Municipal Separate Storm Sewer System

Annual Report

Year Ending June 30, 1999

NPDES Permit Number AZS000003

City of Phoenix

Phoenix, Arizona

Cover Photo:

A winter storm rolls in over South Mountain Park. Most of Phoenix's precipitation occurs in two distinct seasons, summer and winter. Rainfall patterns are highly variable. The mean annual precipitation is approximately seven inches.

Photo: **Karen Winters**

City of Phoenix
OFFICE OF THE CITY MANAGER

September 27, 1999

Mr. Terry Oda, Chief (WTR-5)
Clean Water Act Standards and Permit Office
Water Division
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Oda:

RE: MUNICIPAL SEPARATE STORM SEWER SYSTEM ANNUAL REPORT, NPDES PERMIT NO. AZS000003

We are pleased to submit the second Annual Report for the City's municipal separate storm sewer system. This report covers the reporting period beginning on July 1, 1998 and ending on June 30, 1999, and includes information required by National Pollutant Discharge Elimination System Permit No. AZS000003, effective July 16, 1997.

Please note that Part C.4 of the Permit requires the City to certify that the eight new or evolving best management practices (BMPs) identified in the City's November 10, 1992 Part 2 Permit Application were implemented according to the schedule included in our EPA-approved Storm Water Management Plan. The City did implement all eight BMPs on schedule. Detailed information on their implementation was included in the 1997-1998 Annual Report; this information has not been repeated in this year's report.

Please direct any questions you may have about this report to Lori Sundstrom at (602) 495-5160.

Sincerely,

Alton Washington
Deputy City Manager

cc: Karen Smith, Arizona Department of Environmental Quality
Les Thomas, Interim Engineering & Architectural Services Director
Lori Sundstrom, Environmental Affairs Supervisor

Executive Summary

EXECUTIVE SUMMARY

This Annual Report describes activities and programs implemented by the City of Phoenix from July 1, 1998 through June 30, 1999, as part of its citywide Storm Water Management Program (SWMP) for the Municipal Separate Storm Sewer System (MS4). It also includes the results of storm water monitoring conducted at selected locations within the system. The report is prepared pursuant to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit Number AZS000003.

The City's SWMP meets or exceeds the requirements established in the following documents:

- 40 Code of Federal Regulations 122.26
- NPDES Permit Number AZS000003, effective March 19, 1997 and modified effective May 23, 1998
- City of Phoenix Part 1 Permit Application dated October 3, 1991
- City of Phoenix Part 2 Permit Application dated November 10, 1992
- City of Phoenix Storm Water Management Plan dated October 1, 1996 and revised July 11, 1997

The 1998/99 Annual Report format responds to specific requirements in the permit.

The Table of Contents identifies each chapter and the corresponding permit reference.

Chapter 1 presents the Certification Statement.

Chapter 2 describes the outfall monitoring sites, including photographs and descriptions of the monitoring equipment.

Chapter 3 presents the results of storm water outfall monitoring, by outfall, for the representative storm events that occurred during the reporting period, July 1, 1998 through June 30, 1999.

Chapter 4 includes an estimation of seasonal pollutant loads for the SWMP.

Chapter 5 identifies indicators used to assess the impacts of the SWMP. Water quality indicators, programmatic indicators, and social indicators all serve as useful measures of the program.

Chapter 6 lists any proposed changes to the SWMP.

Chapter 7 contains the 36 Best Management Practices designed to improve or maintain the quality of storm water discharges from the MS4.

Chapter 8 summarizes the enforcement actions taken by the City in the past year.

Chapter 9 outlines the programs used to educate City staff, the business community, and the public about how they can affect the quality of storm water discharges.

Chapter 10 summarizes the City's expenditures for activities specifically related to the SWMP and the more general expenditures for programs that impact the quality of storm water runoff, but are not established solely for that purpose.

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Chapter 1

Certification Statement

CERTIFICATION STATEMENT

MUNICIPAL SEPARATE STORM SEWER SYSTEM
ANNUAL REPORT
FOR THE YEAR ENDING JUNE 30, 1999

NPDES Permit Holder: City of Phoenix, Arizona

Period Covered by This Report: July 1, 1998 through June 30, 1999

NPDES Permit Number: AZS000003

Person to contact concerning information contained in the report:

Lori L. Sundstrom
Environmental Affairs Supervisor
Engineering and Architectural Services Department
200 W. Washington, 7th Floor
Phoenix, Arizona 85003

(602) 495-5160

As required by 40 C.F.R. Section 122.22(b)(2):

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering this information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Alton J. Washington, Deputy City Manager
City of Phoenix

September 27, 1999
Date

Chapter 2

Description of Outfall Monitoring Sites

DESCRIPTION OF OUTFALL MONITORING SITES

The City has a total of nine storm water monitoring sites. Five are outfall monitoring locations that have been strategically placed to represent various land uses throughout the city. Three in-stream sites characterize storm water quality in receiving streams. The receiving streams normally are dry and contain flows only in response to releases from upstream dams or extraordinary storm events. Thus, in-stream water quality data is difficult to obtain. One monitoring site measures surface flows only.

The monitoring sites are described on the following pages. The descriptions include:

- A photo of the site
- Exact site location
- Type of equipment
- Maps showing relative locations of monitoring sites and rain gauges

The outfall monitoring site descriptions also indicate the size of the catchment basin they serve. Chapter 3 provides detailed results of storm water outfall monitoring data, by outfall.

IB08

12499 North 40th Street

Round Pipe 66"
Total acreage: 801
Land use:

Heavy industrial	0.00%
Light industrial	0.00%
Commercial	7.68%
Transportation	0.86%
Open land	7.22%
Public owned	2.03%
Agricultural	0.00%
Light residential	29.26%
Medium residential	51.10%
Heavy residential	1.85%

Equipment:

Sigma 900 MAX sampler with integral flowmeter. Installed in June 1997.

SR03

3501 West Elwood Street

In pipe station, approximately 1200 feet from outfall
Round Pipe 75"
Total acres: 1855
Land use:

Heavy industrial	8.03%
Light industrial	21.68%
Commercial	4.91%
Transportation	0.00%
Open land	5.06%
Public land	10.33%
Agricultural	7.06%
Light residential	0.00%
Medium residential	36.45%
Heavy residential	6.48%

Equipment:

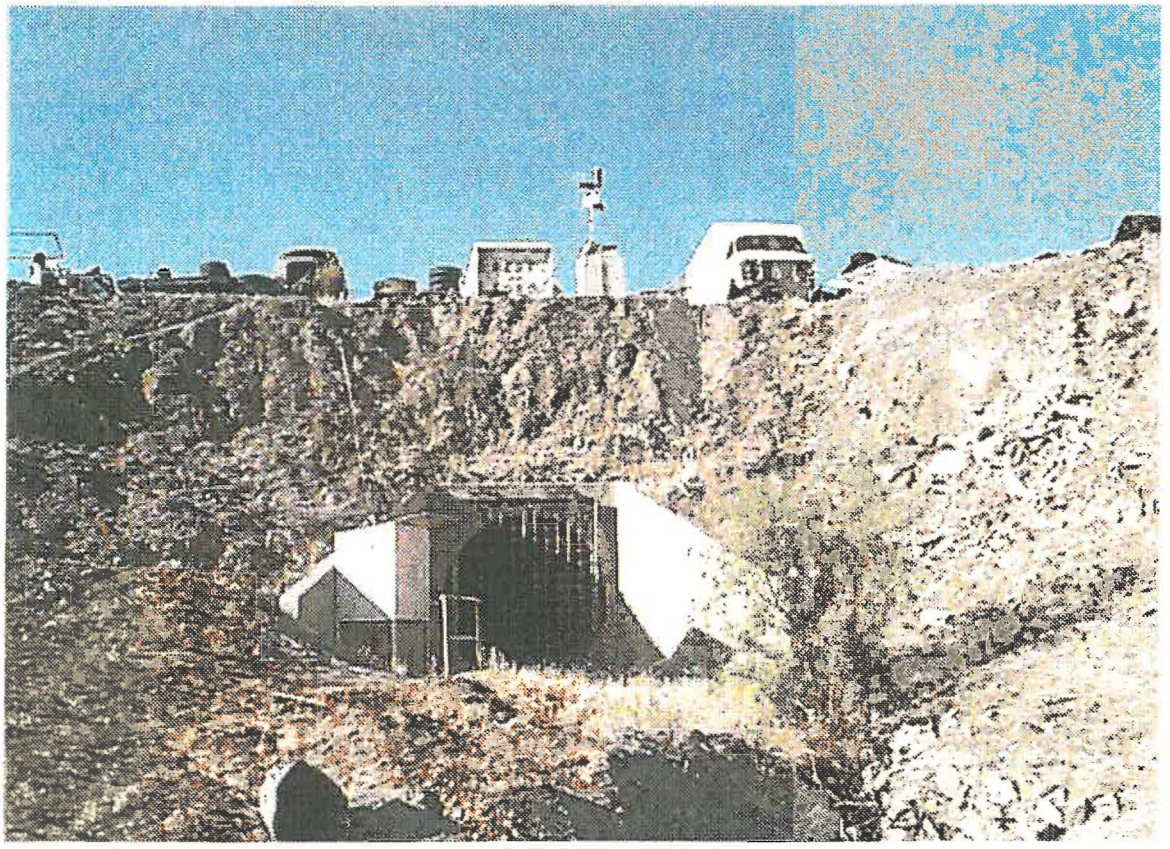
Sigma 900 MAX sampler with integral flowmeter. Installed in June 1997.

SR30

27th Avenue at the Salt River (south bank)

Round Pipe 108"
Total acreage: 1619
Land use:

Heavy industrial	5.36%
Light industrial	2.21%
Commercial	0.00%
Transportation	0.88%
Open land	0.57%
Public land	0.00%
Agricultural	81.89%
Light residential	7.66%
Medium residential	0.01%
Heavy residential	1.18%



Equipment:

Campbell Scientific Instruments CR10 datalogger and SM192 storage module; Sierra Misco Environmental model 2500 tipping bucket; Druck PDCR 940 pressure transducer; Conoflow and pressure-regulator system; Isco Environmental model 3700 automatic pumping sampler, and Motorola MC310 cellular telephone.

SR45

2401 South 40th Street

Round Pipe 54"
Total acreage: 880
Land use:

Heavy industrial	10.47%
Light industrial	53.67%
Commercial	0.00%
Transportation	22.16%
Open land	13.07%
Public land	0.00%
Agricultural	0.00%
Light residential	0.00%
Medium residential	0.62%
Heavy residential	0.00%

NOTE:

A major earth-moving project at Sky Harbor International Airport began this spring. The material is being hauled on an access road that passes by the sampler. For dust control, the road is regularly wetted. The water spray enters the rain gauge causing the sampler equipment to initiate the program daily. The sampling equipment was removed on May 12, 1999. The hauling activities have ended, and the equipment is scheduled to be reinstalled on September 3, 1999.

Equipment:

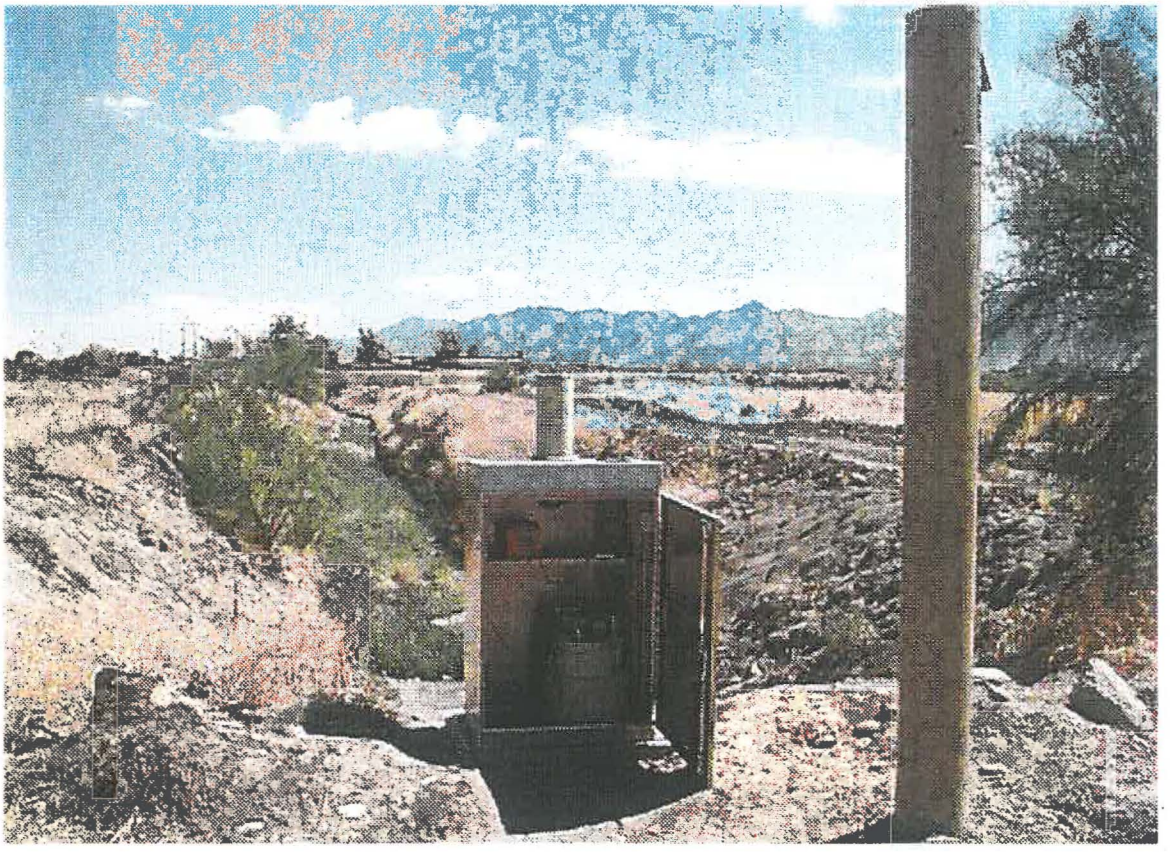
Sigma 900 MAX sampler with integral flowmeter. Installed in June 1997.

SR49

5400 South 67th Avenue

Round Pipe 96"
Total acreage: 4738
Land use:

Heavy industrial	8.00%
Light industrial	18.20%
Commercial	0.00%
Transportation	1.05%
Open land	7.98%
Public owned	0.00%
Agriculture	52.09%
Light residential	6.36%
Medium residential	4.42%
Heavy residential	1.67%

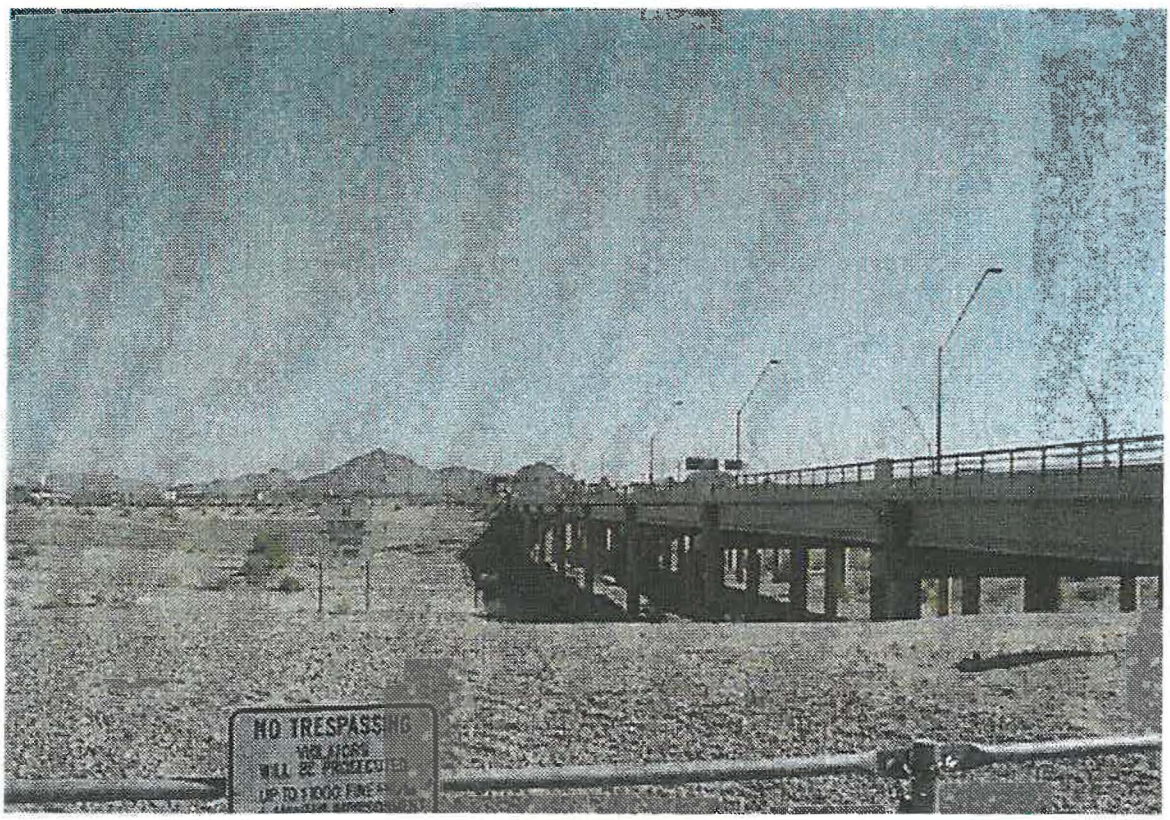


Equipment:

Sigma 900 MAX sampler with integral flowmeter. Installed in March 1998.

Salt River at Priest Drive

In-stream sampling point at the approximate eastern entry point of the Salt River into the city of Phoenix. Samples taken from bridge.



Equipment:

Scientific Instruments bridge crane with sounding reel. Sample collection vessel is lowered into flow and samples are taken on a depth proportional basis.

Salt River at 51st Avenue

In-stream sampling point at the approximate western exit point of the Salt River from the city of Phoenix. Samples taken from bridge.

Equipment:

Scientific Instruments bridge crane with sounding reel. Sample collection vessel is lowered into flow and samples are taken on a depth proportion basis.

ACDC at 51st Avenue

In-stream sampling point at the approximate western exit point of the Arizona Canal Diversion Channel from the city of Phoenix. Samples taken from bridge.

Equipment:

Scientific Instruments bridge crane with sounding reel. Sample collection vessel is lowered into flow and samples are taken on a depth proportional basis.

SURFACE FLOW

Arizona Canal Diversion Channel at 43rd Avenue

Surface runoff
Total acreage: 3.4

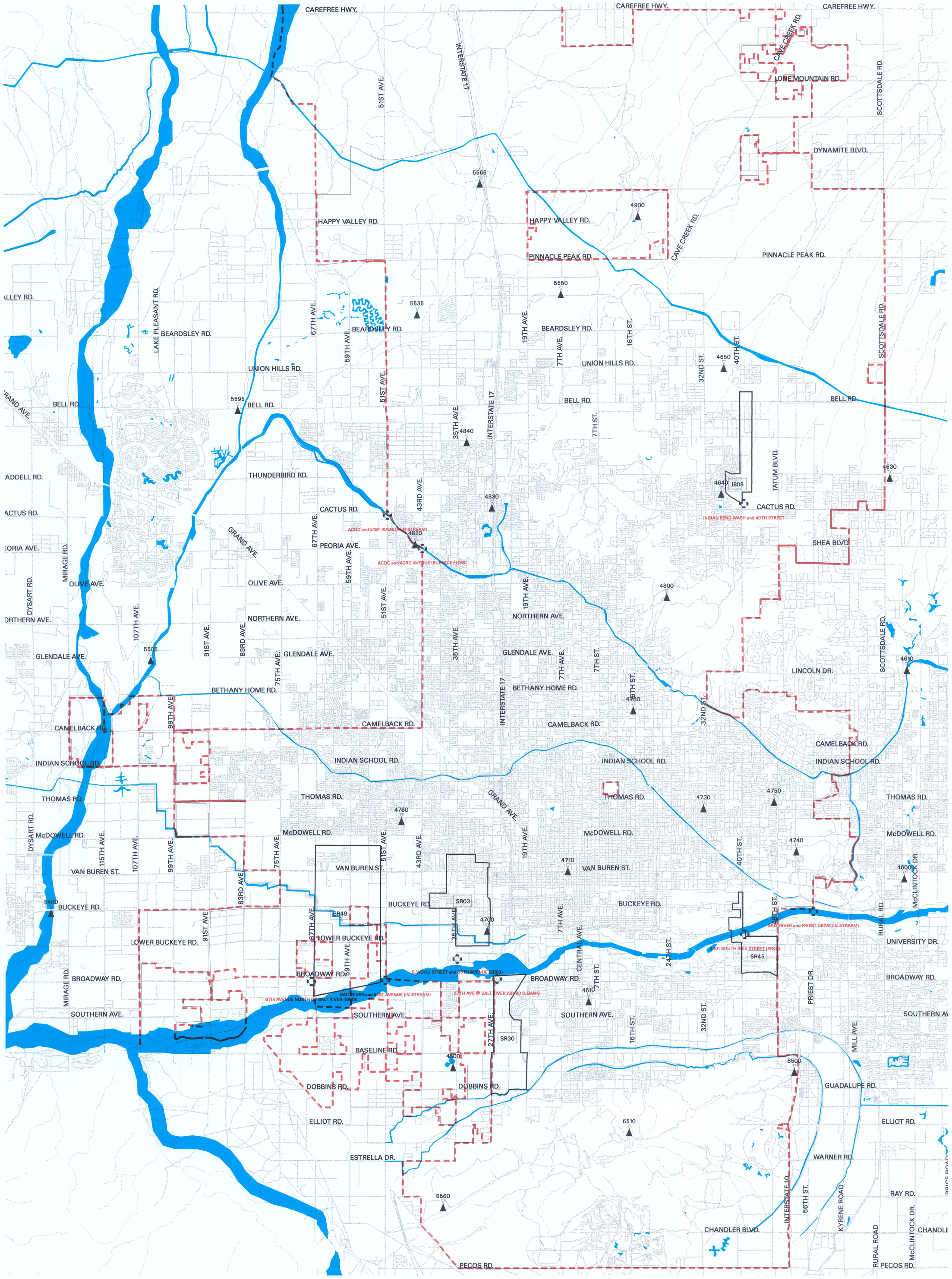
Gage collects runoff form a subbasin on the north side of the Arizona Canal Diversion Channel. The basin is approximately 3.4 acres. The basin is primarily a commercial strip mall.

NOTE:

The sampler site was down from approximately March 10 - April 1, 1999. The privately owned parking lot that provides drainage to this sampling location had been paved in late February or early March. A brief storm on March 16, 1999 caused a large amount of sediment to accumulate at the intake clogging the intake. The sampler was reinitiated on April 1, 1999.

Equipment:

Campbell Scientific Instruments CR10 datalogger and SM192 storage module; Sierra Misco Environmental model 2500 tipping bucket; Druck RDCR 940 pressure transducer; Conoflow and pressure-regulator system; Isco Environmental model 3700 automatic pumping sampler, and Motorola MC310 cellular telephone.



Catchment with ID
Samplers
Rain Gauge
Streets
1999 City Limits
Hydrography
City of Phoenix

Scale in miles
0 1 2 3 4

N
W E
S

City of Phoenix, Arizona

Sampler Locations and Rain Gauge Locations

City of Phoenix

Municipal Separate Storm Sewer System Annual Report
for the Year Ending June 30, 1999
NPDES Permit No. AZS000003

Chapter 3

Results of Storm Water Outfall Monitoring by Outfall

RESULTS OF STORM WATER OUTFALL MONITORING BY OUTFALL

The climate of the City of Phoenix and surrounding desert floor is warm and arid with a mean annual precipitation of approximately seven inches. Most of the precipitation occurs in two distinct seasons, summer (April through September) and winter (October through March). Typical rainfall patterns are highly variable, especially for localized thunderstorms during the summer season. Rainfall can fluctuate within a single catchment, as well between catchments.

Heavy downpours over relatively small areas (up to about 300 square miles) for short periods of time (up to seven hours) usually are accompanied by lightening and thunder. Often referred to as "thunderstorms" or "cloudbursts," these storms are most prevalent and intense during the summer months.

Summer storms usually last from one to three days and consist of numerous locally heavy storm cells embedded in more widespread, light to moderate rain. The more intense summer storms can produce substantial amounts of runoff and occasional flooding.

Winter storms frequently last several days and may occur in series with only slight breaks between storms. They are of lower intensity but longer duration than the summer storms and tend to produce less runoff.

A representative storm event is defined by the City of Phoenix NPDES Permit Number AZS000003 as:

> ...a storm event of greater than 0.1 inch of rainfall and at least 72 hours after the previously measurable (greater than 0.1 inch of rainfall) storm event. Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in the area.

Seasonal storm profiles were identified in the City's Part 2 Permit Application. A representative summer storm has a volume between 0.2 inches to 0.7 inches and lasts between 2.2 and 6.5 hours. A representative winter storm has a volume between 0.2 inches and 0.7 inches and duration of 5.2 to 15.6 hours.

Monitoring results by outfall for Dichlorodiphenyldichloroethylene (DDE) are reported in the following tables, as required by Appendix 1, Section II (b) of Permit Number AZS000003. This chapter also includes storm event hydrographs for the representative storm events that occurred during the reporting period.

Outfall Monitoring

The Flood Control District of Maricopa County (FCDMC) conducted outfall monitoring under an intergovernmental agreement (IGA) at six locations. The following tables summarize the results of water quality monitoring data for qualifying storm events from July 1, 1998 through June 30, 1999. All reported data has been validated to ensure that the data quality objectives of the NPDES program have been met.

The following procedures were used in validating data:

- Analytical methods used in the monitoring program were reviewed to assess the appropriateness of sample collection, transport methods, and holding times.

- Original laboratory reports and the corresponding chain of custody forms were reviewed to determine if quality assurance/quality control requirements were met. Evaluation criteria included holding times, duplicate results, field blank results, method blank results, matrix spike results, equipment calibration information, and sample collection and transport information (to the extent practicable).

Monitoring for certain parameters was not performed, as discussed below:

- Analysis for DDE, benzoic acid, chrysene, and phenol were not performed at outfall IB-08 (February 2, 1999) due to laboratory error.

- At IB-08 (February 2, 1999), the quality control data was outside the specifications for the analysis of total kjeldahl nitrogen, nitrogen as ammonia, and phosphorous.

- Grab samples could not be collected at outfall SR-49 (February 2, 1999) because there was very little flow during the first few hours of the storm, when field personnel visited the site. Grab samples are required for fecal coliform, fecal streptococci, total petroleum hydrocarbon, oil and grease, DDE, acetone, benzoic acid, chrysene, and phenol.

- Grab samples could not be collected at outfall SR-45 (October 26, 1998) because flow had decreased significantly when the site was visited. Grab samples are required for the analysis of fecal coliform, fecal streptococci, total petroleum hydrocarbon, oil and grease, DDE, acetone, benzoic acid, chrysene, and phenol.

