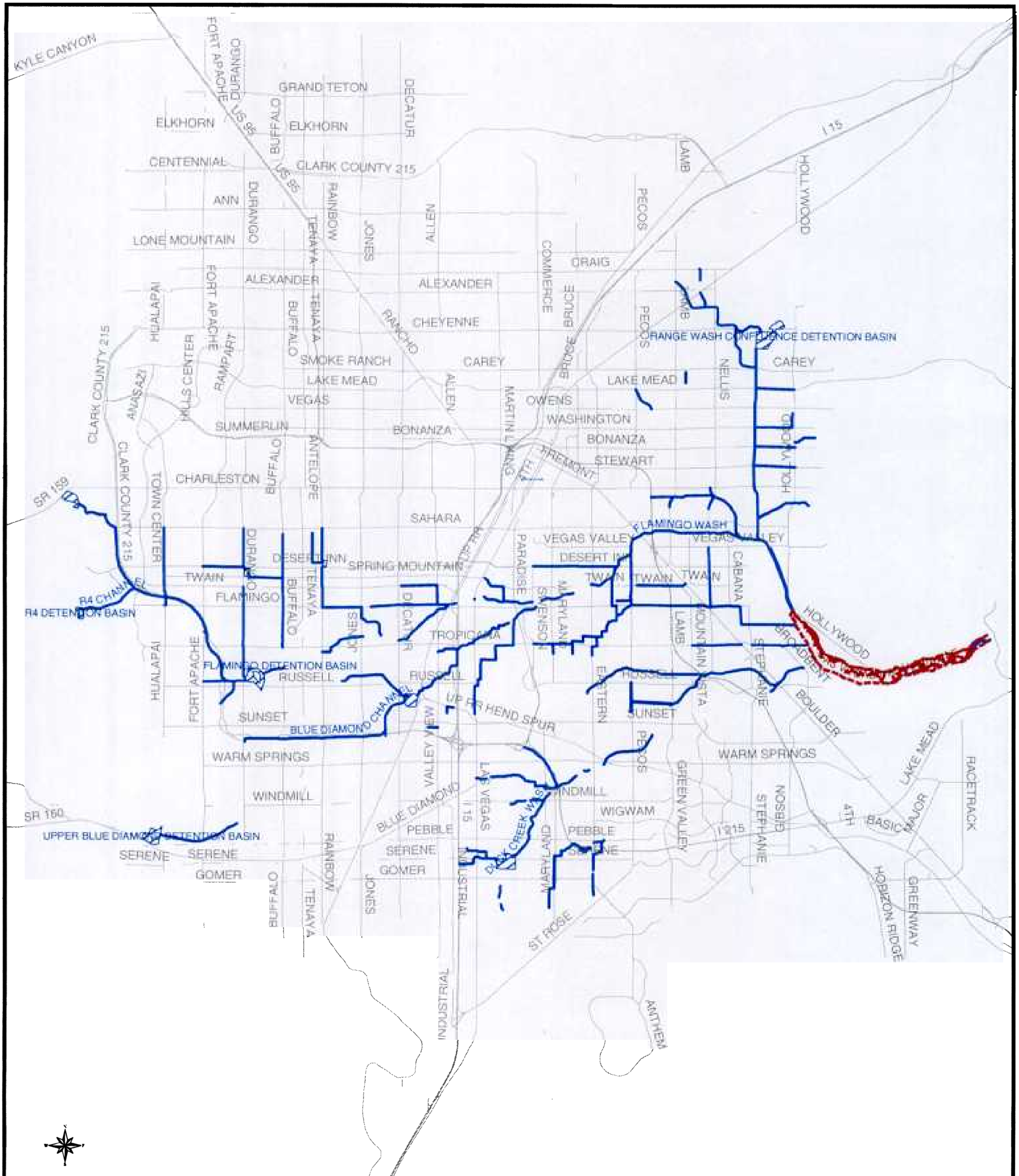
Charleston Boulevard to Vegas Valley Drive.

There was minor dry weather flow but no visible evidence of illicit discharges or illegal connections.

Las Vegas Range Wash

From Lamb Boulevard to the confluence of the Las Vegas Wash.

There was minor dry weather flow but no visible evidence of illicit discharges or illegal connections.



Legend

- 2003 RFCD Detention Basin CC Maintained
- 2003 RFCD Channels CC Maintained
- Wetlands - shown for continuity
- Major Streets

LAS VEGAS VALLEY FLOOD CONTROL FACILITIES MAINTAINED BY CLARK COUNTY

Clark County Public Works
First in Accreditation
Leaders in Service

EWORKS MAPPING
Clark County Public Works

The information portrayed is for display purposes only. Due to the ever changing nature of the data, no liability is assumed as to the accuracy of the data delineated hereon. Printed: April 21, 2004 PWGIS

PART IV – POTENTIAL PROBLEMS OBSERVED, ACTIONS TAKEN AND RECOMMEDNED FOLLOW-UP ACTIVITIES

Duck Creek Channel

At the corner of Nellis Boulevard and Marissa Avenue a spill of five gallons of used motor oil was discovered. The spill was reported to Public Works Maintenance Management Division and the spill was cleaned up.

CITY OF HENDERSON
240 Water Street
P. O. Box 95050
Henderson, NV 89009

MWH-Las Vegas RECEIVED
AUG 13 2004

November 6, 2003

Lance Olson, Project Engineer
MONTGOMERY WATSON
3014 West Charleston Blvd.
Las Vegas, Nevada 89102

SUBJECT: NPDES FALL 2003 CHANNEL INSPECTION REPORT

Dear Lance:

During the week of November 3, 2003 Alan Forbragd and myself performed the Fall NPDES Channel Inspections. The following is a summary of our observations:

DUCK CREEK CHANNEL:

The unlined portion of channel was realigned so that the flow is down the center of channel. Nuisance flow in channel from Sandhill Road and run off from near by subdivision.

LOWER PITTMAN WASH CHANNEL:

1. 36" RCP at Warm Springs Road, nuisance flow from Warm Springs Road.
2. 18" RCP west bank at Warm Springs Road, nuisance flow.
3. Sunset Road Bridge, west side 14" pvc with flap gate. Heavy flow of ground water.
4. 8" weep hole at Whitney Channel interconnect, constant ground water flow.
5. Constant ground water flow from Whitney Channel into the Lower Pittman Wash Channel.
6. Lower Pittman at Stephanie,north side approximately 10" pvc with flap gate. Heavy flow of ground water.
7. Arroyo Grande Bridge- seven (7) each 2" weep holes producing continuous ground water flow. 18" RCP heavy flow of ground water from Henderson Sports Complex.

UPPER PITTMAN CHANNEL:

1. Wigwam to Pecos - 18" storm drain from Chaparral Hills Development. Nuisance flow from development.
2. Pecos to Green Valley Parkway - 24" storm drain from Augusta Development. Nuisance flow from development.

C-1 CHANNEL:

1. 30" RCP at River Landing Development. Nuisance flow from development.
2. 18" storm drain from Canyon Country Development. Nuisance flow/negligible flow from development.
3. Sand and debris removal at the confluence of the C-1 channel and Drake channel.
4. South end of the lined portion of the C-1 channel, on the West Bank, three (3) five-gallon containers of motor oil was discovered. The City crew will remove the containers and clean up the spill.

RAILROAD CHANNEL:

The source of water flow in channel was due to street drainage from near by development. (Negligible/nuisance flow)

EQUESTRIAN DETENTION BASIN:

In/out flow structure northeast side of basin Slow flow of water from the new Southern Nevada Water Treatment Plant that is under construction. Water is clear.

WHITNEY RANCH CHANNEL:

The source of constant water flow in channel is due to ground water.

PITTMAN WASH BURNS CHANNEL:

The source of water flow in channel was due to street drainage from near by South Valley Ranch development and continuous ground water. (Negligible/nuisance flow)

The following channels where inspected and found to be dry with general maintenance required by City maintenance crew:

SUNRIDGE CHANNEL
PITTMAN WASH RAILROAD CHANNEL
C-1 CHANNEL/BOULDER HIGHWAY
PITTMAN PECOS CHANNEL
EQUESTRIAN CHANNEL
DRAKE CHANNEL
PITTMAN WASH BLACK MOUNTAIN CHANNEL
MACDONALD RANCH CHANNEL
EASTERN CHANNEL
SANDWEDGE CHANNEL
GIBSON CHANNEL
VAN WAGENEN CHANNEL
BLACK MOUNTAIN DETENTION BASIN
EAST C-1 DETENTION
McCULLOUGH HILLS DETENTION BASIN
PIONEER DETENTION BASIN
PITTMAN EAST DETENTION BASIN

Should you have any questions with the above information, please give me a call at 267-3105.

Respectfully submitted,

Gene Lesperance
Technical Analyst II
Quality Control

ejl
cc: Robert Murnane, Director Public Works
Curt Chandler, Land Development Manager

Municipal Stormwater Permit NV0021911

City of Henderson
Water Operations Section
Drinking Water Discharges

2003 ANNUAL REPORT

January 22, 2004

Robert Saunders, Associate Engineer
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
333 West Nye Lane
Carson City, NV 89710

Background

On April 7, 2002, the Nevada Division of Environmental Protection (NDEP) authorized the discharge of drinking water under the Clark County Municipal Stormwater Permit. The authorization requires discharges greater than 100,000 gallons and reservoir draining or flushing to be reported annually to the Clark County Regional Flood Control District (CCRFCD) for inclusion in that agency's annual discharge monitoring report to NDEP.

Summary

In calendar year 2003, there were two (2) reportable drinking water discharges within the Henderson City Limits.

- Both discharges were related to a reservoir rehabilitation project on our 3 MG R-12 Reservoir. The reservoir was drained in Feb-03 to allow inspection of the tank floor and ceiling by corrosion experts. It was drained again in Nov-03 to start the rehabilitation process.

The total volume discharged was 300,000 gallons. Best Management Practices (BMPs) were employed in the draining of this reservoir.

Basic Water had no reportable discharges for 2003.

Enclosed are the specific event reports.

Respectfully submitted:

Jeffrey Gebhart
Water Operations Manager

Enclosure

cc: Kurt R. Segler, P.E., Director of Utility Services
Dennis B. Porter, P.E., Assistant Director of Utility Services
Curt Chandler, Land Development Manager
Michael A. Neher, Environmental Services Manager
Kevin Eubanks, CCRFCD
Leslie Long, City of North Las Vegas
Alec Hart, Las Vegas Valley Water District

F:home/dpc/jlg/2003 ann rpt 012104

CITY OF HENDERSON
UTILITY SERVICES DIVISION
240 Water Street
Henderson, NV 89015

DATE: 1/22/04

TO: Utility Operations
Mike Neher, Environmental Services Manager

FROM: (Name) Jeff Gebhart (Title) Water Operations Manager

(Company) City of Henderson

RE: **Quarterly Report - POTABLE WATER DISCHARGES**
Las Vegas Valley Storm Water Permit NV 0021911

REPORT PERIOD ENDING: 12/31/03

SUMMARY OF DISCHARGE INFORMATION

START DATE	END DATE	FACILITY NAME	FACILITY ADDRESS	VOLUME (actual/est.)	BEST MGNT. PRACTICE(S)	CI	TSS	pH
2/27/03	3/2/03	R-12	1200 Berlin Ave.	150,000 gals.	7, *	0.2 mg/L		
11/8/03	11/10/03	R-12	1200 Berlin Ave.	150,000 gals.	7	0.3 mg/L		

* **Note:** *Divers cleaned the tank prior to the discharge resulting in very low Turbidity & TSS discharge water.*
Field Testing techniques were used to determine Turbidity (TSS), chlorine residual and pH (if acids/bases were used) during discharges reported for this period.

List of Best Management Practices

BMP	DESCRIPTION
1	Dechlorination of Discharge
2	Discharge to Improved Surface
3	Engineered Energy Dissipaters
4	Filters or Silt Fence
5	Sediment Barriers
6	Scheduling
7	Flow Rate Control
8	Emergency Repair

THE CITY OF HENDERSON
A Place To Call Home

CITY OF HENDERSON
240 Water Street
P. O. Box 95050
Henderson, NV 89009

RECEIVED
JUN 18 2004

June 16, 2004

Mr. Lance Olson, Project Engineer
MONTGOMERY WATSON
3014 West Charleston Blvd.
Las Vegas, NV 89102

Subject: NPDES SPRING 2004 CHANNEL INSPECTION REPORT

Dear Mr. Olson:

During the week of June 14, 2004 the spring NPDES channel inspections where conducted. The following is a summary of our observations:

DUCK CREEK CHANNEL:

The unlined portion of channel was cleaned and debris removed. The source of water flow in channel is due to ground water and drainage from near by development. (Negligible/nuisance flow)

LOWER PITTMAN WASH CHANNEL:

1. 36" RCP at Warm Springs Road, nuisance flow from Warm Springs Road.
2. 18" RCP west bank at Warm Springs Road, nuisance flow.
3. Sunset Road Bridge, west side 14" pvc with flap gate. Heavy flow of ground water.
4. 8" weep hole at Whitney Channel interconnect, constant ground water flow.
5. Constant ground water flow from Whitney Channel into the Lower Pittman Wash Channel.
6. Lower Pittman at Stephanie,north side approximately 10" pvc with flap gate. Heavy flow of ground water.

UPPER PITTMAN CHANNEL:

1. Channel was cleaned and vegetation growth removed.
2. Wigwam to Pecos - 18" storm drain from Chaparral Hills Development. Nuisance flow from development.
3. Pecos to Green Valley Parkway - 24" storm drain from Augusta Development. Nuisance flow from development.

C-1 CHANNEL:

1. 30" RCP at River Landing Development. Nuisance flow from development.
2. 18" storm drain from Canyon Country Development. Nuisance flow/negligible flow from development.
3. Sand and debris removal at the confluence of the C-1 channel and Drake channel.
4. C-1 Channel is completely lined from Lake Mead to I-515.

RAILROAD CHANNEL:

The source of water flow in channel was due to street drainage from near by development. (Negligible/nuisance flow)

EQUESTRIAN DETENTION BASIN:

In/out flow structure northeast side of basin Slow flow of water from the new Southern Nevada Water Treatment Plant that is under construction. Water is clear.

WHITNEY RANCH CHANNEL:

The source of constant water flow in channel is due to ground water.

PITTMAN WASH BURNS CHANNEL:

The source of water flow in channel was due to street drainage from near by South Valley Ranch development and continuous ground water. (Negligible/nuisance flow)

The following channels where inspected and found to be dry with general maintenance required by City maintenance crew:

SUNRIDGE CHANNEL
PITTMAN WASH RAILROAD CHANNEL
PITTMAN PECOS CHANNEL
EQUESTRIAN CHANNEL
DRAKE CHANNEL
PITTMAN WASH BLACK MOUNTAIN CHANNEL
MACDONALD RANCH CHANNEL
EASTERN CHANNEL
SANDWEDGE CHANNEL
GIBSON CHANNEL
VAN WAGENEN CHANNEL
BLACK MOUNTAIN DETENTION BASIN
EAST C-1 DETENTION
McCULLOUGH HILLS DETENTION BASIN
PIONEER DETENTION BASIN
PITTMAN EAST DETENTION BASIN

Should you have any questions with the above information, please give me a call at 267-3105.

Respectfully submitted,

Gene Lesperance

Gene Lesperance
Technical Analyst II
Quality Control

ejl
cc: Robert Murnane, Director Public Works
    Curt Chandler, Land Development Manager

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City of Las Vegas

Storm Channel Inspection Report
Fall 2003

Clark County NPDES Municipal Separate Storm Sewer System Permit

PART I: INSPECTION SUMMARY

On October 1 and October 2, 2003, John Solvie and Lori Wohletz of the City of Las Vegas Department of Public Works visually inspected exposed storm channels and detention basins located within the City of Las Vegas, primarily focusing on those where dry weather flow persisted. The inspections were performed by visually observing open channel sections and looking for evidence of non-stormwater discharges. Emphasis was placed on those areas that had a reasonable potential of containing illicit discharges, exfiltration from the sanitary sewer system or other sources of non-stormwater. Also looked for were heavy sediment loads that may be associated with construction site runoff.

Weather conditions both days of the inspection included sunny skies and light breezes. The high temperature was 98 degrees on October 1, 2003 and 94 degrees on October 2, 2003. The last measurable rainfall was on September 2, 2003 (trace rainfall had fallen on September 6, 2003).

The report identifies the channels and detention basins that were inspected and the observations that were made. The report has been internally distributed to the Streets & Sanitation Division and the City Engineer Division to make them aware of the findings. Follow-up actions, if necessary, will be determined by each Division.

Part II of the report identifies the channels and detention basins that were inspected (in alphabetical order). Part III of the report details the inspection findings and which channels contained exposed dry weather flow. The attached map shows the majority of major storm conveyances (above-ground and below-ground) that affect the City of Las Vegas. The map has been updated significantly since the last report.

Storm channel inspections are conducted semi-annually as specified in the Las Vegas Valley Storm Water Management Plan for Municipal Separate Storm Sewer System (September 2003). Co-permittees of the Clark County NPDES Municipal Separate Storm Sewer System Permit, which became effective on June 19, 2003, include the Clark County Regional Flood Control District, City of Las Vegas, City of North Las Vegas, City of Henderson, Clark County and the Nevada Department of Transportation.

PART II: CHANNELS / BASINS INSPECTED

CHANNEL / BASIN (*Date Inspected*)	PORTION INSPECTED
Angel Park / Summerlin Channel (*10/1/03*)	1) East/west channel located on the north side of Alta Dr, from the 215 Beltway to Town Center Dr 2) North/south channel located on the west side of Anasazi Dr, from Banburry Cross Dr to Summerlin Pkwy 3) East/west channel located on the south side of Summerlin Pkwy, from Anasazi Dr to Town Center Dr 4) Box culvert outlet located on the east side of Rampart Blvd, between Canyon Run Dr & Summerlin Pkwy (adjacent to the 2nd hole on the Angel Park Par 3 "Cloud Nine" Golf Course)
Angel Park Detention Basin (*10/1/03*)	1) South side of Vegas Dr, just east of Rampart Blvd 2) West side of Durango Dr, at Westcliff Dr
Beltway Channel (*10/1/03*)	North/south channel located on the west side of the 215 Beltway, from Charleston Blvd to Lone Mountain Rd
Buffalo Channel (*10/1/03*)	North/south channel located between Buffalo Dr & Tenaya Way, from Summerlin Pkwy to the Gowan South Detention Basin
Capella Storm Drain (*10/2/03*)	Bubble up outlet on the north side of Capella Ave, located between Valley View Blvd & Procyon St (surface street flow continues eastward to the Freeway Channel at Sirius Ave)
Cedar Creek (*10/2/03*)	East/west channel located between Bonanza Rd & Stewart Ave, from Pecos Rd to Las Vegas Wash
Cheyenne Channel (*10/1/03*)	East/west channel located on the south side of Cheyenne Ave, from approximately 400' west of Spring Shadow Rd to the Gowan South Detention Basin
Elkhorn Springs Detention Basin (*10/1/03*)	West side of Buffalo Dr, between Sunny Springs Ln and Golden Talon Ave
Fort Apache Detention Basin (*10/1/03*)	Southwest side of Bath Dr and Fort Apache Rd
Freeway Channel (*10/1/03*)	North/south channel located on the west side of I-15, from the Desert Inn Arterial to Kings Way
Gilmore Channel (*10/1/03*)	East/west channel located along the south side of Gilmore Ave, extending one block west of White Shadow Ave
Gowan Detention Basins (*10/1/03*)	1) East side of Tenaya Way, from Cheyenne Ave to Peak Dr 2) East side of Tenaya Way, from Buckskin Ave to Alexander Rd
Gowan North Channel (*10/1/03*)	East/west channel located just south of Alexander Rd, from Durango Dr to Buffalo Dr

CHANNEL / BASIN (*Date Inspected*)	PORTION INSPECTED
Holmby Channel (*10/2/03*)	Large collection inlet located just northwest of 1201 S Rainbow Blvd (Ted Wien's Firestone), in the parking lot
Las Vegas Creek (*10/2/03*)	1) East/west channel located on the south side of Alta Dr, from Bedford Rd to Valley View Blvd 2) East/west channel, turning into a north/south channel located east of Valley View Blvd, from Alta Dr to US-95 (inside the LVVWD property) 3) East/west channel located on the south side of US-95, from just east of Valley View Blvd to just west of Martin L King Blvd 4) Large opening located on the southeast side of the US-95 / I-15 interchange 5) Opening located on the southeast side of US-95 and F St 6) Opening located on the southwest side of US-95 and the railroad tracks 7) North/south channel located on the east side of Veterans Memorial Dr, just north of Bonanza Way 8) Confluence of Las Vegas Creek and Las Vegas Wash
Las Vegas Creek Lateral (*10/2/03*)	North/south channel located between Langtry Dr & Starks Dr, from Bonanza Rd to Washington Ave
Las Vegas Wash (*10/2/03*)	North/south channel located between Pecos Rd and Nellis Blvd, from Owens Ave (just east of Stevens St) to Charleston Blvd (just west of Nellis Blvd)
Lone Mountain Detention Basin (*10/1/03*)	West side of Jensen St, between Alexander Rd and Gowan Rd
Lone Mountain – Beltway Detention Basin (*10/1/03*)	Northwest, southwest and southeast sides of Lone Mountain Rd and the 215 Beltway
Oakey Detention Basin (*10/2/03*)	West side of Torrey Pines Dr, from Oakey Blvd to O'Bannon Dr
Mojave / US-95 Detention Basin (*10/2/03*)	North side of US-95, from Mojave Rd to 30th St
Rancho Detention Basin (*10/1/03*)	West side of Centennial Center Blvd, just south of Tropical Pkwy
Red Rock / Hualapai Collector (*10/1/03*)	North/south channel located on the east side of Hualapai Way and east/west channel located on the north side of Desert Inn Rd, extending one block northward and one block eastward of the Hualapai / Desert Inn intersection

CHANNEL / BASIN (***Date Inspected***)	**PORTION INSPECTED**
Summerlin Village 7 Detention Basin (*10/1/03*)	North side of Village Center Cir and Trails Center Dr
Upper Las Vegas Wash Detention Basin and tributaries (*10/1/03*)	Northern easternmost corner of the City of Las Vegas corporate limits, north of Gilbert Ln & east of Jones Blvd
US-95 Channels (*10/1/03*)	North/south channels located alongside US-95, from Kyle Canyon Rd to Vegas Dr
Village 26 Detention Basin (*10/1/03*)	West side of the 215 Beltway, south of Cheyenne Ave
Miscellaneous channels (*10/1-2/03*)	Confirmed dry or underground miscellaneous channels throughout the City of Las Vegas

PART III: INSPECTION FINDINGS

ANGEL PARK / SUMMERLIN CHANNEL

- The exposed portions of the channel west of Town Center Dr are lined with concrete (to the 215 Beltway). The exposed channel east of Town Center Dr is an earthen wash to the Angel Park Detention Basin.
- There was minor flow in the exposed portions of the channel 1) along Alta Dr, and 2) where the channel becomes exposed on Anasazi Dr to just west of Town Center Dr. The water appeared clean.
- Vegetation that was previously noted on both sides of Town Center Dr has been removed.
- The box culvert outlet located adjacent to the 2nd hole on the Angel Park Par 3 "Cloud Nine" Golf Course had a very low continuous flow exiting the outlet, which then entered a sediment trap. The water appeared clean. A minor algae odor emanated from the culvert.
- The channel contained no visible evidence of illicit discharges or illegal connections.

ANGEL PARK DETENTION BASIN

- The south basin contained minor flow through a portion of the center of the basin. The water appeared clean
- The north basin was dry.
- There were ATV tracks in the bottom of both basins.
- Neither basin contained any visible evidence of illicit discharges or illegal connections.

BELTWAY CHANNEL

- The channel has been extended northward to Lone Mountain Rd. Construction workers were working inside the channel near Lone Mountain Rd.
- The housing complexes located on the west side of the channel are contributing minor nuisance flow to the channel, which will likely increase as development continues west.
- The channel contained no visible evidence of illicit discharges or illegal connections.

BUFFALO CHANNEL

- There was significant graffiti in the channel between Washington Ave and Summerlin Pkwy, which extended into the concrete culvert underneath Summerlin Pkwy. The remainder of the channel northward to Gowan Detention Basin contained isolated minor graffiti.

- The culvert underneath Summerlin Pkwy, which is accessible on the north side of Summerlin Pkwy, appears to be entered frequently by individuals. Many empty spray cans were visible inside the culvert.

- There was minor flow entering the channel at various locations. The flow was not continuous. The water appeared clean.

- There was a mixture of water and sediment entering the channel from a drop inlet located underneath Peak Dr on the west side of the channel. The sediment was suspected to have originated from an upstream construction site. The matter was referred to David Lloyd of the Nevada Division of Environmental Protection. He requested that the discharge be photographed. The photographs were e-mailed to Mr. Lloyd, who will follow-up with NDEP's construction stormwater permittees located upstream.

CAPELLA STORM DRAIN

- The bubble up outlet located on the north side of Capella Ave, between Valley View Blvd & Procyon St, had a continuous low flow of water emanating out of it. The flow remained above ground & continuous to the Freeway Channel at Sirius Ave.

- Algae was visible in the street gutter.

- The water appeared clean and contained no visible evidence of an illicit discharge.

CEDAR CREEK

- The flow was moderate and constant throughout the channel. The water appeared clean.

- The channel contained some algae on the bottom of the channel and some minor vegetation.

- The fence post was bent down on the north side of the channel, approximately 100 yards east of Marion Dr, allowing access to the channel.

- The channel contained no visible evidence of illicit discharges or illegal connections.

CHEYENNE CHANNEL

- Minor flow entered the channel underneath Rampart Blvd, which remained continuous to the Gowan South Detention Basin.

- The rust stain from the Highland Falls Golf Course maintenance facility noted in previous reports appeared slightly darker. Water was flowing into the channel in the path of the rust stain and minor sediment was noted. The facility is a Class II permittee of the Industrial Waste Section. An Industrial Waste Inspector responded. The facility had moved their potted plants and was washing them down into the storm drain, which was in violation of their Class II Wastewater Contribution Permit. The facility was assessed a $500 Administrative Penalty Fee for an unauthorized discharge. The potted plants are being moved to a different location.

- A rust stain from an apparent well purging and a light green stain were visible. The origin of the light green stain was not able to be determined, but was likely from a residential source.

- The concrete & caulking is continuing to erode at some of the joints. Exposed rebar is visible as some locations.