- Due to laboratory and/or sampling error, BOD_5 was not analyzed at outfall SR-45 (October 26, 1998).

- Dissolved oxygen levels were not measured at SR-45 (October 26, 1998) and SR-49 (February 4, 1999) due to sampling and/or equipment error.

The City and the FCDMC renegotiated an IGA for storm water monitoring services. The new agreement has a 10-year term. It should also be noted that, for the time being, the monitoring stations are serviced by the United Stated Geological Survey (USGS) pursuant to a separate IGA between the USGS and the FCDMC.

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
Sample Temperature (deg. C)	4
Effluent Temperature (deg. C)	20.4
Ambient Temperature (deg. C)	NM
Barometric Pressure (mm Hg)	NM
pH, Effluent (standard units)	6.4
pH, Lab (standard units)	--
Specific Conductance, FIELD (us/cm)	--
Specific Conductance, LAB (us/cm)	--
Oxygen Dissolved (% saturation)	--
Electrical Conductivity (umhos/cm)	--
COD High Level (mg/l)	401
Chloride (mg/l as Cl)	41
Cyanide Total (mg/l as Cn)	<0.01
Total Dissolved Solids (mg/l)	450
Total Suspended Solids (mg/l)	430
TKN Nitrogen (mg/l as N)	1
Nitrogen, Ammonia + Organic, Total (mg/l as N)	--
Nitrogen Nitrite Total (mg/l as N)	<0.01
Nitrogen Ammonia Total (mg/l as N)	2.29
Nitrogen Organic Total (mg/l as N)	--
Phosphorous Total (mg/l as P)	2.3
Phosphorous Dissolved (mg/l as P)	0.09
Phosphorous Ortho (mg/l as P)	<0.05
Sulfate Dissolved (mg/l)	93
Phenols Total Recoverable (ug/l)	30
Organic Carbon, Total (mg/l)	88
Bicarbonate Whole Field (mg/l as HCo3)	--
Bicarbonate Dissolved, Field (mg/l as HCo3)	--
Carbonate Water Field (mg/l as Co3)	--
Carbonate Water Dissolved, Field, (mg/l as Co3)	--
Alkalinity Water Field Total (mg/l as CaCo3)	--
Alkalinity Dissolved Water Field Total (mg/l as CaCo3)	--

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
Alkalinity LAB (mg/l as CaCo3)	82
Silica Dissolved (mg/l as SiO2)	--
Hardness (mg/l)	154
Antimony (ug/l as Sb)	<5
Arsenic Total (ug/l as As)	13
Arsenic Dissolved (ug/l as As)	<5
Barium Dissolved (ug/l as Ba)	--
Beryllium Total Recoverable (ug/l as Be)	<2
Beryllium Dissolved (ug/l as Be)	<2
Cadmium Total Recoverable (ug/l as Cd)	0.31
Cadmium Dissolved (ug/l as Cd)	0.28
Calcium Dissolved (mg/l as Ca)	--
Chromium Total Recoverable (ug/l as Cr)	4.5
Chromium Dissolved (ug/l as Cr)	4
Cobalt Dissolved (ug/l as Co)	--
Copper, Total Recoverable, (ug/l as Cu)	40
Copper, Dissolved, (ug/l as Cu)	30
Iron, Dissolved, (ug/l as Fe)	--
Lead, Total Recoverable, (ug/l as Pb)	<5
Lead, Dissolved, (ug/l as Pb)	8
Lithium, Dissolved, (ug/l as Li)	--
Magnesium, Dissolved, (mg/l as Mg)	--
Manganese, Dissolved, (ug/l as Mn)	--
Mercury, Total Recoverable, (ug/l as Hg)	<0.2
Mercury, Dissolved, (ug/l as Hg)	<0.2
Molybdenum, Dissolved, (ug/l as Mo)	--
Nickel, Total Recoverable, (ug/l as Ni)	27
Nickel, Dissolved, (ug/l as Ni)	21
Potassium, Dissolved, (mg/l as K)	--
Selenium, Total, (ug/l as Se)	<5
Silver, Total Recoverable, (ug/l as Ag)	<40

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
Silver, Dissolved, (ug/l as Ag)	<50
Sodium, Dissolved, (mg/l as Na)	--
Strontium, Dissolved, (ug/l as Sr)	--
Vanadium, Dissolved, (ug/l as V)	--
Zinc, Total Recoverable, (ug/l as Zn)	160
Zinc, Dissolved, (ug/l as Zn)	170
Diazinon, Total, (ug/l)	--
Ethion, Total, (ug/l)	--
Malathion, Total, (ug/l)	--
Methyl Parathion, Total, (ug/l)	--
Parathion, Total, (ug/l)	--
Trithion, Total, (ug/l)	--
Di-syston, Total, (ug/l)	--
Phorate, Total, (ug/l)	--
Chlorpyrifos, Total, (ug/l)	--
DEF, Total, (ug/l)	--
Fonofos(Dy-fonate), WWT, (ug/l)	--
EPA Method 608 Extraction	
Aldrin, Total, (ug/l)	<1.0
BHC - ALPHA, (ug/l)	<1.0
BHC - Gamma (Lindane), (ug/l)	<1.0
BHC - DELTA, (ug/l)	<1.0
Aroclor 1016, PCB, Total, (ug/l)	<1.0
Aroclor 1221, PCB, Total, (ug/l)	<10
Aroclor 1232, PCB, Total, (ug/l)	<1.0
Aroclor 1242, PCB, Total, (ug/l)	<1.0
Aroclor 1248, PCB, Total, (ug/l)	<1.0
Aroclor 1254, PCB, Total, (ug/l)	<1.0
Aroclor 1260, PCB, Total, (ug/L)	<1.0
Chlordane, Total, (ug/l)	<1.0
P,P' DDD, Total, (ug/l)	<1.0
P, P' DDT, Total, (ug/l)	<2.0

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
Dieldrin, Total, (ug/l)	<1.0
Endo-Sulfan Alpha, Total, (ug/l)	<1.0
Endo-Sulfan Beta, Total, (ug/l)	<1.0
Endo-Sulfan Sulfate, Total, (ug/l)	<1.0
Endrin Aldehyde, Total, (ug/l)	<1.0
Endrin, Total, (ug/l)	<1.0
Heptachlor, Total, (ug/l)	<1.0
Heptachlor Epoxide, Total, (ug/l)	<1.0
Toxaphene, Total, (ug/l)	<1.0
Methoxychlor, Total, (ug/l)	--
Beta Benzene Hexachloride, Total, (ug/l)	<1.0
1,1,2,2-Tetrachloroethane, Total, (ug/l)	--
1,1,1,2-Tetrachloroethane, Total,(ug/l)	--
Tetrachloroethene, PCE, Total, (ug/l)	--
1,1,1- Trichloroethane, Total, (ug/l)	--
1,1,2- Trichloroethane, Total, (ug/l)	--
Trichloroethene, Total, (ug/l)	--
1,1- Dichloroethane, Total, (ug/l)	--
1,1- Dichloroethene, Total, (ug/l)	--
1,2- Dichloroethane, Total, (ug/l)	--
1,2- Dichloropropane, Total, (ug/l)	--
2- Chloroethylvinyl Ether, Total, (ug/l)	--
cis-1,3-Dichloropropene, (ug/l)	--
trans-1,2- Dichloroethene, (ug/l)	--
trans-1,3- Dichloropropene, (ug/l)	--
Benzene, Total, (ug/l)	--
Bromodichloromethane, Total, (ug/l)	--
Bromoform, Total, (ug/l)	--
Carbon Tetrachloride, Total, (ug/l)	--
Chlorobenzene, Total, (ug/l)	--
Chloroethane, (ug/l)	--
Chloroform, Total, (ug/l)	--

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
Ethyl-Benzene, Total, (ug/l)	--
Methylene Chloride, Total, (ug/l)	--
Toluene, Total, (ug/l)	--
Trichlorofluoromethane, Total, (ug/l)	--
Vinyl Chloride, Total, (ug/l)	--
Chlorodibromomethane, Total, (ug/l)	--
4- Methyl, 2- Pentanone, (MIBK), Total, (ug/L)	--
2-Butanone, (ug/l)	--
Carbon Disulfide, Total, (ug/l)	--
1,2 Dichloroethene, Total, (ug/l)	--
Xylenes, Total, (ug/l)	--
2-Hexanone, Total, (ug/l)	--
Styrene, Total, (ug/l)	--
Acrolein, Total, (ug/l)	--
Acrylonitirile, Total, (ug/l)	--
Bromobenzene, Water Whole, Total, (ug/l)	--
1,3-Dichloropropane, Water Whole, Total, (ug/l)	--
Methyl Bromide, Total, (ug/l)	--
Methyl Chloride, Total, (ug/l)	--
Parachloro Toluene, Total, (ug/l)	--
Dibromoethane, Total, (ug/l)	--
EPA Method 625 Extraction	
Acenaphthene, Total, (ug/l)	<25
Acenaphthylene, Total, (ug/l)	<50
Anthracene, Total, (ug/l)	<25
Benzidine, Total, (ug/l)	<100
Benzo (a) Anthracene, Total, (ug/l)	<25
Benzo (b) Fluoranthene, Total, (ug/l)	<25
Benzo (k) Fluoranthene, Total, (ug/l)	<25
Benzo (ghi) Perylene, Total, (ug/l)	<25
Benzo (a) Pyrene, Total, (ug/l)	<25
Benzyl Alcohol, Total, (ug/l)	<50

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
Bis-(2-Chloroethoxy)-Methane, Total, (ug/l)	<50
Bis-(2-Chloroethyl)-Ether, Total, (ug/l)	<50
Bis-(2-Chloroisopropyl)-Ether, Total, (ug/l)	<50
4-Bromo-Phenyl Phenyl Ether, Total, (ug/l)	<25
2-Chloronapthalene, Total, (ug/l)	<25
2-Chlorophenol, Total, (ug/l)	<50
4-Chloro-Phenyl Phenyl Ether, Total, (ug/l)	<50
Dibenzo-[a,h]-Anthracene, Total, (ug/l)	<25
1,3- Dichlorobenzene, Total, (ug/l)	<25
1,4- Dichlorobenzene, Total, (ug/l)	<25
1,2- Dichlorobenzene, Total, (ug/l)	<25
3,3'- Dichlorobenzidine, Total, (ug/l)	<25
2,4- Dichlorophenol, Total, (ug/l)	<50
2,4- Dimethylphenol, Total, (ug/l)	<50
2-Methyl-4,6-Dinitrophenol, Total, (ug/l)	<50
2,4- Dinitrophenol, Total, (ug/l)	<100
2,4- Dinitrotoluene, Total, (ug/l)	<25
2,6- Dinitrotoluene, Total, (ug/l)	<25
Fluoranthene, Total, (ug/l)	<25
Fluorene, Total, (ug/l)	<25
Hexachlorobenzene, Total, (ug/l)	<50
Hexachlorobutadiene, Total, (ug/l)	<25
Hexachlorocyclopentadiene, Total, (ug/l)	<25
Hexachloroethane, Total, (ug/l)	<50
Indeno (1,2,3-CD) Pyrene, Total, (ug/l)	<25
Isophorone, Total, (ug/l)	<50
Naphthalene, Total, (ug/l)	<25
Nitrobenzene, Total, (ug/l)	<50
2-Nitrophenol, Total, (ug/l)	<50
4-Nitrophenol, Total, (ug/l)	<25
N-Nitrosodiphenylamine, Total, (ug/l)	<25

Phoenix SR45
40th Street at Salt River

October 25, 1998

	Result
N-Nitrosodi-N-Propylamine, Total, (ug/l)	<25
Pentachlorophenol, Total, (ug/l)	<50
Phenanthrene, Total, (ug/l)	<25
Pyrene, Total, (ug/l)	<25
1,2,4-Trichlorobenzene, Total, (ug/l)	<25
2,4,5- Trichlorophenol, Total, (ug/l)	<25
2,4,6- Trichlorophenol, Total, (ug/l)	<25
N-Nitrosodimethylamine, Total, (ug/l)	--
1,2- Diphenylhydrazine, Total, (ug/l)	--
Dichlorodifluoromethane, Total, (ug/l)	--
Parachloro-Meta-Cresol, Total, (ug/l)	--

Notes

1. Questionable sample collection methods - tygon tubing in sampler lik

Phoenix SR49
67th Avenue at Salt River

March 16, 1999

	Result
Sample Temperature (deg. C)	4
Effluent Temperature (deg. C)	12.6
pH, Effluent (standard units)	8.41
BOD5 (mg/l)	22
COD High Level (mg/l)	307
Cyanide Total (mg/l as Cn)	<0.01
Total Dissolved Solids (mg/l)	192
Total Suspended Solids (mg/l)	344
Nitrogen No2 + No3, Total (mg/l as N)	2.0
TKN Nitrogen (mg/l as N)	4.18
Nitrogen Nitrate Total (mg/l as N)	1.9
Nitrogen Nitrite Total (mg/l as N)	<0.1
Nitrogen Ammonia Total (mg/l as N)	1.85
Phosphorous Total (mg/l as P)	0.91
Phosphorous Ortho (mg/l as P)	0.23
Phenols Total Recoverable (ug/l)	15
Hardness (mg/l)	114
Arsenic Total (ug/l as As)	<5
Arsenic Dissolved (ug/l as As)	5
Beryllium Total Recoverable (ug/l as Be)	<2
Beryllium Dissolved (ug/l as Be)	<2
Cadmium Total Recoverable (ug/l as Cd)	0.7
Cadmium Dissolved (ug/l as Cd)	0.3
Chromium Total Recoverable (ug/l as Cr)	7
Chromium Dissolved (ug/l as Cr)	4.6
Copper, Total Recoverable, (ug/l as Cu)	33
Copper, Dissolved, (ug/l as Cu)	33
Lead, Total Recoverable, (ug/l as Pb)	13
Lead, Dissolved, (ug/l as Pb)	8
Nickel, Total Recoverable, (ug/l as Ni)	16
Nickel, Dissolved, (ug/l as Ni)	10
Silver, Total Recoverable, (ug/l as Ag)	<40
Silver, Dissolved, (ug/l as Ag)	<50
Zinc, Total Recoverable, (ug/l as Zn)	190
Zinc, Dissolved, (ug/l as Zn)	100
EPA Method 608 Extraction	
EPA Method 625 Extraction	

Phoenix IB08
40th Street at IBW

February 4, 1999

	Result
Sample Temperature (deg. C)	4
Effluent Temperature (deg. C)	12.9
pH, Effluent (standard units)	8.68
Oxygen Dissolved (mg/l)	8.29
BOD5 (mg/l)	24
COD High Level (mg/l)	255
Cyanide Total (mg/l as Cn)	<0.01
Fecal Coliform (MPN/100mL)	30000
Fecal Streptococci (MPN/100mL)	1700
Total Dissolved Solids (mg/l)	215
Total Suspended Solids (mg/l)	244
Nitrogen No2 + No3, Total (mg/l as N)	1.9
TKN Nitrogen (mg/l as N)	4.69
Nitrogen Nitrate Total (mg/l as N)	1.8
Nitrogen Nitrite Total (mg/l as N)	<0.1
Nitrogen Ammonia Total (mg/l as N)	2.23
Phosphorous Total (mg/l as P)	0.68
Phosphorous Ortho (mg/l as P)	0.23
Phenols Total Recoverable (ug/l)	13
Oil and Grease Total Recoverable (mg/l)	5
Total Petroleum Hydrocarbons	<1
Hardness (mg/l)	114
Arsenic Total (ug/l as As)	<5
Arsenic Dissolved (ug/l as As)	<5
Beryllium Total Recoverable (ug/l as Be)	<2
Beryllium Dissolved (ug/l as Be)	<2
Cadmium Total Recoverable (ug/l as Cd)	0.7
Cadmium Dissolved (ug/l as Cd)	<0.2
Chromium Total Recoverable (ug/l as Cr)	6
Chromium Dissolved (ug/l as Cr)	2.4
Copper, Total Recoverable, (ug/l as Cu)	46
Copper, Dissolved, (ug/l as Cu)	23
Lead, Total Recoverable, (ug/l as Pb)	34
Lead, Dissolved, (ug/l as Pb)	<5
Nickel, Total Recoverable, (ug/l as Ni)	13
Nickel, Dissolved, (ug/l as Ni)	6.9

Phoenix IB08
40th Street at IBW

February 4, 1999

	Result
Silver, Total Recoverable, (ug/l as Ag)	<40
Silver, Dissolved, (ug/l as Ag)	<50
Zinc, Total Recoverable, (ug/l as Zn)	310
Zinc, Dissolved, (ug/l as Zn)	90
EPA Method 608 Extraction	
Acetone, Total, (ug/l)	<130
EPA Method 625 Extraction	

Phoenix IB08
40th Street at IBW

March 16, 1999

	Result
Sample Temperature (deg. C)	4
Effluent Temperature (deg. C)	14
pH, Effluent (standard units)	8.9
Oxygen Dissolved (mg/l)	7.24
BOD5 (mg/l)	36
COD High Level (mg/l)	336
Cyanide Total (mg/l as Cn)	<0.01
Fecal Coliform (MPN/100mL)	2400
Fecal Streptococci (MPN/100mL)	16000
Total Dissolved Solids (mg/l)	281
Total Suspended Solids (mg/l)	286
Nitrogen No2 + No3, Total (mg/l as N)	1.4
Nitrogen Nitrate Total (mg/l as N)	1.3
Nitrogen Nitrite Total (mg/l as N)	0.1
Phosphorous Ortho (mg/l as P)	0.2
Phenols Total Recoverable (ug/l)	6.3
Oil and Grease Total Recoverable (mg/l)	<5.0
Total Petroleum Hydrocarbons	2
Hardness (mg/l)	108
Arsenic Total (ug/l as As)	5
Arsenic Dissolved (ug/l as As)	<5
Beryllium Total Recoverable (ug/l as Be)	<2
Beryllium Dissolved (ug/l as Be)	<2
Cadmium Total Recoverable (ug/l as Cd)	0.7
Cadmium Dissolved (ug/l as Cd)	<0.2
Chromium Total Recoverable (ug/l as Cr)	15
Chromium Dissolved (ug/l as Cr)	7.5
Copper, Total Recoverable, (ug/l as Cu)	64
Copper, Dissolved, (ug/l as Cu)	23
Lead, Total Recoverable, (ug/l as Pb)	37
Lead, Dissolved, (ug/l as Pb)	<5
Nickel, Total Recoverable, (ug/l as Ni)	20
Nickel, Dissolved, (ug/l as Ni)	7.8
Silver, Total Recoverable, (ug/l as Ag)	100

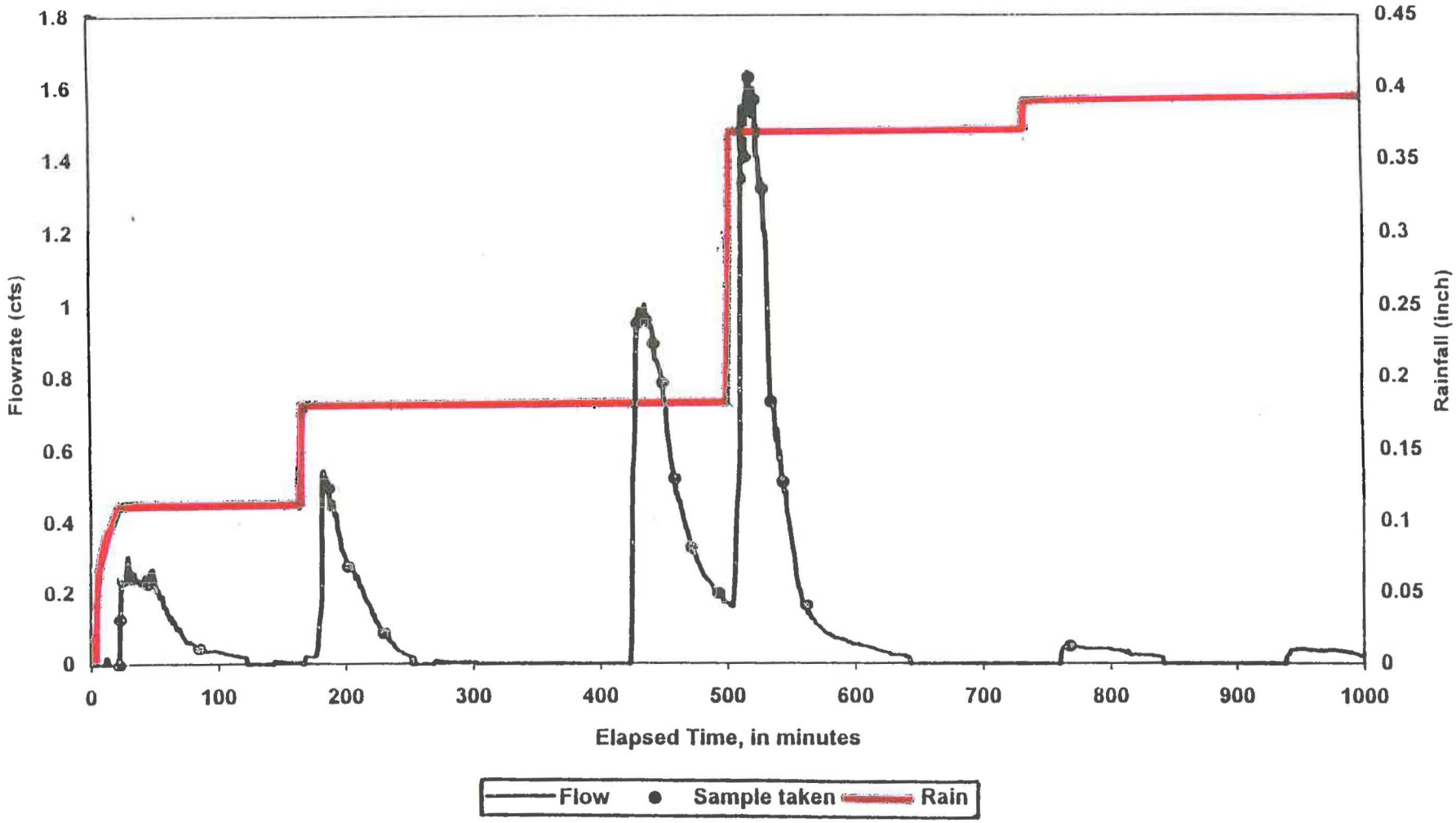
Phoenix IB08
40th Street at IBW

March 16, 1999

	Result
Silver, Dissolved, (ug/l as Ag)	<50
Zinc, Total Recoverable, (ug/l as Zn)	330
Zinc, Dissolved, (ug/l as Zn)	90
EPA Method 608 Extraction	
P,P' DDE, Total, (ug/l)	<1.0
Acetone, Total, (ug/l)	<500
EPA Method 625 Extraction	
Benzoic Acid, Total, (ug/l)	53
Phenol, Total, (ug/l)	<25