- There was minor graffiti underneath the underpasses at Soaring Gulls Dr, Soft Breezes Dr, Buffalo Dr and Ronemus Dr.

- There was minor debris in the channel west of Rampart Blvd.

- The channel contained no evidence of illegal connections.

ELKHORN SPRINGS DETENTION BASIN

- The basin is a park located next to Betsy A. Rhodes Elementary School.

- The basin was dry and contained no visible evidence of illicit discharges or illegal connections.

FORT APACHE DETENTION BASIN

- The basin was under construction at the time of the inspection.

- The basin was dry.

- The basin no visible evidence of illicit discharges or illegal connections.

FREEWAY CHANNEL

- The water in the channel was very slow moving. The water appeared clean.

- The channel contained no visible evidence of illicit discharges or illegal connections.

GILMORE CHANNEL

- The portion inspected is a concrete lined channel.

- The access gate located at White Shadow Ave was unlocked.

- The channel was dry and contained no evidence of illicit discharges or illegal connections.

GOWAN DETENTION BASINS

- The Gowan North Detention Basins were dry.

- Water flowing into the Gowan South Detention Basin from Buffalo Channel and Cheyenne Channel percolated into the ground. The water appeared clean.

- The Gowan South Detention Basin contains a paintball playing field in the center of the basin, which is surrounded by a chain link fence. The playing field contains a number large drainage pipes. This area was incorrectly identified in the Spring 2003 report as a staging area for a storm drain project.

- A number of chains were missing between the concrete blocks surrounding the Gown North Basins. Some of the concrete blocks on the north side of Gowan Rd were leaning significantly into the basin due to erosion underneath the blocks.

- The basins contained no evidence of illicit discharges or illegal connections.

GOWAN NORTH CHANNEL

- There was a minor nuisance flow in the channel at Durango Dr, underneath Cimarron Rd and from the housing complex on the north side of the channel between Buffalo Dr and Cimarron Rd. The flow was not continuous in the channel. The water appeared clean.

- The channel contained no visible evidence of illicit discharges or illegal connections.

HOLMBY CHANNEL

- The channel is a very large open drop inlet located in a commercial parking lot.

- The channel contained two shopping carts and a large amount of debris and sediment. The sediment appeared to be caused by typical stormwater runoff.

- The channel was dry contained no visible evidence of illegal connections.

LAS VEGAS CREEK

- The flow was low and continuous throughout the creek. The creek contained minor algae and vegetation.

- There was graffiti inside the creek where it is exposed along the south side of Alta Dr, west of Valley View Blvd.

- Major construction activity continues inside Meadows Detention Basin and inside the Las Vegas Valley Water District property on the south side of US-95. The channel has been enclosed between the basin and US-95. The LVVWD property and the Meadows Detention Basin is becoming a public park.

- There was minor vegetation growing inside the channel at the opening on the southeast side of the US-95 / I-15 interchange. The water appeared clean.

- There was significant vegetation growing inside the channel at the opening on the southeast side of US-95 and F St. The water appeared clean.

- There was minor algae inside the channel at the opening on the southwest side of US-95 and the railroad tracks. The water appeared clean.

- The portion of the creek along US-95 and Veterans Memorial Pkwy appeared clean. There was little or no vegetation.

- The creek contained no visible evidence of illicit discharges or illegal connections.

LAS VEGAS CREEK LATERAL

- The flow was low.

- Sediment from a LVVWD project on Washington Ave was entering the creek on the south side of Washington Ave. Lori Wohletz spoke with the contractor and also called Alec Hart at the LVVWD to inform them of the situation. Mr. Hart stated that he would follow-up with the contractor.

- The channel contained no visible evidence of illegal connections.

LAS VEGAS WASH

- The flow was low & constant throughout the wash. The water appeared clean. The wash contained minor trash/debris, moderate vegetation and moderate algae.
- There was graffiti at underneath all the underpasses.
- Channel maintenance was being conducted inside the wash east of Lamb Blvd by an outside contractor. Lori Wohletz determined that their silt fencing was not sufficient for the tasks they were performing and immediately shut down the project until their BMPs were in place. Ms. Wohletz also contacted Greg McDermott in the City's Flood Control Division to inform him of the situation.
- The nine drums of oil and diesel fuel that were discovered at 4550 E Washington Ave during the Spring 2003 inspection have been removed. The matter had been referred to the Nevada Division of Environmental Protection (Waste Management). The abandoned construction project where the drums were located has since completely burned down.
- The channel contained no visible evidence of illegal connections.

LONE MOUNTAIN DETENTION BASIN

- The basin was dry.
- Maintenance work was being performed inside the basin.
- There was no visible evidence of illicit discharges or illegal connections.

LONE MOUNTAIN – BELTWAY DETENTION BASIN

- The basin is very large and was under construction at the time of the inspection.
- The basin was dry.
- There was no visible evidence of illicit discharges or illegal connections.

OAKEY DETENTION BASIN

- The basin was dry and contained minor vegetation.
- There was no visible evidence of illicit discharges or illegal connections.

MOJAVE / US-95 DETENTION BASIN

- The basin was dry and contained moderate vegetation.
- There was no visible evidence of illicit discharges or illegal connections.

RANCHO DETENTION BASIN

- Minor nuisance water tricked into the basin from the shopping center located on the north side of the basin. The basin contained moderate vegetation.
- There was no visible evidence of illicit discharges or illegal connections.

RED ROCK / HUALAPAI COLLECTOR

- There was a minor trickle on the east end of the channel originating from the neighborhood to the north. The water appeared clean.
- There was no visible evidence of illicit discharges or illegal connections.

SUMMERLIN VILLAGE 7 DETENTION BASIN

- The basin is a park with baseball fields.
- The basin was dry and contained no visible evidence of illicit discharges or illegal connections.

UPPER LAS VEGAS WASH DETENTION BASIN AND TRIBUTARIES

- The detention basin and tributaries were dry.
- There was construction activity still being conducted inside the basin, apparently to lower it further.
- Construction work inside the basin appears to be complete. The basin remains in an earthen state.
- The basin was dry and contained no visible evidence of illicit discharges or illegal connections.

US-95 CHANNELS

- The channels were dry and contained no visible evidence of illicit discharges or illegal connections.

VILLAGE 26 DETENTION BASIN

- A completely burned vehicle was located on the east side of the basin. The Las Vegas Metropolitan Police Department was contacted and informed of a possible stolen vehicle.

- The basin was dry and contained no visible evidence of illicit discharges or illegal connections. There were ATV tracks in the bottom of the basin.

City of Las Vegas

Storm Channel Inspection Report
Spring 2004

Clark County NPDES Municipal Separate Storm Sewer System Permit

PART I: INSPECTION SUMMARY

On April 20, April 21 and May 4, 2004, John Solvie and Lori Wohletz of the City of Las Vegas Department of Public Works visually inspected exposed storm channels and detention basins located within the City of Las Vegas, primarily focusing on those where dry weather flow persisted. The inspections were performed by visually observing open channel sections and looking for evidence of non-stormwater discharges. Emphasis was placed on those areas that had a reasonable potential of containing illicit discharges, exfiltration from the sanitary sewer system or other sources of non-stormwater. Also looked for were heavy sediment loads that may be associated with construction site runoff.

Weather conditions April 20 and April 21, 2004 included sunny skies and light breezes. Weather conditions on May 5, 2004 included sunny skies and moderately high winds. The high temperature was 80° F on April 20, 2004, 82° F on April 21, 2004 and 100° F on May 4, 2004. The last measurable rainfall was on March 2, 2003 (trace rain had fallen on April 1, April 4 & April 17, 2004).

The report identifies the channels and detention basins that were inspected and the observations that were made. The Upper Las Vegas Wash Detention Basin is no longer included in the inspections, as the City of North Las Vegas is responsible for this basin and has been inspecting it semi-annually.

The report has been internally distributed to the City Engineer Division and the Streets & Sanitation Division to make them aware of the findings. Follow-up actions by these Divisions will be determined and executed at their discretion.

Part II of the report identifies the channels and detention basins that were inspected (in alphabetical order) and the dates they were inspected. Part III of the report details the inspection findings and which channels/basins contained exposed dry weather flow. Part IV of the report details potential problems observed, actions taken and recommended follow-up activities. The attached map shows the majority of major above-ground and below-ground storm conveyances that affect the City of Las Vegas.

Storm channel inspections are conducted semi-annually as specified in the Las Vegas Valley Storm Water Management Plan for Municipal Separate Storm Sewer System (September 2003). Co-permittees of the Clark County NPDES Municipal Separate Storm Sewer System Permit, which became effective on June 19, 2003, include the Clark County Regional Flood Control District, City of Las Vegas, City of North Las Vegas, City of Henderson, Clark County and the Nevada Department of Transportation.

PART II: CHANNELS / BASINS INSPECTED

CHANNEL / BASIN (*Date Inspected*)	PORTION INSPECTED
Angel Park / Summerlin Channel (*4/21/04*)	1) East/west channel located on the north side of Alta Dr, from the 215 Beltway to Town Center Dr 2) North/south channel located on the west side of Anasazi Dr, from Banburry Cross Dr to Summerlin Pkwy 3) East/west channel located on the south side of Summerlin Pkwy, from Anasazi Dr to Town Center Dr 4) Box culvert outlet located on the east side of Rampart Blvd, between Canyon Run Dr & Summerlin Pkwy (adjacent to the 2nd hole on the Angel Park Par 3 "Cloud Nine" Golf Course)
Angel Park Detention Basins (*4/21/04*)	1) South side of Vegas Dr, just east of Rampart Blvd 2) West side of Durango Dr, at Westcliff Dr
Beltway Channel (*4/20/04*)	North/south channel located on the west side of the 215 Beltway, from Charleston Blvd to Lone Mountain Rd
Buffalo Channel (*4/20/04*)	North/south channel located between Buffalo Dr & Tenaya Way, from Washington Ave to the Gowan South Detention Basin
Capella Storm Drain (*4/21/04*)	Bubble up outlet on the north side of Capella Ave, located between Valley View Blvd & Procyon St (surface street flow continues eastward to the Freeway Channel at Sirius Ave)
Cedar Creek (*4/21/04*)	East/west channel located between Bonanza Rd & Stewart Ave, from Pecos Rd to Las Vegas Wash
Cheyenne Channel (*4/20/04*)	East/west channel located on the south side of Cheyenne Ave, from approximately 400' west of Spring Shadow Rd to the Gowan South Detention Basin
Elkhorn Springs Detention Basin (*4/20/04*)	West side of Buffalo Dr, between Sunny Springs Ln and Golden Talon Ave
Fort Apache Detention Basin (*4/20/04*)	Southwest side of Bath Dr and Fort Apache Rd
Freeway Channel (*4/21/04*)	North/south channel located on the west side of I-15, from the Desert Inn Arterial to Kings Way
Gilmore Channel (*4/20/04*)	1) East/west channel located along the south side of Gilmore Ave, extending one block east of Cliff Shadows Pkwy 2) East/west channel along the Gilmore Ave right-of-way, from the 215 Beltway to Lone Mountain Detention Basin
Gowan Detention Basins (*4/20/04*)	1) East side of Tenaya Way, from Cheyenne Ave to Peak Dr 2) East side of Tenaya Way, from Buckskin Ave to Alexander Rd

CHANNEL / BASIN (*Date Inspected*)	PORTION INSPECTED
Gowan North Channel (*4/20/04*)	East/west channel located just south of Alexander Rd, from Durango Dr to Buffalo Dr
Holmby Channel (*4/21/04*)	Large collection inlet located just northwest of 1201 S Rainbow Blvd (Ted Wien's Firestone), in the parking lot
Las Vegas Creek (*4/21/04*)	1) East/west channel located on the south side of Alta Dr, from Bedford Rd to Valley View Blvd 2) East/west channel, turning into a north/south channel located east of Valley View Blvd, from Alta Dr to Meadows Detention Basin (inside the LVVWD property) 3) East/west channel located on the south side of US-95, from just east of Valley View Blvd to just west of Martin L King Blvd 4) Large opening located on the southeast side of the US-95 / I-15 interchange 5) Opening located on the southeast side of US-95 and F St 6) Opening located on the southwest side of US-95 and the railroad tracks 7) North/south channel located on the east side of Veterans Memorial Dr, just north of Bonanza Way 8) Confluence of Las Vegas Creek and Las Vegas Wash
Las Vegas Creek Lateral (*4/21/04*)	North/south channel located between Langtry Dr & Starks Dr, from Bonanza Rd to Washington Ave
Las Vegas Wash (*4/21/04*)	North/south channel located between Pecos Rd and Nellis Blvd, from Owens Ave (just east of Stevens St) to Charleston Blvd (just west of Nellis Blvd)
Lone Mountain Detention Basin (*4/20/04*)	North side of Gowan Rd, between Hualapai Way & Jensen St
Lone Mountain – Beltway Detention Basin (*4/20/04*)	Northwest, southwest and southeast sides of Lone Mountain Rd and the 215 Beltway
Oakey Detention Basin (*4/21/04*)	West side of Torrey Pines Dr, from Oakey Blvd to O'Bannon Dr
Meadows Detention Basin (*4/21/04*)	Southeast of US-95 and Valley View Blvd, inside the LVVWD property.
Mojave / US-95 Detention Basin (*4/21/04*)	North side of US-95, from Mojave Rd to 30th St

CHANNEL / BASIN (*Date Inspected*)	PORTION INSPECTED
Rainbow Detention Basin (*4/21/04*)	South side of Rainbow Blvd & US-95
Rancho Alta Mira Detention Basin (*4/20/04*)	South side of Brookmere Dr & Blue Royal Dr
Rancho Detention Basin (*4/20/04*)	West side of Centennial Center Blvd, just south of Tropical Pkwy
Red Rock / Hualapai Collector (*4/21/04*)	North/south channel located on the east side of Hualapai Way and east/west channel located on the north side of Desert Inn Rd, extending one block northward and one block eastward of the Hualapai / Desert Inn intersection
Summerlin 5 Detention Basin (*5/4/04*)	West of Desert Foothills Dr, between Far Hills Ave & Alta Dr
Summerlin Village 7 Detention Basin (*4/20/04*)	North side of Village Center Cir and Trails Center Dr
US-95 Channels (*4/20/04*)	North/south channels located alongside US-95, from Kyle Canyon Rd to Vegas Dr
Village 26 Detention Basin (*4/20/04*)	West side of the 215 Beltway, south of Cheyenne Ave
Miscellaneous channels (*4/20-21/04*)	Confirmed dry or underground miscellaneous channels throughout the City of Las Vegas

PART III: INSPECTION FINDINGS

ANGEL PARK / SUMMERLIN CHANNEL

- The exposed portions of the channel west of Town Center Dr are lined with concrete (to the 215 Beltway). The exposed channel east of Town Center Dr is an earthen wash to the Angel Park Detention Basin.

- There was minor flow in the exposed portions of the channel 1) along Alta Dr, and 2) where the channel becomes exposed on Anasazi Dr to Town Center Dr where it percolates into the ground. The water appeared clean.

- Very little vegetation was observed in the channel.

- The box culvert outlet located adjacent to the 2nd hole on the Angel Park Par 3 "Cloud Nine" Golf Course had a very low continuous flow exiting the outlet, which then entered a sediment trap. The water appeared clean. Algae was visible in the bottom of the channel. A minor septic odor emanated from the culvert.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

ANGEL PARK DETENTION BASINS

- The only water noted was a small amount of standing water in front of the exit grate located on the southeast corner of the south basin. The water appeared clean.

- The north basin was dry.

- There was a small amount of sediment noted at the exit grate located on the southeast corner of the south basin.

- There was a small amount of rocks inside one of the exit grates located on the east side of the south basin.

- The mechanical gate was missing from one of the exit grates located on the east side of the south basin. A truck bed liner was sitting adjacent to it.

- The grate located on the northeast side of the north basin was dry and clean.

- An automotive battery was sitting next to the mechanical gate located on the northeast side of the north basin.

- A small pile of construction debris was sitting inside the southeast side of the north basin, which included a few gallons of motor oil.

- There were ATV tracks in the bottom of both basins.
- Neither basin contained any visible evidence of illegal connections or excessive sediment.

BELTWAY CHANNEL

- The channel was dry. No nuisance water was noted.
- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

BUFFALO CHANNEL

- There was minor flow continuous flow throughout the channel. Minor algae was on the bottom of the channel. The water appeared clean.
- Rocks were noted in the channel between Cimarron High School and Lake Mead Blvd.
- The large grate located on the west side of the channel, just north of Vegas Dr, was propped far open
- There was isolated graffiti at various locations in the channel.
- The channel has been covered between Washington Ave & Summerlin Pkwy.
- The construction sediment noted during the last inspection underneath Peak Dr is no longer there.
- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

CAPELLA STORM DRAIN

- The bubble up outlet located on the north side of Capella Ave, between Valley View Blvd & Procyon St, was dry. There was no above ground flow between the bubble up outlet and the Freeway Channel.
- The outdoor car wash that used to be located at Fletcher Jones Imports at 3100 S Rancho Dr has been removed. The entire facility has been vacated. There were previous problems at this facility caused by car wash water flowing into the gutter, as noted during previous inspections.

CEDAR CREEK

- The flow was moderate and constant throughout the channel. The water appeared clean.
- The channel contained some algae on the bottom of the channel.
- Very little vegetation was observed in the channel.
- The chain link fence torn down on the north side of the channel, approximately 100 yards west of Lamb Blvd.
- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

CHEYENNE CHANNEL

- Minor flow entered the channel underneath Rampart Blvd, which remained continuous to the Gowan South Detention Basin.
- The rust stain from the Highland Falls Golf Course maintenance facility noted in previous reports was fading. There was no evidence of any recent discharges.
- The joint gaps have widened significantly since the last inspection. The concrete & caulking is continuing to erode. Exposed rebar is visible as some locations.
- There was graffiti inside the channel west of Rampart Blvd and underneath all of the underpasses.
- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

ELKHORN SPRINGS DETENTION BASIN

- The basin is a park located next to Betsy A. Rhodes Elementary School.
- The inlet & outlet grates were clean.
- The basin was dry and contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

FORT APACHE DETENTION BASIN

- The construction of the basin appears complete.
- The inlet & outlet grates were clean.

- The basin was dry and contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

FREEWAY CHANNEL

- The water in the channel was very slow moving from Desert Inn Rd to Sirius Ave. The water appeared clean. Algae was visible on the bottom of the channel.

- The channel was dry from Sirius Ave to Sahara Ave.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

GILMORE CHANNEL

- The channel was dry.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

GOWAN DETENTION BASINS

Gowan North Detention Basin (north of Alexander Rd)

- Vegetation was growing inside the basin.

- Debris covered approximately the bottom eight feet of the outlet grate located on the south side of the basin. Sediment was noted inside the grate. There was standing water inside the grate, which appeared clean.

- Debris was stacked behind the inlet grate located on the northwest corner of the basin, which was pushing the grate open. Sediment and standing water were noted behind the grate. Two broken bicycles were noted in front of the grate.

Gowan North Detention Basin (south of Alexander Rd)

- The basin is used as a soccer field.

- The outlet grate located on the north side of the basin contained a minor amount of sediment and standing water behind the grate. The water appeared clean.

- The inlet grate located on the southeast corner of the basin contained some rocks and standing water. The water appeared clean.

- The inlet grate located on the southwest corner of the basin was dry and contained heavy sediment. The access gate located in front of the grate was unlocked.

Gowan South Detention Basin

- There was standing water where Cheyenne Channel enters the basin. The water appeared clean. There was also a minor accumulation of sediment.

- There was standing water where Buffalo Channel enters the basin. The water appeared clean. There was also a minor accumulation of sediment, some trash and grocery carts lying at the bottom.

- There was water flowing inside the exit grate located on the northeast side of the basin. The water appeared clean. Debris covered approximately the bottom ten feet of the grate. Large vegetation was growing around the grate. There was no sediment noted inside of the grate.

- Some of the concrete blockades have been moved on the north side of the basin, allowing unrestricted vehicular access into the basin.

- There was minor vegetation growing inside the basin.

- Remnants of the paintball playing field in the center of the basin (chainlink fence & drainage pipes) were visible.

GOWAN NORTH CHANNEL

- There was a minor continuous nuisance flow in the channel from Cimarron Rd to where the channel goes underground at Buffalo Dr. The water appeared clean.

- Two shopping carts were inside of the channel.

- There was graffiti inside of the channel between Cimarron Rd and Buffalo Dr.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

HOLMBY CHANNEL

- The channel is a very large open drop inlet located in a commercial parking lot.

- The channel appeared to have been recently cleaned.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

LAS VEGAS CREEK

- The flow was low and continuous throughout the creek. The creek contained minor algae and vegetation.

- Major construction activity continues inside Meadows Detention Basin and inside the Las Vegas Valley Water District property on the south side of US-95. The channel is enclosed between Meadows Detention Basin and US-95. The LVVWD property and the Meadows Detention Basin is becoming a public park.

- There was moderate vegetation growing inside the channel at the opening on the southeast side of the US-95 / I-15 interchange. The water appeared clean. Algae was visible on the bottom of the channel.

- There was moderate vegetation growing inside the channel at the opening on the southeast side of US-95 and F St. The water appeared clean. Algae was visible on the bottom of the channel.

- There was light vegetation growing inside the channel at the opening on the southwest side of US-95 and the railroad tracks. The water appeared clean. Algae was visible on the bottom of the channel.

- The portion of the creek along US-95 and Veterans Memorial Pkwy appeared clean. There was no vegetation. The lock was missing from the north gate, allowing unrestricted access to the channel.

- The creek contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

LAS VEGAS CREEK LATERAL

- The flow was low and continuous. The water appeared clean.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

LAS VEGAS WASH

- The flow was low & constant throughout the wash. The water appeared clean. The wash contained some algae and minor vegetation. The vegetation appeared to have been recently cut in some locations.

- The manhole cover and collar were removed from the sanitary sewer manhole located approximately 100 yards north of the intersection of Sandhill Rd & Proclamation Pl. The pressure lid located approximately 6 feet inside of the manhole was still in place.

- There was graffiti at underneath all the underpasses.

- There were a number of homeless camps located on the east side of the channel between Bonanza Rd & Stewart Ave.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

LONE MOUNTAIN DETENTION BASIN

- The basin was dry.

- The grate located on the north side of the basin was clean and dry.

- The grate located on the northwest side of the basin was clean and dry.

- The grate located on the southeast side of the basin was dry and contained some sediment behind the grate.

- The large inlet channel located on the west side of the basin contained some standing water and some sediment. The water appeared clean.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

LONE MOUNTAIN – BELTWAY DETENTION BASIN

- The basin is very large and was still under construction at the time of the inspection.

- The large basin located on the west side of the 215 beltway appears to still be used as a gravel pit.

- The basin was dry.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

OAKEY DETENTION BASIN

- The basin contained minor vegetation.

- The grate located on the northwest side of the basin contained some standing water and some sediment. The water appeared clean.

- The grate located on the northeast side of the basin had minor nuisance water flowing in it. There was no sediment noted.

- The grate located on the southwest side of the basin was dry and contained some sediment.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

MEADOWS DETENTION BASIN

- The basin is being converted into a park by the LVVWD. The bottom of the basin has been sculpted to allow for ponds of water. Trees and vegetation are being planted around the water ponds.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

MISCELLANEOUS CHANNELS

- A vehicle apparently discharged a noticeable amount of gasoline on the east side of Smoke Peak St, between Silver Mallard Ave & Sunny Springs Ln, which had flowed through the gutter to the large drop inlet located on the north side of Sunny Springs Ln, just west of Buffalo Dr. The vehicle was no longer there. There was a noticeable petroleum odor emanating from the drop inlet.

MOJAVE / US-95 DETENTION BASIN

- There was a low continuous flow through the center of the basin.

- The inlet & outlet were clean.

- The basin contained a moderate amount of vegetation.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

RAINBOW DETENTION BASIN

- The basin is currently under construction.

RANCHO ALTA MIRA DETENTION BASIN

- The basin is a small park.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

RANCHO DETENTION BASIN

- The inlet & outlet were clean.

- Vegetation was growing inside the basin.

- Drainage water was exiting the east side of Home Depot located at 7881 West Tropical Parkway and flowing into the basin. The water was irrigation runoff from the nursery, which flowed underneath numerous pallets of garden chemicals located inside and outside the nursery area before reaching the storm drain.

- The basin contained no visible evidence of illegal connections, excessive sediment or excessive debris.

RED ROCK / HUALAPAI COLLECTOR

- There was a minor trickle on the east end of the channel originating from the neighborhood to the north. The water appeared clean.

- The channel contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

SUMMERLIN 5 DETENTION BASIN

- The basin was dry.

- The basin contained numerous spinout tire tracks and tire tracks up the sidewalls of the basin.

- There was evidence of fires that have burned in a number of areas of the basin, including directly in front of the exit grate located east side of the basin, near the south end. An empty can of Coleman fuel was sitting at the exit grate.

- Three propane canisters were located at the exit grate on the east side of the basin, near the south end. Two of the propane canisters were stacked on top of each other approximately 30 feet inside the culvert behind the grates. The propane canister sitting outside of the grate had a large hole shot in it. The propane canisters had burn marks on them.

- Numerous empty shotgun shells were in the middle of the basin.

- There was a bathtub in the basin that had been shot numerous times.

- The smaller exit pipe located on the east side of the basin, near the north end, was clear.

- Two sets of two manhole covers and rings were removed from four raised storm drain manholes located on the east side of the basin.

- Box culverts are being installed from the basin to the intersection of Alta Dr & Desert Foothills Dr.

SUMMERLIN VILLAGE 7 DETENTION BASIN

- The basin is a park with baseball fields.

- The outlet pipe was clean.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

US-95 CHANNELS

- There was an approximately 40-foot stretch of channel along the west side of the Santa Fe Station located at 4949 N Rancho Dr that contained standing water. The water was parking lot drainage, which had a slight septic odor because it does not drain.

- The channels contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

VILLAGE 26 DETENTION BASIN

- The basin was dry.

- One of the horizontal bars was missing from the exit grate located on the north side of the channel. The inside of the grate contained some rocks.

- A storm drain manhole cover located on the north side of the basin had been removed. Some large rocks had been thrown inside the manhole. The lid was accessible and was replaced.

- The basin contained no visible evidence of illegal connections, illicit discharges, excessive sediment or excessive debris.

PART IV: ACTIONS TAKEN AND RECOMMENDED FOLLOW-UP ACTIVITIES

As noted in Part I of this report, the report has been internally distributed to the City Engineer Division and the Streets & Sanitation Division to make them aware of the findings. Follow-up actions by these Divisions will be determined and executed at their discretion. Follow-up actions that were handled by the City's Environmental Officer and the Industrial Waste Section are as follows:

ANGEL PARK DETENTION BASINS

The City's Environmental Officer will contact H2O Environmental to pickup the automotive battery that was sitting next to the mechanical gate located on the northeast side of the north basin and the small pile of construction debris was sitting inside the southeast side of the north basin, which included a few gallons of motor oil.

MISCELLANEOUS CHANNELS

The City's Environmental Officer planned to contact H2O Environmental to clean the possible petroleum contamination noted in the large drop inlet located on the north side of Sunny Springs Ln, just west of Buffalo Dr. Before contacting H2O Environmental, the City's Streets & Sanitation Division performed a follow-up inspection to determine whether an outside contractor was required. On April 26, 2004, there was no longer any visual or olfactory indication of the petroleum contaminant, nor indication of a source. No further action was taken.

RANCHO DETENTION BASIN

A letter of violation was sent by the Industrial Waste Section via Certified Mail to Home Depot located at 7881 West Tropical Parkway. The letter directed them to immediately cease and desist the discharge of contaminated irrigation water into the storm drain. Future violations may result in the assessment of administrative penalties, as provided for in Chapter 14.17 of the Las Vegas Municipal Code.

SUMMERLIN 5 DETENTION BASIN

The City's Environmental Officer will contact H2O Environmental to pickup the empty can of Coleman fuel that was sitting at the exit grate on the east side of the basin and the three propane canisters that were located at and inside the exit grate on the east side of the basin (near the south end of the basin).

File 1410678/1700554 _ 13.2

Mayor
Michael L. Montandon

Council Members
William E. Robinson
Stephanie S. Smith
Shari Buck
Robert L. Eliason

CITY OF
NORTH LAS VEGAS
Your Community of Choice

Public Works Department - Utilities Division
2829 Fort Sumter Dr • North Las Vegas, Nevada 89030
Telephone: (702) 633-1276 • Fax: (702) 649-9784
www.cityofnorthlasvegas.com

Acting City Manager
Gregory E. Rose

Assistant City Manager
Dan Tarwater

MWH-Las Vegas
RECEIVED
OCT 21 2003

October 20, 2003

Montgomery Watson
Attn: Edwin G. "Chip" Paulson, P.E.
1801 California Street, Suite 2900
Denver, Colorado 80202

Re: October, 2003 Inspection of the Las Vegas Wash and Tributaries in the Central Region of North Las Vegas

Dear Mr. Paulson:

City of North Las Vegas staff performed the semi-annual inspection of the Las Vegas Wash and Tributaries in the Central Region of North Las Vegas in October, 2003. The semi-annual inspections are a requirement of the co-permittees pursuant to Municipal Stormwater Permit NV0021911.

Several illegal/illicit discharges to the flood control facilities were detected during the inspection. When shopping carts were encountered during the inspection, the shopping cart removal company contracted by the City of North Las Vegas was contacted to remove the shopping carts. When irrigation run-off was encountered during the inspection, the run-off was tracked upstream to the source. The source of the over-watering was informed to keep irrigation on-site.

Noteworthy observations made during the inspection are as follows:

1. <u>"A" Channel at intersection of Lake Mead Boulevard and Pecos Road:</u>
   Fair condition; ponding occurring on the northwest side of Lake Mead Boulevard due to minimal vegetation obstructing the flows. Moderate (not excessive) flow from the City of Las Vegas facilities located to the south.

2. <u>"A" Channel at intersection of Las Vegas Boulevard North:</u>
   Fair condition; ponding occurring on the northwest side of Las Vegas Boulevard due to minimal vegetation obstructing the flows. Moderate (not excessive) flow from

the City of Las Vegas. Shopping carts need to be removed from both sides of Las Vegas Boulevard.

3. Cartier Drain/Channel at intersection of Las Vegas Boulevard North:
Great condition; City crews in the process of removing vegetation and debris between Las Vegas Boulevard and Belmont Street. Minimal flow from residential and business landscaping being diverted around work area. Channel drains to "A" Channel east of Belmont Street. City crews working in the channel unearthed a pipe discharging liquid into the channel. Investigation of that pipe revealed that a City crew had damaged the wastewater lateral at the rear units of the Barker Hotel. Repairs were made by City crews on October 1, 2003, on the same day investigated.

4. "A" Channel at intersection of Cheyenne Avenue:
Good condition; the Cheyenne Avenue Peaking Basin project is currently under construction on the north side of Cheyenne Avenue. Moderate (not excessive) flow from the City of Las Vegas being diverted around work area. A shopping cart needs to be removed from the southern side of Cheyenne Avenue.

5. "A" Channel at the intersection of Civic Center Drive:
Good condition; the Cheyenne Avenue Peaking Basin project is currently under construction from Civic Center Drive to Cheyenne Avenue. Moderate (not excessive) flow from the City of Las Vegas facilities located to the south being diverted around work area.

6. "A" Channel west of Civic Center Drive, at intersection of Interstate 15 overpass:
Good condition; moderate (not excessive) flow emanating from channel paralleling I-15 south from the City of Las Vegas; channel paralleling I-15 to the north has no flow.

7. "A" Channel at Losee Road:
Good condition; slight nuisance flow from irrigation, not enough to reach concrete lined channel. Cheyenne Avenue Peaking Basin project is currently under construction from the north side of Losee Road to Alexander Road. Debris needs to be removed from under bridge. The homeless have begun a massing a collection of debris and shopping carts. The City of North Las Vegas Police Department will be contacted to respond.

8. "A" Channel at Alexander Road:
Good condition; slight nuisance flow from irrigation runoff being diverted around work area. Cheyenne Avenue Peaking Basin project is currently under construction from the north side of Losee Road to Alexander Road.

9. Las Vegas Wash at intersection of Craig Road:
Great condition; no flow to the north, slight nuisance flow from construction activities of the new stormwater collection boxes being constructed on the south side of Craig Road.

10. <u>Stormwater collection channel 500 feet north of Craig Road, on North 5th:</u>
Great condition; slight nuisance flows from irrigation.

11. <u>Las Vegas Wash at Commerce Street:</u>
Great Condition; slight nuisance flows from irrigation. Concrete channel liner has been replaced at location of concrete liner failure.

12. <u>Las Vegas Wash at intersection of Camino Al Norte:</u> Great condition; slight nuisance flow from irrigation runoff.

13. <u>Stormwater collection channel approximately 1/4 mile north of Craig Road, on Clayton Avenue, approximately 200 feet east of Clayton Avenue:</u>
Great condition; slight nuisance flows from irrigation.

14. <u>South of Gowan Road the Las Vegas Wash "N" Channel:</u>
Great condition; No flows. City crews cleaning and grading channel from the south side of Gowan Road to the north side of Cheyenne Avenue.

15. <u>North of Gowan Road the Las Vegas Wash "N" Channel:</u>
Great condition; No flows. New commercial development has completed the construction of the con-arch replacing the open dirt channel along the development.

16. <u>Las Vegas Wash "N" Channel at Alexander Road:</u>
Great condition; No flows. Signs of illegal discharge, blue and red stains on the concrete channel were tracked to K&G Construction located at 2917 East Alexander Road. Sometime since the last wash walk, they had an illegal discharge of an adhesive product in their loading dock which drains to the channel. On October 1, 2003 an investigation of K&G Construction was performed and the source of the blue and red stains were found to be from adhesive products that had been accidentally released on site. A follow-up inspection will be performed prior to October 23, 2003.

17. <u>Las Vegas Wash-Colton (LVCL0000) at intersection of Losee Road:</u>
Fair condition; Slight nuisance flows from commercial irrigation along Losee Road and Colton Avenue. East side of Losee Road vegetation and debris needs to be removed. Vegetation and debris on west side of Losee Road has been removed. The source of the nuisance flow was tracked back to the landscaping at Davey Tree and Shrub Care located on Colton Avenue. City of North Las Vegas work crews will be dispatched to remove debris from channel.

18. <u>King Charles Channel and "A" Channel:</u>
Good condition; The King Charles Channel has no flow entering into "A" Channel from the northern region. The southern region has flows entering into the King Charles Channel from the City of Las Vegas; from the Carey/Smoke Ranch Tributary located between AA-Row Dismantling Yard (125 Miller Avenue) and R&R Salvage (2224 Crestline Loop). As noted in previous reports, this flow may be from

groundwater infiltration.

19. Several containers of what appears to be paint, used petroleum products have been removed from various locations along the wash by the City staff.

The City will perform the next inspection in April 2004.

If you have any questions, please call me at (702) 622-1259.

Respectfully,

Leslie Long

Leslie Long, P.E.
Environmental Service Manager

cc: Kevin Eubanks, P.E., Regional Flood Control District
Matt Wilkinson, P.E., MWH, Las Vegas Office
David Bereskin, P.E.
Lenny Badger, P.E.
John Runiks

City of North Las Vegas

Storm Channel Inspection Report
Spring 2004

CITY OF
NORTH LAS VEGAS

Clark County NPDES Municipal Separate Storm Sewer System Permit

Permit Number NV0021911

PART I: INSPECTION SUMMARY

On April 29 and April 30, 2004, Thomas Rura , Pretreatment Supervisor, and Leslie Long, Technical Services Division Manager for the City of North Las Vegas Utility Department, performed the semi-annual inspection of the Las Vegas Wash channels, tributaries, and detention basins in the Central Region under jurisdiction of the City of North Las Vegas. Visual inspections were performed on the exposed stormwater channel sections and the detention basins. The main purpose for the inspection was to look for illegal discharges to the stormwater collection system.

Weather conditions for April 29 and April 30, 2004 were sunny skies and moderate winds in the morning with high winds in the afternoon. On April 29, 2004, the high temperature was 73°F while the low temperature was 59°F. On April 30, 2004, the temperature was 80°F while the low temperature was 57°F. The last measurable rainfall was a trace on April 17, 2004.

This report has been internally distributed to the Operations Division of the Utilities Department and the Roadway Operations Division and Development and Flood Control Division of Public Works. The responsible sections will preform follow-up actions to remediate noted comments.

Storm channel inspections are conducted semi-annually as specified in the Las Vegas Valley Storm Water Management Plans for Municipal Separate Storm Sewer System (September 2003). Co-permittees of the Clark County NPDES Municipal Separate Storm Sewer System permit, which became effective on June 19, 2003, including the Clark County Regional Flood Control District, Clark County, Henderson, City Las Vegas, City of North Las Vegas and the Nevada Department of Transportation.

No illegal discharges to the flood control facilities were detected during this inspection.

PART II: CHANNELS / BASINS INSPECTED

CHANNEL / BASIN (Date Inspected)	PORTION INSPECTED
Las Vegas Wash - Middle LVMD April 29, 2004	North/south channel between Lake Mead Boulevard and Decatur Boulevard
Lower Las Vegas Wash Detention Basin LVMD 2050 April 29, 2004	Detention Basin located between Camino Al Norte and Clayton Street
Cheyenne Peaking Basin LVMD 1645 April 29, 2004	Detention Basin located between Cheyenne Avenue and Gowan Road.
Las Vegas Wash- N Channel LVNC April 29, 2004	North/south channel between just south of Cheyenne Avenue and I-15
King Charles- N Channel KCNC April 29, 2004	East/west channel between Alexander Road and the King Charles Channel.
Las Vegas - King Charles Channel LVKC April 29, 2004	North/south channel between Gowan Road/I-15 and Craig Road
Upper Las Vegas Wash LVUP April 29, 2004	North/south channel between Craig Road and La Madre Street
Range Wash - West Tributary RWWE April 30, 2004	North/south channel between Craig Road and Vandenberg Detention Basin
Vandenberg Detention Basin RWWE 0170 April 30, 2004	Detention Basin located between Donovan Way and I-15
Range Wash - Railroad Channel RWRR April 30, 2004	North/south channel between Vandenberg Detention Basin and northside of the Union Pacific Railroad tracks
Tributary to Western Tributary at Alexander Road April 29, 2004	West/east channel between North 5th Street and Las Vegas Wash - Middle

CHANNEL / BASIN (Date Inspected)	PORTION INSPECTED
Tributary to Western Tributary at Craig Road April 29, 2004	West/east channel between Alexander Road and Las Vegas Wash - Middle
Gowan Outfall Facilities GOOF April 29, 2004	West/east channel between Ferrell Street and Las Vegas Wash - Middle
Las Vegas - Brooks LVBR April 30, 2004	West/east channel between North 5th Street and west side of the Union Pacific Railroad tracks
Freeway Channel LV15 April 30, 2004	South/north channel between Lake Mead Boulevard and Gowan Road.
Las Vegas Wash - Smoke Ranch LVSR April 30, 2004	West/east channel between Losee Road and Freeway Channel
Las Vegas Wash - Colton LVCL April 30, 2004	West/east channel from the westside of Losee Road and Freeway channel
Carey - Lake Mead Detention Basin LVLM 0223 April 30, 2004	Detention Basin located between Carey Avenue and Lake Mead Boulevard
North Las Vegas Detention Basin LVUP 0405 April 30, 2004	Detention Basin located between and Elkhorn Road
Range wash - Las Vegas Wash Divers Levee LVRW 0293 April 30, 2004	East/west levee Nellis Air Base property and the North Las Vegas Detention Basin
Upper Las Vegas Wash Detention Basin LVUP 0910 April 30, 2004	Detention Basin located between Jones Boulevard and Decatur Boulevard
Kyle Canyon Detention Basin LVMD 3315 April 30, 2004	Detention Basin located between Nickelson Street and Mainwal Boulevard

PART III: INSPECTION RESULTS

LAS VEGAS WASH - MIDDLE CHANNEL

- ❑ At intersection of Lake Mead Boulevard and Pecos Road:
  Fair condition; minor ponding is occurring on the northwest side of Lake Mead Boulevard due to minimal vegetation obstructing the flows. Moderate (not excessive) flow from the City of Las Vegas.

- ❑ At intersection of Carey Avenue:
  Good condition; Pallet and chair in channel on the southeast side of Carey Avenue. Moderate flow. Grading being done on side of channel outside the flow line.

- ❑ At intersection of Las Vegas Boulevard North:
  Good condition; minor ponding is occurring on the northwest side of Las Vegas Boulevard due to minimal vegetation obstructing the flows. Moderate (not excessive) flow from the City of Las Vegas. Grading being done on side of channel outside the flow line.

- ❑ Cartier Drain/Channel south of intersection of Las Vegas Boulevard North:
  Great condition; Minimal flow from residential and business irrigation . Channel drains to "A" Channel east of Belmont Street. Shopping carts and furniture need to be removed . Grading being done on side of channel outside the flow line.

- ❑ At intersection of Cheyenne Avenue:
  Good condition; the Cheyenne Avenue Peaking Basin project is currently under construction on the north side of Cheyenne Avenue. Moderate (not excessive) flow from the City of Las Vegas being diverted around work area.

- ❑ At the intersection of Civic Center Drive:
  Good condition; the Cheyenne Avenue Peaking Basin project is currently under construction from Civic Center Drive to Cheyenne Avenue. Moderate (not excessive) flow from the City of Las Vegas being diverted around work area.

- ❑ At intersection of Civic Center Drive:
  Good condition; the Cheyenne Avenue Peaking Basin project is currently under construction from Civic Center Drive to Cheyenne Avenue. Moderate (not excessive) flow from the City of Las Vegas being diverted around work area.

- ❑ At intersection of Interstate 15 overpass: Good condition; moderate (not excessive) flow emanating from channel paralleling I-15 south from the City of Las Vegas. Shopping cart needs removed. Channel paralleling I-15 to the north has no flow. Two golf carts were found and removed from the channel.

- ❑ <u>At Losee Road:</u>
  Good condition; slight nuisance flow from irrigation. Construction of concrete channel part of Cheyenne Peaking Basin project. Shopping cart and other debris needs to be removed from under bridge.

- ❑ <u>At Alexander Road:</u>
  Good condition; slight nuisance flow from irrigation runoff being diverted around work area. Cheyenne Peaking Basin project is currently under construction from the north side of Losee Road to Alexander Road.

- ❑ <u>At intersection of Craig Road:</u>
  Great condition; no flow. Construction activities of the new stormwater collection boxes have been completed on the south side of Craig Road (LV06 0000). Traffic control barrels and safety netting need to be removed from the north side of Craig Road.

- ❑ <u>At Commerce Street:</u>
  Great Condition; no flow.

- ❑ <u>At intersection of Camino Al Norte:</u>
  Great condition; slight nuisance flow from businesses and residential irrigation runoff along Camino Al Norte.

LOWER LAS VEGAS WASH DETENTION

- ❑ Basin dry.
- ❑ No signs of illegal discharge.
- ❑ No excessive build -up of sediment.

CHEYENNE PEAKING BASIN

- ❑ Basin under construction.
- ❑ Moderate (not excessive) flow being diverted around work area.

LAS VEGAS WASH - N CHANNEL

- ❑ Great condition, channel dry.

KING CHARALES - N CHANNEL

- ❑ Good condition, channel dry.

LAS VEGAS - KING CHARLES CHANNEL

- ❑ Good condition, channel dry.

UPPER LAS VEGAS WASH

- ❑ Good condition, channel dry.

RANGE WASH - WEST TRIBUTARY

- ❑ Good condition, channel dry.

VANDENBERG DETENTION BASIN

- ❑ Basin dry.
- ❑ No signs of illegal discharge.
- ❑ No excessive build -up of sediment.

RANGE WASH - RAILROAD CHANNEL

- ❑ Channel dry.
- ❑ No signs of illegal discharge.

TRIBUTARY TO WESTERN TRIBUTARY AT ALEXANDER ROAD

- ❑ Channel dry, no signs of illegal discharge.
- ❑ Construction underway as part of the Cheyenne Avenue Peaking Basin project.

TRIBUTARY TO WESTERN TRIBUTARY AT CRAIG ROAD

- ❑ Channel dry, no signs of illegal discharge.
- ❑ Construction of concrete channel and box culvert completed.

GOWAN OUTFALL FACILITIES

- ❑ Great condition, channel dry.

LAS VEGAS - BROOKS

- ❑ Channel had minor flow from irrigation from business along Losee Road.

FREEWAY CHANNEL

- ❑ Channel has moderate flows.
- ❑ No illegal discharge.
- ❑ This channel is maintained by NDOT south of Cheyenne Avenue to Lake Mead Boulevard.

LAS VEGAS WASH - SMOKE RANCH

- ❑ Channel has moderate flows.
- ❑ No illegal discharge.

LAS VEGAS WASH - COLTON

- ❑ Fair condition; Slight nuisance flows from commercial irrigation along Losee Road and Colton Avenue.
- ❑ No illegal discharge.

CAREY - LAKE MEAD DETENTION BASIN

- ❑ Basin dry, no signs of illegal discharge.
- ❑ No excessive build -up of sediment.

NORTH LAS VEGAS DETENTION BASIN

- ❑ Basin dry, no signs of illegal discharge.
- ❑ No excessive build -up of sediment.

RANGE WASH - LAS VEGAS WASH DIVERS LEVEE

- ❑ Basin dry.
- ❑ No signs of illegal discharge.
- ❑ An abandoned vehicle found and removed by North Las Vegas Police Department.

UPPER LAS VEGAS WASH DETENTION BASIN

- ❑ Basin dry.
- ❑ No signs of illegal discharge.
- ❑ No excessive build -up of sediment.

KYLE CANYON DETENTION BASIN

- ❑ Basin dry.
- ❑ No signs of illegal discharge.
- ❑ No excessive build -up of sediment.

PART IV: ACTIONS TAKEN AND RECOMMENDED FOLLOW-UP ACTIVITIES

As noted in Part I of the report, the report has been internally distributed to the City Operations Division of the Utilities Department and the Roadway Operations Division and Development and Flood Control Division of Public Works. The responsible divisions will perform follow-up actions to remediate noted comments. Responsible divisions will notify the Environmental Services Section when noted remediations are complete.

The City will perform the next semi-annual inspection of the Las Vegas Wash channels, tributaries, and detention basins in the Central Region under jurisdiction of the City of North Las Vegas in October 2004.

If you have any questions, please call me at (702) 622-1261.

Respectfully,

Thomas Rura
Pretreatment Supervisor

CC: Kirk Medina
Leslie Long
Jennifer Doody
Dennis Scott

Southern Nevada Water Authority
1001 S. Valley View Blvd.
Las Vegas, NV 89153

January 30, 2004

TO: Kevin Eubanks
Assistant General Manager
Clark County Regional Flood Control

FROM: Alec Hart
Environmental Compliance Manager
Southern Nevada Water Authority

RE: **LAS VEGAS STORM WATER PERMIT NV 0021911**
Annual Report of Potable Water Discharges

The attached table provides required information on discharge events greater then 100,000 gallons recorded for the Southern Nevada Water System (SNWS) and the Las Vegas Valley Water District (reporting for, and on behalf of, the City of Las Vegas) for the period: January 1, 2003 through December 31, 2003.

The Las Vegas Valley Water District conducted three (3) reservoir cleanings during 2003. None of these events resulted in the discharge of reportable quantities of water.

In addition to the seasonal well start-up activities, there were fourteen (14) reportable (greater then 100,000-gallon) discharge events (see attached summary). Field Screening techniques were used by trained personnel to determine Turbidity (TSS), chlorine residual and pH (in those instances where dechlorination or acids/bases were used).

Start up and system optimization activities at the River Mountains Water Treatment Plant during August 2003 resulted in the discharge of an estimated 6.6 million gallons of water. Flows were to the Equestrian Storm water detention basin and to the C-1 channel. Information on this activity has been included with the attached discharge summary. If there are any questions, please do not hesitate to contact my office. Thank you.

Attachment

Municipal Stormwater Permit NV0021911
Water Production Division
Las Vegas Valley Water District

ANNUAL REPORT

Potable Water Discharges Greater Than 100,000 Gallons
Discharge Events Report for the Period January 1, 2003 to December 31, 2003

Date	Facility Name/ Location	Amount (Gallon)	BMP*	Cl	TSS	pH
01/07/03	Azure west of Rainbow	142,800	2, 8	0.00	n/a	0
01/13/03	Well 104	109,080	2, 3	0.00	n/a	0
01/13/03	Well 104	283,680	2, 3	0.00	n/a	0
01/14/03	Well 104	651,360	2, 3	0.00	4.33	0
01/15/03	Well 104	639,692	2, 3	0.00	0.95	0
01/16/03	Well 104	581,130	2, 3	0.00	0.68	0
01/17/03	Well 104	470,470	2, 3	0.00	0.70	0
02/03/03	Well 105	460,110	2, 3	0.00	2.61	0
02/04/03	Well 105	321,392	2, 3	0.00	2.48	0
02/05/03	Well 105	493,142	2, 3	0.00	n/a	0
02/06/03	Well 105	496,321	2, 3	0.00	0.77	0
02/07/03	Well 105	518,760	2, 3	0.00	0.66	0
02/11/03	Well 105	347,984	2, 3	0.00	n/a	0
02/12/03	Well 105	261,170	2, 3	0.00	n/a	0
02/13/03	Well 105	353,425	2, 3	0.00	0.74	0
02/21/03	Grand Canyon Resv.	215,850	2, 7	0.00	0.00	0
02/24/03	Well 105	262,905	2, 3	0.00	2.64	0
02/25/03	Well 105	423,522	2, 3	0.00	0.84	0
02/26/03	Well 105	198,560	2, 3	0.00	0.73	0
02/27/03	Well 105	243,432	2, 3	0.00	1.88	0
02/28/03	Well 105	115,680	2, 3	0.00	13.20	0
03/10/03	Nellis and Boulder Hwy	576,000	2, 8	0.00	n/a	0
03/24/03	Jones and Dorreal Street	1,080,000	2, 8	0.08	n/a	0
04/01/03	Boulder Hwy/Indois & Nellis	300,000	2, 8	0.10	1.00	0
05/01/03	Well 98	109,386	2, 3	0.00	12.20	0
05/02/03	Well 94	131,070	2, 3	0.00	11.90	0
05/02/03	Well 22A	106,590	2, 3	0.00	7.47	0
05/03/03	Well 90	127,110	2, 3	0.00	13.10	0
05/05/03	Well 52	135,575	2, 3	0.00	10.40	0
05/07/03	Well 28	530,400	2, 3	0.00	2.64	0
05/08/03	Well 28	804,000	2, 3	0.00	26.40	0
05/09/03	Well 28	1,012,500	2, 3	0.00	18.60	0
05/12/03	Well 28	594,000	2, 3	0.00	8.62	0
05/13/03	Well 28	638,000	2, 3	0.00	0.45	0
05/14/03	Well 28	148,500	2, 3	0.00	0.76	0
05/20/03	Well 34	185,000	2, 3	0.00	n/a	0
05/20/03	3710 Sandhill	500,000	2, 8	n/a	n/a	0
05/22/03	Well 34	374,880	2, 3	0.00	47.60	0
05/27/03	Twain & Sandhill	750,000	2, 7	0.06	n/a	0

Date	Facility Name/ Location	Amount (Gallon)	BMP*	Cl	TSS	pH
06/02/03	Well 7A	176,750	2, 3	0.00	119.00	0
06/02/03	Well 73	198,600	2, 3	0.00	10.10	0
06/02/03	Well 83	225,000	2, 3	0.00	45.00	0
06/02/03	Well 117	107,700	2, 3	0.00	10.50	0
06/03/03	Well 5A	105,600	2, 3	0.00	7.60	0
06/03/03	Well 13	238,700	2, 3	0.00	13.30	0
06/03/03	Well 15A	1,958,180	2, 3	0.00	11.80	0
06/03/03	Well 93	139,692	2, 3	0.00	13.40	0
06/04/03	Well 1A	413,020	2, 3	0.00	12.10	0
06/04/03	Well 24	160,968	2, 3	0.00	16.00	0
06/04/03	Well 88	276,760	2, 3	0.00	8.96	0
06/05/03	Well 27	110,132	2, 3	0.00	14.50	0
06/05/03	Well 89	147,108	2, 3	0.00	9.69	0
06/05/03	Well 104	169,326	2, 3	0.00	15.80	0
06/09/03	Well 85	772,560	2, 3	0.00	11.00	0
06/23/03	Tee Pee & Grand Teton	170,000	2, 8	n/a	n/a	0
07/03/03	4426 Swandale	132,000	2, 8	n/a	n/a	0
07/07/03	Well 74	124,200	2, 3	0.00	n/a	0
07/07/03	Well 75	125,000	2, 3	0.00	n/a	0
07/09/03	Spring Mtn/ Wynn & Valley View	132,000	2, 8	n/a	n/a	0
08/26/03	Well 116	527,850	2, 3	0.00	7.83	0
08/31/03	10120 W. Flamingo	150,000	2, 8	n/a	n/a	0
09/02/03	3100 Buffalo	115,000	2, 8	n/a	n/a	0
09/19/03	Las Vegas Springs Preserve	105,000	2	0.10	1.00	0
09/27/03	4450 E. Washington	120,000	2, 8	0.75	n/a	0
10/07/03	7620 Torey Pines	108,000	2, 8	n/a	n/a	0
10/22/03	713 E. Sahara	150,000	2, 8	n/a	n/a	0
10/28/03	1524 D Street	264,240	2, 8	n/a	n/a	0
10/30/03	1012 Robin	150,000	2, 8	n/a	n/a	0
10/30/03	1484 Gateway	140,000	2, 8	n/a	n/a	0
11/06/03	Rancho & Bonanza	150,000	2, 8	n/a	n/a	0
11/07/03	Flamingo & Cabana	245,000	2, 8	n/a	n/a	0
11/27/03	325 Bermuda	700,000	2, 8	n/a	n/a	0
12/12/03	Well 82	100,800	2, 3	0.00	n/a	0
	TOTAL	24,602,662	Gallons			

Field Screening techniques were used to determine Turbidity (TSS), chlorine residual and pH (where dechlorination or acids/bases were used).