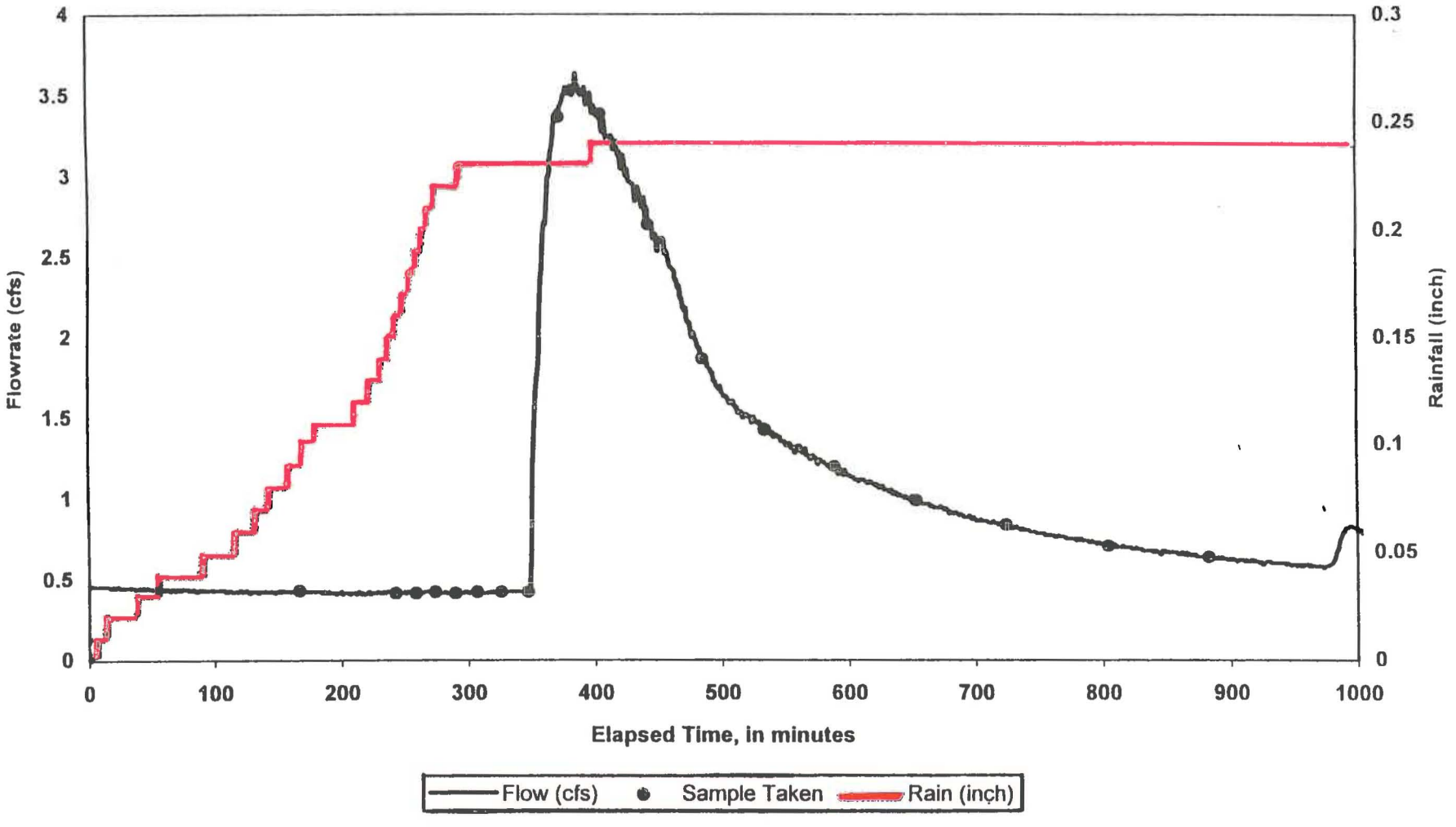
Phoenix SR45

25 October 1998



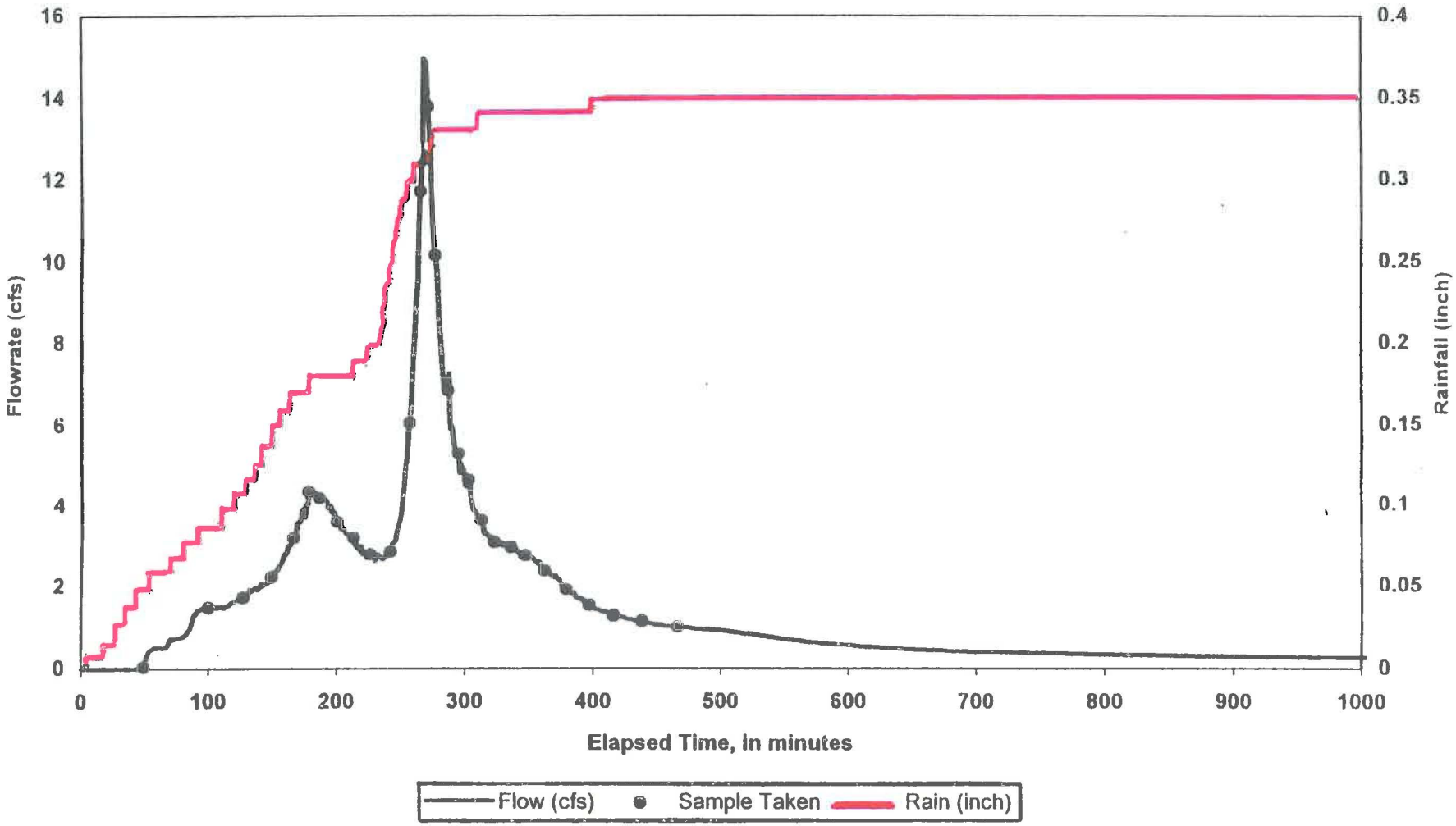
Phoenix SR49

04 Feburary 1999



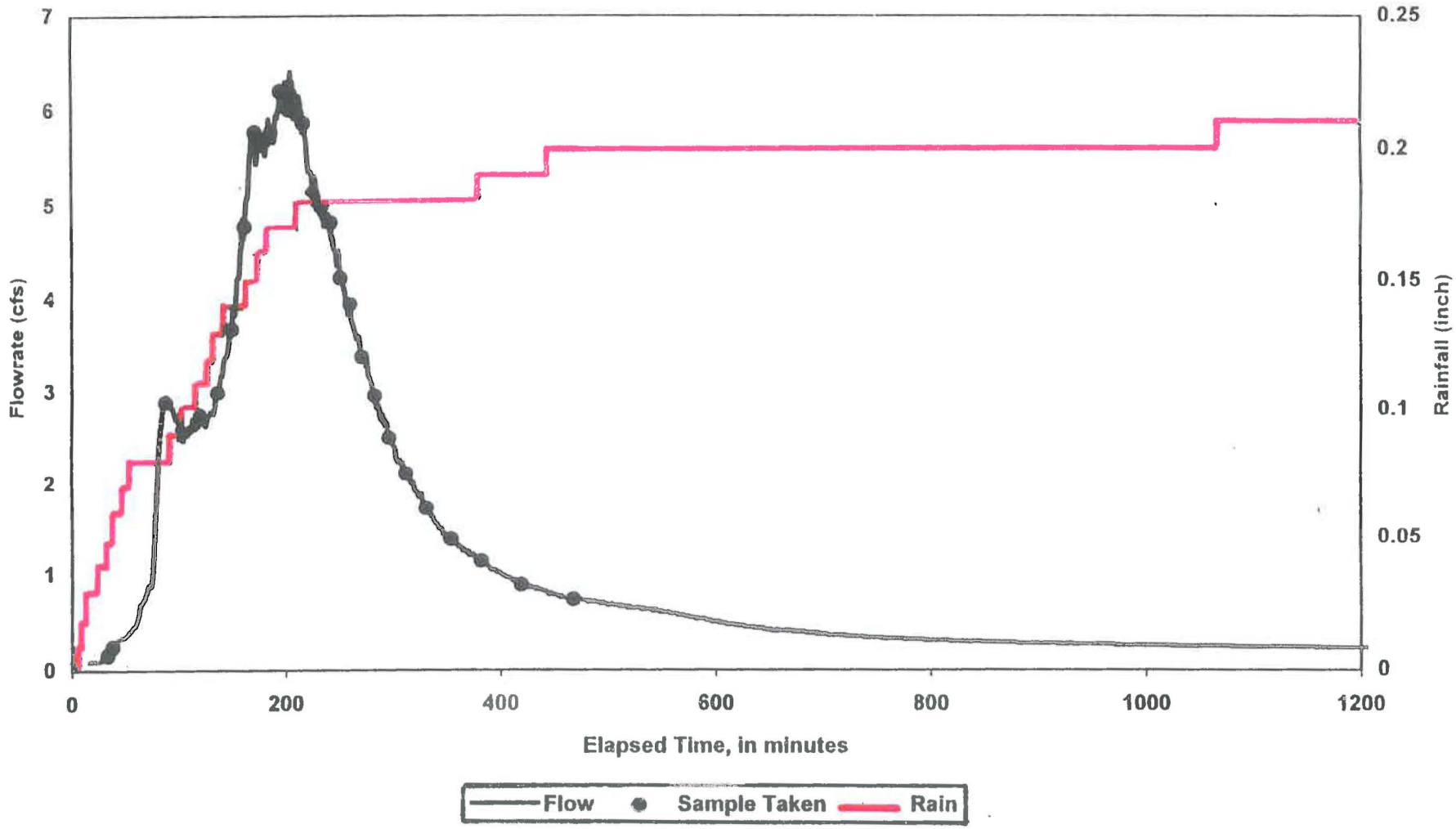
Phoenix IB08

04 February 1999



Phoenix IB08 - IBW at 40th Street

16 March 1999



Chapter 4

Pollutant Loading Estimates

POLLUTANT LOADING ESTIMATES

The City of Phoenix (City) has calculated annual and seasonal pollutant load estimates for pollutants detected in the City's storm water discharges. In accordance with 40 CFR, Section 122.21, Part 122 and Appendix 1 of NPDES Permit AZS000003, the estimates include pollutants that are infrequently detected as well as pollutants that are routinely detected in the discharges.

Total pollutant load estimates for all watershed basins within the Phoenix Municipal Separate Storm Sewer System (MS4) are presented in Table 4-1. An in-depth description of the approach and methods used to determine the pollutant load estimates is presented from page 4-3 through page 4-6. Finally, land use specific concentration information and tables summarizing pollutant load estimates for individual watershed basins are provided beginning on page 4-7.

When reviewing these estimates, it is important to note that currently there is very limited data available. This paucity of data makes it impossible at this time to assess the significance of the pollutant loads. The variability of rainfall and the small number of representative rainfall events that occurs in the arid Phoenix environment limits the City's ability to collect statistically significant amounts of sampling data. It will be several years before sufficient data may be available.

The City selected the simple method described in guidance material published by the U.S. Environmental Protection Agency[1] to determine pollutant loads. At this time, the City believes this to be the most suitable method for calculating these estimates. As noted above, an in-depth description of the calculation approach is presented on pages 4-3 through 4-6.

Table 4-1: City of Phoenix Total Pollutant Loadings (all basins)

Constituent	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5	2,689,824	1,701,688	4,391,513
COD High Level	11,327,680	7,417,907	18,745,587
Cyanide Total	179	114	293
Solids Residue at 180 Deg. C (TDS)	5,349,118	3,396,909	8,746,028
Residue, Total at 105 Deg. C (TSS)	9,956,791	6,514,249	16,471,041
Nitrogen No2 + No3, Total	29,967	19,366	49,333
Nitrogen Nitrate Total	27,482	17,811	45,294
Nitrogen Nitrite Total	2,225	1,382	3,607
Nitrogen Ammonia Total	110,569	66,440	177,009
Phosphorous Total	35,963	23,575	59,538
Phosphorous Ortho	4,334	2,797	7,131
Phenols Total Recoverable	2,030	1,334	3,364
Oil and Grease Total Recoverable	127,930	81	128,011
Arsenic Total	88	56	144
Beryllium Total Recoverable	45	29	73
Cadmium Total Recoverable	45	29	73
Chromium Total Recoverable	260	168	428
Copper, Total Recoverable	3,230	2,082	5,312
Lead, Total Recoverable	1,210	743	1,953
Nickel, Total Recoverable	341	217	558
Silver, Total Recoverable	1,318	871	2,189
Zinc, Total Recoverable	7,806	5,068	12,875

City Wide Pollutant Loads

Seasonal and annual pollutant loads were developed for all 10 of the City's hydrologic basins for the period of July 1, 1998 through June 30, 1999. Winter, summer, and total annual loads were computed for all water quality parameters where sufficient validated data was available. Representative results from the City's 1997-1998 and 1998-1999 monitoring data were used to correlate pollutant concentrations with land uses for 10 hydrologic basins in Phoenix. The "Simple Method" as described in EPA's guidance documents was used in performing this analysis.[1]

The following methodology was used in developing pollutant loads:

1. Land use data for each catchment area within the 10 basins was obtained from the *City of Phoenix Part 2 NPDES Permit Application* and recent updates to this information.

2. Weighted average runoff coefficients ("C" factors) were developed for each catchment based on published literature values that were adjusted for local conditions.[2]

   The weighted average C value for each catchment was obtained as follows:

$$C_{weighted} = \frac{(C_{res.} \times Area_{res.} + C_{comm.} \times Area_{comm.} + C_{ind.} \times Area_{ind.} + C_{open} \times Area_{open})}{Area_{total}}$$

   Where:

   $C_{weighted}$ = weighted runoff coefficient,
   $C_{res.}$ = coefficient for residential areas, $Area_{res.}$ = residential acreage,
   $C_{comm.}$ = coefficient for commercial areas; $Area_{comm.}$ = commercial acreage,
   $C_{ind.}$ = coefficient for industrial areas, $Area_{ind.}$ = industrial acreage,
   C_{open} = coefficient for open space, $Area_{open}$ = open space acreage, and
   $Area_{total}$ = Total acreage of catchment

   Runoff coefficients that were utilized for each land use are as follows:

   - Industrial: 0.4 (published range 0.4-0.9)
   - Commercial: 0.4 (published range 0.4-0.95)
   - Residential: 0.3 (published range 0.3-0.75)
   - Open Space: 0.05 (published range 0.05-0.3)

   The C values listed above were obtained by adjusting the published ranges of values to obtain runoff volumes that correlated with previously measured values from the City's NPDES Permit application.

3. Monthly rainfall data from July 1998 to June 1999 was obtained for 28 rain gauges in the Phoenix area from the Maricopa County Flood Control District's Internet web page. For each catchment a corresponding rain gauge that was most representative of rainfall within the area was identified. Where necessary, the average of two or three rain gauge measurements was used to obtain representative rainfall data for a particular catchment.

4. Using the data from steps 2 and 3 listed above, seasonal runoff volumes for each catchment were determined. Winter runoff volumes were computed using rainfall data for the months of October through March. Summer runoff volumes were computed using rainfall data for the months of April through September. Seasonal runoff volumes were calculated using the formula $Q = 0.9 \times C \times I \times A$, where Q is the runoff volume in acre-inch, C is the weighted average runoff coefficient, I is the average seasonal precipitation rate in inches for the catchment of interest, and A is the catchment area in acres.

   EPA guidance recommends that the seasonal runoff totals be adjusted by a 0.9 factor to account for events where no runoff occurs.[1] To obtain runoff volumes for the 10 major basins, individual catchment flows within each basin were added.

5. Several statistical methods were evaluated to correlate measured pollutant concentrations to land uses. Multiple regression models and matrix solution methods were used to determine the relationship between land use and measured pollutant concentrations. However, due the limited data set, the broad range of measured values for a contaminant, and other hydrologic variables such as antecedent rainfall conditions and storm intensity; these common statistical methods did not provide realistic solutions (negative numbers for many values). Therefore an alternative statistical approach was used.

   Flow weighted average pollutant concentrations were developed for the following catchments with homogeneous land uses (all results that were below method detection levels were considered as values at one-half of the detection level):

   - Arizona Canal Diversion Channel (ACDC) at 43rd Avenue – pollutant concentrations from this outfall were assumed to be representative of commercial activity.

   - 27th Avenue at South Bank of Salt River (27th Ave. at SR) – pollutant concentrations from this outfall were assumed to be representative of industrial activity.

6. Pollutant concentrations for open spaces were developed using flow-weighted averages of measured values from the SR-45 outfall (South Bank of the Salt River and 40th Street) and the 27th Ave. at SR and 43rd Ave. at ACDC data. Since the SR-45 catchment is comprised of industrial, commercial, and open space areas, pollutant concentrations for open spaces were obtained using the following equation:

$$PC_{open} = \frac{(PC_{SR\text{-}45} - PC_{industrial} \times \%\text{Industrial Use} - PC_{commercial} \times \%\text{Commercial Use})}{\%\text{Open Space}}$$

Where:

PC_{open} = pollutant concentration representative of open space
$PC_{SR\text{-}45}$ = flow weighted average of measured concentrations at SR-45
$PC_{industrial}$ = pollutant concentration representative of industrial activity (from 27th Ave. at SR data)
$PC_{commercial}$ = pollutant concentration representative of commercial activity (ACDC at 43rd Ave. data)
%Industrial Use = percent of area in SR-45 that has industrial uses
%Open Space = percent of area in SR-45 that is open space
%Commercial Use = percent of area in SR-45 that has commercial uses

7. Pollutant concentrations for residential activities were developed using flow-weighted averages of measured values from the IB-08 outfall (North Bank of Indian Bend Wash and 40th Street), the open space concentrations computed above, and the ACDC at 43rd Ave. data. Since the IB-08 catchment is comprised of residential, commercial, and open space areas, pollutant concentrations for residential activities were obtained using the following equation:

$$PC_{residential} = \frac{(PC_{IB\text{-}08} - PC_{commercial} \times \%\text{Commercial Use} - PC_{open} \times \%\text{Open Space})}{\%\text{Residential Land Use}}$$

Where:

$PC_{residential}$ = pollutant concentration representative of residential activity
$PC_{IB\text{-}08}$ = flow weighted average of measured concentrations at IB-08
$PC_{commercial}$ = pollutant concentration representative of commercial activity (from ACDC at 43rd Ave. data)
%Commercial Use = percent of area in IB-08 that has commercial uses
PC_{open} = pollutant concentration representative of open space (computed in step 6)
%Open Space = percent of area in IB-08 that is open space

%Residential Land Use = percent of area in IB-08 that has residential uses

The statistical approach discussed above was used to estimate pollutant concentrations for industrial, residential, and commercial land uses and open spaces, as summarized in Table 4-2. It is recognized that pollutant concentrations for certain parameters in the open space category were computed as zero. This is a result of the limited data set that prevented solutions to certain equations. These estimates can be improved in the future when additional data is obtained. For parameters such as BOD_5 , fecal coliform, and fecal streptococci, sufficient monitoring data from 1998-1999 was not available so land use specific concentrations from the 1998 annual report were used.

8. The following equation was subsequently used to determine pollutant concentrations for a catchment with mixed land uses:

$$PC_{\text{Land Use Weighted}} = PC_{\text{industrial}} \times \%\text{Industrial Land Use} + PC_{\text{open}} \times \%\text{Open Space} + PC_{\text{commercial}} \times \%\text{Commercial Land Use} + PC_{\text{residential}} \times \%\text{Residential Land Use}$$

Where:

$PC_{\text{Land Use Weighted}}$ = Estimated pollutant concentration for a catchment with mixed land uses

All other terms as previously defined

9. Using the equation presented in Step 8, land use weighted average pollutant concentrations were developed for each of the 10 basins. These concentrations and the runoff volumes determined under step 4 were used to compute seasonal and annual pollutant loads. Pollutant loads for each basin and the City wide total are presented in Table 4-3 through 4-12. For pH, fecal coliform, fecal streptococci, and dissolved oxygen, pollutant loading estimates were not developed because analytical measurements for these parameters are not available on a mass per unit volume basis.

The approach presented above represents the simple method for determining seasonal and annual pollutant loads, as per EPA's guidance criteria.

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1. *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer System*, November 1992

2. Viessman (1972) and Viessman et al. (1977), *Urban Stormwater Hydrology*

Table 4-2: Land Use Specific Pollutant Concentrations

Parameter	Open Space Pollutant Concentrations	Residential Land Use Pollutant Concentrations	Industrial Land Use Pollutant Concentrations	Commercial Land Use Pollutant Concentrations
Oxygen Dissolved (mg/l)	0.00	8.52	7.37	9.18
BOD5 (mg/l)*	304.08	44.94	348.00	32.00
COD High Level (mg/l)	2,392.36	81.99	215.56	150.14
Cyanide Total (mg/l as Cn)	0.00	0.01	0.02	0.01
Fecal Coliform (CFU/100mL)*	102,847.70	1,357.30	6,832.00	400.00
Fecal Streptococci (CFU/100mL)*	299,636.54	8,558.02	17,911.00	454.00
Solids Residue at 180 Deg. C (TDS) (mg/l)	0.00	293.52	704.44	84.29
Residue, Total at 105 Deg. C (TSS) (mg/l)	2,054.36	85.91	224.44	112.29
Nitrogen No2 + No3, Total (mg/l as N)	0.00	1.94	2.43	0.67
Nitrogen Nitrate Total (mg/l as N)	0.00	1.83	2.00	0.63
Nitrogen Nitrite Total (mg/l as N)	0.00	0.09	0.43	0.04
Nitrogen Ammonia Total (mg/l as N)	0.00	2.29*	31.33	1.47
Phosphorous Total (mg/l as P)	5.51	0.99*	0.84	0.34
Phosphorous Ortho (mg/l as P)	0.09	0.24	0.35	0.14
Phenols Total Recoverable (ug/l)	499.85	0.00	13.44	8.71
Oil and Grease Total Recoverable (mg/l)	0.00	1.68	12.33	27.86
Arsenic Total (ug/l as As)	0.28	4.29	12.44	2.36
Beryllium Total Recoverable (ug/l as Be)	0.00	1.61	5.00	5.00
Cadmium Total Recoverable (ug/l as Cd)	9.71	0.00	1.89	0.50
Chromium Total Recoverable (ug/l as Cr)	23.91	9.80	17.78	3.43
Copper, Total Recoverable, (ug/l as Cu)	670.08	0.00	212.22	14.71
Lead, Total Recoverable, (ug/l as Pb)	0.00	42.59	276.67	6.71
Nickel, Total Recoverable, (ug/l as Ni)	0.00	19.27	39.44	8.00
Silver, Total Recoverable, (ug/l as Ag)	182.57	52.92	0.50	0.50
Zinc, Total Recoverable, (ug/l as Zn)	760.95	292.70	443.33	134.29

* 1999 data set insufficient to develop concentrations for these parameters, 1998 data used in pollutant load development.

Table 4-3: East Fork of Cave Creek Basin Pollutant Loadings

TOTAL AREA: 3766.7 acres Residential: 54.16% Industrial : 4.90% Undeveloped: 30.54% Commercial: 10.38%
Total summer (Apr-Sept) Runoff, cubic feet: 10,187,174 Total Winter (Oct-Mar) Runoff, cubic feet: 8,007,729

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	137.58	87,433	68,727	156,160
COD High Level (mg/l)	801.18	509,157	400,228	909,385
Cyanide Total (mg/l as Cn)	0.007	4	3	8
Solids Residue at 180 Deg. C (TDS) (mg/l)	202.24	128,525	101,028	229,553
Residue, Total at 105 Deg. C (TSS) (mg/l)	696.58	442,685	347,977	790,661
Nitrogen No2 + No3, Total (mg/l as N)	1.24	789	620	1,409
Nitrogen Nitrate Total (mg/l as N)	1.15	734	577	1,311
Nitrogen Nitrite Total (mg/l as N)	0.07	47	37	84
Nitrogen Ammonia Total (mg/l as N)	2.93	1,861	1,463	3,324
Phosphorous Total (mg/l as P)	2.29	1,458	1,146	2,605
Phosphorous Ortho (mg/l as P)	0.19	119	94	213
Phenols Total Recoverable (ug/l)	154.22	98	77	175
Oil and Grease Total Recoverable (mg/l)	4.41	2,800	2	2,802
Arsenic Total (ug/l as As)	3.26	2	2	4
Beryllium Total Recoverable (ug/l as Be)	1.64	1	1	2
Cadmium Total Recoverable (ug/l as Cd)	3.11	2	2	4
Chromium Total Recoverable (ug/l as Cr)	13.84	9	7	16
Copper, Total Recoverable, (ug/l as Cu)	216.57	138	108	246
Lead, Total Recoverable, (ug/l as Pb)	37.32	24	19	42
Nickel, Total Recoverable, (ug/l as Ni)	13.20	8	7	15
Silver, Total Recoverable, (ug/l as Ag)	84.49	54	42	96
Zinc, Total Recoverable, (ug/l as Zn)	426.58	271	213	484

Table 4-4: Grand Canal Basin Pollutant Loadings

TOTAL AREA: 308.7 acres Residential: 15.16% Industrial : 29.26% Undeveloped: 6.90% Commercial: 48.62%
Total summer (Apr-Sept) Runoff, cubic feet: 756,178 Total Winter (Oct-Mar) Runoff, cubic feet: 872,513

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	145.18	6,848	7,902	14,750
COD High Level (mg/l)	313.57	14,792	17,068	31,860
Cyanide Total (mg/l as Cn)	0.01	0	1	1
Solids Residue at 180 Deg. C (TDS) (mg/l)	291.60	13,756	15,872	29,627
Residue, Total at 105 Deg. C (TSS) (mg/l)	275.04	12,974	14,971	27,945
Nitrogen No2 + No3, Total (mg/l as N)	1.33	63	72	135
Nitrogen Nitrate Total (mg/l as N)	1.17	55	64	119
Nitrogen Nitrite Total (mg/l as N)	0.16	7	9	16
Nitrogen Ammonia Total (mg/l as N)	10.23	483	557	1,040
Phosphorous Total (mg/l as P)	0.94	44	51	96
Phosphorous Ortho (mg/l as P)	0.21	10	12	22
Phenols Total Recoverable (ug/l)	42.66	2	2	4
Oil and Grease Total Recoverable (mg/l)	17.41	821	1	822
Arsenic Total (ug/l as As)	5.46	0	0	1
Beryllium Total Recoverable (ug/l as Be)	4.14	0	0	0
Cadmium Total Recoverable (ug/l as Cd)	1.47	0	0	0
Chromium Total Recoverable (ug/l as Cr)	10.00	0	1	1
Copper, Total Recoverable, (ug/l as Cu)	115.49	5	6	12
Lead, Total Recoverable, (ug/l as Pb)	90.67	4	5	9
Nickel, Total Recoverable, (ug/l as Ni)	18.35	1	1	2
Silver, Total Recoverable, (ug/l as Ag)	21.01	1	1	2
Zinc, Total Recoverable, (ug/l as Zn)	291.89	14	16	30

Table 4-5: Indian Bend Wash Basin Pollutant Loadings

TOTAL AREA: 8927.8 acres Residential: 80.14% Industrial : 0.00% Undeveloped: 9.98% Commercial: 9.88%
Total summer (Apr-Sept) Runoff, cubic feet: 20,895,676 Total Winter (Oct-Mar) Runoff, cubic feet: 22,308,698

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	69.52	90,627	96,755	187,382
COD High Level (mg/l)	319.30	416,218	444,364	860,583
Cyanide Total (mg/l as Cn)	0.01	11	12	23
Solids Residue at 180 Deg. C (TDS) (mg/l)	243.56	317,487	338,956	656,443
Residue, Total at 105 Deg. C (TSS) (mg/l)	284.97	371,467	396,587	768,054
Nitrogen No2 + No3, Total (mg/l as N)	1.62	2,117	2,260	4,376
Nitrogen Nitrate Total (mg/l as N)	1.53	1,993	2,128	4,121
Nitrogen Nitrite Total (mg/l as N)	0.08	99	106	205
Nitrogen Ammonia Total (mg/l as N)	1.98	2,582	2,757	5,339
Phosphorous Total (mg/l as P)	1.38	1,794	1,916	3,710
Phosphorous Ortho (mg/l as P)	0.21	280	299	579
Phenols Total Recoverable (ug/l)	50.75	66	71	137
Oil and Grease Total Recoverable (mg/l)	4.10	5,343	6	5,348
Arsenic Total (ug/l as As)	3.70	5	5	10
Beryllium Total Recoverable (ug/l as Be)	1.78	2	2	5
Cadmium Total Recoverable (ug/l as Cd)	1.02	1	1	3
Chromium Total Recoverable (ug/l as Cr)	10.58	14	15	29
Copper, Total Recoverable, (ug/l as Cu)	68.33	89	95	184
Lead, Total Recoverable, (ug/l as Pb)	34.79	45	48	94
Nickel, Total Recoverable, (ug/l as Ni)	16.24	21	23	44
Silver, Total Recoverable, (ug/l as Ag)	60.68	79	84	164
Zinc, Total Recoverable, (ug/l as Zn)	323.78	422	451	873

Table 4-6: Old Cross Cut Canal Basin Pollutant Loadings

TOTAL AREA: 1594.4 acres Residential: 62.41% Industrial : 6.03% Undeveloped: 16.77% Commercial: 14.79%
Total summer (Apr-Sept) Runoff, cubic feet: 4,641,061 Total Winter (Oct-Mar) Runoff, cubic feet: 2,273,619

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	104.76	30,330	14,858	45,189
COD High Level (mg/l)	487.57	141,164	69,155	210,320
Cyanide Total (mg/l as Cn)	0.01	2	1	4
Solids Residue at 180 Deg. C (TDS) (mg/l)	238.13	68,945	33,776	102,721
Residue, Total at 105 Deg. C (TSS) (mg/l)	428.27	123,996	60,745	184,740
Nitrogen No2 + No3, Total (mg/l as N)	1.46	422	207	629
Nitrogen Nitrate Total (mg/l as N)	1.36	393	192	585
Nitrogen Nitrite Total (mg/l as N)	0.09	25	12	38
Nitrogen Ammonia Total (mg/l as N)	3.54	1,024	502	1,525
Phosphorous Total (mg/l as P)	1.64	476	233	708
Phosphorous Ortho (mg/l as P)	0.21	60	29	89
Phenols Total Recoverable (ug/l)	85.93	25	12	37
Oil and Grease Total Recoverable (mg/l)	5.91	1,712	1	1,713
Arsenic Total (ug/l as As)	3.82	1	1	2
Beryllium Total Recoverable (ug/l as Be)	2.05	1	0	1
Cadmium Total Recoverable (ug/l as Cd)	1.82	1	0	1
Chromium Total Recoverable (ug/l as Cr)	11.71	3	2	5
Copper, Total Recoverable, (ug/l as Cu)	127.35	37	18	55
Lead, Total Recoverable, (ug/l as Pb)	44.25	13	6	19
Nickel, Total Recoverable, (ug/l as Ni)	15.59	5	2	7
Silver, Total Recoverable, (ug/l as Ag)	63.74	18	9	27
Zinc, Total Recoverable, (ug/l as Zn)	356.88	103	51	154

Table 4-7: Arizona Canal Basin Pollutant Loadings

TOTAL AREA: 11491.1 acres Residential: 67.74% Industrial : 2.72% Undeveloped: 14.62% Commercial: 14.91%
Total summer (Apr-Sept) Runoff, cubic feet: 41,034,029 Total Winter (Oct-Mar) Runoff, cubic feet: 16,858,963

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	89.14	228,172	93,745	321,918
COD High Level (mg/l)	433.55	1,109,824	455,975	1,565,798
Cyanide Total (mg/l as Cn)	0.01	21	9	30
Solids Residue at 180 Deg. C (TDS) (mg/l)	230.56	590,198	242,485	832,683
Residue, Total at 105 Deg. C (TSS) (mg/l)	381.39	976,295	401,114	1,377,409
Nitrogen No2 + No3, Total (mg/l as N)	1.48	3,795	1,559	5,355
Nitrogen Nitrate Total (mg/l as N)	1.39	3,554	1,460	5,014
Nitrogen Nitrite Total (mg/l as N)	0.08	201	83	284
Nitrogen Ammonia Total (mg/l as N)	2.62	6,715	2,759	9,474
Phosphorous Total (mg/l as P)	1.55	3,966	1,629	5,595
Phosphorous Ortho (mg/l as P)	0.21	526	216	742
Phenols Total Recoverable (ug/l)	74.74	191	79	270
Oil and Grease Total Recoverable (mg/l)	5.63	14,404	6	14,410
Arsenic Total (ug/l as As)	3.64	9	4	13
Beryllium Total Recoverable (ug/l as Be)	1.97	5	2	7
Cadmium Total Recoverable (ug/l as Cd)	1.55	4	2	6
Chromium Total Recoverable (ug/l as Cr)	11.13	28	12	40
Copper, Total Recoverable, (ug/l as Cu)	105.93	271	111	383
Lead, Total Recoverable, (ug/l as Pb)	37.38	96	39	135
Nickel, Total Recoverable, (ug/l as Ni)	15.32	39	16	55
Silver, Total Recoverable, (ug/l as Ag)	62.62	160	66	226
Zinc, Total Recoverable, (ug/l as Zn)	341.61	874	359	1,234

Table 4-8: Cave Creek Basin Pollutant Loadings

TOTAL AREA: 4337.8 acres Residential: 56.07% Industrial : 5.56% Undeveloped: 19.94% Commercial: 18.43%
Total summer (Apr-Sept) Runoff, cubic feet: 14,405,085 Total Winter (Oct-Mar) Runoff, cubic feet: 30,706,832

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	111.08	99,818	212,780	312,598
COD High Level (mg/l)	562.67	505,631	1,077,836	1,583,467
Cyanide Total (mg/l as Cn)	0.01	7	15	22
Solids Residue at 180 Deg. C (TDS) (mg/l)	219.28	197,053	420,051	617,103
Residue, Total at 105 Deg. C (TSS) (mg/l)	490.98	441,214	940,522	1,381,736
Nitrogen No2 + No3, Total (mg/l as N)	1.35	1,212	2,583	3,795
Nitrogen Nitrate Total (mg/l as N)	1.25	1,127	2,402	3,529
Nitrogen Nitrite Total (mg/l as N)	0.08	73	157	230
Nitrogen Ammonia Total (mg/l as N)	3.30	2,963	6,317	9,280
Phosphorous Total (mg/l as P)	1.76	1,584	3,376	4,960
Phosphorous Ortho (mg/l as P)	0.20	177	377	555
Phenols Total Recoverable (ug/l)	102.02	92	195	287
Oil and Grease Total Recoverable (mg/l)	6.76	6,076	13	6,089
Arsenic Total (ug/l as As)	3.59	3	7	10
Beryllium Total Recoverable (ug/l as Be)	2.10	2	4	6
Cadmium Total Recoverable (ug/l as Cd)	2.13	2	4	6
Chromium Total Recoverable (ug/l as Cr)	11.89	11	23	33
Copper, Total Recoverable, (ug/l as Cu)	148.13	133	284	417
Lead, Total Recoverable, (ug/l as Pb)	40.50	36	78	114
Nickel, Total Recoverable, (ug/l as Ni)	14.47	13	28	41
Silver, Total Recoverable, (ug/l as Ag)	66.19	59	127	186
Zinc, Total Recoverable, (ug/l as Zn)	365.25	328	700	1,028

Table 4-9: Skunk Creek Basin Pollutant Loadings

TOTAL AREA: 2803.6 acres Residential: 44.95% Industrial : 14.29% Undeveloped: 31.95% Commercial: 8.81%
Total summer (Apr-Sept) Runoff, cubic feet: 3,426,866 Total Winter (Oct-Mar) Runoff, cubic feet: 10,835,931

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	169.90	36,322	114,851	151,172
COD High Level (mg/l)	845.25	180,696	571,369	752,064
Cyanide Total (mg/l as Cn)	0.01	2	5	7
Solids Residue at 180 Deg. C (TDS) (mg/l)	240.03	51,313	162,255	213,569
Residue, Total at 105 Deg. C (TSS) (mg/l)	736.95	157,544	498,163	655,708
Nitrogen No2 + No3, Total (mg/l as N)	1.28	274	865	1,138
Nitrogen Nitrate Total (mg/l as N)	1.16	249	787	1,036
Nitrogen Nitrite Total (mg/l as N)	0.11	22	71	93
Nitrogen Ammonia Total (mg/l as N)	5.64	1,205	3,810	5,015
Phosphorous Total (mg/l as P)	2.36	504	1,592	2,096
Phosphorous Ortho (mg/l as P)	0.20	42	134	176
Phenols Total Recoverable (ug/l)	162.39	35	110	144
Oil and Grease Total Recoverable (mg/l)	4.97	1,063	3	1,066
Arsenic Total (ug/l as As)	4.00	1	3	4
Beryllium Total Recoverable (ug/l as Be)	1.88	0	1	2
Cadmium Total Recoverable (ug/l as Cd)	3.42	1	2	3
Chromium Total Recoverable (ug/l as Cr)	14.89	3	10	13
Copper, Total Recoverable, (ug/l as Cu)	245.71	53	166	219
Lead, Total Recoverable, (ug/l as Pb)	59.27	13	40	53
Nickel, Total Recoverable, (ug/l as Ni)	15.01	3	10	13
Silver, Total Recoverable, (ug/l as Ag)	82.23	18	56	73
Zinc, Total Recoverable, (ug/l as Zn)	449.88	96	304	400

Table 4-10: Papago Diversion Channel Basin Pollutant Loadings

TOTAL AREA: 19944.9 acres Residential: 66.00% Industrial : 7.96% Undeveloped: 14.56% Commercial: 9.23%
Total summer (Apr-Sept) Runoff, cubic feet: 55,344,928 Total Winter (Oct-Mar) Runoff, cubic feet: 33,771,150

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	104.59	361,103	220,343	581,446
COD High Level (mg/l)	433.46	1,496,554	913,189	2,409,743
Cyanide Total (mg/l as Cn)	0.01	30	18	48
Solids Residue at 180 Deg. C (TDS) (mg/l)	257.58	889,317	542,656	1,431,973
Residue, Total at 105 Deg. C (TSS) (mg/l)	384.05	1,325,954	809,089	2,135,043
Nitrogen No2 + No3, Total (mg/l as N)	1.54	5,309	3,240	8,549
Nitrogen Nitrate Total (mg/l as N)	1.43	4,921	3,003	7,924
Nitrogen Nitrite Total (mg/l as N)	0.10	335	205	540
Nitrogen Ammonia Total (mg/l as N)	4.14	14,299	8,725	23,024
Phosphorous Total (mg/l as P)	1.55	5,364	3,273	8,638
Phosphorous Ortho (mg/l as P)	0.21	732	446	1,178
Phenols Total Recoverable (ug/l)	74.65	258	157	415
Oil and Grease Total Recoverable (mg/l)	4.66	16,095	10	16,105
Arsenic Total (ug/l as As)	4.08	14	9	23
Beryllium Total Recoverable (ug/l as Be)	1.92	7	4	11
Cadmium Total Recoverable (ug/l as Cd)	1.61	6	3	9
Chromium Total Recoverable (ug/l as Cr)	11.68	40	25	65
Copper, Total Recoverable, (ug/l as Cu)	115.81	400	244	644
Lead, Total Recoverable, (ug/l as Pb)	50.75	175	107	282
Nickel, Total Recoverable, (ug/l as Ni)	16.60	57	35	92
Silver, Total Recoverable, (ug/l as Ag)	61.59	213	130	342
Zinc, Total Recoverable, (ug/l as Zn)	351.66	1,214	741	1,955

Table 4-11: Salt River Basin Pollutant Loadings

TOTAL AREA: 64891.2 acres Residential: 45.01% Industrial : 18.60% Undeveloped: 21.86% Commercial: 14.53%
Total summer (Apr-Sept) Runoff, cubic feet: 179,119,023 Total Winter (Oct-Mar) Runoff, cubic feet: 89,384,247

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	156.08	1,744,007	870,297	2,614,304
COD High Level (mg/l)	621.78	6,947,820	3,467,112	10,414,931
Cyanide Total (mg/l as Cn)	0.01	100	50	150
Solids Residue at 180 Deg. C (TDS) (mg/l)	275.39	3,077,198	1,535,588	4,612,785
Residue, Total at 105 Deg. C (TSS) (mg/l)	545.81	6,098,925	3,043,495	9,142,419
Nitrogen No2 + No3, Total (mg/l as N)	1.42	15,909	7,939	23,848
Nitrogen Nitrate Total (mg/l as N)	1.29	14,387	7,179	21,567
Nitrogen Nitrite Total (mg/l as N)	0.13	1,406	702	2,107
Nitrogen Ammonia Total (mg/l as N)	7.07	79,031	39,438	118,469
Phosphorous Total (mg/l as P)	1.86	20,735	10,347	31,083
Phosphorous Ortho (mg/l as P)	0.21	2,377	1,186	3,564
Phenols Total Recoverable (ug/l)	113.03	1,263	630	1,893
Oil and Grease Total Recoverable (mg/l)	7.10	79,311	40	79,351
Arsenic Total (ug/l as As)	4.65	52	26	78
Beryllium Total Recoverable (ug/l as Be)	2.38	27	13	40
Cadmium Total Recoverable (ug/l as Cd)	2.55	28	14	43
Chromium Total Recoverable (ug/l as Cr)	13.44	150	75	225
Copper, Total Recoverable, (ug/l as Cu)	188.09	2,102	1,049	3,151
Lead, Total Recoverable, (ug/l as Pb)	71.60	800	399	1,199
Nickel, Total Recoverable, (ug/l as Ni)	17.17	192	96	288
Silver, Total Recoverable, (ug/l as Ag)	63.89	714	356	1,070
Zinc, Total Recoverable, (ug/l as Zn)	400.06	4,470	2,231	6,701

Table 4-12: Scatter Wash Basin Pollutant Loadings

TOTAL AREA: 114.9 acres Residential: 60.77% Industrial : 27.12% Undeveloped: 0.78% Commercial: 11.37%
Total summer (Apr-Sept) Runoff, cubic feet: 648,248 Total Winter (Oct-Mar) Runoff, cubic feet: 179,437

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	127.70	5,164	1,429	6,594
COD High Level (mg/l)	144.02	5,824	1,612	7,436
Cyanide Total (mg/l as Cn)	0.01	0	0	1
Solids Residue at 180 Deg. C (TDS) (mg/l)	379.00	15,327	4,243	19,569
Residue, Total at 105 Deg. C (TSS) (mg/l)	141.87	5,737	1,588	7,325
Nitrogen No2 + No3, Total (mg/l as N)	1.92	77	21	99
Nitrogen Nitrate Total (mg/l as N)	1.73	70	19	89
Nitrogen Nitrite Total (mg/l as N)	0.18	7	2	9
Nitrogen Ammonia Total (mg/l as N)	10.06	407	113	519
Phosphorous Total (mg/l as P)	0.91	37	10	47
Phosphorous Ortho (mg/l as P)	0.26	10	3	13
Phenols Total Recoverable (ug/l)	8.54	0	0	0
Oil and Grease Total Recoverable (mg/l)	7.53	305	0	305
Arsenic Total (ug/l as As)	6.25	0	0	0
Beryllium Total Recoverable (ug/l as Be)	2.90	0	0	0
Cadmium Total Recoverable (ug/l as Cd)	0.64	0	0	0
Chromium Total Recoverable (ug/l as Cr)	11.36	0	0	1
Copper, Total Recoverable, (ug/l as Cu)	64.45	3	1	3
Lead, Total Recoverable, (ug/l as Pb)	101.68	4	1	5
Nickel, Total Recoverable, (ug/l as Ni)	23.32	1	0	1
Silver, Total Recoverable, (ug/l as Ag)	33.77	1	0	2
Zinc, Total Recoverable, (ug/l as Zn)	319.31	13	4	16

Chapter 5

Assessment of Storm Water Management Program Impacts

ASSESSMENT OF STORM WATER MANAGEMENT PROGRAM IMPACTS

In July 1996, the Center for Watershed Protection issued a Final Report on Environmental Indicators to Assess Storm Water Control Programs and Practices.[1] The report provides a set of methods with which to assess the success of a storm water management program. Indicator categories include

- Water Quality Indicators
- Physical and Hydrological Indicators
- Biological Indicators
- Programmatic Indicators
- Site Indicators
- Social Indicators

Water Quality Indicators / Assessment of Water Quality Improvement or Degradation

Phoenix averages just over seven inches of annual rainfall. The water bodies that receive storm water discharges from the City's storm drain system normally are dry. The Salt and Gila Rivers typically run only when water has been released from upstream dams.

During dam releases, the rivers may run through Phoenix for several weeks before drying up completely. During times when no releases occur, aquatic communities that may exist in the river courses are ephemeral, short-lived, opportunistic, and located near outfalls in response to localized storm water discharges.

Two other receiving streams, the Arizona Canal Diversion Channel (ACDC) and the Indian Bend Wash, flow short distances for a few days to a few weeks in response to heavy rains. The ACDC is a concrete-lined channel whose operation precludes the existence of aquatic communities. For much of its length, the Indian Bend Wash is a landscaped multi-use facility, used as a park when it does not carry flood waters.

Since ordinarily there is no water in the receiving streams for months at a time, assessing whether the health of the receiving stream has improved or degraded is inherently problematic. Limited water quality information is available to quantitatively measure the effectiveness of the City's SWMP on water quality in general.

Figure 5-1 contains a comparison of storm water pollutant loading data reported in the City's 1998 Annual Report with loading data calculated during this reporting period. Pollutant load estimates are largely dependent on rainfall quantities and runoff volumes, neither of which are functions of storm water management practices. Substantial variations in pollutant loading estimates can occur due to variations in rainfall patterns between monitoring periods and the techniques used to estimate storm water runoff. Therefore, there is limited benefit in using pollutant load estimates as a means of assessing the effectiveness of storm water management programs. Hydrologic and

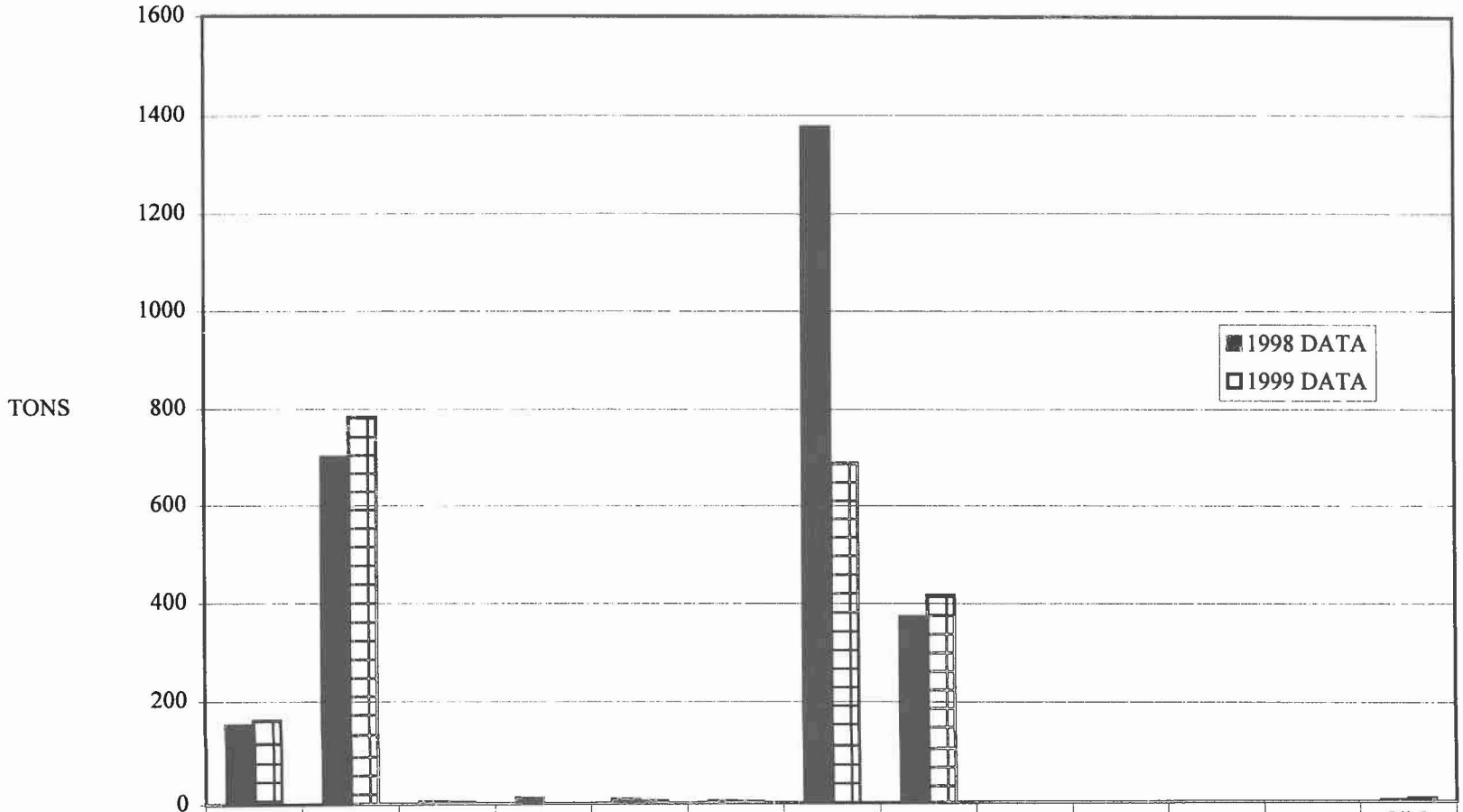
[1] R.A. Claytor and W.E. Brown, Environmental Indicators to Assess Storm Water Control Programs and Practices, (Silver Spring, Maryland).

hydraulic variables result in pollutant load estimates that do not accurately represent water quality at the outfalls.

Alternatively, the City proposes that comparing flow-weighted averages of pollutant concentrations at a particular outfall from different monitoring periods be used for assessing the effectiveness of storm water management programs. This method may generate more meaningful conclusions because actual data measurements are compared, using similar protocols for several monitoring periods.

Figure 5-2 compares data collected in 1992, 1998 and 1999 at the 27th Avenue at the Salt River outfall (primarily industrial use). The City will continue to evaluate this approach to assess the effectiveness of its BMPs as a larger data set is obtained for flow-weighted pollutant concentrations.

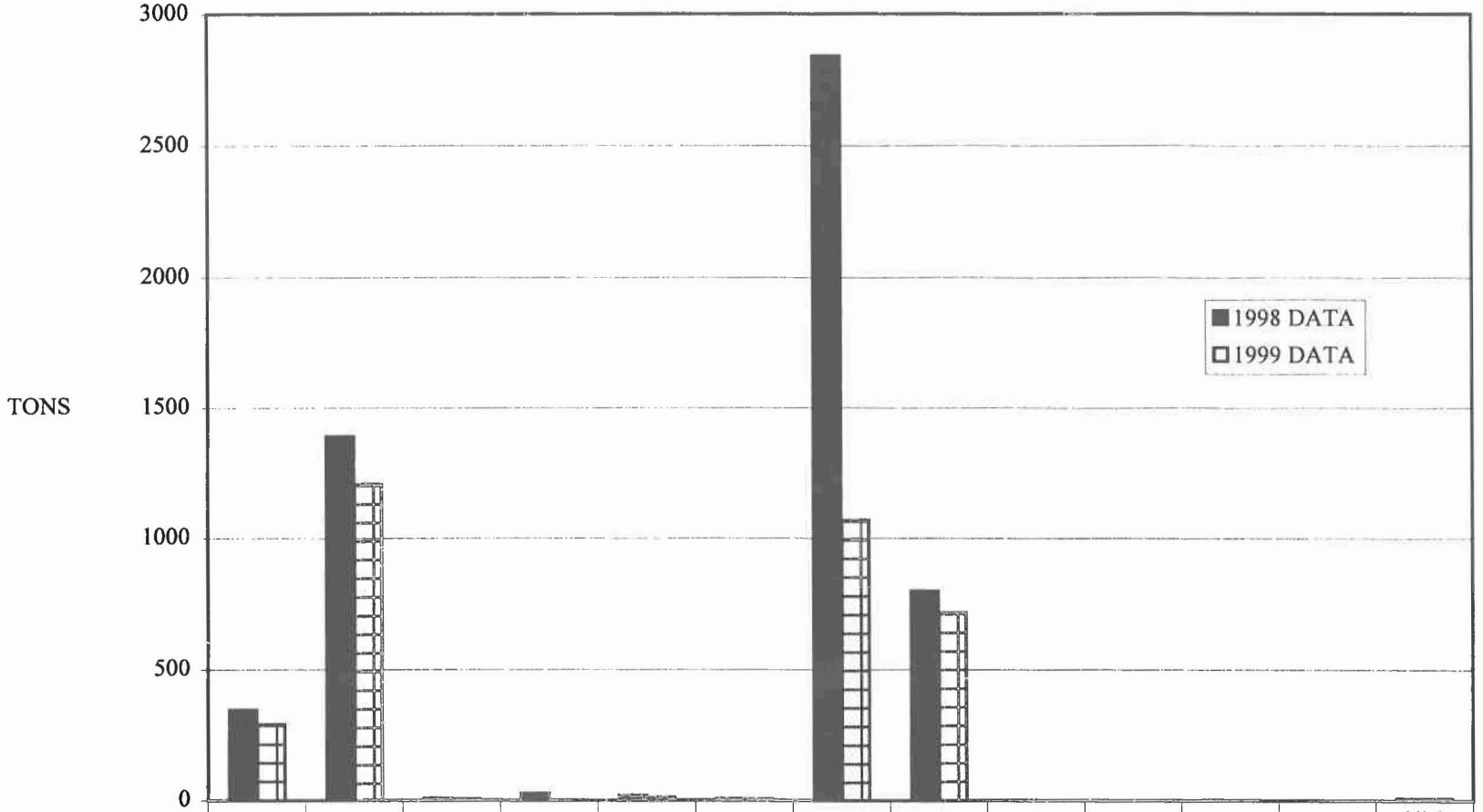
FIGURE 5-1a ARIZONA CANAL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TDS	Cu	Pb	Zn	Cd	Oil & Grease
1998 DATA	151.36	701.74	3.93	11.44	8.06	3.45	1375.9	373.97	0.377	0.11	0.623	0.0045	3.78
1999 DATA	160.96	782.90	2.68		4.74	2.80	688.70	416.34	0.19	0.07	0.62	0.00	7.21