* List of Best Management Practices:

BMP	Description
1	Dechlorination of Discharge
2	Discharge to Improved Surface
3	Engineered Energy Dissipaters
4	Filter or Silt Fence
5	Sediment Barriers
6	Scheduling
7	Flow Rate Contreol
8	Emergency Repair

Municipal Stormwater Permit NV0021911
Water Production Division
Southern Nevada Water System

ANNUAL REPORT

Potable Water Discharges Greater Than 100,000 Gallons
Discharge Events Report for the Period January 1, 2003 to December 31, 2003

Date	Facility Name/Location	Amount (Gallon)	BMP*	Cl	TSS	pH
11/25/03	Contract 170-B/ Sta. 195 & 40	624,000	2	0	0	0
09/17/03	Equestarian Basin	3,600,000	3, 5	n/a	n/a	0
04/03/03	Raw water reg. Tank #2	150,000	3, 8	0	0	0
	TOTAL	4,374,000	Gallons			

Field Screening techniques were used to determine Turbidity (TSS), chlorine residual and pH (where dechlorination or acids/bases were used).

* List of Best Management Practices:

BMP	Description
1	Dechlorination of Discharge
2	Discharge to Improved Surface
3	Engineered Energy Dissipaters
4	Filter or Silt Fence
5	Sediment Barriers
6	Scheduling
7	Flow Rate Contreol
8	Emergency Repair

SOUTHERN NEVADA
WATER AUTHORITY

Administrative Office
1001 S. Valley View Blvd.
Las Vegas, Nevada 89153
Telephone: (702) 258-3939
Fax: (702) 258-3268

Project Office
1900 E. Flamingo, Ste. 170
Las Vegas, Nevada 89119
Telephone: (702) 862-3400
Fax: (702) 862-3470

Southern Nevada Water System
243 Lakeshore Road
Boulder City, NV 89005
Telephone: (702) 564-7697
Fax: (702) 564-7222

January 30, 2003

Mr. Cliff Lawson
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
333 West Nye Lane, Room 129
Carson City, NV 89706-0851

Subject: Annual Potable Water Discharge Information for the Southern Nevada Water System, Las Vegas Valley Water District Water and the City of Las Vegas

Dear Mr. Lawson:

The Southern Nevada Water System (SNWS) is responsible for providing the Las Vegas Valley Water District, and subsequently the City of Las Vegas, with potable water. Under current arrangement, the City of Las Vegas does not operate any water wells, reservoirs, or pumping stations. Therefore the City does not conduct activities resulting in potable water discharges subject to the existing discharge reporting agreement between the Division of Environmental Protection, the Clark County Regional Flood Control office, and municipal water purveyors in southern Nevada.

Pursuant to the above referenced discharge reporting agreement, the Southern Nevada Water Authority (SNWA) on behalf of SNWS, the City of Las Vegas and the Las Vegas Valley Water District provides the attached summary discharge information. This includes discharges that occurred at specific "in-valley" locations of unincorporated Clark County and in the City of Las Vegas during 2003.

If there are any specific questions regarding this submittal, please do not hesitate to contact me at 702-822-8349.

Sincerely,

Alec Hart C.E.M.
Manager,
Environmental Compliance

Attachment

cc: Kevin Eubanks, Clark County Regional Flood Control District
Lori Wohletz, City of Las Vegas, Environmental Services
Las Vegas Valley Water District Environmental File

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Maintenance Staff Training for Illicit Discharge Detection

Information taken from Nevada Division of Environmental Protection
Storm Water Branch

Stormwater?

BMP?

What do I look for?

Clean Water Act?

Information taken from Nevada Division of Environmental Protection
Storm Water Branch

The U S Clean Water Act
as amended

- A law enacted by Congress that includes a requirement for USEPA to control storm water discharges as needed to protect water quality
- Final regulations published in *Federal Register* on November 16, 1990
- Amendments to 40 CFR 122.26(b)(14)
- NDEP is the designated permitting authority

Information taken from Nevada Division of Environmental Protection
Storm Water Branch

Definitions

- CWA = Clean Water Act
- NPDES = National Pollutant Discharge Elimination System
- SWMP = Storm Water Management Plan
- SQMC = Stormwater Quality Management Committee
- SWPPP = Storm Water Pollution Prevention Plan
- MS4 = Municipal Separate Storm Sewer System
- BMP = Best Management Practice

Information taken from Nevada Division of Environmental Protection
Storm Water Branch

Definitions

- discharge = water and/or pollutants released into a drainage system
- drainage system = a series of streets, inlets, storm drains, channels, and washes which convey stormwater
- stormwater = rainfall runoff
- non-stormwater discharge = a discharge which is not a result of rainfall (pollutant)
- permittee = the governing entity (e.g. City of Henderson, City of Las Vegas, City of North Las Vegas, Clark County)

SWMP

- The requirement:
  - Municipal maintenance staffs for streets and storm drains from each permittee will be trained to look for evidence of non-stormwater discharges to the drainage system during their normal duties. A process for reporting potential problems will be established.

Areas to be Monitored During Normal Course of Duties:

- Storm Drains
- Washes
- Along streets

Program to Detect and Eliminate Existing Illegal/Illicit Discharges

- Visual Field Investigations During Normal Duties:
  - Illegal discharges
  - Illicit connections
  - Illegal dumping of wastes
  - Checklist - turn in to supervisor
- Follow Up Activities by Others:
  - May require further field investigations

Storm Drains and Washes

- Examples of Illegal Discharges:
  - Discharge from industrial site
  - Overflow Discharge from commercial car wash
  - Discharge from construction site
- Example of Illicit Connections:
  - Connection of pipe
- Examples of Illegal Dumping:
  - Industrial waste (e.g. containers)
  - Residential: oil/grease, paint, pool waste

Street Maintenance Checklist

- Questions to ask yourself
- What should you look for?

Street Maintenance Checklist

- Is there evidence of sediment discharged from the property?

- Look for:
  - Sediment in street or curb and gutter downstream of construction or industrial site
  - Sediment over topping perimeter BMPs (sand bags, silt fences, hay bales, sediment basins)
  - Sediment-filled catch basings or drain inlets
  - Unprotected soil stockpiles at edge of site
  - Washdown of track-out into drainage system


BRAKE SHOP
'99 11 2
Information taken from Nevada Division of Environmental Protection
Storm Water Branch


AUSTIN WHITE LIME
'99 11 2
Information taken from Nevada Division of Environmental Protection
Storm Water Branch

Street Maintenance Checklist

- Is there evidence of chemicals (e.g. paint, oil, concrete, solvents) discharged from a property?
- Look for:
  - Stained or discolored earth or pavement at the edge of sites
  - Chemical odors
  - Pooled liquid waste near the edge of sites
  - Evidence of construction vehicle washing or maintenance in offsite areas

Street Maintenance Checklist

- Is there evidence of excessive vehicle track-out from the property?

- Look for:
  - Excessive sediment on roadways adjacent to construction or industrial site ingress/egress areas

Street Maintenance Checklist

- Is there evidence of any other inappropriate substances or materials discharged from the property?
- Look for:
  - Construction materials
  - Trash
  - Leaking portable toilets
  - Excessive Dust

Recommended Actions:

- By Maintenance Staff:
  - Fill out and submit Inspection and Maintenance Checklist
  - Report problem(s) to direct supervisor
- By Others:
  - Refer problem to local authorities if violation of local stormwater regulations is likely. These regulations prohibit discharge of any non-stormwater substance to local drainage facilities.
  - Refer problem to NDEP if gross violation of stormwater regulations is likely, or if contractor has clearly not complied with normal requirements of construction site SWPPPs and BMPs.

Recommended Actions:

- Requirements that were covered are minimum requirements
- Be on the lookout for any other type of illegal discharge
- Report any and all violations

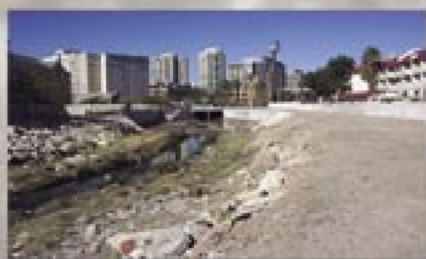
NDEP Websites

SQMC website

http://www.lvstormwater.com

Bureau of Water Pollution Control

http://ndep.state.nv.us/bwpc/bwpc01.htm



Appendix F

APPENDIX F

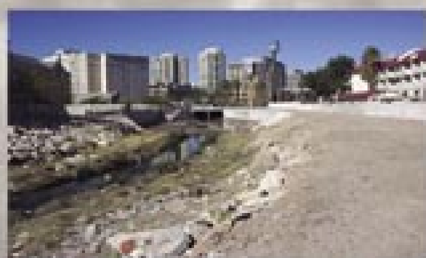
CITY OF LAS VEGAS
STORMWATER COMPLIANCE INSPECTION FORM

LAS VEGAS VALLEY MUNICIPAL SEPARATE STORM SEWER PERMIT
INDUSTRIAL FACILITY MONITORING AND CONTROL PROGRAM

CITY OF LAS VEGAS STORMWATER COMPLIANCE INSPECTION FORM

Facility Name		
Contact Name		
Address		
Digest		
Follow-up / Referral Action Required		
Inspector (Print / Sign)		
Date	Time	IWS Permit

City of Las Vegas, Industrial Waste Section, 6005 East Vegas Valley Drive, Las Vegas, Nevada 89142
Phone: (702) 229-6594 Fax: (702) 641-9738 E-mail: iws@lasvegasnevada.gov



Appendix G

APPENDIX G

REVIEW OF CONSTRUCTION SITE BMP MANUALS

Clark County Regional Flood Control District
Las Vegas Valley Stormwater Management Plan

Best Management Practices Update

August 2004

MWH
Denver, Colorado

Table of Contents

1. INTRODUCTION

This document summarizes stormwater best management practices (BMPs) that are effective in arid climates including Las Vegas Valley, Nevada. BMPs for construction, permanent installation and maintenance practices are all discussed. The review of BMPs was prepared to fulfill the requirements of the Las Vegas Valley Municipal Separate Storm Sewer System Storm Water Management Plan (SWMP), and to provide an updated compendium of BMPs suitable for use in the Las Vegas Valley. The current version of the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (CCRFCD Manual), adopted in 1999, contains a list of recommended post-construction structural BMPs including:

- Infiltration basin
- Infiltration trench
- Porous pavement
- First flush diversion system
- Dry extended detention pond
- Vegetated swale
- Water quality inlet

These BMPs are discussed herein. In addition, the following sources were reviewed for BMPs that could potentially be added to the CCRFCD BMP manual:

- Truckee Meadows Construction Site Best Management Practices Handbook, 2003
- Truckee Meadows Structural Controls Design Manual, 2004
- State of Nevada Handbook of Best Management Practices, 1994

Further guidance was gathered from a number of recent California Department of Transportation (Caltrans) BMP reference materials. Caltrans is a leader in conducting research in the practical design, construction, maintenance, and performance of BMPs.

The Las Vegas Valley's arid climate and rapid rate of development necessitate special requirements for BMPs. BMPs will be most effective in the Las Vegas Valley if they meet the following criteria:

- Cost effective
- Feasible in an arid environment without irrigation
- Feasible for controlling runoff from high-intensity thunderstorm events
- Capable of handling high sediment loads
- Feasible in a high growth area

These criteria were considered when evaluating BMPs for inclusion in the CCRFCD Manual and will be important for other BMP guidance documents that may be prepared in the future.

2. PERMANENT (POST-CONSTRUCTION) BMPS

Table 2-1 summarizes the permanently installed BMPs that were found in the references from **Section 1** that are potentially applicable to the Las Vegas Valley. **Table 2-2** summarizes those BMPs that were listed in the references but are not recommended for the Las Vegas Valley because they do not meet the required criteria. The BMPs listed as not recommended are not suitable for the arid climate of the Las Vegas Valley because they would require an external water source in most situations.

Table 2-1. Potentially Applicable Post-Construction BMPs for the Las Vegas Valley

BMP	BMP Manual Citations			
	CCRFCD, 1999	Nevada, 1994	Truckee, 2004	Truckee, 2003
Infiltration basin	X	X	X	
Infiltration trench	X	X	X	
Porous pavement	X		X	
First flush diversion system	X			
Dry extended detention basin	X	X	X	X
Water quality inlet	X		X	
French drain		X		
Dry well		X		
Permanent diversion structures		X		X
Slope shaping / Retaining structures				X
Storm drain outlet protection				X
Level spreader/waterspreading		X		
Filter strips (landscaping)		X	X	
Preserving existing vegetation				X
Rolled erosion products				X
Rip rap				X
Fiber rolls				X
Windbreaks		X		X
Revegetation		X		X
Rock and gravel mulch		X		
Landscape detention			X	
Sand filter basin			X	
Surface media filter			X	
Underground media filter			X	
Hydrodynamic separator			X	
Wet vault			X	

Table 2-2. Post-Construction BMPs not recommended for the Las Vegas Valley

BMP	BMP Manual Citations			
	CCRFCD, 1999	Nevada, 1994	Truckee, 2004	Truckee, 2003
Constructed wetlands		X	X	
Vegetated swale	X	X	X	
Stormwater ponds			X	
Modular wetlands			X	

Some of the permanent BMPs can also be used temporarily at construction sites. Construction BMPs that are strictly temporary are summarized in **Section 3**. The potentially applicable permanent BMPs for the Las Vegas Valley are discussed below.

2.1 Infiltration Basin

Infiltration basins capture stormwater and allow it to infiltrate into the ground. Pollutants such as suspended solids, metals, nutrients, and bacteria are removed through sedimentation, adsorption, and filtration. Infiltration through soils is shown to have a high rate of pollutant removal. Infiltration basins may be vegetated with plants that are tolerant to both moist and dry conditions.

Applications

- Areas with well drained and pervious soils.
- Drainage areas between 5 and 50 acres.
- Areas adjacent to roadways and near interchanges

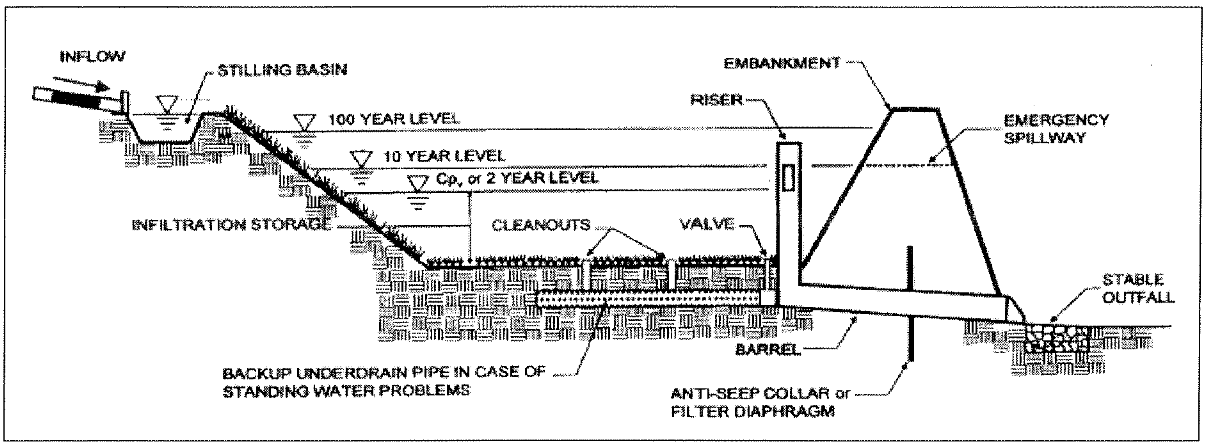


Figure 2-1. Typical Infiltration Basin Profile View

Figure Source: Truckee, 2004

Limitations

- Should not be used in areas where hazardous or toxic materials are stored outdoors and the potential for a spill is relatively high.
- Areas with highly erodible soils will require more maintenance.
- May require a large amount of space.
- Should not be used in areas with existing soil or water contamination.
- Should not be used in areas with clay or silty soils.
- Difficult to maintain and restore if clogging occurs.
- Design may require pretreatment for sediment removal.

Reference: Truckee, 2004

2.2 Infiltration Trench

A trench lined with filter fabric and filled with rock. The trench captures runoff and facilitates infiltration. Pollutants are removed through adsorption, precipitation, filtering and possibly biological action.

Applications

- Drainage areas less than 5 acres
- Small size facilitates use in small spaces, such as along the perimeter of a site, and in retrofit applications
- Median strips and parking lot islands

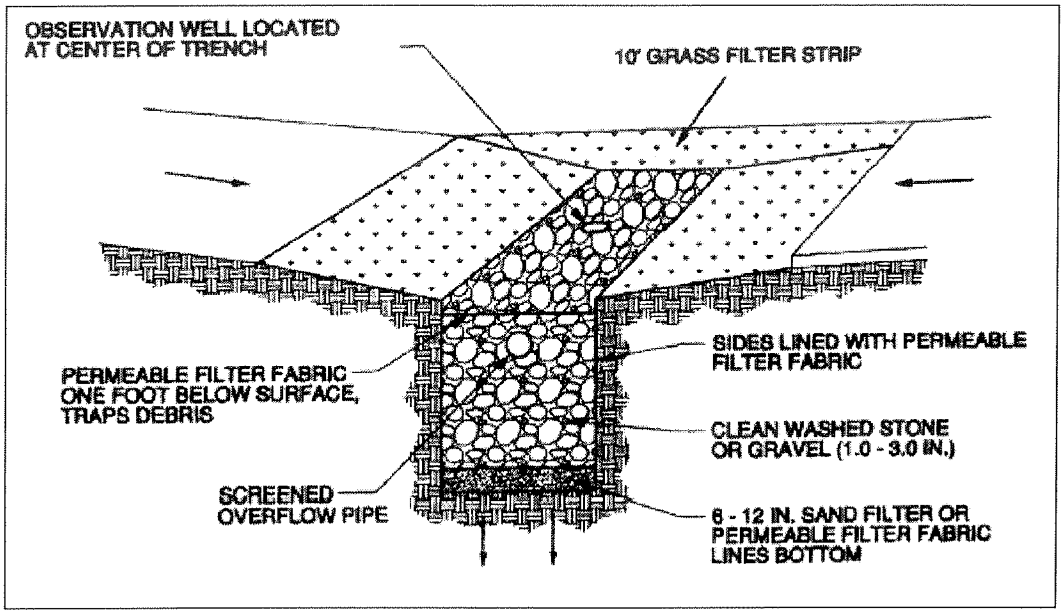


Figure 2-2. Side View of Typical Infiltration Trench

Figure Source: Truckee, 2004

Limitations

- Do not use in areas with highly erodible soils because sediments could clog pores.
- Do not apply on slopes greater than 20 percent.
- Should only be used in porous soils with an infiltration rate of at least 0.5 inches per hour.
- Do not use on sites with a high risk of spills.
- Design may require pretreatment for sediment removal.

Reference: Truckee, 2004

2.3 Porous Pavement

Porous pavement is designed to reduce runoff and ponding on paved surfaces. The pavement is typically composed of concrete or brick blocks with pervious openings. Porous pavement typically overlays a sub-base constructed of gravel, sand, or other porous material.

Discharge from the sub-base typically consists of infiltration to the underlying soils with an overflow to a receiving water, or direct discharge to a receiving water or other treatment system. The sub-base detains the water and provides some filtration benefits.

Applications

- Substitute for conventional pavement in areas with low traffic volume
- Parking areas
- Low traffic volume roadways with little to no truck traffic
- Residential driveways, residential street parking lanes, overflow parking areas, maintenance walkways/trails, stopping lanes on divided highways, patios

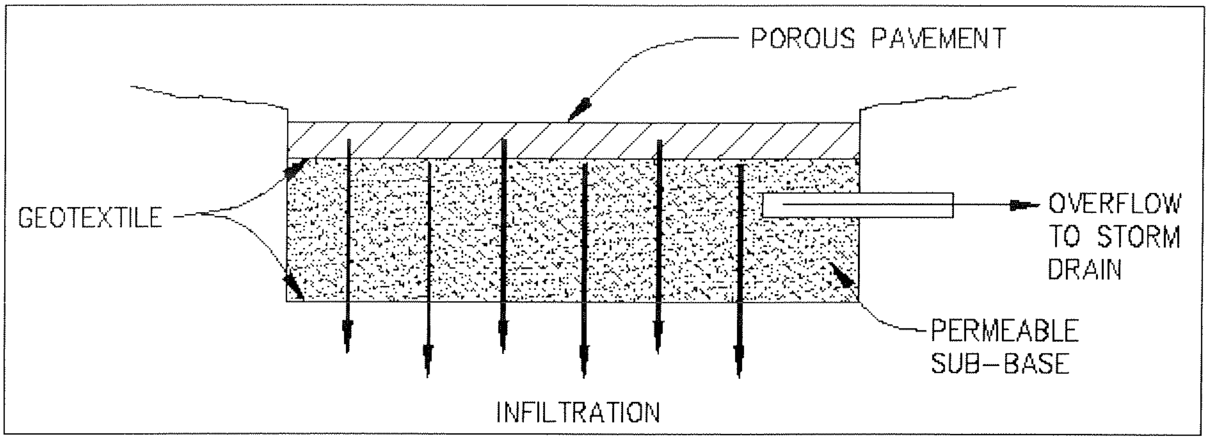


Figure 2-3. Porous Pavement used for Infiltration

Figure Source: Truckee, 2004

Limitations

- Not suitable for high traffic areas or where speeds exceed 30 mile per hour
- May become clogged
- Maintenance costs can be high if blocks become clogged with sediment
- Can become an uneven driving surface

Reference: Truckee, 2004

2.4 First Flush Diversion System

First flush diversion systems are designed to divert the more polluted first flush of stormwater and non-stormwater flows from their normal conveyance paths and hold them for later water quality treatment. The system usually has a chamber with an outlet to the treatment device and an overflow weir to discharge to the storm drain system. The diverted first flush and low flows are not discharged to surface water, but are stored until they are treated by some sort of treatment device. The first flush diversion system subjects the treatment system to a lower volume of potentially more polluted water.

Applications

- Existing or new storm drains

- Prior to any water quality treatment system

Limitations

- Adequate space for a treatment facility is needed.
- Requires regular inspection and maintenance.

Reference: CCRFCD, 1999

2.5 Dry Extended Detention Basin

Dry extended detention basins allow for the collection and slow draining of stormwater runoff. Sediments and associated pollutants are settled out of the water in the detention basin. The stormwater detention can also have flood control benefits. The outlet structure is designed to detain the water quality volume for 2 to 7 days for adequate settling. Between storm events the basin is dry unless there is a baseflow.

Applications

- The outlet structure of flood control detention facilities can be retrofitted to create an extended detention pond for added water quality benefit.
- Typically used as a regional BMP for residential, commercial, and industrial areas.
- Can be used as a small scale pretreatment device.

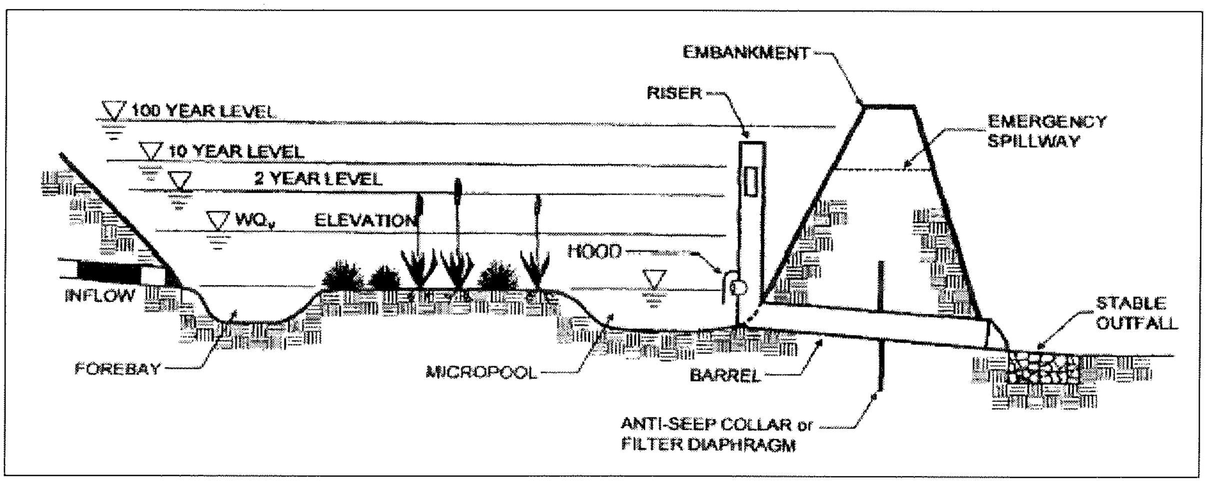


Figure 2-4. Typical Dry Extended Detention Pond in Profile

Figure Source: Truckee, 2004

Limitations

- Must be landscaped and maintained to not detract from the value of neighboring homes.
- Discharges can increase the temperature of downstream receiving waters.

Reference: Truckee, 2004

2.6 Water Quality Inlet

A water quality inlet is a BMP designed to remove oil and grease and some sediment from stormwater. They typically consist of three chambers that promote sedimentation of coarse materials and removal of oil floating on the water surface.