POLLUTANTS

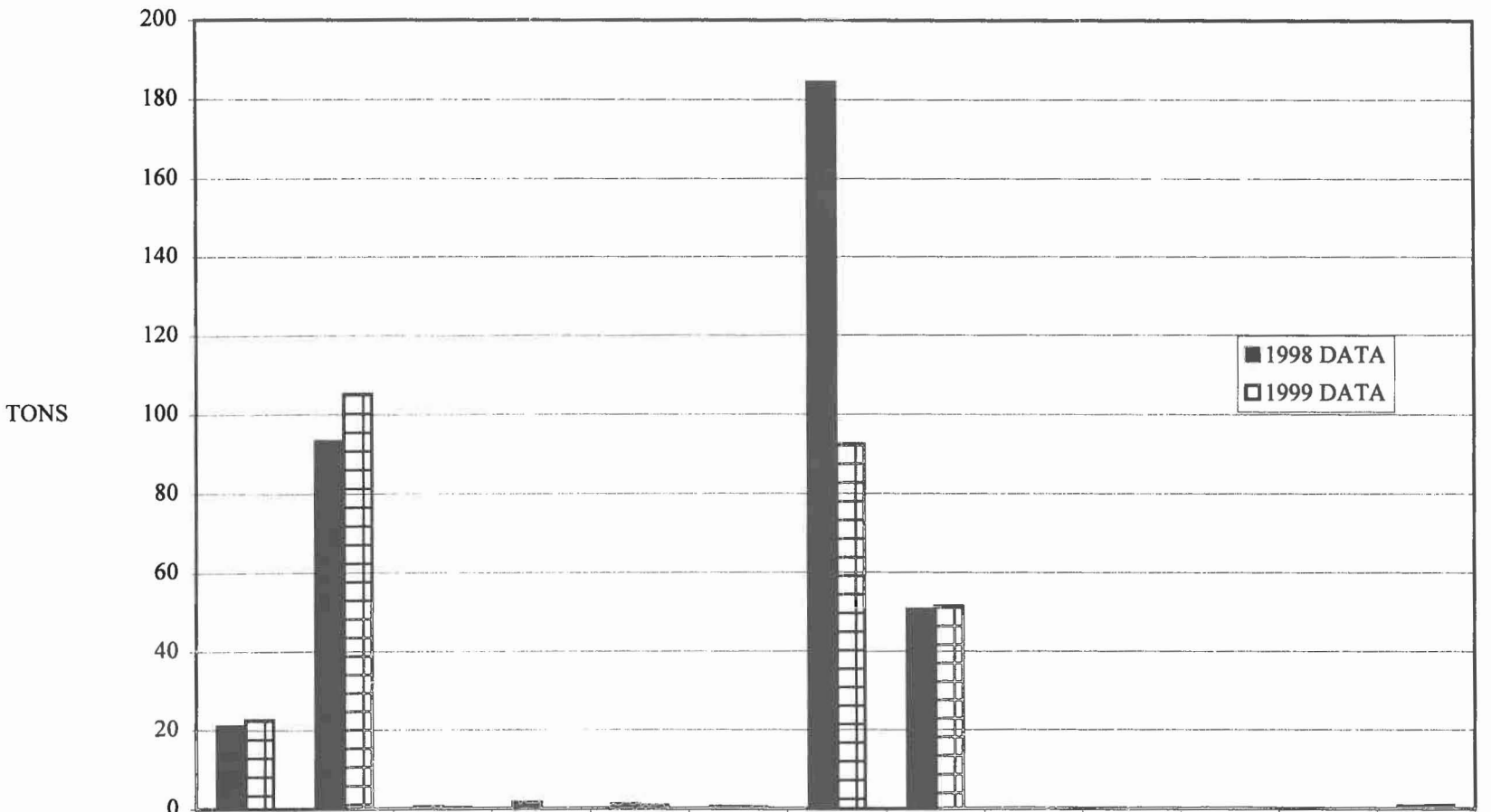
TABLE 5-1b PAPAGO DIVERSION CHANNEL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TDS	Cu	Pb	Zn	Cd	Oil & Grease
1998 DATA	347.75	1390.93	8.08	27.8	18.63	6.8	2842.2	799.6	0.725	0.26	1.26	0.0085	7.68
1999 DATA	290.72	1204.87	4.27		11.51	4.32	1067.52	715.99	0.32	0.14	0.98	0.00	8.05

POLLUTANTS

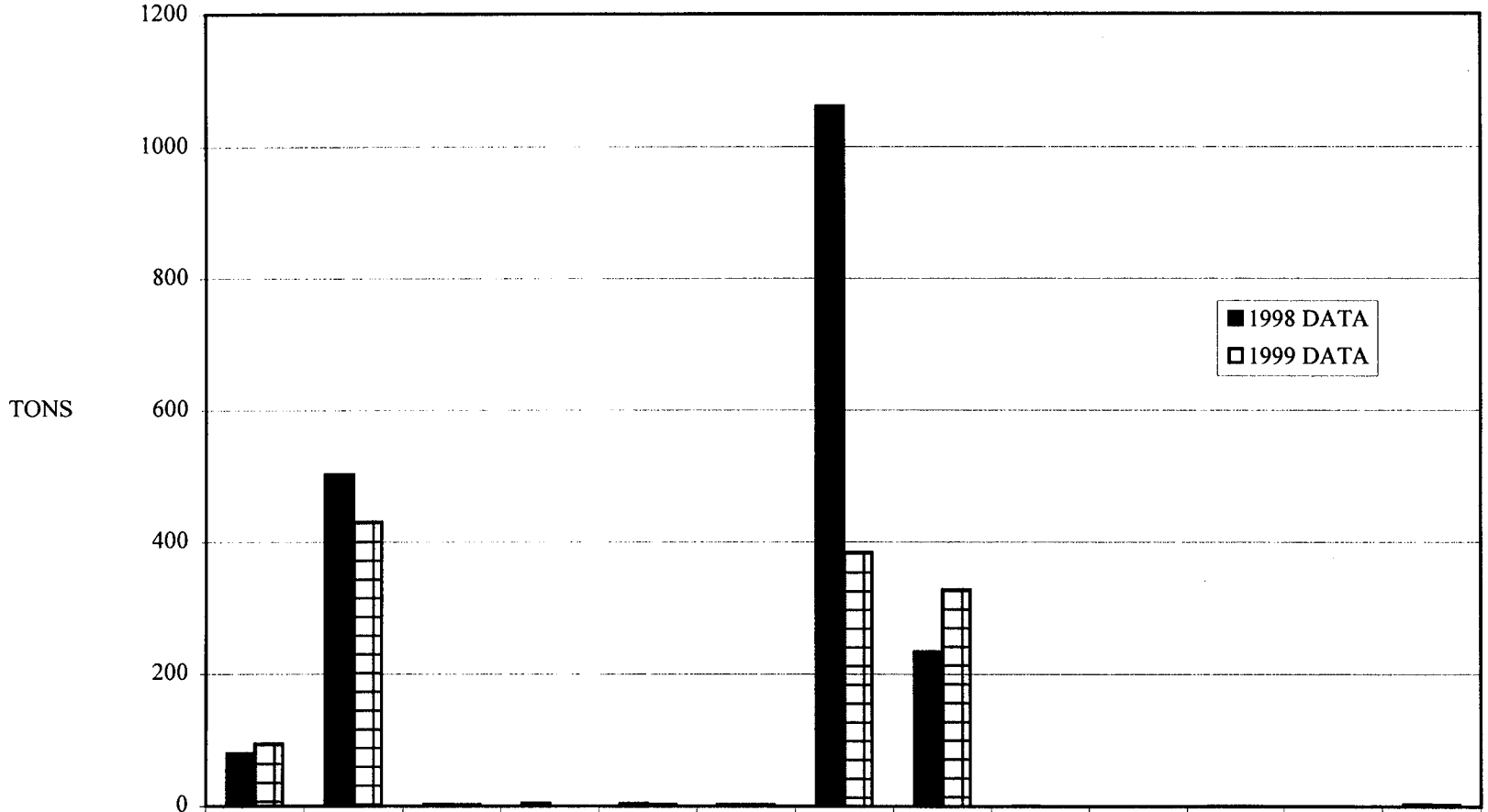
FIGURE 5-1c OLD CROSS CUT CANAL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TDS	Cu	Pb	Zn	Cd	Oil & Grease
1998 DATA	21.02	93.22	0.53	1.62	1.122	0.46	184.38	50.65	0.05	0.0155	0.083	0.0005	0.643
1999 DATA	22.59	105.16	0.31		0.76	0.35	92.37	51.36	0.03	0.01	0.08	0.00	0.86

POLLUTANTS

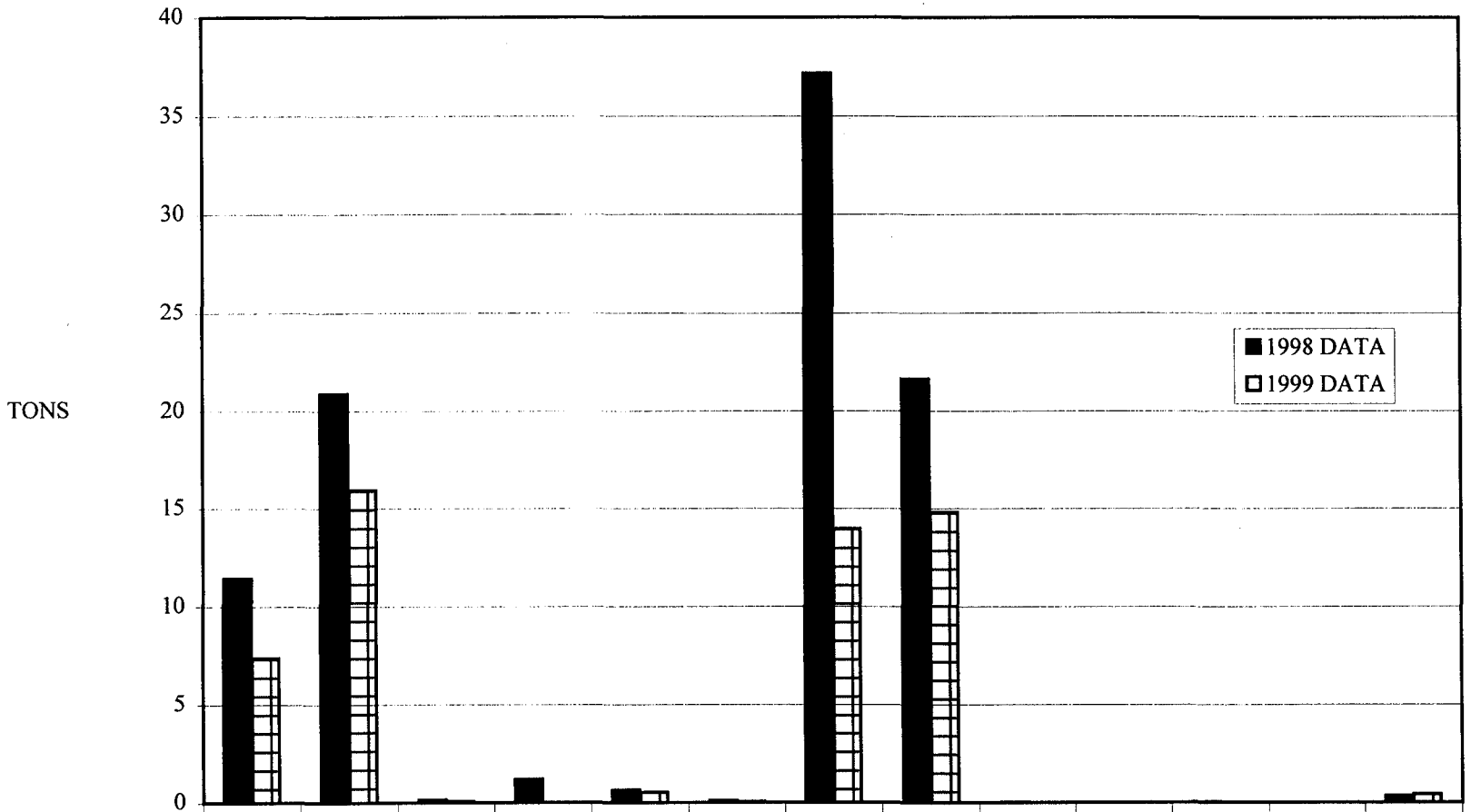
FIGURE 5-1d INDIAN BEND WASH ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TDS	Cu	Pb	Zn	Cd	Oil & Grease
1998 DATA	79.34	502.1	2.82	4.38	4.094	2.362	1060.4	233.36	0.2285	0.057	0.405	0.0025	2.886
1999 DATA	93.691	430.2915	2.188		2.6695	2.188	384.027	328.2215	0.092	0.047	0.4365	0.0015	2.674

POLLUTANTS

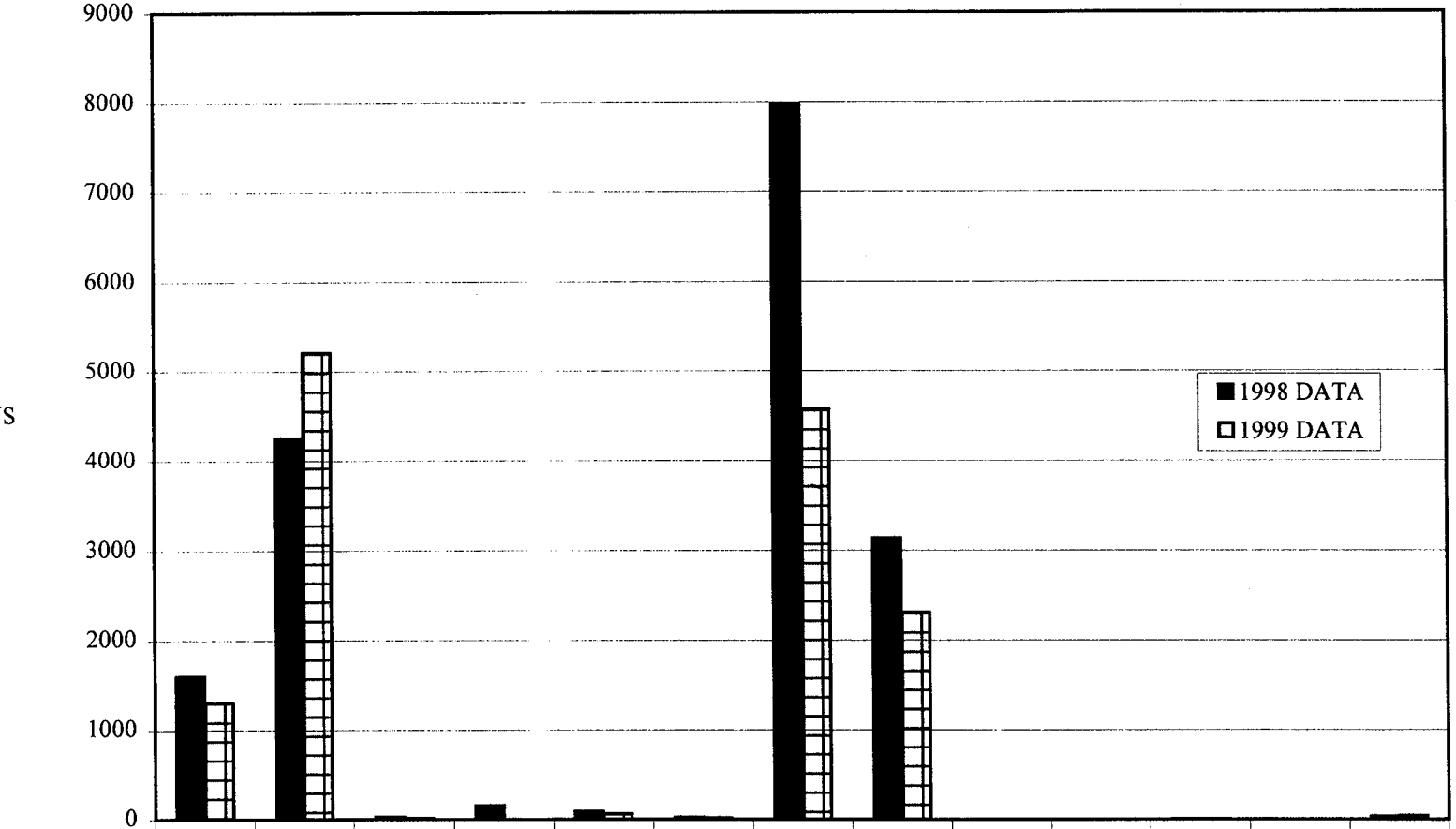
FIGURE 5-1e GRAND CANAL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TDS	Cu	Pb	Zn	Cd	Oil & Grease
1998 DATA	11.45	20.87	0.155	1.185	0.637	0.1	37.12	21.62	0.01	0.008	0.0275	0	0.34
1999 DATA	7.38	15.93	0.07		0.52	0.05	13.97	14.81	0.01	0.00	0.02	0.00	0.41

POLLUTANTS

FIGURE 5-1f SALT RIVER ANNUAL POLLUTANT LOADS

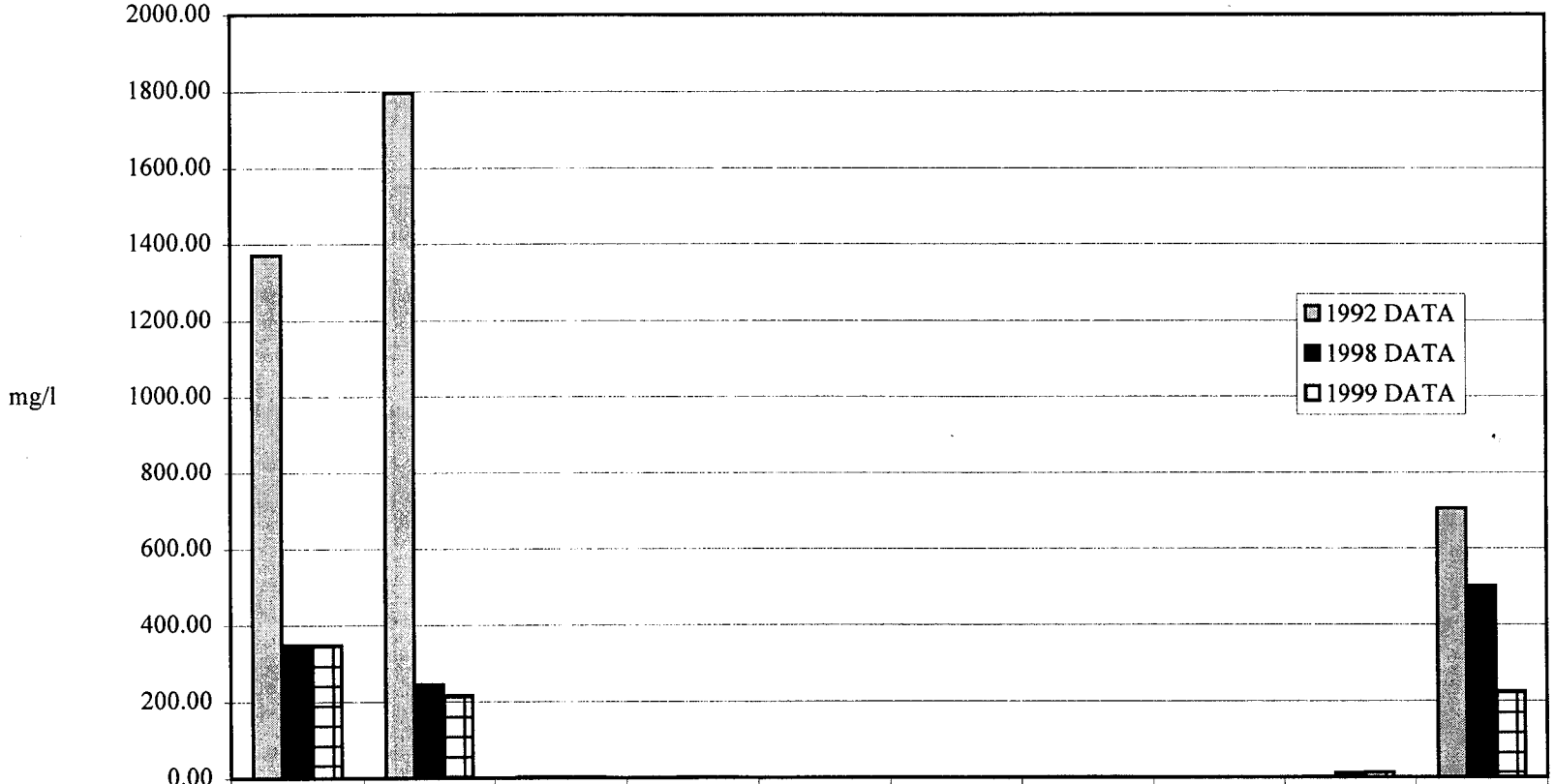


	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TDS	Cu	Pb	Zn	Cd	Oil & Grease
1998 DATA	1595.06	4249.32	26	151.64	87.46	21.76	7971.06	3134.76	2.56	1.198	4.52	0.031	31.68
1999 DATA	1307.15	5207.47	11.92		59.23	15.54	4571.21	2306.39	1.58	0.60	3.35	0.02	39.68

POLLUTANTS

FIGURE 5-2a

27th AVENUE AT SALT RIVER AVERAGE CONCENTRATIONS



	BOD	COD	NO2/NO3	P(total)	Cu	Pb	Zn	Cr	Oil & Grease	TSS
1992 DATA	1371.00	1796.00	2.10	0.83	0.200	0.256	0.442	0.028	1.00	703.00
1998 DATA	348.00	244.70	2.67	1.33	0.151	0.273	0.522	0.021	10.47	501.00
1999 DATA	348.00	215.56	2.43	0.84	0.21	0.28	0.44	0.02	12.33	224.44

POLLUTANTS

In addition to water quality indicators, the City uses programmatic and social indicators to evaluate the effectiveness of its program.

Programmatic Indicators

The Programmatic Indicators used by the City include:

- Identifying and correcting illicit connections
- Installing, inspecting, and maintaining BMPs
- Monitoring, permitting, and compliance

The Illicit Discharge Identification and Elimination Program consists of field compliance, regulatory enforcement, and illicit discharge education (see Chapter 7, BMPs 7 & 8). Teams inspect outfalls, industrial facilities, and investigate complaints. Inspections are prioritized and areas previously identified as having illicit connections, cross-connections, and dry weather flows are monitored to ensure compliance. Violations are enforced according to the City's Enforcement Response Plan, which is based on legal authority established in the Phoenix City Code, Chapter 32C (see Chapter 8).

The final element of the Illicit Discharge Identification and Elimination Program includes outreach to educate the general public and target audiences on proper management of materials that may contribute pollutants to the storm drain system. Education efforts include information given during inspections, brochures, and suggested best management practices (see Chapter 9).

Table 5-1 includes the outcome measures used to evaluate the City's Illicit Discharge Identification and Elimination Program. These measures also help the City determine staffing and budgetary information needed to continue effective program implementation. The indicators have proved to be helpful measures in prioritizing inspections and in evaluating and refining the overall effectiveness of the SWMP.

BMP 25 calls for educating employees and high-volume users regarding the proper use and management of fertilizers, pesticides, herbicides, and other potentially harmful chemicals. This is carried out through training classes and by requiring those employees who handle pesticides to register with the Structural Pest Control Commission (SPCC). The training classes help employees understand the importance of proper pesticide and chemical use. One-hundred percent of City employees who might apply pesticides are required by City policy to be certified by the SPCC.

BMP 34 calls for procedures to implement erosion and sediment control policies contained in the existing storm water ordinance and Grading and Draining Ordinance. This practice has been implemented by issuing Storm Water Management Permits and conducting construction site inspections to ensure that the requirements called for in the site's storm water management plan are being implemented. Table 5-1 lists the number of permits issued and sites inspected.

Permitting and Compliance Indicators are useful for determining the relative impact of a variety of pollutant sources. The City's policy of requiring Storm Water Management

Permits and Grading and Drainage Permits for all construction sites, and monitoring those permits through inspections, allows staff to ensure that private developers understand and physically implement the goals established in their storm water management plans. In cases where inspectors find that the plans are not being correctly implemented, the permits are revoked or Certificates of Occupancy are not issued until compliance is achieved.

The Street Transportation Department's Storm Water Management Team ensures that property owners comply with City ordinances by investigating illicit discharges. Information gathered from these investigations allows staff to identify potentially significant pollutants and pollutant sources.

TABLE 5-1

PROGRAMMATIC INDICATORS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Total Storm Water Related Complaints Received	178	122
Total Illicit Discharge Inspections Performed	118	92
Total Storm Water Related Public Outreach Events	22	15
Total Cross-Connection Investigations	1	5
Approximate Number of Employees Registered with the Structural Pest Control Commission	200*	250
Total Employees Receiving Pesticide Applicator Training	122*	250
Total Storm Water Management Permits Issued to Construction Sites	134	138
Total Storm Water Management Permit Inspections Performed at Construction Sites	2,766	2,483
Total Grading and Drainage Permits Issued	768	622
Total Grading and Drainage Inspections Performed	13,829	11,287

*Reflects correction from 1997/98 Annual Report.

Social Indicators

In 1997 the City commissioned a study to learn what Phoenix area residents know about storm drains and storm water pollution. The study focused on the following areas:

- Awareness of where storm water goes
- Seriousness of storm drain pollution problem pollution
- Knowledge of contributors to storm drain pollution
- Personal methods of waste disposal
- Reporting illegal dumping
- Waste disposal information sources

The study was performed by a professional survey research company, and was based on 605 telephone surveys conducted with heads of households in Maricopa County during May, 1997.

Only about 23 % of Valley residents were aware that storm drain water ends up in the river, while the remaining 77 % were either not sure or had an incorrect perception. About 39% viewed storm drain pollution as only a moderate or minor problem in the Valley. Few residents (8 %) saw animal waste as a serious contributor to storm water pollution, while approximately 42 % view lawn and garden chemicals, and industrial chemicals as the greatest contributors.

Roughly one-fifth of Valley residents indicated they disposed of household chemicals and fluids simply by dumping them in the garbage (19%), pouring them on the ground (1%), or dumping them in a landfill (1%). A combined total of 52 % indicated they disposed of such material via service stations (11 %), hazardous waste collection events (18 %), auto parts stores (17 %), or some other recycler (6 %).

Nearly 38% of Valley residents would have reported illegal dumping incidents to the Police Department, while 27% would report them to another City department. Ten percent of residents surveyed said they would report illegal dumping to the Arizona Department of Environmental Quality (ADEQ) or the Environmental Protection Agency.

Half of the residents surveyed would have contacted their city government if they wanted information on proper waste disposal while 17 % said they would contact ADEQ. Nearly 20% were not sure whom they would contact for such information.

This survey provides a baseline of information that can be used to evaluate current and future outreach efforts. Combined with the Water quality and Programmatic Indicators, the Social Indicators provide reasonable tools with which to measure the Storm Water Management Program.