Applications

- Industrial areas where there is a risk of leaks or spills because hydrocarbons can be captured by the device
- Airport aprons, equipment washdown areas, gas stations, loading docks
- Pretreatment system prior to additional treatment controls.

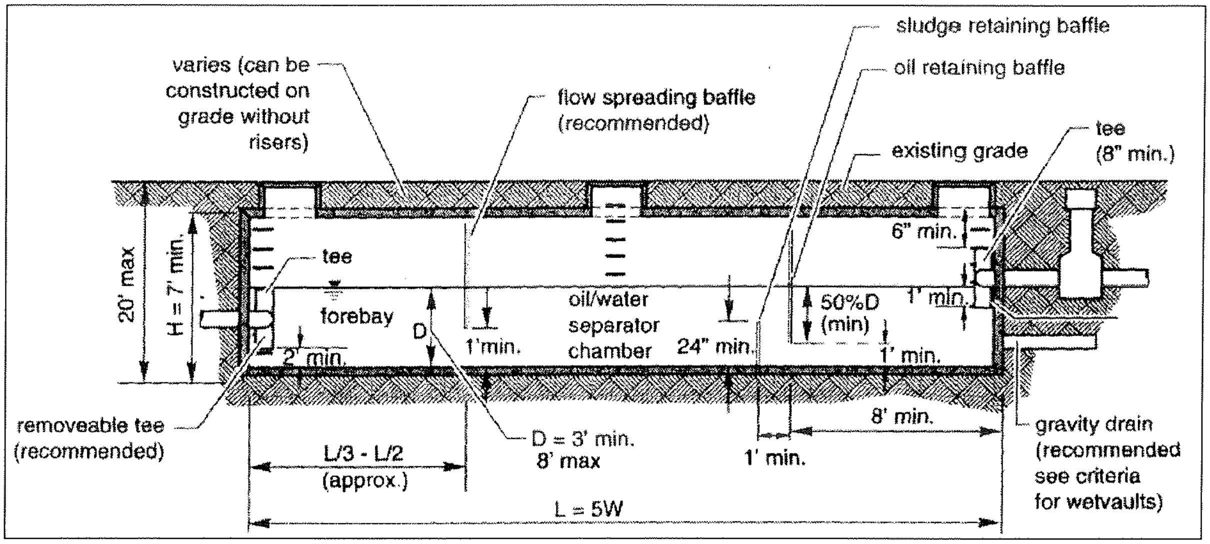


Figure 2-5. Water Quality Inlet Profile View

Figure Source: Truckee, 2004

Limitations

- The flow through design and small storage space limits effectiveness of removing metals and nutrients.
- Frequent maintenance required to prevent resuspension of captured sediments
- Limited pollutant removal for constituents other than oil and grease
- Cannot be used for the removal of dissolved or emulsified oils.
- Standing water can create mosquito habitat.

2.7 French Drain

A french drain is a trench containing a perforated drainage pipe surrounded by gravel used to convey water underground and facilitate infiltration.

Applications

- Steep slopes where the storage capacity of infiltration trenches is limited and excess water must be conveyed to a different location
- Used to convey roof top runoff away from foundations.
- Adjacent to impervious surfaces

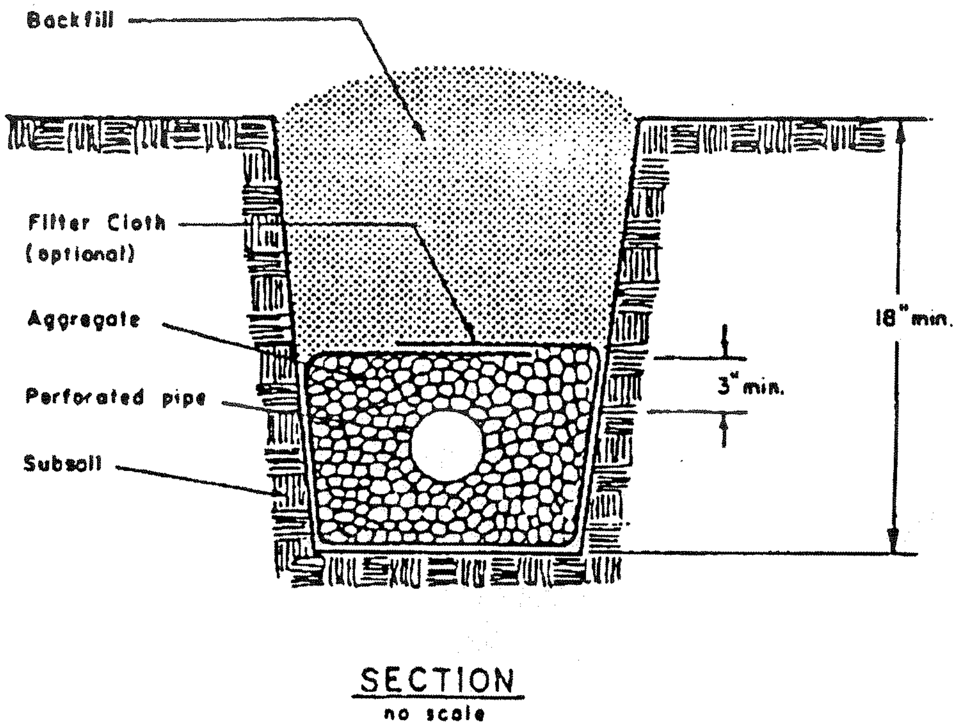


Figure 2-6. French Drain

Figure Source: Nevada, 1994

Limitations

- May be costly
- Regular maintenance is required to remove accumulated debris
- Susceptible to clogging; use only where loads of sediments and other solids are very low.
- Should not be used where the risk of spills is high.

Reference: Nevada, 1994

2.8 Dry Well

A dry well is a stone or gravel filled pit, deeper than it is wide, that facilitates infiltration of stormwater.

Applications

Applicable to sites requiring additional storage or infiltration capacity for runoff from impervious surfaces or as an alternative to infiltration trenches on steeper slopes.

Limitations

- Permits may be required
- Should not be used if groundwater level is near the surface
- Requires soils with high transmissivity
- Susceptible to clogging; use only where loads of sediments and other solids are very low.
- Should not be used where the risk of spills is high.

Reference: Nevada, 1994

2.9 Permanent Diversion Structures

These systems are concentrated flow conveyance structures that can be used alone or in combination to intercept and divert surface flows. Such structures include trenches, swales, dikes, dams, and pipes. Flows are diverted to infiltration or storage BMPs prior to entering sensitive waterways. Diversion systems convey discharge with a minimum of soil erosion, both onsite and downstream and can be used to stabilize drainage channels.

Applications

- To decrease the threat of runoff from upstream watersheds that could pose a hazard resulting in property damage or erosion.
- To protect upland slopes by reducing slope lengths and minimizing erosion and soil loss.
- To reduce runoff velocities and increase stability by reducing channel slope and adding channel liners.

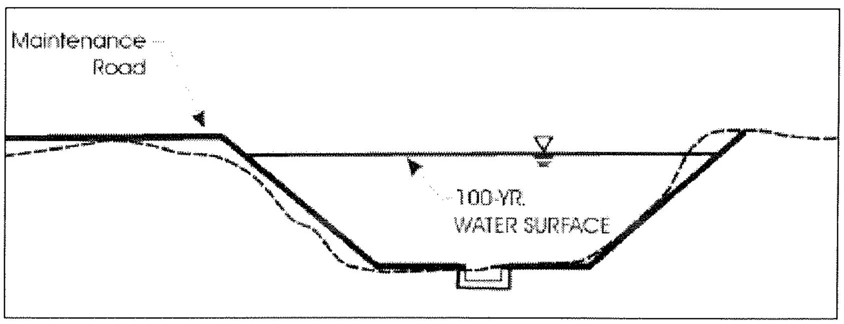


Figure 2-7. Typical Open Channel Replacing Natural Swale

Figure Source: Truckee, 2003

Limitations:

- May require watershed modeling and engineering design
- May require additional measures to ensure channel stability and function.
- When used alone, do not prevent conveyance of pollutants to downstream water bodies.

Reference: Truckee, 2003

2.10 Slope Shaping/Retaining Structures

Slope shaping is designing and modifying cut or fill slopes to reduce the soil erosion and runoff potential. Terraces, benches, steps, and retaining walls can all be used to reduce steep and unstable slopes to reduce the velocity of surface runoff and increase the distance of overland flow for infiltration and sedimentation.

Applications

Applicable to all slopes.

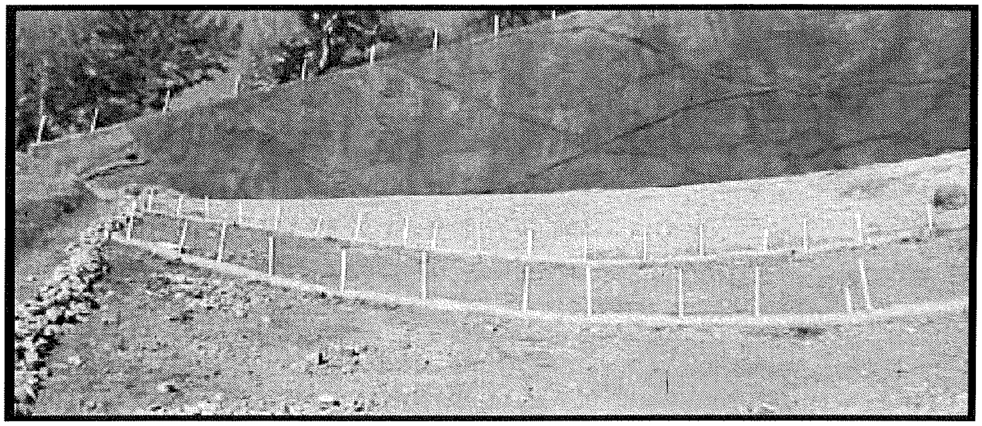


Figure 2-8. Benches and Retaining Wall on Slope

Figure Source: Caltrans, 2003b

Limitations

- Engineers must perform the design.

Reference: Nevada, 1994

2.11 Storm Drain Outlet Protection

Stormdrain outlet protection is used to reduce stormwater flow velocities and energy by placing riprap, grouted riprap, or concrete aprons at pipe outlets within channels. This BMP can be effective at controlling sediment caused by erosion, but not other pollutants.

Applications

- At locations where discharge velocities and energies may erode downstream reaches
- Pipe, drain culvert, conduit or channel outlets
- At outlets located at the bottom of mild to steep slopes
- At the outlets of channels that carry continuous flows
- Outlets subject to short, intense flows of water
- Points where lined conveyances discharge to unlined conveyances

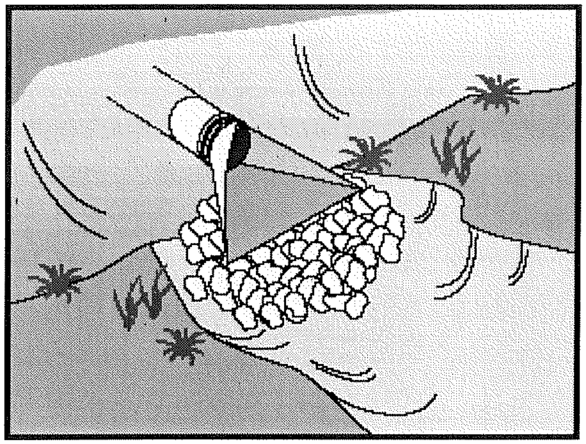


Figure 2-9. Storm drain Outlet Protection

Figure Source: Truckee, 2003

Limitations

- Riprap can be displaced.
- Stability can be affected by downstream channel degradation

Reference: Truckee, 2003

2.12 Level Spreader/Waterspreading

Devices used to convert concentrated flow to sheet flow in order to reduce erosion potential and encourage sedimentation and infiltration. Level spreaders are typically used to cause sheet flow over vegetated areas.

Applications

Used at locations where concentrated runoff from unstabilized areas can be diverted onto stabilized areas under sheet flow conditions; e.g., at diversion dikes or runoff interception trench outlets.

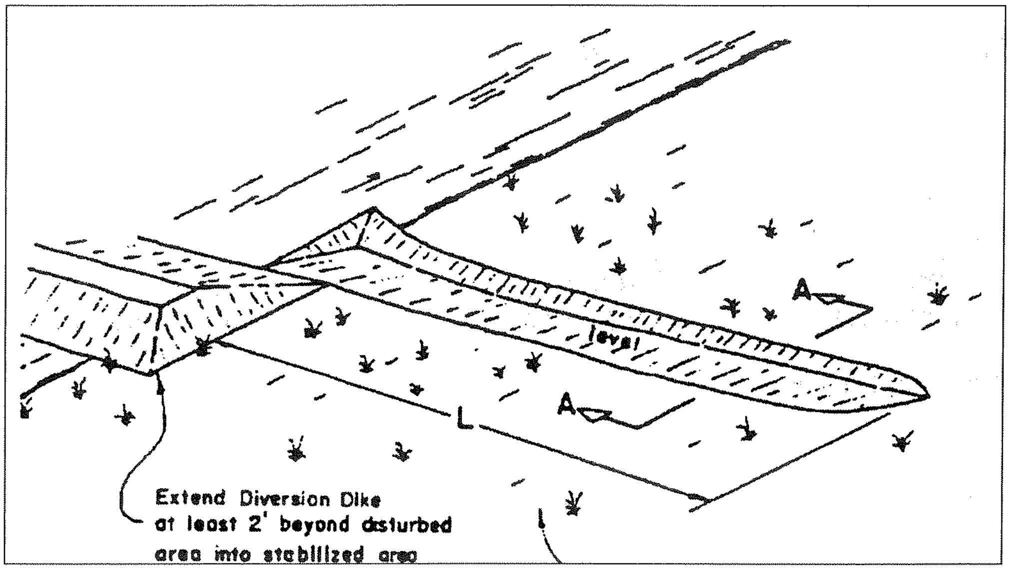


Figure 2-10. Level Spreader

Figure Source: Nevada, 1994

Limitations

- Not appropriate for temporary constructions sites (Caltrans, 2003a).

Reference: Nevada, 1994

2.13 Filter Strips

Strips of close growing vegetation located to receive runoff from diffuse sources, waterways, drains, paved areas and intermittent streams before the water enters a larger waterway. Filter strips provide a desilting area to remove sediments from runoff. Strips can be areas of existing vegetation.

Applications

Applies to all land uses where topography, soils and moisture supplies are suitable for establishment of filter strips. Can be incorporated in urban landscaping to treat runoff from paved areas prior to discharge to waterway.

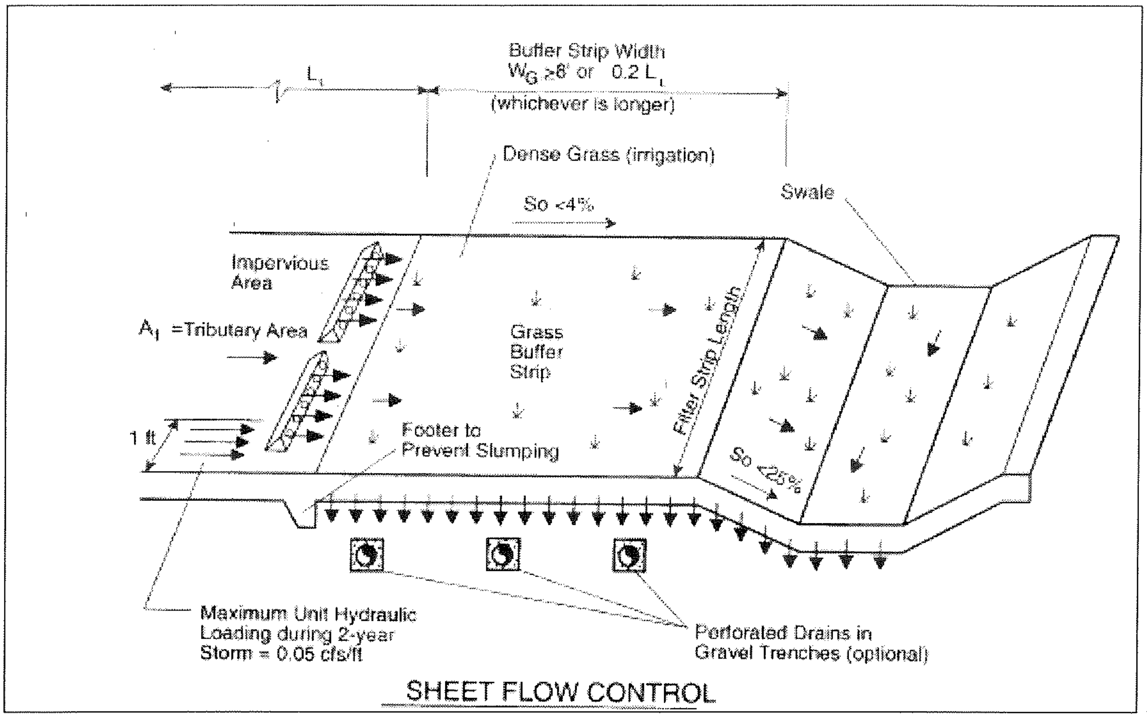


Figure 2-11. Filter Strips

Figure Source: Truckee, 2004

Limitations

- Only applicable in areas that would be irrigated for landscaping purposes.

Figure Source: Nevada, 1994

2.14 Preserving Existing Vegetation

Preserving existing vegetation is the process of identifying and protecting desirable plants and trees prior to construction to retain their erosion control and aesthetic benefits. This practice can be used at any construction site in areas that do not need to be disturbed to complete the project. Preserving existing vegetation is a cost effective way to reduce the amount of disturbed soil area subject to erosion. Temporary fencing may be needed to protect the existing vegetation during construction.

Applications

- Can be used on all types of construction sites
- Applicable for floodplains, wetlands, streambanks, steep slopes, future construction areas, and sensitive habitat areas that have desirable vegetation.

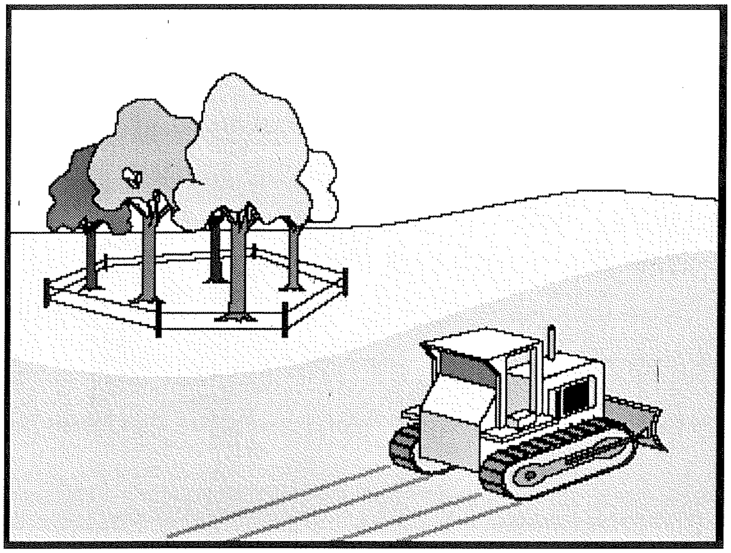


Figure 2-12. Preserving Existing Vegetation

Figure Source: Truckee, 2003

Limitations

- May reduce the working area available during the construction phase.
- Limited effectiveness in areas where only native vegetation is sparse desert habitat

Reference: Truckee, 2003

2.15 Rolled Erosion Products

Rolled erosion control products include geotextiles, plastic covers, turf reinforcement mats, erosion control blankets, or cellular confinement systems, that are unrolled over disturbed slopes to reduce erosion.

Applications

Effective on steep slopes (3H:1V or greater) with high erosion potential, slopes that are adjacent to streams or wetlands, on disturbed soils that are slow to establish vegetative cover, and on slopes where mulch must be anchored. Can also be applied in stream channels where flow velocities exceed 3 feet per second. Many products are designed to allow vegetation to grow through over time.

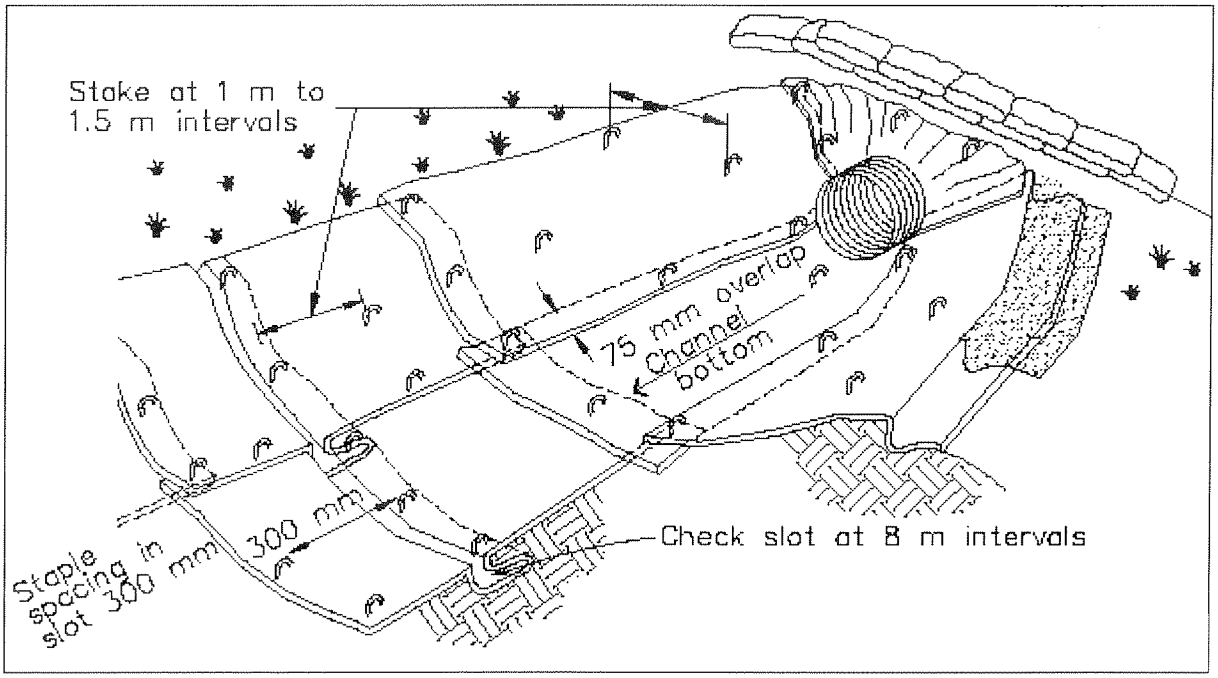


Figure 2-13. Rolled Erosion Control Product Installed in Swale

Figure Source: Caltrans, 2003d

Limitations

- Tends to be more expensive than other erosion control methods (Caltrans, 2003a)
- Cannot be used on rocky or mowed surfaces
- Shorter life span in severe environments

Reference: Truckee, 2003, figure available

2.16 Rip Rap

Rock applied to slopes to prevent erosion from concentrated flow.

Applications

Used on cut-and-fill slopes, channel side sloes, channel bottoms, inlets and outlets of culverts and slope drains, and streambanks.

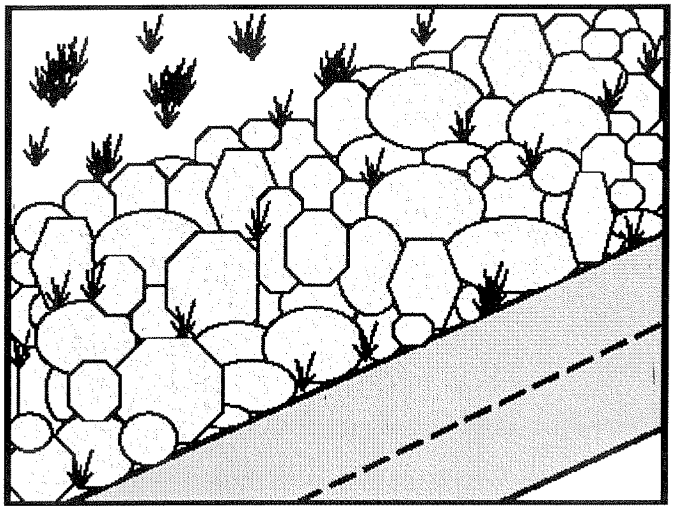


Figure 2-14. Rip Rap

Figure Source: Truckee, 2003

Limitations

- Can be expensive without local sources of rock
- Provides little habitat or other environmental values

Reference: Truckee, 2003

2.17 Fiber Rolls

Materials rolled or bound into a roll and placed on a slope or edge of disturbed area to intercept runoff, reduce flow velocity, release runoff as sheet flow, and remove sediment from the runoff. Fiber rolls are generally staked to the ground to hold them in place.

Applications

- Along the face of slopes to reduce the slope length
- At grade breaks where slopes transition from shallow to steep
- In drainage swales
- Along streambanks

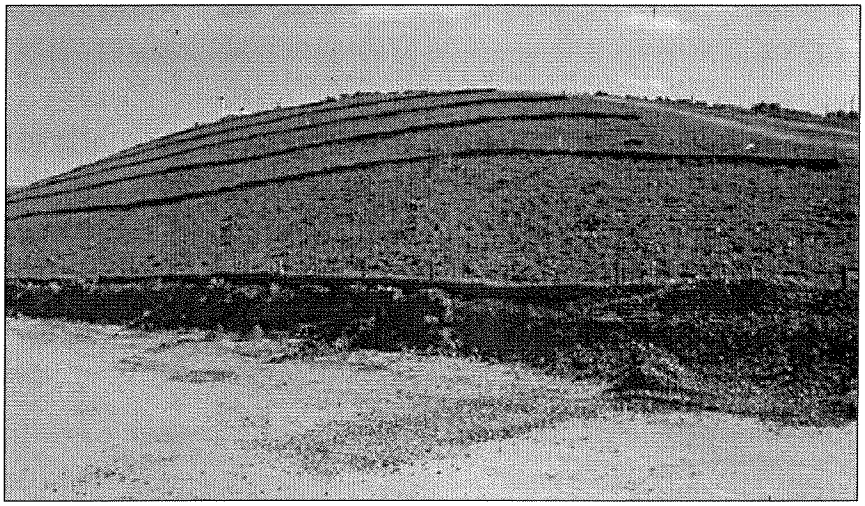


Figure 2-15. Fiber Rolls on Hillside

Figure Source: Caltrans, 2003c

Limitations

- Applicable where surface flows do not exceed 1 cfs and on slopes of less than 3H:1V.
- Fiber rolls are not to be used at the base of slopes in place of linear sediment barriers such as silt fences.
- Can be overwhelmed by high sediment loads.

Reference: Truckee, 2003

2.18 Windbreaks

Windbreaks are barriers used to reduce and redirect wind, typically consisting of trees and shrubs, but may also consist of perennial and annual crops, fences, or other structures. Along with benefits such as energy savings, windbreaks can reduce soil erosion.

Applications

Windbreaks are applicable wherever a reduction or redirection of winds is desired. The resulting reduction in wind speed leads to microclimate changes that create desirable environments for growing crops, raising livestock, reducing snow drifting, protecting living and working areas, and reducing wind-related surface erosion that produces airborne particulates and subsequent deposition during rainfall events.

Limitations

Irrigation and fencing may be required during the establishment period of planted windbreaks.

Reference: Nevada, 1994

2.19 Revegetation

Revegetation is the establishment of plants to reduce erosion, increase soil moisture, increase infiltration, and provide habitat. There are a variety of methods to revegetate such as hydroseeding and sod.

Applications
Can be applied on slopes, adjacent to waterways, as buffer strips and landscape corridors. When revegetating with xeriscape approaches, use mulches or other methods to assure soil stability.

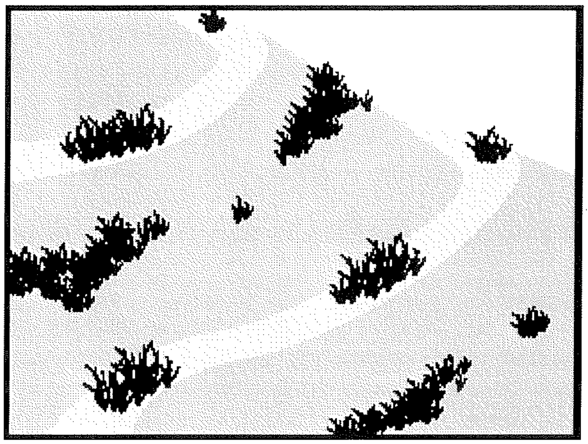


Figure 2-16. Revegetation

Figure Source: Truckee, 2003

Limitations

- May require irrigation particularly until vegetation is established.
- Climate, soils, and topography must all be considered when choosing the appropriate seed mix.
- Desert landscaping may provide limited erosion protection, particularly when first established.

Reference: Truckee, 2003

2.20 Rock and Gravel Mulch

Rock or gravel mulch is applied to exposed soil to reduce erosion.

Applications
Can be used on construction sites, dirt roads, driveways, other areas of light vehicular activity, and surface disturbance areas. Effective when incorporated in desert landscaping.

Limitations

- Slopes steeper than thirty percent may require additional sediment and erosion control structures.
- Installation and maintenance requires heavy equipment.

Reference: Nevada, 1994

2.21 Landscape Detention

Landscape detention consists of a low-lying vegetated area underlain by a sand reservoir and an underdrain system. The main purpose is to improve water quality and detain surface flows from small storm events. Runoff from large storm events should be diverted to the conventional storm drain system. Secondary benefits may include shade and wind breaks, reduced irrigation, and improved aesthetics.

Applications

- Street median strips, parking lot islands and edges, and roadside swales where irrigated landscaping would normally be used.
- May be implemented in natural surface depressions and swales.

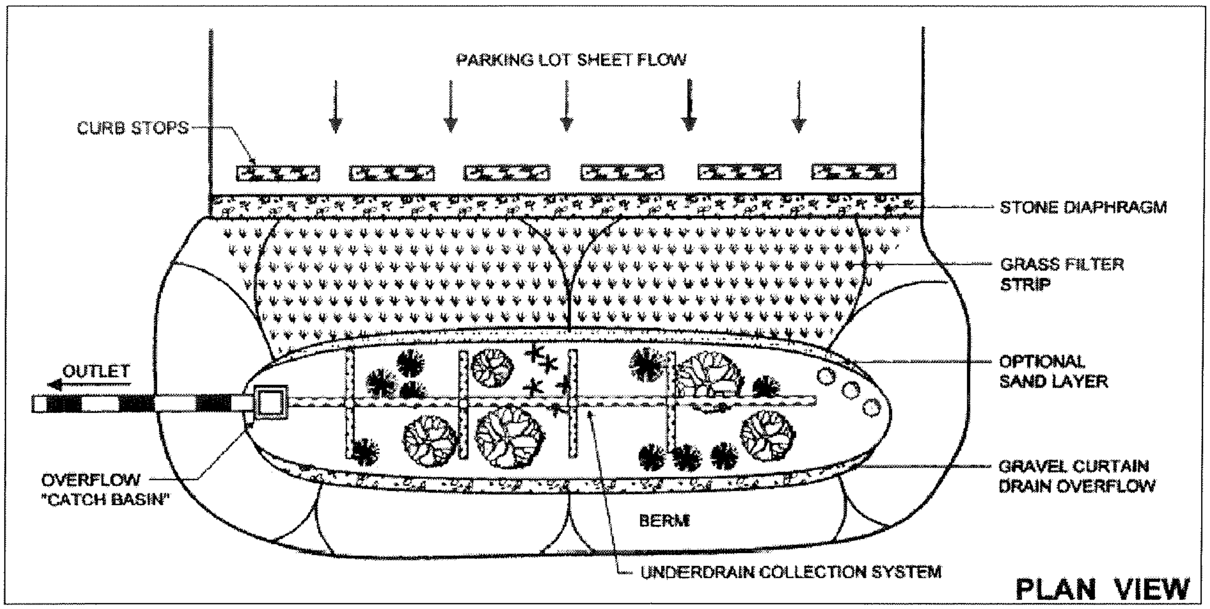


Figure 2-17. Landscape Detention Facility for Parking Lot Runoff

Figure Source: Truckee, 2004

Limitations

- Clogging may be a problem in areas with high sediment load
- May require vector management.
- Drainage area should be less than 1 acre.
- Plants must be able to survive in wet and dry environments.

Reference: Truckee, 2004

2.22 Sand Filter Basin

A sand filter basin is a combination of a sand filter and a dry extended detention basin. Runoff collects in the basin and infiltrates through a sand bed to an underdrain. The underdrain discharges to the storm drain system or receiving water. Sediments and associated pollutants are removed.

Applications

- Urban areas with relatively low sediment loads and no baseflow.
- Used as an offline treatment device where high flows bypass system.

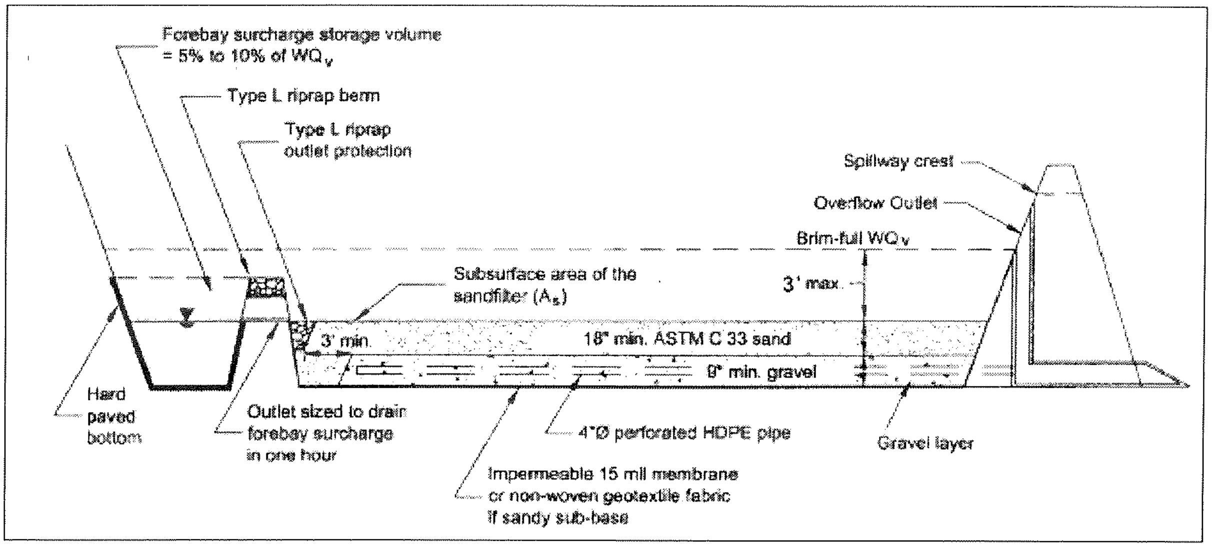


Figure 2-18. Profile of Sand Filter Basin

Figure Source: Truckee, 2004

Limitations

- Potential for clogging
- Should not be installed in new developments until construction is complete and all soils are stabilized.

Reference: Truckee, 2004

2.23 Surface Media Filters

Surface media filters use sedimentation, adsorption, and filtration to remove sediment and associated pollutants. Runoff first enters a sedimentation chamber to remove floatables and heavier suspended sediments. Water is then directed to a media filter bed equipped with an underdrain system.

Applications

- Drainage areas from 0.5 to 50 acres of both pervious and impervious surfaces.
- Transportation facilities, large parking areas, commercial developments
- Highly developed areas
- Steep slopes
- Retrofit for existing sites

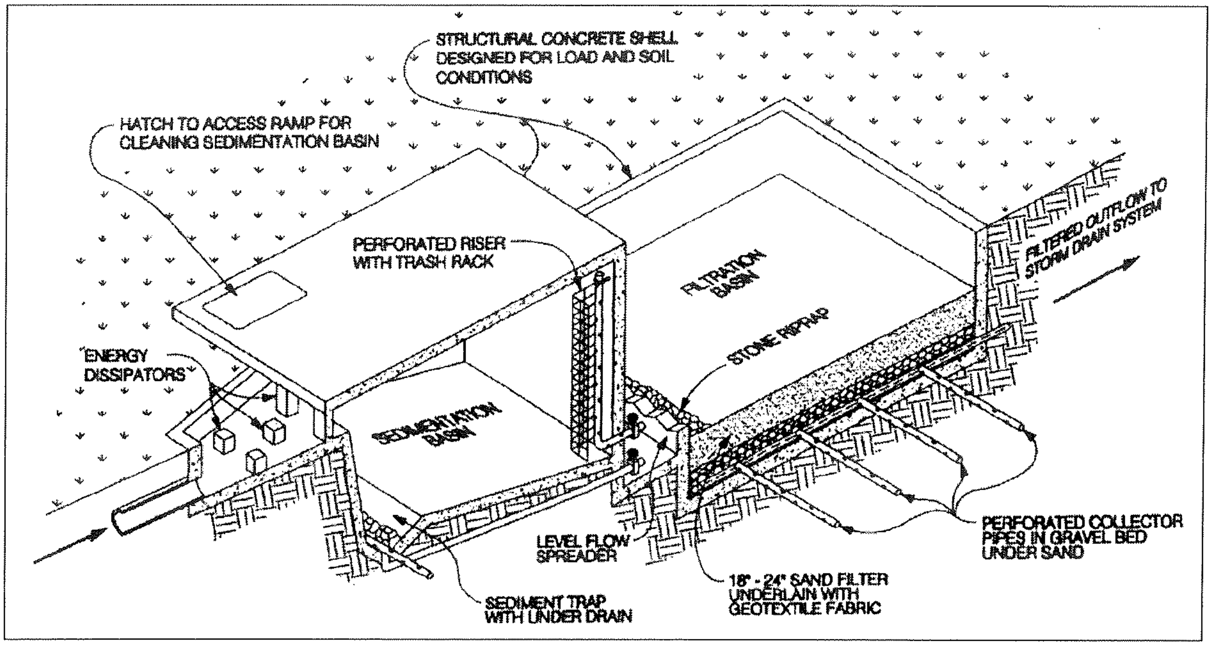


Figure 2-19. Surface Sand Filter

Figure Source: Truckee, 2004

Limitations

- Should not be used in areas with high sediment loads unless used with pretreatment.
- Can become clogged if not maintained.
- Can only be used in areas with sufficient elevation change to allow the system to drain by gravity.
- Sufficient space required

Reference: Truckee, 2004

2.24 Underground Media Filter

The underground media filter contains the components of a surface media filter underground. Underground sand filters are typically equipped with a bypass mechanism for high flows. A sedimentation chamber removes floatables and heavy sediments. Then, a sand, or other media, filter bed equipped with an underdrain removes finer sediments and associated pollutants.

Proprietary versions of the underground media filter are also available. These systems may use more complicated configurations or containers for the filter media.

Applications

- Highly urbanized areas
- Placed under parking lots, sidewalks, or close to buildings
- Locations with limited land area

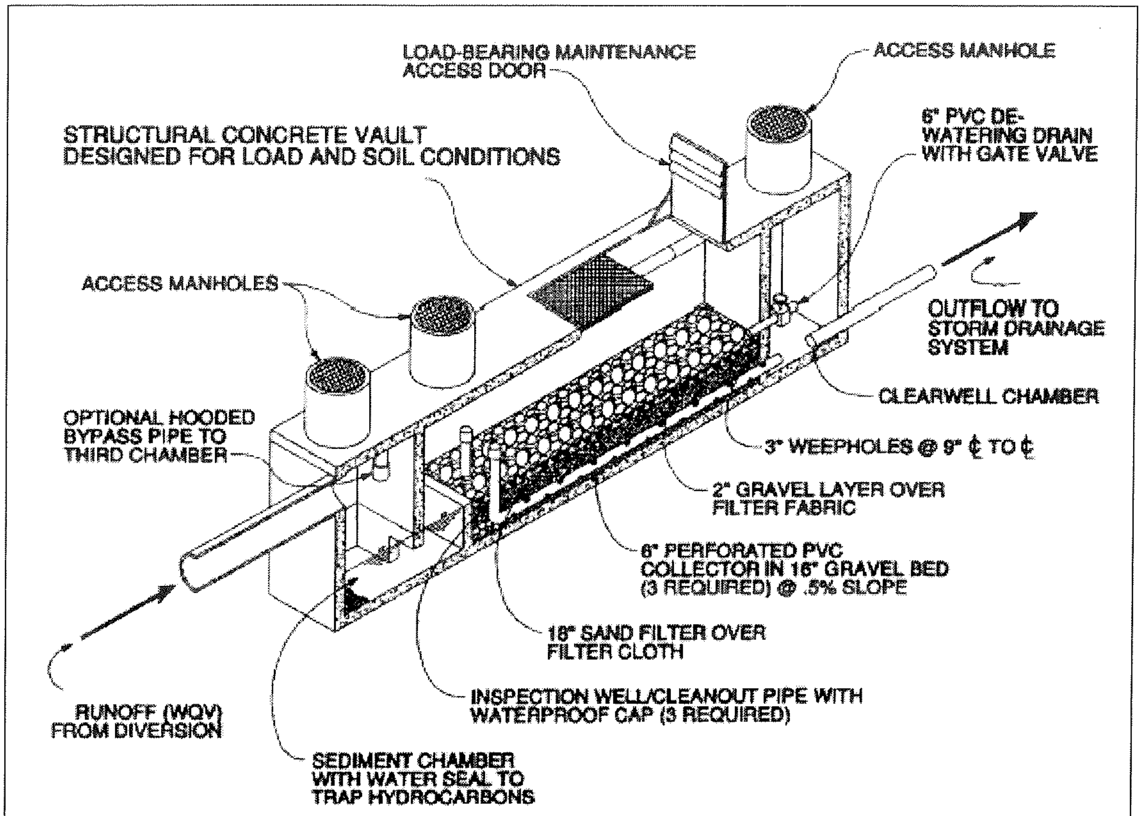


Figure 2-20. D.C. Type Underground Sand Filter

Figure Source: Truckee, 2004

Limitations

- Potential for clogging
- Standing water in sediment chamber may provide mosquito habitat if points of entry are not completely sealed.

Reference: Truckee, 2004

2.25 Hydrodynamic Separator

Hydrodynamic separators are round gravity separators designed to remove trash and debris as well as some sediment, oil and grease from urban runoff. Various types of separators are available from commercial vendors. They consist of flow-through structures that have a settling or separation unit to remove sediment or other debris. The energy of the water flowing into the separator is utilized to create centrifugal forces that allow suspended sediment and attached pollutants to move to the center of the device and settle to the bottom. Heavy pollutants and floatables have the best removal efficiency. Dissolved pollutants are not removed.

Applications

- Added to new or existing storm drains
- Can be used in small spaces

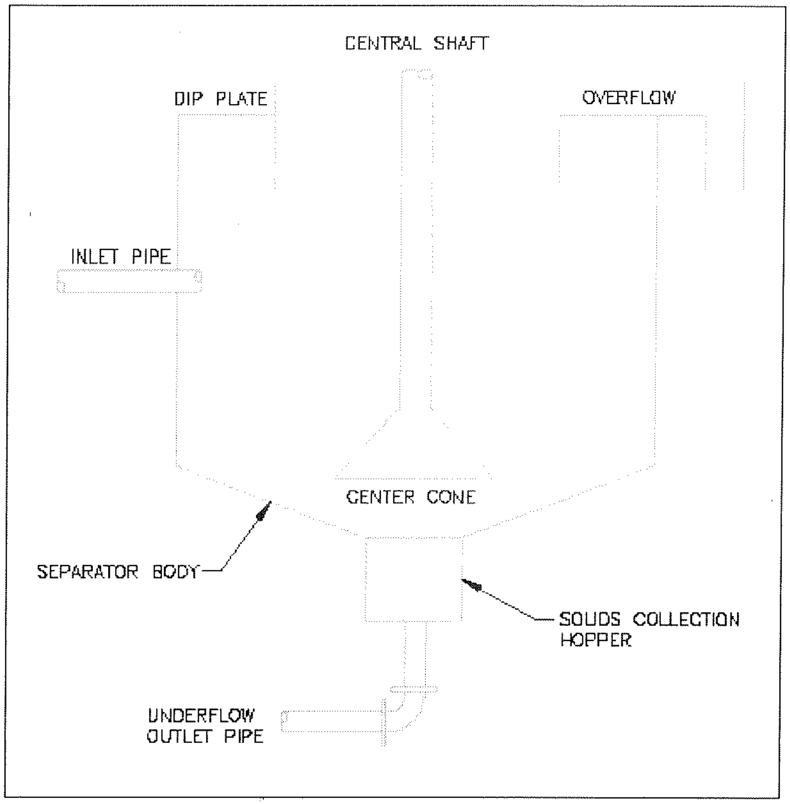


Figure 2-21. General Schematic of Hydrodynamic Separator

Figure Source: EPA, 1999

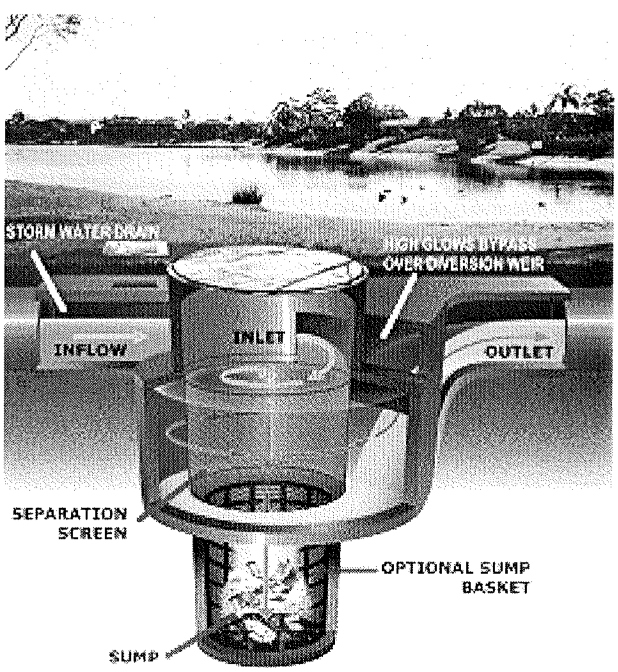


Figure 2-22. CDS Brand Hydrodynamic Separator

Figure Source: CDS, 2004

Limitations

- Will not significantly remove pollutants such as nutrients, which adhere to fine particulates or are dissolved.
- Units with standing water can provide mosquito habitat.
- Non-steady flows of stormwater can decrease efficiencies that are estimated from testing under constant flow.
- Maintenance is required to remove accumulated debris.

Reference: Truckee, 2004

2.26 Wet Vaults

Wet vaults are subterranean structures designed to dissipate the energy of stormwater runoff with baffles and chambers to promote the settling of particulate stormwater pollutants. They have a permanent pool of water that is typically 3 to 5 feet deep. They may also have a constricted outlet that causes a temporary rise in the water level of the pool during storm events. Manufactured wet vaults are available in different configurations and capacities.

Applications

- Typically used on commercial, industrial, or roadway projects where space limitations preclude the use of other treatment BMPs.

Limitations

- Can be considerably more expensive than other types of BMPs. However, the cost may be offset by the value of continued use of the land surface.
- Limited removal of dissolved constituents.
- Treatment efficiencies decline as sediment fills the storage chamber.
- Maintenance can require special equipment.
- Standing water may create mosquito-breeding habitat.

Reference: Truckee, 2004

3. TEMPORARY CONSTRUCTION BMPS

Temporary BMPs for construction sites are meant to be removed following completion of a construction project. They are frequently used to mitigate the effects of disturbed soil surfaces at the construction site. The temporary construction BMPs discussed in this report are summarized in **Table 3-1**.

Table 3-1. Potentially Applicable BMPs for the Las Vegas Valley

BMP	BMP Manual Citations	
	Nevada, 1994	Truckee, 2003
Temporary diversion dikes and ditches		X
Check dams		X
Temporary slope drains		X
Soil binders		X
Brush and rock filters		X
Sand bag sediment barriers	X	X
Straw bale barriers	X	X
Gravel filter berm		X
Silt fences	X	X
Temporary sediment traps		X
Stabilized construction site access		X
Construction exit tire wash		X
Stabilized construction roadway		X
Temporary steam crossing		X
Storm drain inlet protection	X	X
Catch basin inlet filters		X
Wood mulch	X	X
Hydraulic mulch		X
Straw mulch	X	X

3.1 Temporary Diversion Dikes and Ditches

Captures and diverts runoff away from unprotected slopes.

Applications

- Used upslope of disturbed area
- Located at the perimeter of construction sites
- Intercepts runoff from paved surfaces
- Directs runoff to sediment trapping devices or stabilized outlets

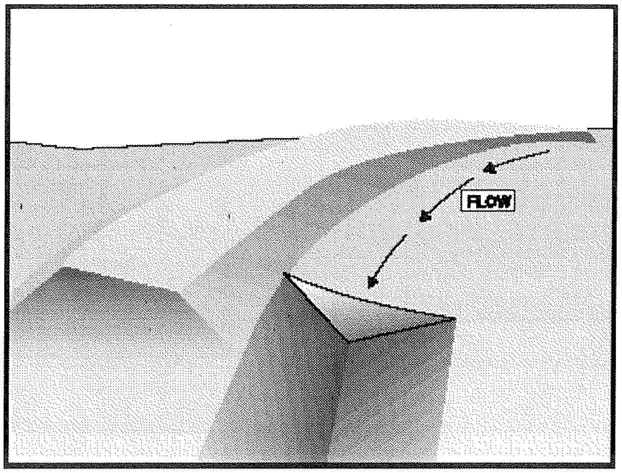


Figure 3-1. Temporary Diversion Dikes and Ditches

Figure Source: Truckee, 2003

Limitations

- Erosion and scour of newly graded swales is possible
- Can be expensive if engineering design is required

Reference: Truckee, 2003

3.2 Check Dams

Check dams are small structures constructed of rock or sandbags placed across a channel or drainage ditch. The purpose is to reduce erosion by slowing the velocity of flow in the ditch.

Applications

- Used in small open channels draining 10 acres or less
- Used in steep channels when runoff velocities exceed 5 feet per second
- Used when establishing grass linings in channels or drainage ditches

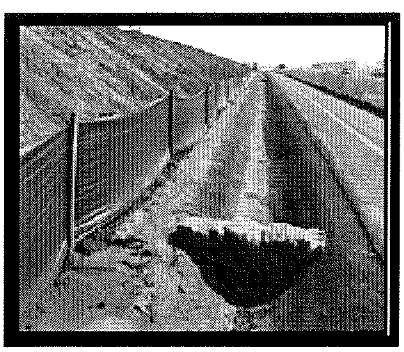


Figure 3-2. Check Dam

Figure Source: Caltrans, 2003b

Limitations

- Sediments must be removed for maintenance

- Should not be used in live streams
- Should not be used in channels draining areas larger than 10 acres

Reference: Truckee, 2003

3.3 Temporary Slope Drains

Conveys concentrated runoff across a slope to a stabilized discharge point to reduce erosion.

Applications

Used on construction sites where surface runoff could cause slope erosion.

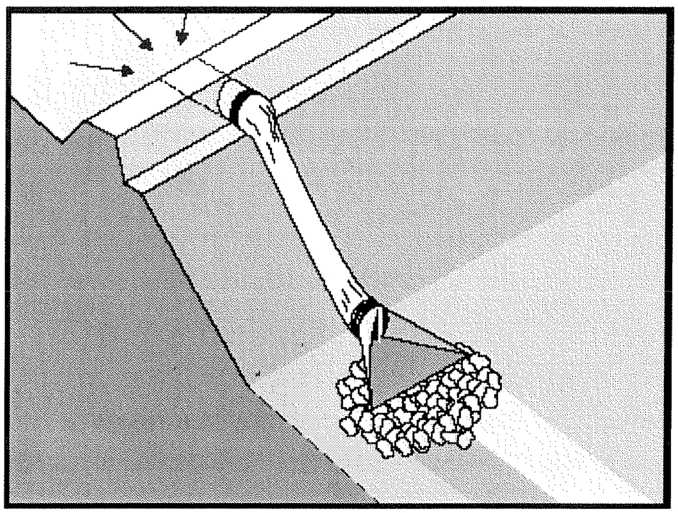


Figure 3-3. Temporary Slope Drain

Figure Source: Truckee, 2003

Limitations

- Slope drain can become clogged.
- High flows must be dissipated at drain outlet to avoid downstream erosion.

Reference: Truckee, 2003

3.4 Soil Binders

Soil binders are polymeric or lignin sulfonate soil stabilizers used for temporary soil stabilization. Soil binders typically are applied to disturbed areas requiring temporary protection from erosion. They can be used in locations where other methods such as seeding of vegetation is not possible.

Applications

- Locations where other methods such as temporary or permanent seeding of vegetation can't be applied
- Used in combination with vegetative perimeter practices to enhance erosion and sediment control.
- Often used for dust control to comply with air quality regulations.