Chapter 6

Proposed Changes to the Storm Water Management Program

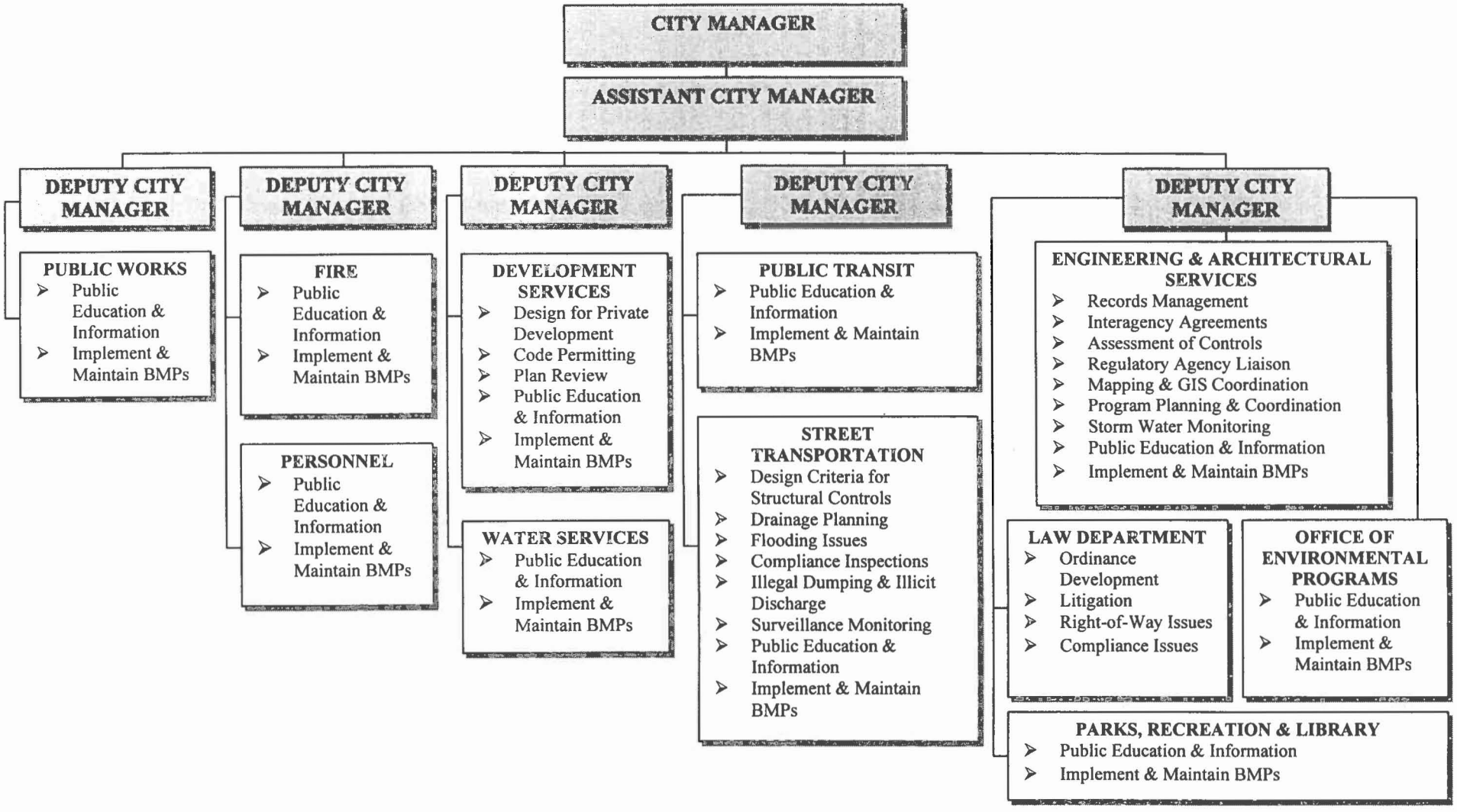
PROPOSED CHANGES TO THE STORM WATER MANAGEMENT PROGRAM

Based on an evaluation of existing data, there is not enough information available to warrant changes to current Best Management Practices (BMPs). During Fiscal Year 1999/2000, existing BMPs will continue to be implemented and evaluated; however, the City is planning to propose repackaging the Storm Water Management Program (SWMP) to consolidate similar BMPs into a single, broader BMP. After two years of implementation experience, the City has found that tracking individual departmental BMPs using the current system is cumbersome. The proposal will not add, subtract, or change any activities of the City. It simply will reorganize the presentation of the City's efforts.

The City also will propose to replace the surface flow sampling site located at 43rd Avenue and the Arizona Canal Diversion Channel (ACDC) with a site located at 31st Avenue and the ACDC. The 43rd Avenue site is located in a privately-owned parking lot, serving a privately-owned strip mall with overland flow directly into the ACDC. The storm water discharged from this site never enters the City's storm drain system. The new site at 31st Avenue is located approximately 1.5 miles east of the old site, also on the ACDC, and serves predominately commercial land use.

There will be one organizational change to the SWMP during the next reporting year. The City's management structure has undergone an annual rotation, resulting in different reporting requirements for some of the departments with direct and/or indirect responsibility of implementing the SWMP. The new organizational chart is depicted in Figure 6-1.

FIGURE 6-1
CITY OF PHOENIX, ARIZONA
STORM WATER MANAGEMENT PROGRAM
REPORTING YEAR ENDING JUNE 30, 2000



Chapter 7

Status of Implementing Storm Water Management Program Components

STATUS OF IMPLEMETING STORM WATER MANAGEMENT PROGRAM COMPONENTS

FIGURE 7-1
BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES

Introduction

Chapter 7 describes the City of Phoenix's implementation of the Best Management Practices (BMPs) established by the Storm Water Management Program (SWMP). Each description is organized to provide a clear link between the BMP's implementation and the required elements of a storm water management program, as established by the Environmental Protection Agency (EPA). The City's interpretation of each of the EPA's required program elements is described below. The BMPs that apply to the program elements are listed after each description.

A. Measures to Reduce Pollutants from Residential and Commercial Areas (40 CFR 122.26(d)(iv)(A))

This covers BMPs associated with storm water runoff from residential and commercial pollutant sources that affect the existing municipal system, and the expected benefits of the BMPs to storm water quality. The BMPs include structural and source control measures implemented in developed and developing areas of Phoenix. The following activity categories apply:

A-1. Drainage System Maintenance

In order to ensure optimum effectiveness in the performance of its structural storm water management facilities, the City routinely inspects its storm drain system, repairs or replaces infrastructure where necessary, and builds new storm drains in developing and previously unserved areas. An important feature of the City's storm drain system is the lack of existing or planned combined sewer systems.

Relevant BMPs: 24 & 27

A-2. Controls for New Development

Structural and nonstructural measures are used to prevent or mitigate storm water contamination during and after construction. An important part of the City's efforts in this area is the Site Development Program and design standards established in part to provide storm water management. Also included are education and outreach programs that provide technical assistance in meeting City requirements of developers and contractors.

Relevant BMPs: 28, 29, 30, 31, 32, 33, 34 & 35

A-3. Maintenance of Public Streets, Roads, and Highways

Maintaining road surfaces minimizes pollutants entering storm water flows from the City's roadways. Maintenance activities include routine street and gutter sweeping, paving dirt roads, and ensuring that City vehicles comply with air emission requirements.

Relevant BMPs: 18, 19, 20, 21, 22 & 23

A-4. Flood Management Projects

The Flood Control District of Maricopa County (FCDMC) provides flood control management under the terms of an Intergovernmental Agreement. FCDMC builds and maintains regional and local flood control structures throughout Maricopa County, including Phoenix. The City constructs and maintains its own municipal storm drain system, which interacts on a limited basis with FCDMC structures.

The City enforces localized storm water management requirements through site development ordinances, requirements for onsite storm water retention, and prohibition of direct connections between roof drains and the storm drain system.

Relevant BMPs: 28, 29, 30 & 31

A-5. Controls for Municipal Waste Facilities

The City has established priorities for managing storm water at municipal waste facilities. The City operates two municipal wastewater treatment plants, several landfills, and one municipal solid waste transfer station. Each of these facilities is covered by a National Pollutant Discharge Elimination System (NPDES) storm water permit. These facilities are included in the City's industrial inspection program.

Relevant BMP: 8

A-6. Controls for Pesticides, Herbicides, and Fertilizers

The purpose of this program element is to reduce pollutants associated with lawn and garden chemicals in the storm drain system. The City has a variety of education and outreach activities for employees and the public. The City also provides training and oversight for staff who work with these chemicals to ensure their safe and appropriate use.

Relevant BMPs: 11, 25 & 26

B. Measures to Control Illicit Connections and Illegal Dumping to the Storm Drain (40 CFR 122.26(d)(iv)(B))

This includes BMPs that help prevent non-storm water discharges into the City's storm drain system, and includes the following activity areas:

B-1. Preventing Illicit Discharges

This program element addresses potential industrial sources of storm water contaminants. Also included are citywide and regional events to encourage residents to properly dispose of household hazardous wastes. Illicit discharges are further prevented through City ordinances covering the disposal of litter, trash, and debris.

Relevant BMPs: 2, 4, 5, 6, 8, 10, 11, 12, 13 & 17

B-2. Ongoing Field Screening Activities

Routine inspections of the storm drain system outfalls allow staff to look for dry weather flows. Administrative procedures enhance City inspectors' ability to record and respond to potential problems.

Relevant BMPs: 8, 12 & 27

B-3. Investigating Potential Illicit Discharges

The Phoenix City Code, Chapter 32C, Storm Water Quality Protection, prohibits cross-connections between sanitary sewers and storm drains. This entails routine and targeted inspections of the storm drain system outfalls to identify dry weather flows and investigations of non-storm water flows.

A Storm Water Hotline accepts complaints about illicit discharges into the storm drain system. The Storm Water Management section investigates these complaints and takes appropriate corrective actions when necessary.

Relevant BMPs: 7, 8 & 12

B-4. Spill Prevention and Response

The City implements an aggressive program to respond to and prevent hazardous or toxic spills. The Hazardous Materials Response Team responds to eminent hazards that threaten life and property. Several education and outreach programs targeted at both City employees and the general public emphasize the importance of preventive measures.

Relevant BMPs: 9 & 14

B-5. Public Awareness and Reporting Program

This program element enhances the public's understanding of the benefits and need for storm water management. The public is encouraged to report illicit discharges or activities that may contribute to storm water contamination.

Relevant BMPs: 3, 11, 14, 16 & 36

B-6. Proper Management of Used Oils and Toxins

Providing a means for residents to dispose of used oil and other toxic material, and educating the public and City personnel on proper handling and disposal methods is the focus of this program element. In addition, the City enforces installation requirements for underground and above ground petroleum storage tanks, and requires that rainfall runoff be separated from outside chemical or material storage areas at commercial and industrial facilities.

Relevant BMPs: 6, 10, 14, 15 & 35

B-7. Controlling Exfiltration of Sanitary Sewage

This program element is designed to prevent contamination of storm water from exfiltration of wastewater from sanitary sewers. Controls include maintenance of the sanitary sewer system and periodic inspections of the storm drain system to look for non-storm water flows.

Relevant BMPs: 7 & 8

C. Measures to Control Pollutants from Municipal Landfills and Industrial Facilities (40 CFR 122.26(D)(Iv)(C))

This reflects the potential impact of storm water discharges from municipal landfills and the type of industrial facilities (many of which are required to have their own NPDES storm water permit) located within the City. The following activity categories concern implementing an industrial inspection prioritization system to determine compliance with the City's storm water management ordinance.

C-1. Identifying Priorities and Implementing Controls

The City prioritizes industrial facilities for inspections, including municipal waste facilities, based on whether the facility is a hazardous waste treatment, storage or disposal facility, or is subject to the Superfund Amendments and Reauthorization Act, Title III. Other criteria include whether the facility uses chemicals that have been found in significant amounts in storm water, the relative toxicity of those chemicals, the type of industry, the size of the facility, and whether it has been issued a NPDES storm water permit by the Environmental Protection Agency, or an Industrial Pretreatment Permit by the City. An inspection, which can include sampling, may indicate the need for a facility to implement new or modified storm water controls pursuant to Phoenix City Code, Chapter 32C, Storm Water Quality Protection.

Relevant BMPs: 8 & 12

C-2. Inspections and Monitoring

This section summarizes the City's industrial facility inspection activity.

Relevant BMPs: 7, 8 & 9

D. Measures to Control Pollutants from Construction Sites (40 CFR 122.26(d)(iv)(D))

These BMPs are designed to reduce pollutants in storm water runoff from construction sites and, to the degree possible, maintain pre-construction hydrologic conditions using structural and non-structural methods. The City's program addresses all construction sites, regardless of size, and involves the following activities:

D-1. Reviewing Construction Site Plans

The City requires developers and contractors to submit for review and approval a storm water pollution prevention plan (SWPPP) for their site, and apply for a storm water pollution prevention permit. This is in addition to grading and drainage, and erosion control requirements.

Relevant BMP: 34

D-2. Requiring Nonstructural and Structural Best Management Practices

The focus of this program element is the specific controls that a developer or contractor will implement in their SWPPP, and that will be included in the storm water management permit issued by the City.

Relevant BMP: 32

D-3. Education of Construction Site Operators

The success of storm water management practices at construction sites must ultimately rest with the individuals charged with implementation and enforcement, namely City staff, developers and contractors. This program element is directed at educating these individuals about the need for storm water controls, and the various ways in which this can be achieved.

Relevant BMP: 33

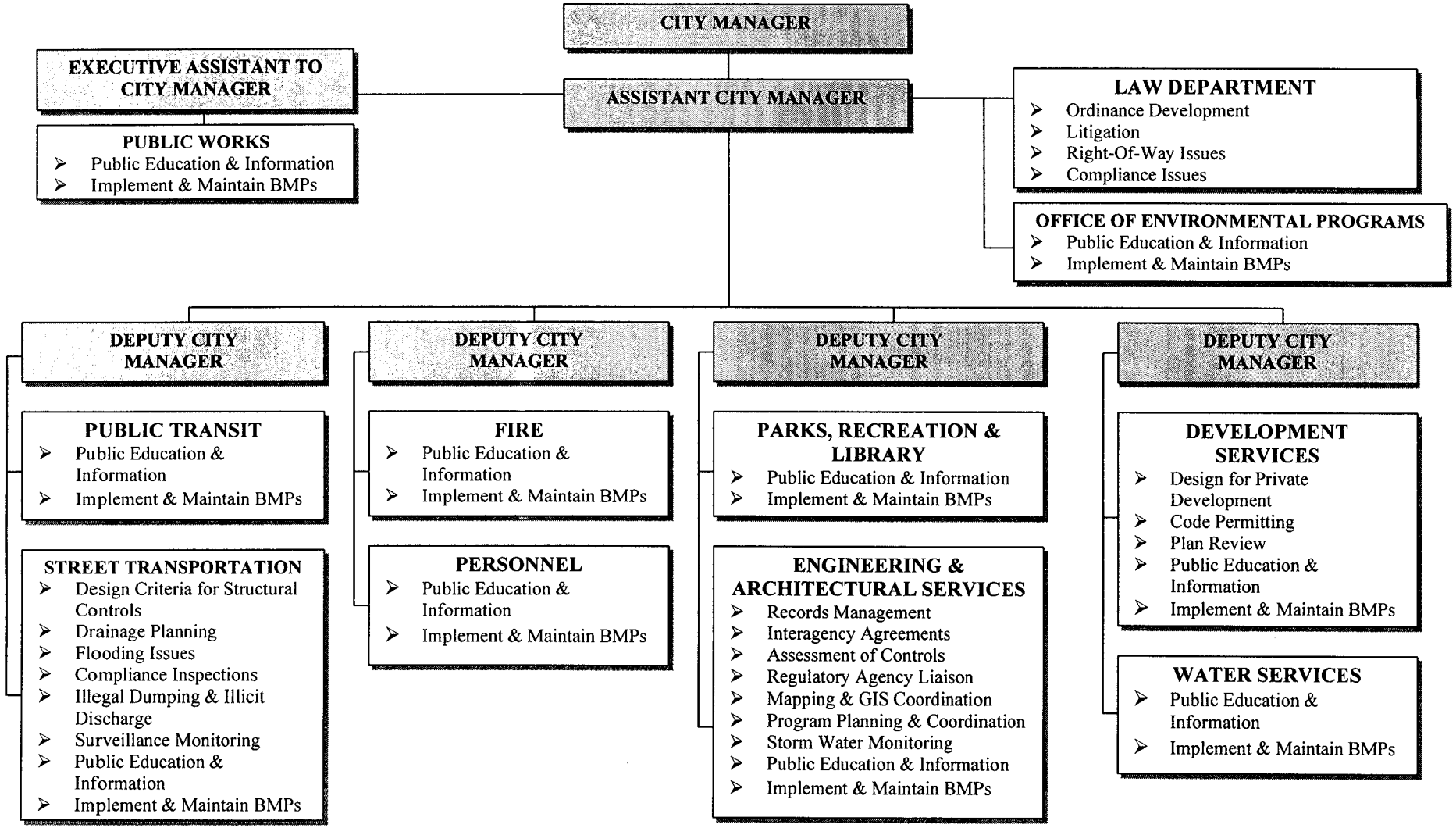
D-4. Site Inspections and Enforcement

Because installation and maintenance of storm water controls are susceptible to construction activities, and given that the City may not receive any rain for several months at a time, inspection and enforcement of SWPPPs are necessary to ensure consistent implementation. This program element describes the City's procedures to inspect construction sites and enforce implementation of SWPPP.

Relevant BMP: 34

The next section of Chapter 7 lists the 36 BMPs and provides descriptions of the City's progress toward implementing each BMP. Many of the BMPs are made successful through the combined effort of several departments. In addition, there exists some overlap, as many of the programs and services described in one BMP often apply to one or more other BMPs. Figure 7-2 depicts the organizational structure of the City's SWMP.

FIGURE 7-2
CITY OF PHOENIX, ARIZONA
STORM WATER MANAGEMENT PROGRAM
ORGANIZATION CHART FOR REPORTING YEAR ENDING JUNE 30, 1999



BEST MANAGEMENT PRACTICE 1
Continue to manage the implementation of the NPDES Storm Water Management Program.

The information contained in this report demonstrates the City's efforts to implement the National Pollutant Discharge Elimination System (NPDES) Storm Water Management Program (SWMP).

Engineering and Architectural Services Department
The Engineering and Architectural Services (EAS) Department coordinates all program activities and participants; directs the storm water sampling program; manages all required records and documents; prepares all compliance reports; develops and negotiates intergovernmental and interagency agreements; and assesses the effectiveness of the program and its elements. EAS also is responsible for preparing the NPDES permit application, negotiating the terms and conditions of the NPDES permit, mapping and geographic information system activities, and program planning.

Contributing Departments and Agencies
The Law Department contributes to the administration of the SWMP by assisting with ordinance development and litigation. The Law Department also deals with permit negotiation, right-of-way and access issues, and compliance issues.

The Flood Control District of Maricopa County (FCDMC) implements the City's Storm Water Sampling Program in accordance with the terms and conditions of the City's NPDES permit. The agency also oversees regional monitoring program coordination and funding.

There are many activities and programs undertaken by the City that directly or indirectly contribute to storm water management. These activities and programs are discussed in detail in this chapter. The contributing departments and offices include:

- Development Services Department
- Engineering and Architectural Services Department
- Fire Department
- Law Department
- Office of Environmental Programs
- Parks, Recreation, and Library Department
- Personnel Department
- Public Transit
- Public Works Department
- Street Transportation Department
- Water Services Department

♦♦♦

BEST MANAGEMENT PRACTICE 2

Implement City ordinances that provide legal authority to control littering and the improper disposal of potentially harmful wastes.

Phoenix City Code, Chapter 27, regulates solid waste and recyclable materials collection. Known as the Solid Waste Ordinance, Chapter 27 defines how solid wastes should be contained, stored, collected, hauled, and disposed to prevent public nuisance or health hazards.

Public Works Department

The Public Works Department (PWD), Solid Waste Field Services Division, enforces the Solid Waste Ordinance, and complies with Federal, State, and County regulations related to solid waste collection. On-site investigations of possible Ordinance violations are performed primarily as a result of a complaint. Some of the issues addressed by the Ordinance include, but are not limited to:

- Failure to properly contain and dispose of solid waste
- Illegal dumping
- Burning solid waste, where prohibited
- Uncollected animal waste
- Dead animals
- Early morning or late night commercial waste collection near neighborhoods
- Obstruction of solid waste collection

There are 44 employees who respond to complaints and requests for services, and investigate illegal dumping. Compliance with the Ordinance primarily is sought through education and persuasive negotiations. A person convicted of an Ordinance violation is guilty of a Class I misdemeanor, punishable by a minimum fine of up to $250, with the maximum fine reaching $2,500 and possible imprisonment for six months. Violations under the criminal code are prosecuted in instances where voluntary compliance cannot be obtained.

In September 1990, the PWD established an Illegal Dumping Inspections Team to identify and prosecute illegal dumping of solid waste in north Phoenix. Since that time, illegal dumping in north Phoenix has been reduced by 60 percent and five illegal dumping "hot spots" have been eliminated. The team has since expanded to south Phoenix where they have successfully eliminated 12 hot spots, reducing illegal dumping there by 50 percent.

Once cleaned, the areas are bermed and "No Dumping" signs are posted to help prevent a recurrence. Areas that have been cleaned up are monitored, and have shown a noticeable decrease in illegal dumping. The Team works closely with other City departments and government agencies, including the Maricopa County Department of Environmental Health, the Arizona State Land Department, and the Bureau of Land Management, to manage illegal dumping.

The PWD, Solid Waste Field Services Division, also has a citizen-based program to assist in stopping illegal dumping practices. Known as HALT (Help Attack Littering and Trashing), the program is designed to enlist the help of citizen volunteers as auxiliary "eyes and ears" in the fight against littering and illegal dumping. These volunteers work with the Illegal Dumping Inspections Team, and participate in a four-hour training class conducted by the PWD, Police Department, and the Law Department.

"Phoenix Recycles" is an innovative recycling program that allows residents to place recyclable materials into a single container for curbside pickup. The program is an overwhelming success and has been expanded to cover 85 percent of the City. Implementation is ongoing and expected to be complete in March 2000. Residents in areas where Phoenix Recycles is not available may drop off materials to recycling bins at various locations.

In 1993, the City opened a recycling facility with the capacity to process 90,000 tons per year of mixed recyclable materials. In August 1998, a second recycling facility was opened and processes an additional 60,000 tons per year. A percent of the revenues gained from recycled materials are used to offset the costs of the Phoenix Recycles program.

The PWD Solid Waste Disposal Division operates landfill and solid waste disposal facilities. Currently, the Skunk Creek Landfill is the only open landfill operated by the City. The landfill comprises 688 acres, has an approximate capacity of 18 million tons, and receives approximately 2,900 tons of solid waste each day.

In addition to the landfill operations, the PWD also operates a Solid Waste Management Facility (SWMF). Located adjacent to the closed 27th Avenue Landfill, the SWMF is a multi-functional facility designed to provide solid waste transfer, commercial recyclable materials sorting, self-haul materials recovery, yard and wood waste mulching, and public education. The SWMF can transfer up to 3,800 tons of waste per day and can recycle 400 tons per day.

The following provides a summary of selected landfill operations:

- A waste screening program prevents the dumping of prohibited materials. Random unannounced inspections of incoming loads are conducted at least twice per day at the Skunk Creek Landfill and the Solid Waste Management Facility.
- Bi-annual groundwater monitoring is conducted at the Skunk Creek Landfill. Quarterly groundwater sampling is conducted at three closed landfill sites (27th Avenue Landfill, 19th Avenue Landfill, and the Del Rio Landfill).

A tub grinder, located at the SWMF, capable of mulching up to 24 tons of vegetation per hour, reduces the amount of yard waste entering the landfill. The mulched material is used on landscaping and erosion control projects. With the use of special screens, smaller sized compost material is generated and can be used as a soil additive to promote healthy landscaping. Also, in an effort to reduce the volume of residential yard waste, home composting kits are available to residents. These kits include a compost barrel (made from old 100-gallon solid waste containers) and a bag of mulch to start the composting process.

Tours of the Skunk Creek Landfill and the SWMF are provided to the public. The tours include a description of how illegal dumping practices impact the environment. Recycling is encouraged, as are proper waste disposal practices.

TABLE 7-1

SOLID WASTE DISPOSAL MEASURES	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
Households Receiving Solid Waste Collection	312,282	317,688
Contained Solid Waste Collected (tons)	493,507	481,689
Bulk Solid Waste Collected (tons)	78,883	86,463
Waste Recycled (tons)	80,494	85,000
Tires Collected	7,911	8,613
Illegally Dumped Materials Collected (tons)	1,835	1,477
Materials Entering Skunk Creek Landfill Sold for Recycling	10%	1%
Vegetation and Wood Waste Mulched at Skunk Creek Landfill (tons)	3,200	0*

*No mulching was done at the Skunk Creek Landfill during the reporting year. Mulching was done at the SWMF; however, the materials are not weighed before or after mulching.

Figure 7-3 (pages 7-15 through 7-18) provides a sample of solid waste and recycling information that is available on the City's Internet site (www.ci.phoenix.az.us). The Garbage/Recycling section includes schedules for solid waste collection, bulk trash collection, and recycling.

FIGURE 7-3

GARBAGE COLLECTION

GARBAGE/RECYCLING COLLECTION

Your garbage or recycling is collected Monday and Thursday or Tuesday and Friday. You either have a container that you share with neighbors or you have an individual container assigned to your house. Alley containers have been placed in the ideal location for pickup and should not be moved. Curbside containers must be out by 5:30 a.m. on collection days and removed by 5:30 a.m. the day after collection. For more information, call the Public Works Department, Solid Waste Field Services Division, at (602) 262-7251.

BULK TRASH COLLECTION

Bulk trash, which includes limbs and lumber cut into four-foot lengths, cardboard moving boxes, palm fronds, small scrap metal, appliances, water heaters, furniture and bagged or boxed yard clippings, is collected four times a year. The upcoming week's collection schedule is published in Friday's *Arizona Republic* in "CityPage," printed quarterly in *NOTES* , which is mailed with the water bill, or by calling the Solid Waste Field Customer Services Section at (602) 262-7251 or see the Annual Trash Collection Schedule calendar.

Some items can damage a garbage truck's compaction system; it will be necessary to dispose of these items yourself. These include dirt, rocks, concrete, bricks, large auto parts, large heavy metal objects, tires, construction or demolition materials, piping over one inch in diameter and appliances that contain CFC's. Contact the Solid Waste Field Customer Services Section at (602) 262-7251 for additional information or e-mail to pwserve@ci.phoenix.az.us with questions.

Internet: pwserve@ci.phoenix.az.us

Click here to send e-mail to Public Works Field Customer Service

FIGURE 7-3

RECYCLING

RECYCLING

More than half of what we throw away can be recycled. Recycling helps conserve landfill space, preserve natural resources and control rising waste disposal costs.

By 2000, all homeowners that receive city garbage collection will be able to participate in the citywide "Phoenix Recycles" program, which kicked off in June 1992.

Each home will have two storage containers - one black or green container for garbage and the other, a blue container, for recycling (to request additional containers, contact customer service). When the recycling container is delivered, information on how to participate will be included.

You can recycle these items only:

***Plastic bottles & containers with CODES 1, 2, or 6 on side or bottom of container:**

(NO plastic bags/wraps OR pool chemicals/hazardous waste containers)

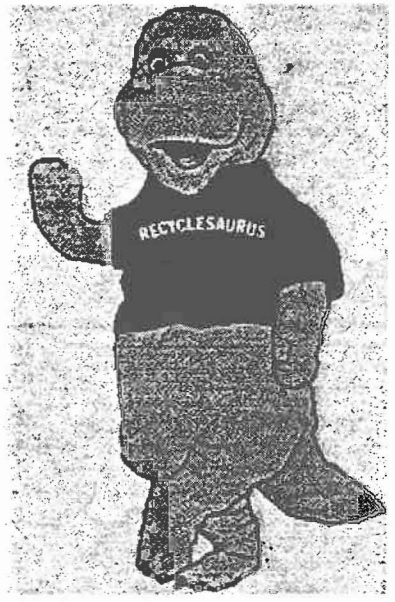
***Food or beverage foam plastics with CODE 6 [egg cartons/meat trays/cups,etc.]**
(NO packing/shipping foam material-"peanuts", rigid blocks, or bubble wrap)
(NO PLASTIC BAGS OF ANY KIND WITH OR WITHOUT A RECYCLING SYMBOL)

***Food or beverage Glass bottles & jars**(NO windows, mirrors, dishes, TV's or light bulbs)
***Scrap paper; Junk mail; Newspapers; Magazines**(NO books or telephone books)
***Cardboard/Chipboard; Milk cartons; Juice boxes**
***Aluminum and Steel cans & clean foil; Scrap metal under 25 pounds including small appliances.**

- **All recylable material must relatively be clean, dry, empty and uncrushed. No need to wash recyclables.**
- **Do not bag, box or tie recyclables.**
- **Remove ALL caps and lids and discard plastic ones in garbage.**
- **No grass, yard or food waste.**

FIGURE 7-3

Recycling
Many items placed out for bulk trash collection can be recycled, such as cardboard boxes and scrap metal. Call (602) 262-7251 for more information.



Composter
Residents can dispose of their yard wastes by using a composter or mulcher. The city of Phoenix composters and yard carts (constructed from damaged garbage cans) are available at either the Skunk Creek Landfill or the 27th Avenue Solid Waste Management Facility for $5. Call (602) 262-7109 or (602) 262-6598 for more information.

Donatable items
Reuse and reduction of waste is as important as recycling. Old furniture or an appliance that needs a few repairs might be needed by a charitable, non-profit organization. To find them, call Community Information and Referral at (602) 263-8856 or look in the Yellow Pages under "thrift".

Household hazardous wastes
Call (602) 262-7251 for the latest information on Household Hazardous Waste collection events. For private companies that test, remove and dispose of hazardous materials for a fee, look in the Yellow Pages under "Waste disposal - hazardous."

Other City Numbers - for a full list of city services and phone numbers, click here.

Click here to send e-mail to Public Works Field Customer Service

FIGURE 7-3

For more information, call (602)262-7251 or e-mail to pwserve@ci.phoenix.az.us.

RECYCLING DROP-OFF SITES
The recycling drop-off sites are designed to provide a convenient way to recycle until curbside recycling is implemented in all Phoenix neighborhoods. Phoenix residents may drop off commingled recyclable material at any of the blue roll-off bin locations listed below:

Name	Address/Location
Paradise Valley Park	40th Street/Union Hills Drive (SW Corner)
Hudson-Baylor West	1919 E. University Drive
Skunk Creek Landfill	3165 W. Happy Valley Road (I-17 & Happy Valley)
27th Avenue Solid Waste Management Facility	27th Avenue/Lower Buckeye Road

Questions? Call (602)262-7251 or email to: pwserve@ci.phoenix.az.us

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Click here to send e-mail to Public Works Field Customer Service

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Return to Environmental Programs

Return to Garbage/Recycling

Return to Phoenix Is Your City

BEST MANAGEMENT PRACTICE 3

Continue to provide or participate in City or regional programs, both public and private, that educate the public regarding the storm water pollution impacts that result from littering and improper waste disposal practices.

Public Works Department

The Public Works Department (PWD), Solid Waste Field Services Division, promotes a variety of solid waste management programs that help educate the public regarding proper solid waste disposal. These efforts include neighborhood meetings and hearings, school shows, special events, and tours of the various solid waste facilities. Topics include

- *Phoenix Recycles* - a residential recycling program
- BOPA (battery, oil, paint, and antifreeze) collection activities
- *HALT* (Help Attack Littering and Trashing) - an illegal dumping program
- Waste composting
- *No Time to Waste* - a reduce and reuse program
- Litter control
- Mulching
- *Bag and Tie* - a county-wide vector control program
- Recyclesaurus – a mascot entertains and informs youngsters about solid waste and beautification

The PWD also has a Garbage/Recycling section on *Phoenix at Your Fingertips*, the City's Internet site (see BMPs 2 and 4).

Phoenix Clean and Beautiful

In addition to the City's educational activities, Phoenix Clean and Beautiful (PC&B) provides programs and information to the public. PC&B, an affiliate of Keep America Beautiful, is under contract with the City to educate residents on solid waste management issues and beautification practices.

PC&B administers a Neighborhood Program, an Educational Program, a Business Program along with other service programs. The Neighborhood Program includes informational presentations to homeowner associations, block watch groups and other neighborhood organizations. Residents are provided with cleanup guides, trash bags, roll-off bins, landfill passes, and litter containers.

The Education Program includes presentations and handouts to youth groups, school groups, and other organized groups. In addition to the presentations, PC&B offers teacher training on solid waste topics and includes the GreenShelf Collection, a special collection of books that focus on environmental topics. PC&B, in partnership with local corporations, has donated nine sets of the Greenshelf books to Phoenix libraries.

The Business Program includes two key resource guides: *Waste in the Workplace,* targeted to small businesses; and *Build America Beautiful*, a guide demonstrating how waste haulers and builders can improve waste handling and construction debris disposal.

In addition to their specific programs, PC&B organizes special events throughout the year. Below is a brief description of the major events:

- The Great American Cleanup, sponsored by Keep America Beautiful, was held March through May. The event is the nation's largest organized cleanup.
- PC&B provided resources and support for 12 citywide cleanups.
- Three cleanup projects were organized during Public Lands Month.
- Eight schools received and planted six trees each after participating in a low water usage tree presentation.
- Eight subdivisions, one in each City Council District, received a presentation on low water usage trees and received 20 each that were planted on public land in their neighborhoods.

In addition to the events described above, PC&B participates in neighborhood fairs, parades, and partners with other nonprofits on events and projects. PC&B writes and distributes a quarterly newsletter to residents, businesses, and organizations in the Phoenix area. Please refer to BMP 11 for additional information on public outreach and education activities.

TABLE 7-2

PUBLIC POLLUTION PREVENTION EDUCATION EFFORTS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
Special Events and Neighborhood Meetings	40	169
Number of Residents Attending Special Events and Neighborhood Meetings (approximate)	100,000	103,000
School Shows Held (approximate)	200	250
Number of Students Attending School Shows (approximate)	30,000	31,123

(continued)

TABLE 7-2 (continued)

POLLUTION PREVENTION EDUCATION PROGRAMS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Phoenix Clean and Beautiful		
Cleanup Guides Distributed	56	26
Trash Bags Distributed	31,490	14,413
Landfill Passes Distributed	482	112
Litter Containers Distributed for Special Events & Cleanups	321	808
Roll-off Bins Provided for Cleanups	89	64
Materials Distributed at School/Youth Presentations	3,715	5,362
Waste in the Workplace Resource Guides Distributed	15	21
Build America Beautiful Resource Guides Distributed	12	7

Appendix A includes a sample of a newsletter distributed to public to provide information about PC&B's activities and programs.

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BEST MANAGEMENT PRACTICE 4

Continue to collect uncontainerized trash and debris four times per year from curbside locations.

Public Works Department

Bulk trash primarily consists of yard wastes. The Public Works Department (PWD), Solid Waste Field Services Division's bulk trash collection program minimizes the impact bulk trash may have on the storm sewer system by requiring residents to bag and tie loose grass and leaves.

A schedule of pick-up times and locations is published in the local newspaper and in the monthly municipal service bill. Materials cannot be put out any sooner than two weeks before the scheduled pickup date. Residents who put their uncontained trash out before the allotted time are issued notices requesting their cooperation. The notices indicate that continued offenses may be subject to prosecution or civil penalties.

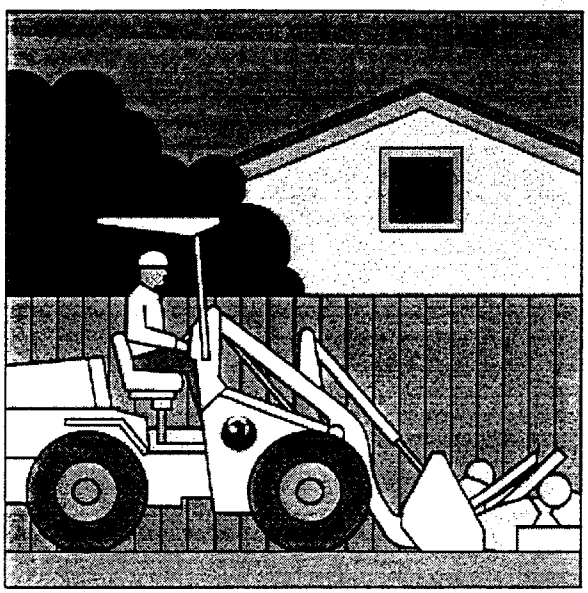
In a combined effort to control the amount of debris that may enter the storm sewer system, the Street Transportation Department coordinates their street sweeping schedule with the bulk trash pickup schedule. Residential street sweeping follows bulk trash collection.

TABLE 7-3

BULK TRASH COLLECTION	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
Bulk Trash Collected (tons)	78,883	86,463

Figure 7-4 (pages 7-23 through 7-28) is an example of what can be found on the Public Works Department's Internet Site.

FIGURE 7-4



BULK TRASH COLLECTION

Please Note:

New '99 map and schedule available

East region residents only - the 1999 east region area boundaries of the map have changed. All other map boundaries remain unchanged.

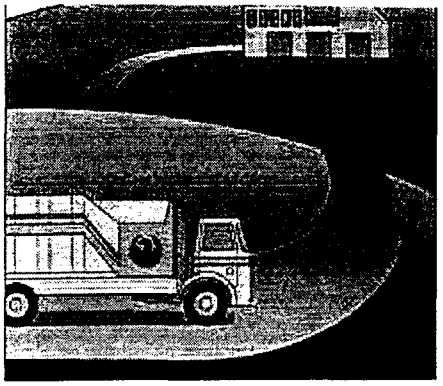
Bulk trash consists mainly of those materials that cannot be placed in your green/black garbage container.

Bulk trash is collected from city-serviced residences four times each year. Material must be out by 5:30 a.m. on the Monday of the collection week. Material cannot be placed out for collection more than two weeks prior to collection, since it is important to keep neighborhoods looking clean and beautiful.

To learn more about this solid waste service, click on these topics. This information contains either graphics or pictures that can be downloaded or expanded for easier viewing. **Click on any of the small images to get a full size view.**

- **Map/Calendar** - Date of the next home collection
- **Bulk Trash Placement** - Areas allowed and not allowed - alley/street
- **Items Collected and Not Collected** - See photographs of items collected and not collected
- **Bulk Trash Collection Process** - See the process through photographs
- **Additional Information** - CFC appliances, recycling, dead animal pick-up, storm waste, etc.
- **Pamphlet in English or Español** - Most recent pamphlet or flier

FIGURE 7-4

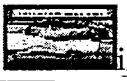


BULK TRASH COLLECTION PROCESS

The following photographs show the bulk trash collection process including equipment, personnel and disposal. Click on any of the small images to get a full size view.

Placement of Materials:

 behind fence in ally -  correct /  incorrect

 behind curb or street -  correct /  incorrect

 behind sidewalk -  correct /  incorrect

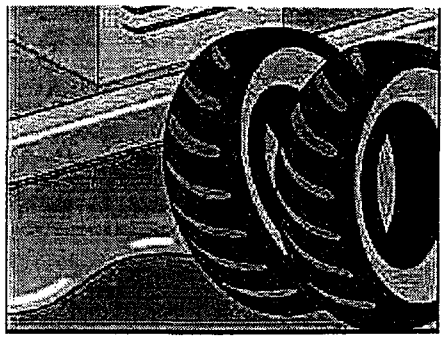
 **Collection equipment - Bobcat**
The articulated loader (bobcat) is used to load materials into rear loading collection vehicle. This efficient collection method reduces the need for manual collection and the chance for injuries.

 **Collection equipment - Rear loading vehicle**
Rear loading vehicles are used only for bulk trash collection. (The rear loading vehicle looks similar to garbage trucks used more than 20 years ago before Phoenix automated its garbage collection.)

 **Cleaning alley or street**
If needed, the operator at the rear of the truck will rake large loose debris and place it in a pile for the articulated loader to collect.

 **Illegal materials**
See the section "Items Not Collected" for more information.

FIGURE 7-4



ADDITIONAL INFORMATION

Non-collection times and unacceptable items
If you are between collection cycles and are unable to wait for the next collection, or if you have items that you must dispose of yourself (appliances with CFC's, tires, demolition debris, etc.), call the city of Phoenix landfill information line at (602) 253-7345.

Appliances with CFC's or refrigerants
As a resident of Phoenix, you may take your own refrigerator, freezer, heat pump, dehumidifier or water cooler to the city landfill or 27th Avenue Solid Waste Management Facility (602) 253-7345 for recycling. Any remaining CFC material is removed and the appliance is dismantled and sold as scrap metal.

Tires
As a resident of Phoenix, you may take no more than five automobile tires to the city landfill or 27th Avenue Solid Waste Management Facility (602) 253-7345. Tires are collected in a separate bin and are not allowed to be disposed of in city landfills by state law. Maricopa County collects the tires from the city for proper disposal or recycling.

Dead animal collection
To report a dead animal on a public street, call (602) 262-7251; or on a state highway, call (602) 257-1563.

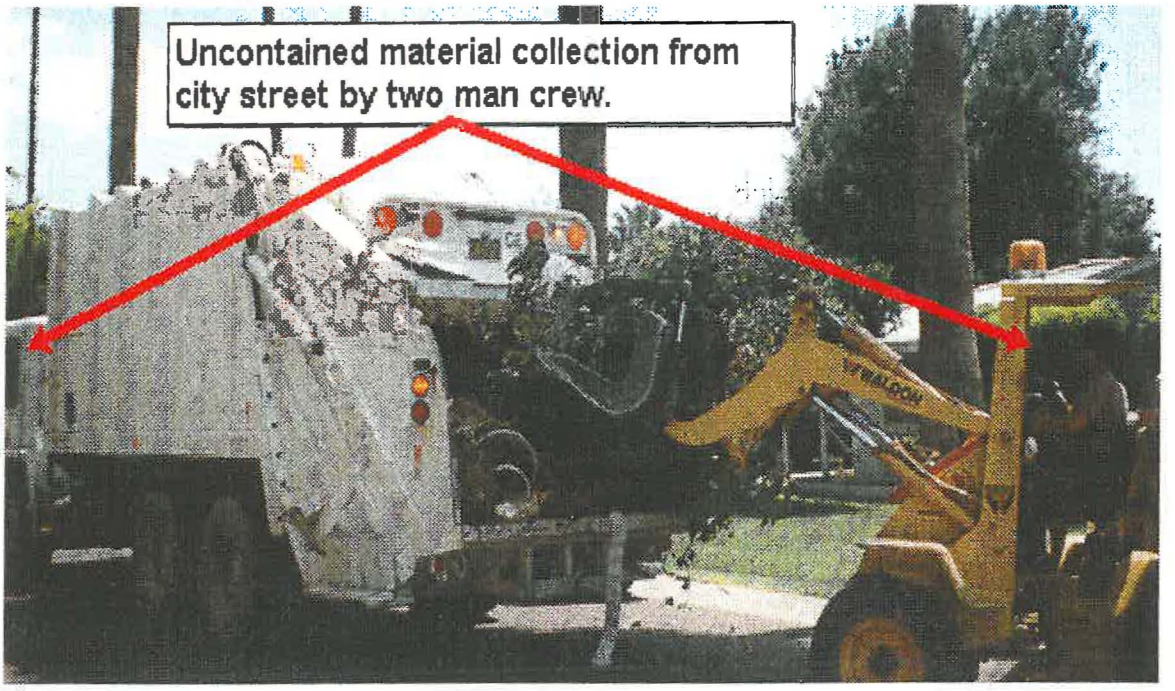
Residents also may call (602) 262-7251 for collection of a small family pet or home freezer spoilage (meat only). **BUT ONLY if material is placed at the edge of a public street. Private property will not be entered for collection.** The city service does not include farm animals or livestock. For private companies that remove animals, look in the phone book under "animal carcass removal."

Accident or storm materials in the street
Call the Street Transportation Department at (602) 262-6441.

Street sweeping
Call the Street Transportation Department at (602) 262-6441.

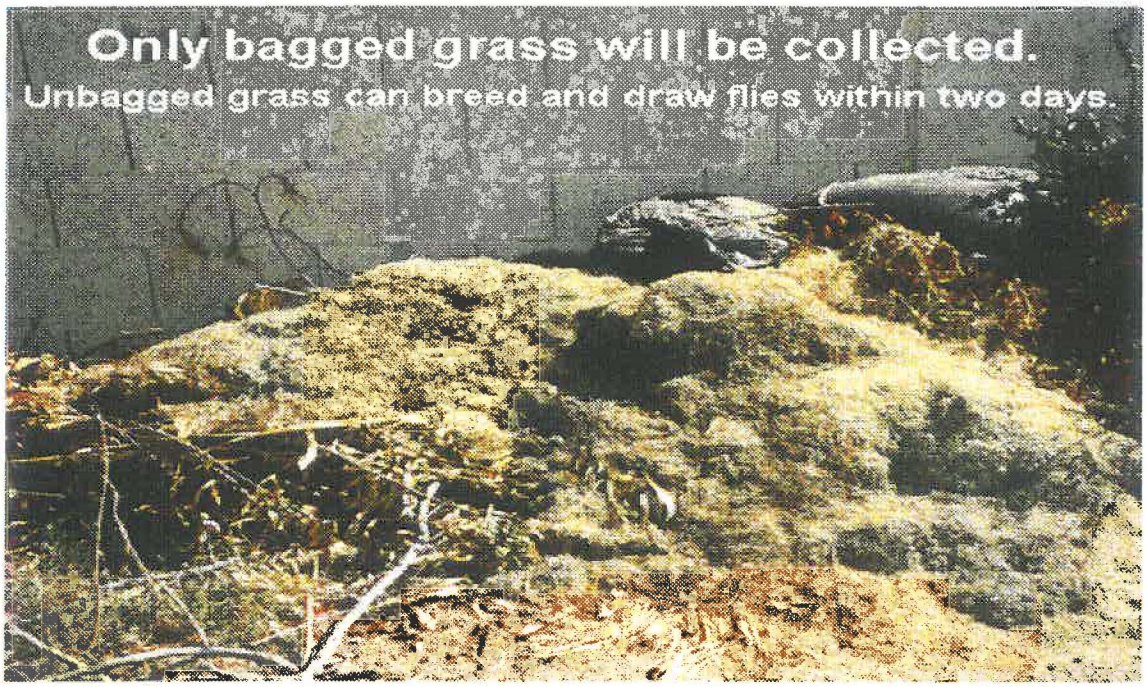
Water in the street or alley
Report to the Water Services Department at (602) 262-6251 or (602) 261-8000 for 24-hour Service.

FIGURE 7-4



Solid Waste Field Collection Education - Internet Pages

FIGURE 7-4



Solid Waste Field Collection Education - Internet Pages

FIGURE 7-4

Solid Waste Field Collection Education - Internet Pages

BEST MANAGEMENT PRACTICE 5
Continue to provide, collect, and maintain litter receptacles in public areas and during major public events; and continue to maintain park grounds through sweeping, litter control, and landscaping activities.

Public Works Department
The Public Works Department (PWD) Solid Waste Field Services Division routinely collects litter from receptacles in public areas, facilities and at public events. The Division also provides special cleaning activities for public facilities in a 24-block area located in downtown Phoenix. The Street Transportation Department performs hand sweeping of access areas, sidewalks, curbs, and gutters.

The City participates in many special cleanup events throughout the year including neighborhood cleanups, the annual Christmas tree collection program, and many other events sponsored by the City and Phoenix Clean and Beautiful (see BMP 3). Table 7-4 provides more detailed information about the City's efforts to control litter in public areas and during major public events.

Parks, Recreation and Library Department
The Parks, Recreation and Library Department (PRLD) operates and maintains City libraries, parks, golf courses, and sport centers. Litter receptacles are located at all of these facilities, and collection is provided at least twice per week.

PRLD enlists citizens to help protect the environment by reporting abuse and vandalism, illegal activities, and violations of park rules. Two programs, *Preserve Watch* and *Park Watch*, encourage citizens to help protect the mountain preserves and parks. Citizens involved in *Preserve Watch* receive formal training and are assigned to patrol activities in the Phoenix Mountain Preserve System. Under the *Park Watch* program, neighbors of City parks watch for suspicious and illegal activities, and notify the Police or Park Ranger dispatch upon witnessing such activities.

PRLD operates and maintains over 200 parks. In addition to standard park maintenance activities, PRLD oversees several other programs that have a positive impact on storm water quality. The Urban Forestry program enhances the urban environment by promoting tree planting and increasing the awareness of proper tree care. Established in March 1994, the Phoenix Urban Forestry Program provides a variety of environmental benefits that include reduced urban runoff, reduced soil erosion, better air quality, noise abatement, shade, and improved wildlife habitat.

A study conducted by *American Forests* for Dade County, Florida, indicates that tree canopy cover can reduce storm water flow by up to 15 percent. While Arizona and Florida have obvious variations in soil and vegetation types, and in climatic conditions, the information provides a valuable case study of the impacts of tree canopies on storm water quality.

The Urban Forestry program emphasizes proper tree selection and placement, and appropriate care for young trees to help ensure survival and longevity. The benefits of trees to our environment are promoted through the following activities:

- Administering a matching fund program for planting trees on public property, such as right-of-ways, schools, and parks.
- Sponsoring a puppet show and Tree Talk programs for children in Kindergarten through Third grades.
- Providing educational materials related to proper tree selection, planting, and maintenance. Three brochure racks containing this information are rotated between various branches of the City's libraries.

PRLD also has a Living Tree Celebration Program to encourage citizens to donate trees to the park system. The Living Tree Celebration Program adds to the parks' canopy cover and gives residents an added interest in maintaining the park system.

In addition to their various programs, PRLD distributes a number of brochures and pamphlets to the public. Some of those include

- "Benefits of Trees"
- "New Tree Planting"
- "A Tree Planting Guide for Kids and Their Parents!"
- "Guide to Arizona Desert Shade Trees"

TABLE 7-4

LITTER CONTROL AND PARK MAINTENANCE ACTIVITIES	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
Days Per Week of Litter Collection From Downtown Receptacles	5	2
Roll-off Bins Provided for Neighborhood Cleanups	818	884
Waste Collected at Neighborhood Cleanups (tons)	2,676	2,674
Parks, Recreation and Library Department		
Trees Planted Through Urban Forestry Program	527	518
Trees Donated Through Living Tree Celebration Program	25	30
Children Attending Puppet Shows and Tree Talk Programs	6,630	9,915
Seedlings Given Away at Schools and Special Events	1,126	1,408
Brochures Ordered and Available to the Public	23,800	21,900

BEST MANAGEMENT PRACTICE 6

Continue to provide or participate in City or regional programs, both public and private, that provide means for proper disposal of oil, antifreeze, pesticides, herbicides, paints, solvents, and other potentially harmful chemicals.

Public Works Department

The Public Works Department (PWD), Solid Waste Field Services Division, hosts regional events to collect batteries, oils, paints, and antifreeze (BOPA). The BOPA collection began in January 1997, providing residents a convenient method for disposing household hazardous wastes. The Program reduces the amount of hazardous materials entering the sewers and landfills, reduces illegal dumping of hazardous waste, promotes public awareness, and offers alternatives to hazardous waste disposal. BOPA collections are held over three-day periods at various locations throughout the City.

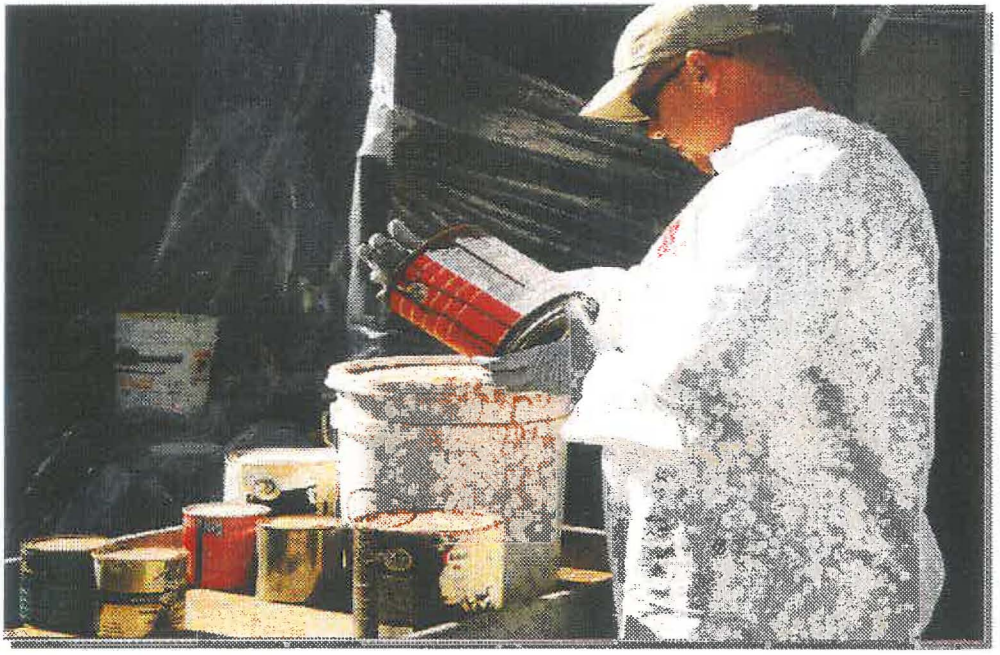


Photo 7-1: March 1999 BOPA Collection Event

A number of the materials collected at BOPA events are recycled. Other items are transported to a licensed hazardous waste facility for disposal. Please see Table 7-5 for more detailed information regarding these events, the materials collected, and participation levels. Appendix A includes an advertisement and information sheet for the BOPA events.

In addition to the special collection events, the PWD, Solid Waste Disposal Division, collects and recycles automotive batteries and used motor oil at the Skunk Creek Landfill. The 27th Avenue Solid Waste Management Facility also has a collection and recycling program for automotive batteries.

TABLE 7-5

HAZARDOUS WASTE COLLECTION PROGRAMS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
Household Hazardous Waste Collection Events Held	1	*
Residents Participating in Household Hazardous Waste Collection Day	2,261	*
Hazardous Waste Collected at Household Hazardous Waste Events (gallons)	26,000	*
BOPA Events Held	10	10
Residents Participating in BOPA Events	3,600	5,381
Hazardous Waste Collected at BOPA Events (gallons)	24,000	42,554
Approximate Percent of BOPA Materials Recycled	65%	45%

*Household Hazardous Waste Collection events have been replaced by BOPA events.

BEST MANAGEMENT PRACTICE 7

Implement existing City ordinances that provide the legal authority to eliminate cross-connections between sanitary sewers and storm drains.