Figure 3-4. Soil Binder Application

Figure Source: Caltrans, 2003b

Limitations

- May limit infiltration and increase runoff
- Only temporary, must be reapplied
- Some soil binders do not perform well in climates with low relative humidity
- Overuse may adversely affect water quality
- Chemical stabilizers are expensive compared to vegetation

Reference: Truckee, 2003

3.5 Brush and Rock Filters

Berms of rock or brush temporarily detain and filter runoff, help retain sediment on construction sites, and slowly release water in sheet flow.

Applications

- Along the border of disturbed areas
- Contributing drainage areas of less than 5 acres
- Along streams and channels

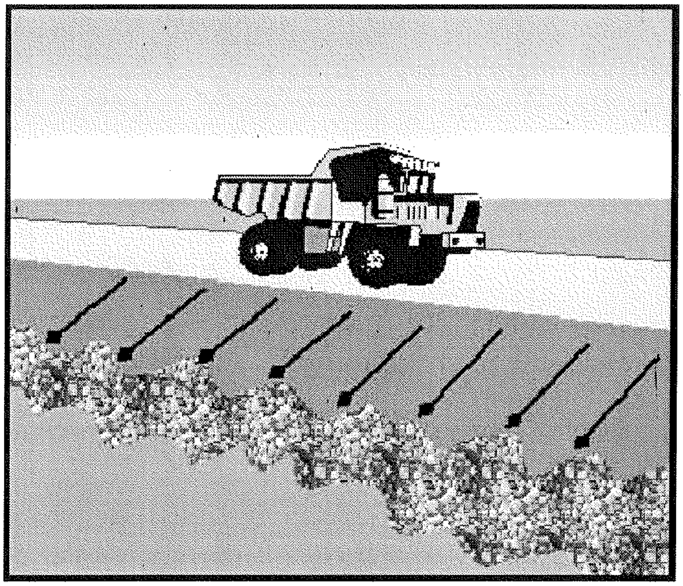


Figure 3-5. Brush and Rock Filters

Figure Source: Truckee, 2003

Limitations

- Not appropriate for sites greater than 5 acres.
- Rock filters can be difficult to remove.
- Not as effective or cost effective as other temporary sediment controls (Caltrans, 2003a).

Reference, Truckee, 2003

3.6 Sand Bag Sediment Barriers

Temporary barriers consisting of stacked sandbags or straw bales designed to intercept and slow the flow of sediment-laden sheet flow runoff. Barriers allow sediment to settle before water leaves the construction site.

Applications

- Along the perimeter of a site
- Parallel to roadways to keep sediments off pavement
- Used to divert flows from storm drains, channels, or watercourses
- Near the toe or at the top of slopes
- Around stockpiled materials
- To capture and detain non-stormwater discharges and create a sediment basin

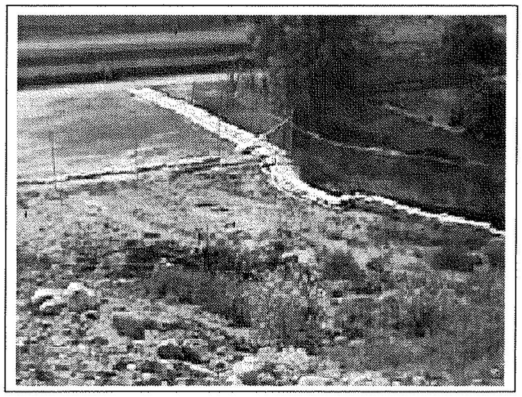


Figure 3-6. Sandbag barrier

Figure Source: Caltrans, 2003c

Limitations

- Upstream drainage area should be less than 5 acres
- Sand bag installation can be labor intensive

Reference: Truckee, 2003

3.7 Straw Bale Barrier

A straw bale barrier is a linear sediment barrier constructed of straw bales. The barriers allow sediment to settle from runoff before water leaves the construction site. Straw bales are typically staked in place.

Applications

- Along the perimeter of a site
- Along streams and channels
- Below the toe of exposed and erodible slopes
- Down slope of exposed soil areas
- Around stockpiles
- Across minor swales or ditches with small catchments
- Parallel to roadways to keep sediment off paved areas (Caltrans, 2003d)

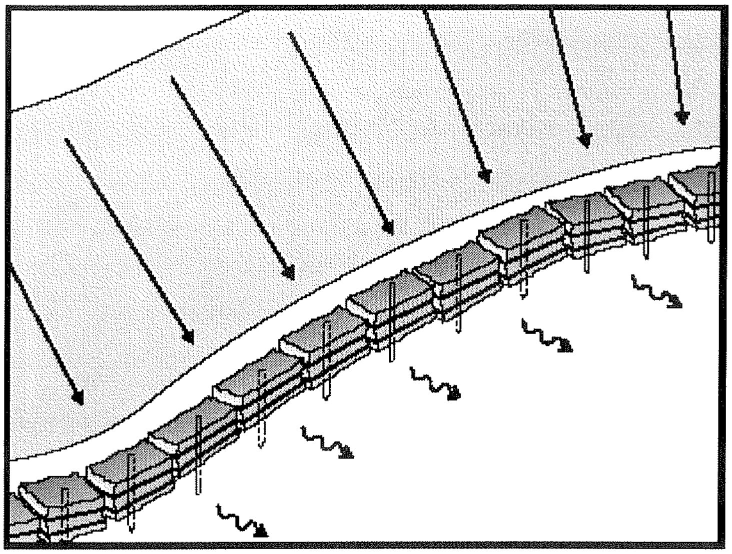


Figure 3-7. Straw Bale Barrier

Figure Source: Caltrans, 2003d

Limitations

- Installation can be labor intensive
- Maintenance needs can be extensive
- Can be attractive to vectors
- Should only be used for 3 months or less
- Discouraged for use in the Truckee Meadows (Truckee, 2003)

Reference: Nevada, 1994

3.8 Gravel Filter Berm

Berms made of gravel are created to detain sediment laden runoff to facilitate settling. Gravel may be bagged or formed into a ridge and secured with wire mesh along the contour of a slope. Impermeable sheeting can be placed on top to direct runoff to stable conveyance channels.

Applications

- Across slopes
- Near the toe of slopes
- To act as temporary check dams across construction roads or other unpaved roads when not in use
- Around the base of stockpiles materials

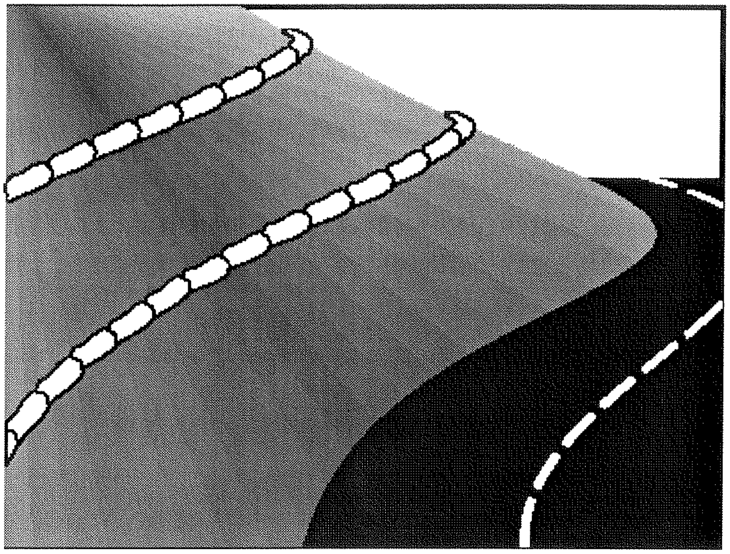


Figure 3-8. Gravel Filter Berm

Figure Source: Truckee, 2003

Limitations

- Sediment must be periodically removed
- Upstream areas should be less than 5 acres in size
- Difficult to clean up when applied to landscaped areas

Reference: Truckee, 2003

3.9 Silt Fences

A silt fence is a temporary barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff from exposed, erodible soil. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Applications

- Construction sites with exposed, erodible soils

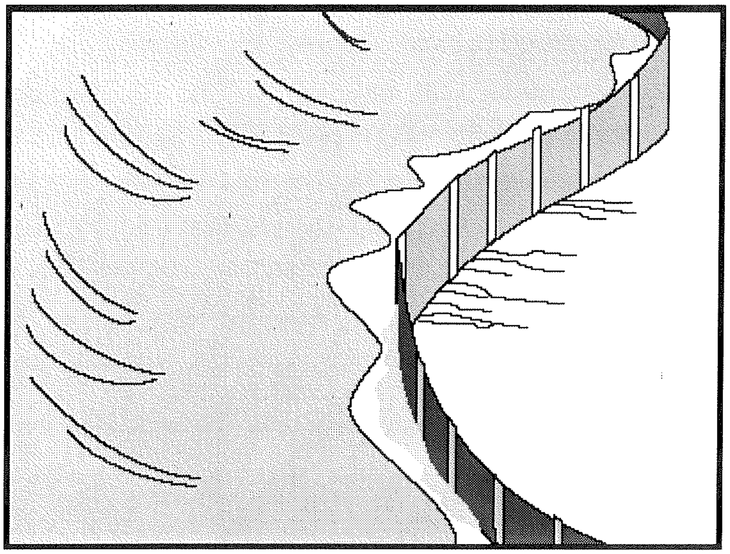


Figure 3-9. Silt Fences

Figure Source: Truckee, 2003

Limitations

- Only effective if properly installed
- Can be maintenance intensive

Reference: Truckee, 2003

3.10 Temporary Sediment Traps

A sediment trap is a small temporary containment area with a controlled release structure formed by excavating or constructing an earthen embankment across a ditch or low drainage area.

Applications

- Applies to drainage areas of 1 acre or less
- In locations where sediment laden stormwater might enter storm drains

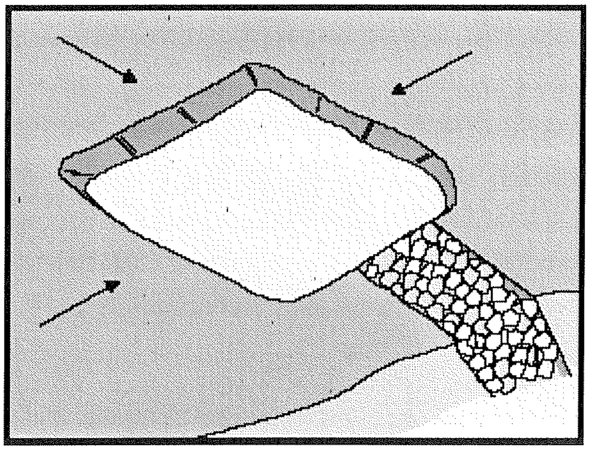


Figure 3-10. Temporary Sediment Trap

Figure Source: Truckee, 2003

Limitations

- Can only be used for drainage areas of 1 acre or less
- May create mosquito/midge habitat
- Requires maintenance to remove sediment
- May require fencing to keep children out
- May require large surface area

Reference: Truckee, 2003

3.11 Stabilized Construction Site Access

A stabilized access point is a point of entrance/exit to a construction site that is constructed and maintained to reduce the tracking of mud and dirt onto public roads. The number of access points should also be limited to reduce tracking.

Applications

Use at construction sites where dirt or mud might be tracked onto public roads, near water bodies, or where dust may be a problem.

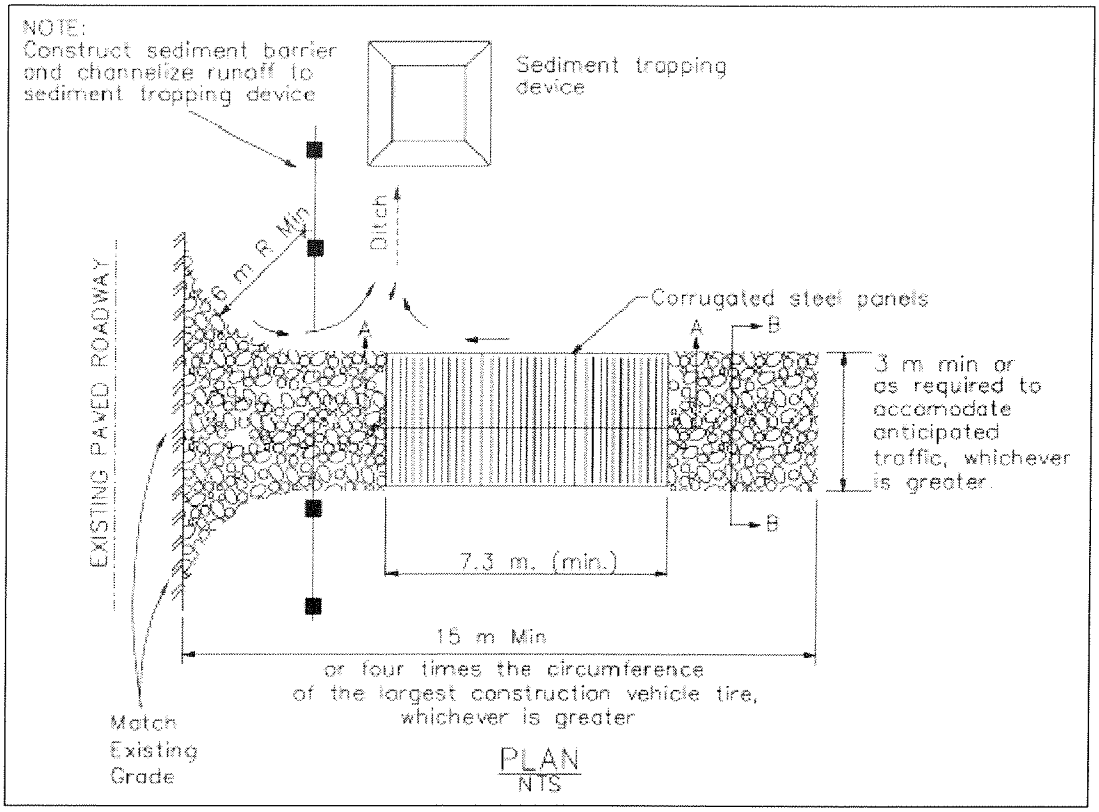


Figure 3-11. Stabilized Entrance/Exit

Figure Source: Caltrans, 2003d

Limitations

- Can be expensive to install and maintain
- Construction site layout will determine the design

Reference: Truckee, 2003

3.12 Construction Exit Tire Wash

A tire wash is an area located at a stabilized construction site exit that removes sediment from tires and the vehicle undercarriage to reduce or prevent sediment from being transported off the construction site.

Applications

Locations where dirt or mud tracking offsite may be a problem.

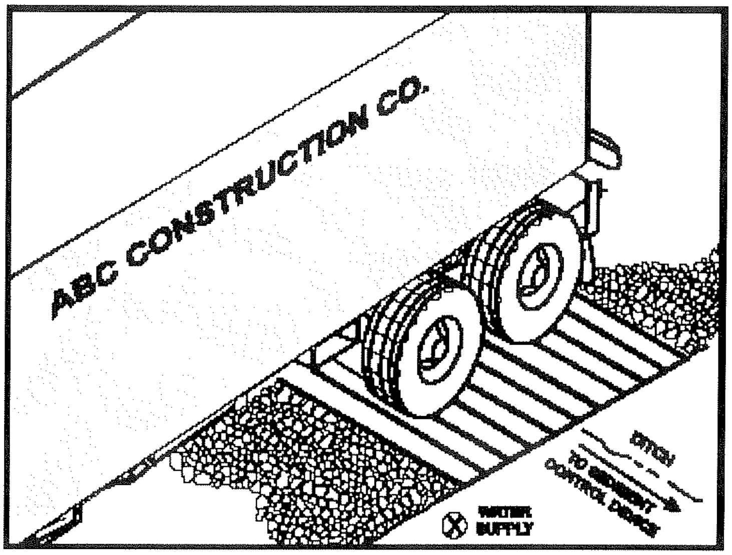


Figure 3-12. Construction Exit Tire Wash

Figure Source: Caltrans, 2003d

Limitations

- Requires a water source.
- Requires a double width construction entrance to allow entering vehicles to avoid the tire wash.

Reference: Truckee, 2003

3.13 Stabilized Construction Roadway

A stabilized construction roadway is a temporary access road connecting a public road to the construction area. It is designed to control dust and erosion created by vehicles entering and exiting the construction site. Roadways can be stabilized with aggregate, asphalt concrete, or concrete based on site requirements and longevity.

Applications

- Construction roadways and short term detours in locations where mud or dust may be a problem.
- Locations where there are steep grades and additional traction is needed
- Near waterbodies

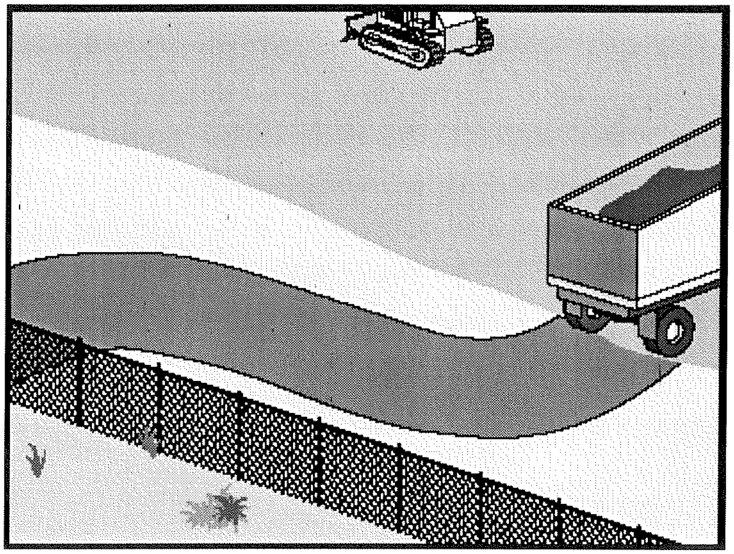


Figure 3-13. Stabilized Construction Roadway

Figure Source: Caltrans, 2003d

Limitations

- Materials will likely need to be removed prior to final project grading and stabilization
- Not applicable for very short duration projects

Reference: Truckee, 2003

3.14 Temporary Stream Crossing

A temporary stream crossing is a structure placed across a waterway that allows vehicles to cross the waterway during construction without entering the water, reducing erosion and sedimentation caused by the vehicles.

Applications

- Sites where construction vehicles will frequently cross a waterway
- Sites where duration of construction activities will not exceed one year

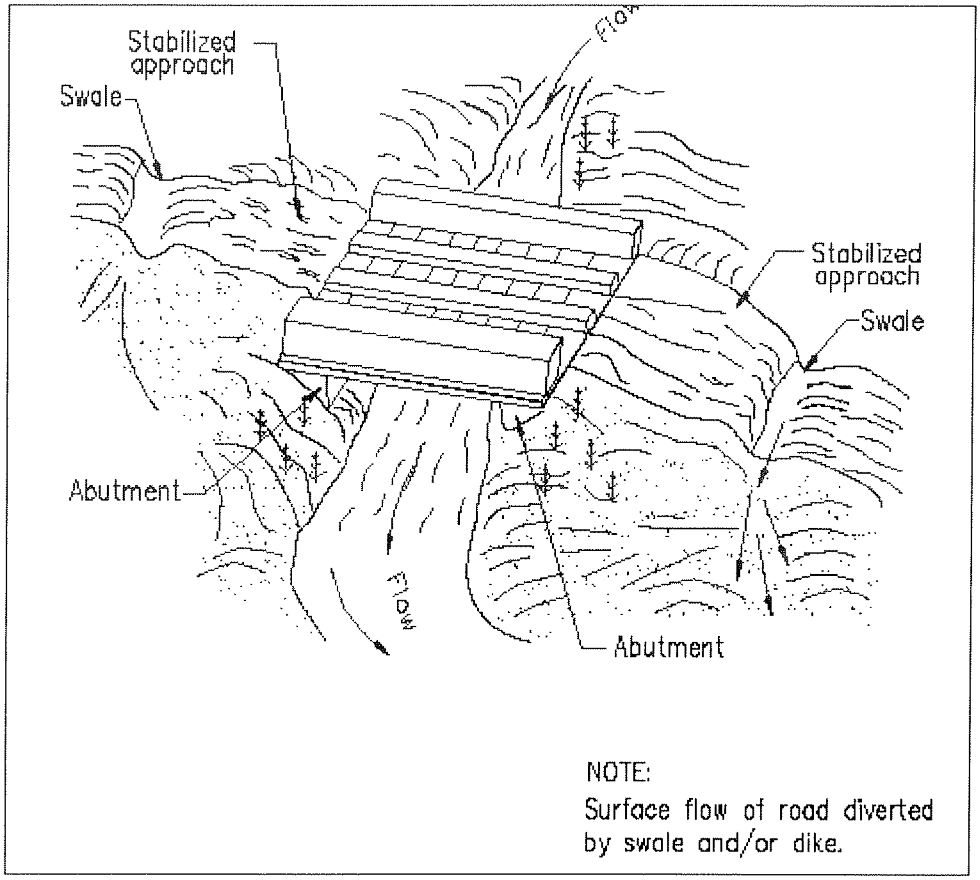


Figure 3-14. Temporary Stream Crossing

Figure Source: Truckee, 2003

Limitations

- Waterway will be disturbed during installation.

Reference: Truckee, 2003

3.15 Storm Drain Inlet Protection

Device used to detain and/or filter sediment-laden runoff to allow sedimentation before discharge into a storm drain or waterway. Methods include:

- Filter fences surrounding the drain
- Excavated sediment traps
- Gravel bag barriers
- Foam barriers and fiber rolls

Applications

- Inlets potentially impacted by sediment
- Drainage areas less than 1 acre
- Disturbed drainage areas that have not been permanently stabilized
- Wet season

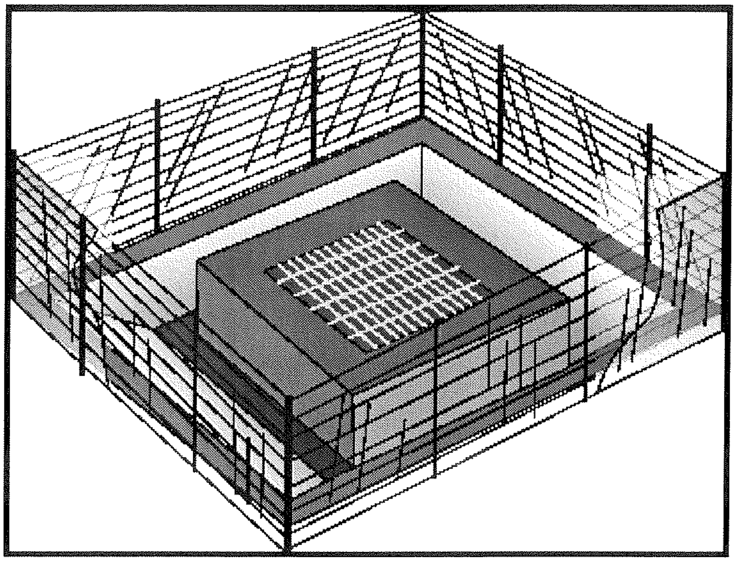


Figure 3-15. Storm drain Inlet Protection with Silt Fence and Excavated Sediment Traps

Figure Source: Caltrans, 2003d

Limitations

- Requires adequate area for water to pond
- Must not create ponding in roadway
- May not be effective in high flow or high sediment concentration locations
- Frequent maintenance is required
- For drainage areas larger than 1 acre, should be used with other sediment control BMPs (Caltrans, 2003d).

Reference: Truckee, 2003

3.16 Catch Basin Inlet Filters

Filters are used to remove sediments prior to water entering the storm drain system. Fabric may be pinched between the grate and catch basin to hold it in place. Catch basin inserts comprised of a variety of materials are available from various vendors.

Applications

- At sites where runoff may carry sediment or trash
- Where drainage system is prone to clogging
- At sites where space or traffic constraints limit the use of other forms of storm drain inlet protection.

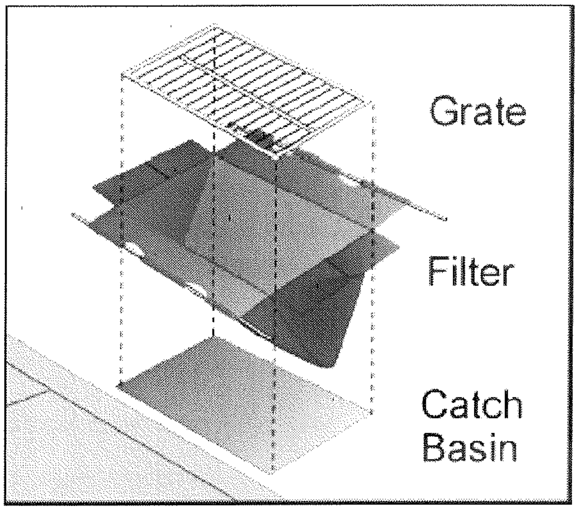


Figure 3-16. Catch Basin Inlet Filters

Figure Source: Truckee, 2003

Limitations

- Should only be used as a secondary sediment control measure with other primary control measures
- Filter fabric can tear
- Can cause flooding if not properly maintained

Reference: Truckee, 2003

3.17 Wood Mulch

Wood mulch provides soil stabilization by reducing the potential for erosion of the underlying soil from rain or wind. Jute or synthetic netting can be used to anchor mulch in place on varying topography or in wind prone areas (Nevada, 1994). Mulch reduces runoff velocity and increases infiltration (Caltrans, 2003b). It can also improve vegetation by moderating temperature and retaining moisture and fertilizer.

Applications

- As a short-term surface cover on disturbed areas

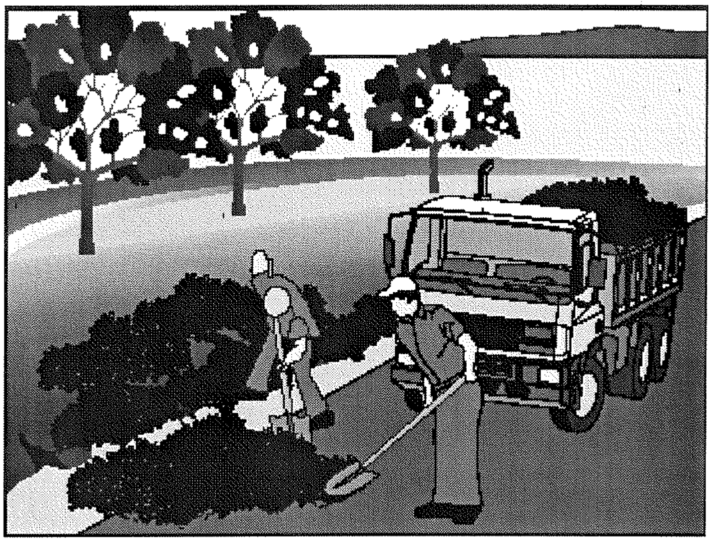


Figure Source: Caltrans, 2003d

Limitations

- Hydraulic mulch and straw mulch demonstrated greater pollution control and are more technically feasible than shredded wood mulch or compost (Caltrans, 2003a).
- Wood mulch may introduce unwanted species

Reference: Nevada, 1994

3.18 Hydraulic Mulch

Hydraulic mulch consists of shredded wood fibers, water, and/or a stabilizing emulsion. The mixture is applied to disturbed soil areas using hydro-mulching equipment to temporarily stabilize the soil and reduce erosion by wind and water (Caltrans, 2003b). Hydraulic mulch is good for covering large areas quickly and economically.

Applications

Apply to disturbed soil areas requiring temporary protection or those that will be redisturbed after a temporary period of inactivity

Figure 3-17. Hydraulic Mulch Application

Figure Source: Caltrans, 2003c

Limitations

- Additional control measures are needed for the establishment of vegetation on erosion prone areas.
- Wood fiber hydraulic mulches typically only last for part of a growing season.

Reference: Truckee, 2003

3.19 Straw Mulch

Uniform layer of straw applied to soil and attached with a studded roller or tackifier. Acts as a temporary soil stabilizer. It can be used prior to revegetation and can enhance plant establishment.

Applications

- All bare soil surfaces needing temporary cover.
- Can be used in combination with seeding strategies to enhance plant establishment.

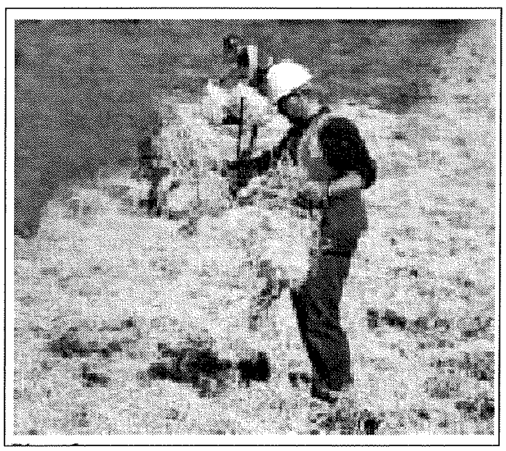


Figure 3-18. Straw Mulch

Figure Source: Caltrans, 2003c

Limitations

- Can be blown away if not adequately anchored.
- May introduce unwanted vegetation types.

4. SITE AND MAINTENANCE BEST PRACTICES

Source control measures can be used to reduce pollutant discharge into waterways. The following BMPs are activities rather than structures that can be used to protect the water quality in Las Vegas Valley. Although there are maintenance practices for a variety of activities, the practices shown in **Table 4-1** were chosen because they met the following criteria:

- Applicable to an urban environment
- Applicable to a variety of sites and activities

Table 4-1. Site and Maintenance Best Practices

BMP	BMP Manual Citations		
	Nevada, 1994	Truckee, 2004	Truckee, 2003
Water conservation		X	X
Waste management	X	X	X
Street cleaning	X		X
Vehicle and equipment maintenance and fueling		X	X
Illicit dishcarge reporting			X
Soil amendment, fertilizer, and pesticide management	X		X
Storm drain labeling			X

4.1 Water Conservation

The potential for erosion and pollutants being transported offsite can be reduced by appropriately managing the use of water. Water using processes should be checked for leaks and water reuse should be utilized whenever feasible. Irrigation systems should be used in the most efficient manner.

Applications

All sites where water is used.

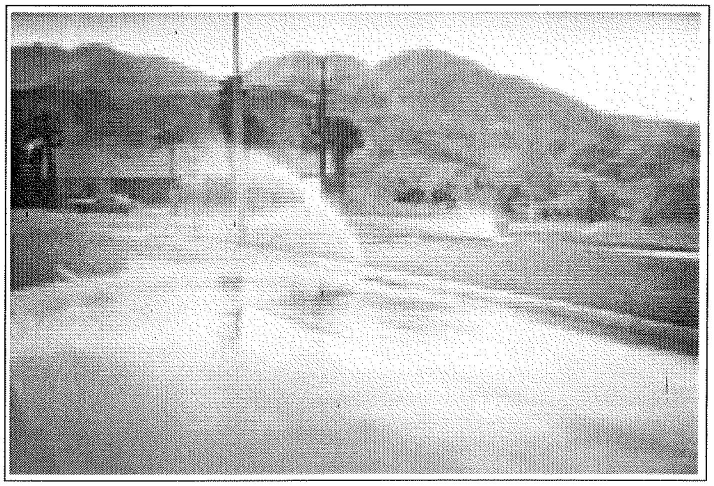


Figure 4-1. Irrigation System Not Used Efficiently

Figure Source: Caltrans, 2003c

Limitations

None identified

Reference: Truckee, 2003

4.2 Waste Management

Waste management includes practices for material delivery, handling, storage, and disposal that reduce the likelihood of materials coming into contact with stormwater. They also include the day to day operations of a site that can be controlled to reduce the potential for contamination. Waste management activities include:

- Spill prevention and control
- Proper storage locations with cover and protection from wind if required
- Stockpile management – protect stockpiles with berms, impermeable covers, and locate them away from drainageways
- Disposal of wastes at proper locations.

Applications

Waste management applies to all commercial, residential and industrial sites.

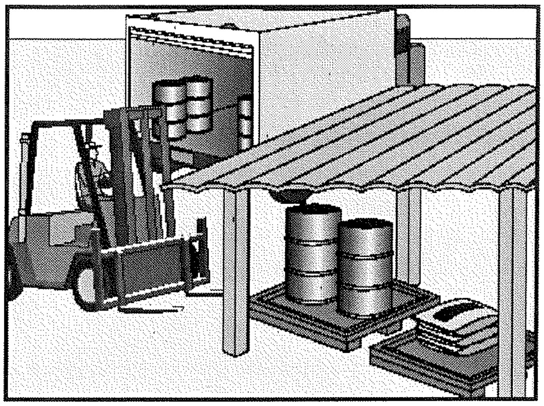


Table 4-2. Proper Storage of Waste

Figure Source: Caltrans, 2003d

Limitations

- Space limitations at site

Reference: Truckee, 2003

4.3 Street Cleaning

Street cleaning is the removal of sediment and accumulated debris from streets to remove pollutants prior to entering waterways.

Applications

Street cleaning is applicable to any location where debris, sediment, or trash accumulates in the street.

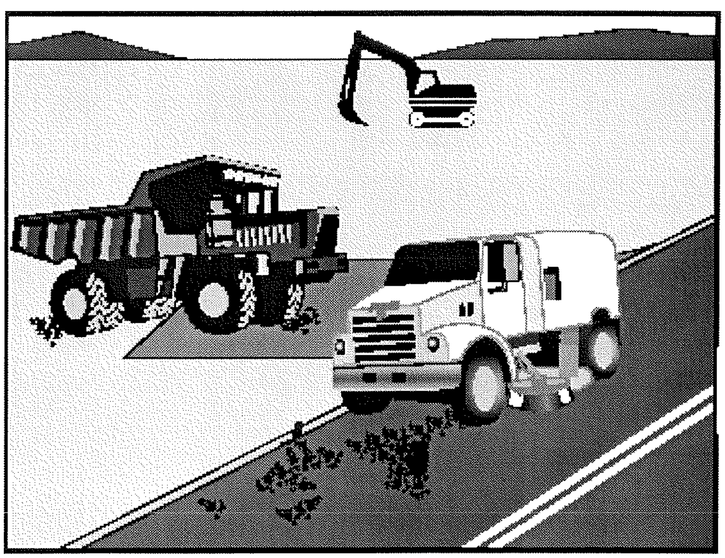


Table 4-3. Street Cleaning

Figure Source: Caltrans, 2003d

Limitations

- Wet debris may not be swept up.

Reference: Truckee, 2003

4.4 Vehicle and Equipment Maintenance and Fueling

Vehicle and equipment maintenance and fueling should be situated to avoid release of pollutants into the storm drain system. Effective practices include:

- Avoid onsite fueling
- Have fuel spill cleanup kits available onsite
- Fuel over impervious surfaces or use drip pans or absorbent sheets in fueling area
- Properly dispose of used batteries, tires, and oil
- Use berms or sandbags to create containment areas
- Locate fueling and maintenance areas away from waterways.

Applications

Any location where vehicles or equipment are potentially maintained or fueled.

Figure 4-2. Spill Kit

Figure Source: Caltrans, 2003c

Limitations

None identified

Reference: Truckee, 2003

4.5 Vehicle and Equipment Cleaning

Vehicle and equipment cleaning should be situated to reduce or eliminate pollutant discharge to storm drains. Effective practices include:

- Avoid cleaning equipment onsite

- Not using detergents or chemicals
- Containing wash water

Applications
Any location where vehicles or equipment are potentially cleaned.

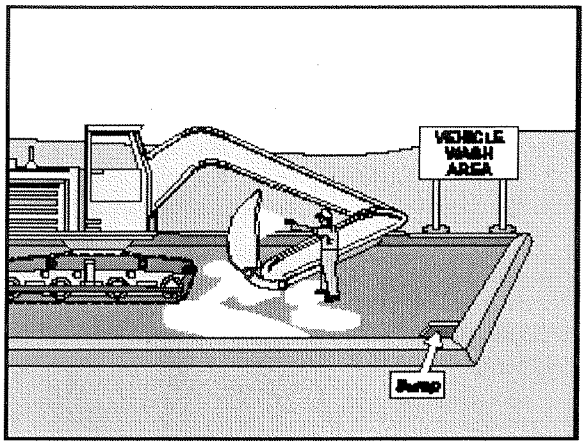


Figure 4-3. Equipment Cleaning Practices

Figure Source: Truckee, 2003

Limitations
- Wash water discharges may need to be pretreated prior to release to the sanitary sewer.

Reference: Truckee, 2003

4.6 Illicit Discharge and Illegal Dumping Reporting

Illegal dumping and discharge to the storm drain system should be reported to the authorities. Illegal dumping can be identified as:

- Debris and rubbish piles
- Staining or unusual colors on pavements, soils, or waterways
- Strange smells
- Excessive sediment deposits in ditches that may indicate illegal flows during non-work hours
- Higher than expected flows in waterways

Applications
Illicit discharges and dumping are possible in all urban and rural environments. Common locations are in storm drains and on construction sites.

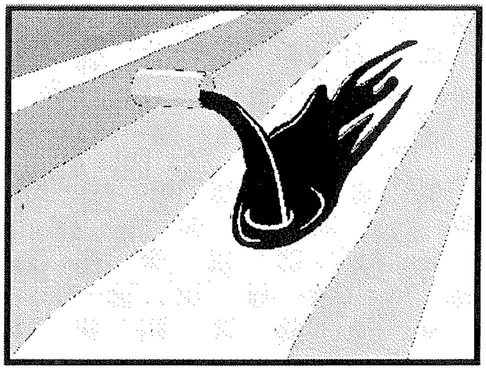


Table 4-4. Illicit Discharge

Figure Source: Caltrans, 2003d

Limitations
None identified

Reference: Truckee, 2003

4.7 Soil Amendment, Fertilizer, and Pesticide Management

Fertilizer management is the careful application of fertilizers based upon plant nutritional requirements to prevent excess fertilizer from reaching ground or surface waters. Fertilizers should not be used in or around stream channels.

A pest management program that is environmentally acceptable should be used. Using pest resistant plants and adjusting planting dates to avoid problems can reduce the use of pesticides. Mechanical cultivation and biological controls can aid in reducing pest problems.

Landscaping chemicals and mixing equipment should be properly located to reduce the risk of contaminating runoff and groundwater.

Applications
Proper management of materials and chemicals applies to all landscaping activities.

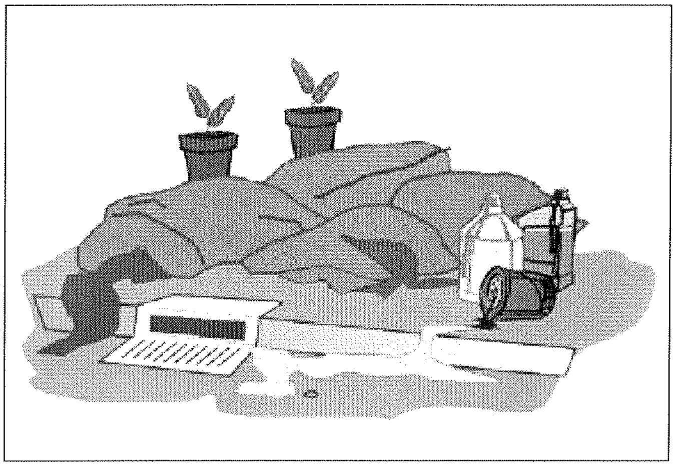


Table 4-5. Landscape Materials Management

Figure Source: Truckee, 2003

Limitations

None identified

Reference: Nevada, 1994

4.8 Storm Drain Labeling

Illegal dumping in storm drains can be a problem for water quality downstream. Storm drain labels can educate the public and reduce dumping of wastes such as used motor oil into the storm drain system. Messages can be applied with stencils or paint, stamped in concrete, cast into the storm drain inlet or applied as stickers.

Applications

- All areas where illegal dumping is possible
- Reflective messages may help reduce nighttime dumping.

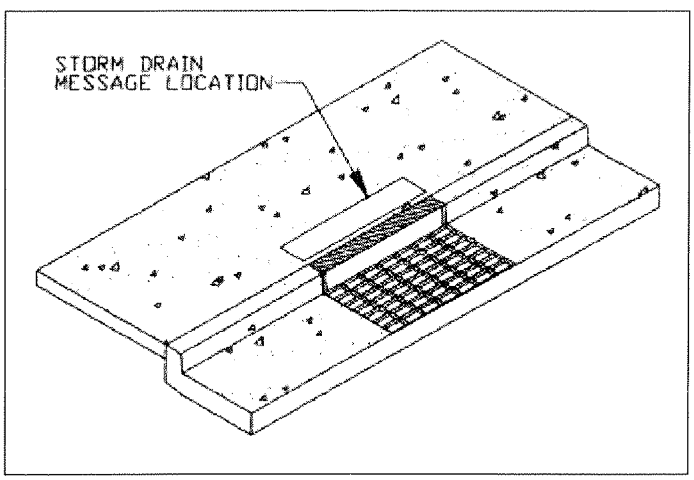


Figure 4-4. Example of Storm Drain Labeling

Figure Source: Truckee, 2004 and Stormwater Quality Management Committee, 2004

Limitations

- Stencils tend to weather and fade over time.
- Markers applied with adhesive can become detached with time.
- Messages can be subject to vandalism.

Reference: Truckee, 2004

5. REFERENCES

Caltrans (2003a), *Statewide Stormwater Management Plan*, May 2003

Caltrans (2003b), *Guidance for Temporary Soil Stabilization*, 2003

Caltrans (2003c), *Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide*, 2003

Caltrans (2003d), *Caltrans Stormwater Quality Handbook – Construction Site Best Management Practices Manual*, March 2003.

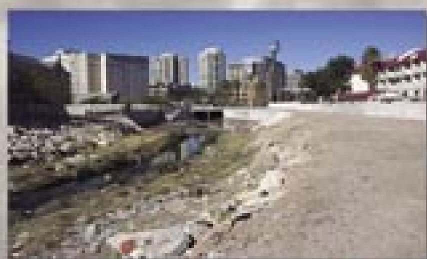
CDS (2004), *CDS Technologies, Inc. website*.
Available at: http://www.cdstech.com.au/us/index.asp, accessed: August 19, 2004.

EPA (1999), Stormwater Technology Fact Sheet – Hydrodynamic Separators. EPA 832-F-99-017. September, 1999.

Stormwater Quality Management Committee (2004), *Stormwater Quality Management Committee website*. Available: http://www.lvstormwater.com/community.html accessed: August 19, 2004

Truckee Meadows Regional Stormwater Quality Management Program (Truckee) (2003) *Truckee Meadows Construction Site Best Management Practices Handbook*, prepared by Kennedy/Jenks Consultants, February 2003.

Truckee Meadows Regional Stormwater Quality Management Program (Truckee) (2004). *Truckee Meadows Structural Controls Design Manual*, prepared by Kennedy/Jenks Consultants, January 2004.



Appendix H

APPENDIX H

- **DAQEM CONSTRUCTION SITE INSPECTION CHECKLIST**
- **POST-STORM CONSTRUCTION SITE INSPECTION CHECKLIST**
- **DETENTION BASIN INSPECTION CHECKLIST**

Las Vegas Valley Municipal Separate Storm Sewer System Permit
Construction Site Runoff Management Program

DAQEM Construction Site Inspection Checklist

Construction Site Name/Address/Jurisdiction:	
Property Owner:	**Date/Time of Inspection:**
Contractor Company/Point of Contact:	**Inspector Name:**
Type of Construction Project: *(circle one)* ***Residential Commercial Industrial Roadway Other***	**Inspector Contact Number:**

Inspection Criteria	**Yes**	**No**
1. Is there evidence of sediment discharged from the property?		
2. Is there evidence of construction chemicals (e.g., paint, oil, concrete, solvents) discharged from the property?		
3. Is there evidence of other inappropriate substances or materials discharged from the property?		
Actions Taken	√	
1. Informed contractor of need to correct problem		
2. Observed contractor correcting problem		
Actions Required	√	
1. Refer problem to Clark County Regional Flood Control District		
2. Other		
Comments: *(include location/description of problems observed; continue on back)*		

Copies of this form should be sent to Kevin Eubanks, Clark County Regional Flood Control District. Notify Kevin Eubanks within 5 business days of any potential violation of local stormwater ordinances or State stormwater regulations that was not corrected during the inspector's presence. Phone: 455-3139. Fax: 455-3870

INSTRUCTIONS FOR COMPLETING DAQEM CONSTRUCTION SITE INSPECTION CHECKLIST

Basic Information Section

Construction Site Name/Address/Jurisdiction: Name of construction project as filed with planning and permitting agencies; include address if established; include municipal entity with jurisdiction if known (Clark County, City of Las Vegas, City of North Las Vegas)
Property Owner: Name of development company or parcel owner
Contractor Company/Point of Contact: Name of construction general contractor, and name of on-site construction supervisor
Type of Construction Project: Circle category of development; if mixed use, circle the dominant development type in the project
Date/Time of Inspection: Date and time inspector arrived onsite
Inspector Contact Number: Phone number at which inspector can be reached during normal business hours if follow-up information is needed regarding the inspection report

Inspection Criteria Section

1. Evidence of Sediment Discharge. Look for: sediment in street or curb and gutter downstream from site; sediment overtopping perimeter BMPs (e.g., sand bags, silt fences, hay bales, sediment basins); sediment-filled catch basins or drain inlets downstream of the site; unprotected soil stockpiles at edge of site; wash-down of track-out into drainage system.
2. Evidence of Construction Chemical Discharge. Look for: stained or discolored earth or pavement at edge of site; chemical odors; pooled liquid waste near edge of site; evidence of construction vehicle washing or maintenance in offsite areas.
3. Evidence of Other Inappropriate Substances or Materials. Could include: construction materials; leaking portable toilet; over-application of dust palliative.

Actions Taken

1. Inform contractor of need to correct problem if violation of local stormwater regulations is likely. These regulations prohibit discharge of any non-stormwater substance to local drainage facilities (inlets, catch basins, storm drains, curb-and-gutter, streets). Provide contractor with handout on applicable regulations and best management practices. Notify contractor of need to comply with his Storm Water Pollution Prevention Plan.
2. If possible, observe contractor correcting problem during the inspection visit. Many problems can be addressed quickly and immediately.

Actions Required

1. Refer problem to Clark County Regional Flood Control District (CCRFCD) if a probable violation of local stormwater regulations remains after inspection visit is complete. Do not inform CCRFCD if problem was addressed during inspection visit. Probable violations should be referred to CCRFCD within 5 business days, either by calling Kevin Eubanks at 455-3139 or faxing this form to 455-3870.
2. Other. If desired, recommend follow-up visit by DAQEM inspector. Report violations representing immediate, severe threat to the environment to CCRFCD and Nevada Division of Environmental Protection.

Comments: *(continued from front)*

Post-Storm Construction Site Inspection Checklist

Construction Site Name/Address/Jurisdiction:	
Property Owner:	**Date/Time of Storm:**
Contractor:	**Date/Time of Inspection:**
Type of Construction Project: *(circle one)* ***Residential Commercial Industrial Roadway Other***	**Inspector Name/Affiliation:**

Storm Characteristics

24-hr rainfall near site: _____ inches   Max 15-minute rainfall near site: ______ inches

Inspection Criteria	**Yes**	**No**
1. Is there evidence of sediment discharged from the property?		
2. Is there evidence of construction chemicals (e.g., paint, oil, concrete, solvents) discharged from the property?		
3. Is there evidence of excessive vehicle track-out from the property?		
4. Is there evidence of other inappropriate substances or materials discharged from the property?		

Actions Recommended		
1. Refer problem to local authorities *(if follow-up visit is needed or local pollutant discharge ordinance enforcement may be needed)*		
2. Refer problem to Nevada Division of Environmental Protection *(if violation of NDEP stormwater permit is likely)*		

Comments:

Any gross violations should be reported directly to NDEP at (702) 486-2872 or (775) 687-9440.

INSTRUCTIONS FOR COMPLETING POST-STORM CONSTRUCTION SITE INSPECTION CHECKLIST

Basic Information Section
Construction Site Name/Address/Jurisdiction: Name of construction project as filed with planning and permitting agencies; include address if established; include municipal entity with jurisdiction if known (Clark County, City of Las Vegas, City of North Las Vegas)
Property Owner: Name of development company or parcel owner
Contractor Company/Point of Contact: Name of construction general contractor
Type of Construction Project: Circle category of development; if mixed use, circle the dominant development type in the project
Date/Time of Storm: Date and approximate time (start and finish) of storm that occurred at the construction site, based on nearest CCRFCD precipitation gage
Date/Time of Inspection: Date and time inspector arrived onsite
Inspector Name/Affiliation: Name and organization of person conducting post-storm inspection

Storm Characteristics Section
24-hour Rainfall Near Site: 24-hour rainfall on date of storm as recorded at the CCRFCD precipitation gage nearest the construction site
Max. 15-Minute Rainfall Near Site: Maximum 15-minute rainfall during preceding storm event as recorded at the CCRFCD precipitation gage nearest the construction site

Inspection Criteria Section
1. Evidence of Sediment Discharge. Look for: sediment in street or curb and gutter downstream from site; sediment overtopping perimeter BMPs (e.g., sand bags, silt fences, hay bales, sediment basins); sediment-filled catch basins or drain inlets downstream of the site; unprotected soil stockpiles at edge of site; wash-down of track-out into drainage system.
2. Evidence of Construction Chemical Discharge. Look for: stained or discolored earth or pavement at edge of site; chemical odors; pooled liquid waste near edge of site; evidence of construction vehicle washing or maintenance in offsite areas.
3. Evidence of Excessive Trackout. Look for: excessive sediment on roadways adjacent to site ingress/egress areas.
4. Evidence of Other Inappropriate Substances or Materials. Could include: construction materials; trash; leaking portable toilet.

Actions Recommended
1. Refer problem to local authorities if violation of local stormwater regulations is likely. These regulations prohibit discharge of any non-stormwater substance to local drainage facilities (inlets, catch basins, storm drains, curb-and-gutter, streets).
2. Refer problem to NDEP if gross violation of stormwater regulations is likely, or if contractor has clearly not complied with normal requirements of construction site SWPPPs and BMPs.

Comments: *(continued from front)*

Detention Basin Inspection Checklist

Detention Basin:	
Location:	**Date/Time of Inspection:**
Jurisdiction:	**Inspector:**
	Agency:

Type of Inspection: *(circle one)* ***Routine*** ***Post-Storm***

If Post-Storm Inspection, provide storm characteristics: Storm date/time: ________________

24-hr rainfall near site: _____ inches Max 15-minute rainfall near site: ______ inches

Inspection Criteria	Yes	No
1. Is there an accumulation of sediment in the basin?		
2. Is there evidence of construction chemicals (e.g., paint, oil, concrete, solvents) discharged from upstream properties?		
3. Is there evidence of construction debris discharged from upstream properties?		

Actions Recommended	√	
1. Track potential sources of sediment or other discharges to upstream properties		
2. Refer maintenance problem to local authorities		

Comments:

Copies of this form should be faxed to Matt Wilkinson, MWH at (702) 878-7833.

INSTRUCTIONS FOR COMPLETING DETENTION BASIN INSPECTION CHECKLIST

Basic Information Section
Detention Basin: Name of detention basin as commonly used by CCRFCD or local entity
Location: Nearest major streets or other description
Jurisdiction: Community with local jurisdiction (Clark County, Las Vegas, North Las Vegas or Henderson)
Date/Time of Inspection: Date and time inspector arrived onsite
Inspector: Name of person conducting inspection
Agency: Affiliation of person conducting the inspection

Type of Inspection Section
Routine: visit at any time except after a significant storm event
Post-Storm: visit made to specifically determine potential storm impacts to detention basin
Storm Date/Time: date and time (start and finish) of storm as it occurred at or near the detention basin
24-hour Rainfall Near Site: 24-hour rainfall on date of storm as recorded at the CCRFCD precipitation gage nearest the detention basin
Max. 15-Minute Rainfall Near Site: Maximum 15-minute rainfall during preceding storm event as recorded at the CCRFCD precipitation gage nearest the detention basin

Inspection Criteria Section
1. Evidence of Sediment Accumulation. Look for: sediment accumulated at inlets; sediment accumulated at outlet; greater depths of sediment than typical for routine conditions
2. Evidence of Construction Chemical Discharge. Look for: stained or discolored earth or concrete near inlets; chemical odors; pooled liquid waste in low-lying areas.
3. Evidence of Construction Debris. Look for: construction materials; trash; paint cans; other inappropriate materials.

Actions Recommended
1. Recommend tracking source of sediment or other construction materials to upstream sources if: unique characteristics of deposited material would allow tracing to source; or, deposits are very large and clearly originated from a single storm.
2. Refer maintenance problem to local authorities if accumulation of sediment or other material: affects performance of detention basin; affects quality of water stored in detention basin; or could be washed into downstream channel in a future storm.

Comments: *(continued from front)*


Las Vegas Valley
Stormwater Quality
Management Committee
CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT
MWH