City ordinances relevant to cross-connections between sanitary sewers and storm drains include the Phoenix City Code, Chapters 28 and 32C. Chapter 28 is the comprehensive ordinance regarding the disposal of sewage and industrial wastes to the City's sanitary sewer system. Chapter 32C is the Storm Water Management Ordinance, designed to help protect storm water quality. Both chapters expressly prohibit cross connections and provide the City with the legal authority to pursue enforcement measures that will eliminate or remove discharges that do not meet criteria as defined by the ordinances. The combination of these activities and legal authorities provides the City with effective measures to control and eliminate the exfiltration of sanitary sewage, cross connections, and illegal connections to both the sanitary system and the storm drain system.

Water Services Department

Cross-connections are found during routine inspections. The City has an extensive sanitary sewer preventive maintenance and inspection program to locate and eliminate exfiltration and infiltration from sanitary sewer lines and systems. Administered by the Water Services Department, this program uses a combination of techniques to identify and locate sources of infiltration and exfiltration, cross connections, and unauthorized connections to the sanitary sewer system. The program also identifies maintenance needs, such as damaged pipes, obstructions, structural defects, root intrusions, and other issues related to the operation of a gravity sanitary sewer system.

Inspection techniques include visual inspections of manholes and sewers, closed circuit television, video cameras and recorders, smoke testing, and dye testing. Visual inspections, smoke test, and dye test activities and results are documented with logs and forms. Closed-circuit television observations are documented with video and audiotape.

When storm sewer discharges are found in the sanitary sewer, the inspectors notify the Street Transportation Department, which maintains the City's storm sewer system. If the inspection reveals a sanitary sewer connection to the storm sewer, the Water Services Department takes immediate action to remedy the situation.

The Water Services Department's Commercial Inspection program enforces the general user requirements of the Phoenix City Code, Chapter 28 (Sewers), for the installation and maintenance of interceptors and grease traps. Pretreatment devices are installed at approximately 10,000 commercial and industrial facilities to prevent sanitary sewer blockages.

The Water Services Department implements the Industrial Pretreatment Program (IPP) and a community-focused Pollution Prevention (P2) Program. The IPP is a federally required activity that regulates industrial and commercial discharges to the City's sanitary sewer system. The City conducts regular inspections and compliance sampling to verify and encourage compliance with federal and City wastewater limits. To identify

potentially significant industrial users, the industrial community is routinely surveyed, and proposed industrial development and construction plans are reviewed.

The Water Services Department's P2 Program is designed to educate businesses and consumers on ways to prevent or minimize the generation of hazardous and non-hazardous waste. The Program develops and encourages the use of techniques or measures to control, minimize, or eliminate the discharge of hazardous pollutants and routinely provides informational booths and displays, and participates in trade shows, professional association conferences, and community events. Two interactive educational games, one focused on business interests and the other on the public-at-large, have been developed and often are the central element in displays and school presentations.

Street Transportation Department

These same techniques, plus monitoring and dry-weather field screening activities, are used to assist in detecting illicit discharges, including sanitary sewage and cross connections, to the storm sewers. The Street Transportation Department's Storm Water Management Program uses a van equipped with closed-circuit television and video cameras to inspect and create permanent records of storm drain interiors. Field personnel use this equipment to locate points of entry for all types of discharges to the system. The storm water program also has another van outfitted for sampling. This enables staff to sample discharges to the storm water drainage system and possibly identify the nature of the discharge through its chemical composition.

TABLE 7-6

CROSS-CONNECTION IDENTIFICATION	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Storm Sewer Cross-Connection Investigations	1	5
Water Services Department		
Industrial Facility Inspections	172	155
Industrial Facilities Inspected	148	142

(See TABLE 7-7 for more information on Street Transportation Department inspection activities)

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BEST MANAGEMENT PRACTICE 8

Continue to implement a field program to search for, detect, and prevent dumping or routinely discharging pollutants into storm drains and drainage channels.

Street Transportation Department

The City has implemented an Illicit Discharge Identification and Elimination Program, as authorized by the Phoenix City Code Chapter 32C (Storm Water Management Ordinance). Administered by the Street Transportation Department, the Program consists of field compliance, regulatory enforcement, and illicit discharge education.

The field compliance element includes those activities performed in the field, such as inspecting outfalls, inspecting industrial facilities, and investigating complaints. It also includes monitoring selected outfalls and suspected illicit discharges.

In February 1994, the Street Transportation Department began inspecting storm water outfalls and dry weather flows. Staff also developed a policy and procedure manual to guide inspection crews. Ongoing training occurs for new staff responsible for industrial inspections. Inspectors are trained in the use of field test kits, inspection equipment, sample collection for laboratory analysis, inspection methods, and reporting techniques.

Colorimetric field test kits supplement dry weather flow inspections where appropriate. This task involves tracing an observed discharge through the storm drain system. Flows are traced by opening manholes until the flow no longer can be detected, or until the source has been discovered. Methods include remote video cameras and colored dye placed in the storm drain system.

Major outfalls and/or storm drain segments are prioritized for inspections based on their potential to receive pollutants from various sources. The field inspection group uses this list to target field screening and inspection activities. The priorities are reviewed and updated each year using data such as sampling results of dry weather flows collected during previous years. Those outfalls with higher contaminant readings receive priority for a television inspection of the storm drain system. During the reporting year, 43% of the City's active outfalls were inspected, exceeding the 20% required by the Permit (See Table 7-8).

Industrial inspections have been conducted in response to complaints or illicit discharge detection. Field inspection forms include a checklist to help distinguish acceptable, marginal, or unacceptable discharges. The checklist also encourages consistency among inspections.

The City prioritizes industrial facilities, including municipal landfills, for inspections using the following criteria:

- Facilities that are on the Arizona Department of Environmental Quality's list of facilities subject to the requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986.
- Hazardous waste, treatment, storage, disposal, and recovery facilities.
- Industrial facilities with a NPDES permit to discharge to the City's storm drain system.

Other criteria include whether the facility uses chemicals that have been found in significant amounts in the City's storm water, the types of industry, the size of the facility, and whether it has been issued an Industrial Pretreatment Permit by the City. An inspection, which can include sampling, may indicate the need for a facility to implement new or modified storm water controls pursuant to the Phoenix City Code, Chapter 32C, Storm Water Quality Protection.

The second component is consistent and effective enforcement. The City follows an Enforcement Response Plan (ERP) that identifies the types of violations that can occur and the range of legally possible and procedurally appropriate responses. The ERP also establishes a hierarchy of responses that increase in severity according to the seriousness of the violation. The Phoenix City Code, Chapter 32C, provides adequate legal authority for enforcement.

Information on illicit discharge cases is compiled using inspection forms and phone logs. The two sources provide caseload and cycle time information . The information also is used to target education and outreach efforts.

The illicit discharge educational element focuses on identifying general public, commercial, and industrial target audiences; developing educational materials on proper management of hazardous and other materials which may contribute pollutants to the storm drain system; and information dissemination through workshops, guidance manuals, and brochures. The Storm Water Management Section developed a series of pamphlets describing best management practices (BMPs) recommended for specific industries. The BMPs provide businesses with examples of business practices or operating procedures that might result in storm water contamination. The pamphlets provide information on correcting or avoiding potential problems and are updated or expanded as necessary (please see BMP 36 for more information).

TABLE 7-7

STORM WATER POLLUTION DISCHARGE PREVENTION	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Major Outfalls Inspected*	36 (25% of total)	73 (43% of total)
Industrial Inspections Performed	118	76
Illicit Discharge Complaints Received	178	122
Formal Enforcement Actions	3	7
Public Outreach Events Conducted	22	15

* As defined by the EPA

Table 8-8

City of Phoenix Outfalls 36" or greater serving 50+ acres or 12" or greater serving 2+ acres of industrial land use.

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
AC01	51st Avenue & ACDC channel	78		Inches	Active			9/3/98	9/3/03
AC02	43rd Avenue & Peoria Avenue	90		Inches	Active			3/3/99	3/3/04
AC03	43rd Avenue & Peoria Avenue	42		Inches	Active			5/3/99	5/3/04
AC04	35th Avenue & ACDC Channel	96		Inches	Active			3/4/99	3/4/04
AC05	30th Avenue & Metro Center	53		Inches	Active		Reported at 48" but measured at 53 inches - changed 6/2/95	3/4/99	3/4/04
AC06	29th Avenue & Metro Center	48		Inches	Active			3/19/99	3/19/04
AC07	29th Avenue & Metro Center	43		Inches	Active			3/23/99	3/23/04
AC08	Black Canyon Freeway & ACDC channel	36		Inches	Active			5/3/99	5/3/04
AC09	25th Avenue & ACDC channel	12		Inches	Active			5/3/99	5/3/04
AC10	19th Avenue & ACDC channel	36		Inches	Active			3/24/99	3/24/04
AC11	7th Street & ACDC channel	42		Inches	Active			3/26/99	3/26/04
AC12	18th Place & ACDC channel	48		Inches	Active			9/26/94	9/26/99
AC13	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/99	5/5/04
AC14	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/99	5/5/04
AC19	42nd Street & Arizona Canal	36		Inches	Eliminated	11/1/94	Changed from AC19 to AZ01 - goes to AZ canal. Changed 11/1/94	1/18/95	1/18/00

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
AC21	49th Drive & ACDC channel	50		Feet	Active		Spillway	5/3/99	5/3/04
AC22	Lupine Drive & ACDC channel	50		Feet	Active		Spillway	5/3/99	5/3/04
AC23	Yucca Street & ACDC channel	50		Feet	Active		Spillway	5/3/99	5/3/04
AC24	39th Avenue & ACDC channel	50		Feet	Active		Spillway	5/3/99	5/3/04
AC25	Ironwood Drive & ACDC channel	50		Feet	Active		Spillway	5/3/99	5/3/04
AC26	3rd Avenue & ACDC channel	50		Feet	Active		Spillway	5/3/99	5/3/04
AC28	10th Street & ACDC channel - north side spillway	50		Feet	Active		Spillway	5/3/99	5/3/04
AC31	14th Street & State Ave (ACDC channel)	50		Feet	Active		Spillway	5/5/99	5/5/04
AC33	7th Avenue & ACDC channel	42		Inches	Active			5/3/99	5/3/04
AC39	14th Street & ACDC channel	36		Inches	Active			5/5/99	5/5/04
AC44	6th Street & ACDC channel - east wall	36		Inches	Active			5/3/99	5/3/04
AC48	10th Street & ACDC channel	42		Inches	Active			5/3/99	5/3/04
AC49	10th Street & ACDC	50		Feet	Active		Spillway	11/30/98	11/30/03
AC70	Dunlap & ACDC tunnel	60		Inches	Active			3/25/99	3/25/04
AC72	Dunlap & ACDC tunnel	36		Inches	Active			5/3/99	5/3/04
AC81	1/2 mile Tunnel & ACDC channel		6 X 6	Feet	Active			5/5/99	5/5/04
AC83	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/99	5/5/04

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
AC94	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/99	5/5/04
AC101	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/99	5/5/04
AC106	2 mile Tunnel & ACDC channel	36		Inches	Active			5/6/99	5/6/04
AC107	2 mile Tunnel & ACDC channel	48		Inches	Active			5/6/99	5/6/04
AC109	2 mile Tunnel & ACDC channel	96		Inches	Active			5/6/99	5/6/04
AC110	2 mile Tunnel & ACDC channel	96		Inches	Active			5/6/99	5/6/04
AC113	2 mile Tunnel & ACDC channel	36		Inches	Active			5/6/99	5/6/04
AC121	2 mile Tunnel & ACDC channel	36		Inches	Active			5/6/99	5/6/04
AC124	Squaw Peak Parkway & ACDC channel	36		Inches	Active			5/5/99	5/5/04
AZ01	42nd Street & Arizona Canal	36		Inches	Active		Changed from AC19 to AZ01 - goes to AZ canal. Changed 11/1/94	12/8/95	12/8/00
CC01	? - Unable to find	24		Inches	Eliminated	9/15/94	Unable to find - may be tapped into another storm drain	9/15/94	9/15/99
CC02	Carol Ave & CC east wall, north of ACDC	48		Inches	Active			12/7/98	12/7/03
CC03	Peoria & CC east wall	84		Inches	Active			12/7/98	12/7/03
CC04	Cholla Rd & CC east wall	78		Inches	Active			12/7/98	12/7/03
CC05	Cactus Rd & CC east wall, south of cactus	48		Inches	Active			12/7/98	12/7/03
CC06	Larkspur Dr & CC east side of detention basin	36		Inches	Active			12/7/98	12/7/03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
CC07	19th Ave & Sweetwater Ave Not in CC west of 19th Ave. north wall	48		Inches	Active			12/10/98	12/10/03
CC08	23rd Avenue & Thunderbird Road	72		Inches	Active			12/10/98	12/10/03
CC09	12th Ave & Thunderbird Ave Not in CC, south of T-Bird, SE corner	54		Inches	Active			12/10/98	12/10/03
CC10	19th Ave & Greenway Rd on 19th south of Greenway, north side of wash	90		Inches	Active			12/10/98	12/10/03
CC11	7th Street & Greenway Parkway	84		Inches	Eliminated	9/14/94	Eliminated CC11 Changed to EF10 on 9/14/94	9/14/94	9/14/99
CC12	7th Street & Greenway Parkway - north side	36		Inches	Eliminated	9/14/94	Eliminated CC12 Changed to EF12 on 9/14/94	9/14/94	9/14/99
CC13	7th Street & Greenway Parkway - south side	36		Inches	Eliminated	9/14/94	Eliminated CC13 Changed to EF11 on 9/14/94	9/14/94	9/14/99
CC14	7th Street & Tierra Buena Not in CC		6 X 3	Feet	Active			12/10/98	12/10/03
CC15	11th Avenue & CC Not in CC east fork see comments	90		Inches	Active			12/10/98	12/10/03
CC24	Shangri-La Rd & CC west wall, south of Cholla	36		Inches	Active			12/7/98	12/7/03
CC34	10th Ave & CC north of Greenway Pkwy	21		Inches	Active	12/10/98		12/11/98	12/11/03
CC39	Bell Road & CC southeast side of bridge	36		Inches	Active	12/10/98		12/11/98	12/11/03
EF01	Cave Creek Road & Greenway Parkway	72		Inches	Active			3/24/95	3/24/00
EF02	16th Street & Greenway Parkway north side of wash	84		Inches	Active	12/30/98		12/30/98	12/30/03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
EF03	18th Street & Greenway Parkway north side of wash	84		Inches	Active			12/30/98	12/30/03
EF04	20th Street & Greenway Parkway north side of wash	96		Inches	Active			12/30/98	12/30/03
EF06	9th Street & Greenway Parkway center of wash	96		Inches	Active		box	12/30/98	12/30/03
EF07	9th Street & Greenway Parkway north side of wash	36		Inches	Active			12/30/98	12/30/03
EF08	Cave Creek Road & Greenway Parkway	72		Inches	Active			3/24/95	3/24/00
EF09	16th Street & Greenway Parkway	48		Inches	Active	12/30/98		12/30/98	12/30/03
EF10	7th Street & Greenway Parkway	84		Inches	Active	9/14/94	Active site Changed from CC11 as of 9/14/94	3/24/95	3/24/00
EF11	7th Street & Greenway Parkway - south side	36		Inches	Active		Active site Changed from CC13 to EF11 as of 9/14/94	3/24/95	3/24/00
EF12	7th Street & Greenway Parkway - north side	36		Inches	Active		Active site Changed from CC12 to EF12 on 9/14/94	3/24/95	3/24/00
EF13	Cave Creek Rd & EF spillway 50 feet west of CC Rd.	264		Inches	Active	12/30/98	spillway	12/30/98	12/30/03
EF14	22nd Place & EF spillway on south side of wash	70		Feet	Active	12/30/98	spillway	12/30/98	12/30/03
EF15	22nd Street & EF north side of wash	36		Inches	Active	12/30/98		12/30/98	12/30/03
EF16	22nd Street & EF north side	36		Inches	Active	12/30/98		12/30/98	12/30/03
EF17	22nd Street & EF spillway south side of wash	40		Feet	Active	12/30/98	spillway	12/30/98	12/30/03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
EF18	21st Street & EF north side of wash eastern of 2 pipes	36		Inches	Active	12/30/98		12/30/98	12/30/03
EF19	21st Street & EF north side	40		Inches	Active	12/30/98		12/30/98	12/30/03
EF20	20th Place & EF spillway south side of wash	120		Inches	Active	12/30/98	Spillway	12/30/98	12/30/03
EF21	20th Street & EF spillway south side of wash 50 feet east of 20th Street	252		Inches	Active	12/30/98	Spillway	12/30/98	12/30/03
EF23	19th Street & EF spillway on south side of wash	276		Inches	Active	12/30/98	Spillway	12/30/98	12/30/03
EF25	14th Street & EF spillway on south side of wash east of EF26	180		Inches	Active	12/30/98	Spillway	12/30/98	12/30/03
EF26	14th Street & EF spillway on south side of wash	252		Inches	Active	12/30/98	Spillway	12/30/98	12/30/03
EF27	12th Street & EF north side	36	8X12	Inches	Active	12/30/98	36" is low flow and box is for high flow	12/30/98	12/30/03
EF28	12th Street & EF 50 foot spillway south side of wash	276		Inches	Active	12/30/98	Spillway	12/30/98	12/30/03
GC01	Grand Avenue & Grand Canal	24		Inches	Active			9/19/94	9/19/99
GC02	Grand Avenue & Grand Canal	36		Inches	Active			9/19/94	9/19/99
GC03	Washington St & Hohokam Expressway		10 X 6	Feet	Active			11/22/94	11/22/99
IB01	52nd Street & Shea	36		Inches	Active			3/31/95	3/31/00
IB02	52nd Street & Shea	84		Inches	Active			3/31/95	3/31/00

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
IB03	Tatum, near Indian Bend Wash	66		Inches	Active			6/16/94	6/16/99
IB04	Tatum, near Indian Bend Wash	66		Inches	Active			6/16/94	6/16/99
IB05	Shea & Indian Bend Wash	78		Inches	Active			6/15/94	6/15/99
IB06	35th Street & Cholla	60		Inches	Active			6/10/94	6/10/99
IB07	36th Street, south of Sweetwater	78		Inches	Active			2/9/95	2/9/00
IB08	40th Street, south of Sweetwater	66		Inches	Active			3/31/95	3/31/00
IB09	40th Street, south of Sweetwater	36		Inches	Active			3/31/95	3/31/00
IB10	32nd Street & Acoma	66		Inches	Active			2/9/95	2/9/00
IB11	56th Street & Indian Bend Wash	66		Inches	Active			3/31/95	3/31/00
IB13	40th Street & Cactus Rd., on Cactus Road	72		Inches	Active		South Outfall	3/31/95	3/31/00
IB17	52nd Street & Indian Bend Wash		8 X 3	Feet	Active			6/9/94	6/9/99
IB18	40th Street & Cactus Rd.	72		Inches	Active		North Outfall	3/31/95	3/31/00
OC01	Old Cross Cut canal tunnel	36		Inches	Active			11/3/94	11/3/99
OC02	Van Buren & Old Cross Cut canal tunnel	42		Inches	Active			11/4/94	11/4/99
OC03	47th Street & Roosevelt	66		Inches	Active			11/1/94	11/1/99
OC04	46th Street & McDowell Road	42		Inches	Active			8/23/94	8/23/99
OC05	48th Street & Thomas Road	36		Inches	Active			12/1/94	12/1/99

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
OC06	48th Street & Earll Drive	54		Inches	Active			12/1/94	12/1/99
OC07	48th Street & Indian School Road	36		Inches	Active			12/1/94	12/1/99
OC08	46th Street & McDowell Road	54		Inches	Active			8/23/94	8/23/99
OC35	Old Cross Cut canal	36		Inches	Active			8/31/94	8/31/99
OC39	Old Cross Cut canal		6 X 5	Feet	Active			8/31/94	8/31/99
OC40	Old Cross Cut canal		6 X 5	Feet	Active			11/4/94	11/4/99
OC43	Old Cross Cut canal	60		Inches	Active			8/31/94	8/31/99
OC49	Old Cross Cut canal tunnel	36		Inches	Active			8/30/94	8/30/99
PD01	91st Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	3/9/00
PD02	83rd Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	3/9/00
PD03	75th Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	3/9/00
PD04	67th Avenue & Papago Diversion channel	90		Inches	Active			3/31/95	3/31/00
PD05	59th Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	3/9/00
PD06	51st Avenue & Papago Diversion channel	84		Inches	Active			3/9/95	3/9/00
PD07	43rd Avenue & Papago Diversion channel	72		Inches	Active			7/22/94	7/22/99
PD08	43rd Avenue & Papago Diversion channel	54		Inches	Active			7/22/94	7/22/99
PD09	39th Avenue & Papago Diversion channel	78		Inches	Active			7/22/94	7/22/99

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
PD10	35th Avenue & Papago Diversion channel	54		Inches	Active			7/22/94	7/22/99
PD11	31st Avenue & Papago Diversion channel		10 X 6	Feet	Active			11/30/94	11/30/99
PD15	32nd Avenue and Papago Diversion channel - west of PD11	40		Inches	Active			11/30/94	11/30/99
PD16	34th Avenue (approx) and Papago Diversion channel - west of PD11	42		Inches	Active			11/12/94	11/12/99
SC01	56th Avenue & Union Hill		12 X 12	Feet	Active			3/31/95	3/31/00
SC02	51st Avenue & Yorkshire Dr.	36		Inches	Active			9/22/94	9/22/99
SC04	40th Avenue and Beardsley Rd - south side	78		Inches	Active	3/29/95	Discovered on 3/29/95	3/29/95	3/29/00
SR01	51st Avenue & Salt River - north side	96		Inches	Active			7/23/97	7/23/02
SR02	43rd Avenue & Salt River - north side	90		Inches	Active			7/29/97	7/29/02
SR03	35th Avenue & Salt River - north side	75		Inches	Active			7/29/97	7/29/02
SR04	27th Avenue & Salt River - north side	72		Inches	Active			7/30/97	7/30/02
SR05	Approx. 25th Avenue & Salt River - north side	102		Inches	Active			7/29/97	7/29/02
SR06	22nd Avenue & Salt River - north side	78		Inches	Active			10/17/97	10/17/02
SR07	19th Avenue & Salt River - North Side	54		Inches	Active			2/14/97	2/14/02
SR08	15th Avenue & Salt River - north side	96		Inches	Active			8/2/95	8/2/00
SR09	11th Avenue & Salt River - north side	81		Inches	Active			10/24/97	10/24/02

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR10	7th Avenue & Salt River - north side	54		Inches	Active			12/31/97	12/31/02
SR11	Central Avenue & Salt River - north side	30		Inches	Active			1/9/98	1/9/03
SR12	Central Avenue & Salt River - north side	42		Inches	Active			1/9/98	1/9/03
SR13	Central & Salt River - north side	21		Feet	Active		Tunnel	1/9/98	1/9/03
SR14	3rd Street & Salt River - north side (261 E. University Dr.)	36		Inches	Active			1/14/98	1/14/03
SR15	3rd Street & Salt River - north side	84		Inches	Active			1/15/98	1/15/03
SR16	10th Street & Salt River - north side	54		Inches	Active			1/6/98	1/6/03
SR17	12th Street & Salt River - north side	96		Inches	Active			1/7/98	1/7/03
SR18	16th Street & Salt River - north side	66		Inches	Active			1/20/98	1/20/03
SR19	20th Street & Salt River - north side	21		Feet	Active		Tunnel	1/20/98	1/20/03
SR20	24th Street & Salt River - north side	84		Inches	Active			1/21/98	1/21/03
SR21	32nd Street & Salt River - north side	90		Inches	Eliminated	7/9/96	Eliminated Now is part of SR61. Changed 7/9/96.	6/20/95	6/20/00
SR22	32nd Street & Salt River - north side	84		Inches	Eliminated	7/9/96	Eliminated Is now is part of SR61. Changed 7/9/96	3/7/95	3/7/00
SR23	32nd Street & Salt River - north side	60		Inches	Eliminated	11/22/94	Eliminated This is Not an outfall - part of SR21. Changed 11/22/94	11/22/94	11/22/99
SR24	28th Street & Salt River - north side	90		Inches	Active			1/21/98	1/21/03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR25	34th Street & Salt River - north side	27		Inches	Eliminated	6/20/95	Eliminated This outfall no longer exists. The original outfall has been taken out and the storm sewer now drains exclusively to the 28th Street outfall (SR24).	6/20/95	6/20/00
SR26	37th Street & Salt River - north side	42		Inches	Active			1/22/98	1/22/03
SR27	40th Street and Salt River - north side -west outfall	72		Inches	Active			1/22/98	1/22/03
SR28	40th Street & Salt River - north side	72		Inches	Active			1/23/98	1/23/03
SR29	44th Street & Salt River - north side	78		Inches	Active			1/26/98	1/26/03
SR30	27th Avenue & Salt River - south side	108		Inches	Active			7/3/95	7/3/00
SR31	19th Avenue & Salt River - south side	72		Inches	Active			2/14/97	2/14/02
SR32	7th Avenue & Salt River - south side	72		Inches	Active			1/7/98	1/7/03
SR33	Central Avenue & Salt River - south side	66		Inches	Active			1/9/98	1/9/03
SR34	Central Avenue & Salt River - south side	15		Inches	Eliminated	11/23/94	The outfall at this location does not exist anymore. The 15" pipe is plugged at Pioneer Avenue and the flows are shunted to the storm sewer on the west side of central (SR33).	11/23/94	11/23/99
SR35	7th Street & Salt River - south side	72		Inches	Active			1/8/98	1/8/03
SR36	15th Street & Salt River - south side	72		Inches	Active		Galvanized	1/15/98	1/15/03
SR37	16th Street & Salt River - south side	36		Inches	Active			1/15/98	1/15/03
SR38	24th Street & Salt River - south side	72		Inches	Active			1/20/98	1/20/03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR39	28th Street & Salt River - south side	96		Inches	Active			1/21/98	1/21/03
SR40	Elwood Street (@32nd Street) & Salt River - south side	30		Inches	Eliminated	3/7/95	Eliminated The site drains into a retention pond at Elwood Street and University, north of the highway. The pond does not drain into the river, and should not be considered an outfall of the Salt River.	3/7/95	3/7/00
SR41	33rd Street & University - south side of Salt River	15		Inches	Eliminated	3/7/95	Eliminated The site drains into a retention pond at Elwood Street and University, north of the highway. The pond does not drain into the river, and should not be considered an outfall of the Salt River.	3/7/95	3/7/00
SR42	35th Street & University - south side of Salt River	48		Inches	Eliminated	3/7/95	Eliminated The site drains into a retention pond at Elwood Street and University, north of the highway. The pond does not drain into the river, and should not be considered an outfall of the Salt River.	3/7/95	3/7/00
SR43	37th Street & University - south side of Salt River	15		Inches	Eliminated	3/7/95	Eliminated The site drains into a retention pond at Elwood Street and University, north of the highway. The pond does not drain into the river, and should not be considered an outfall of the Salt River.	3/7/95	3/7/00
SR44	36th Street & University - south side of Salt River	15		Inches	Active		Eliminated The site drains into a retention pond at Elwood Street and University, north of the highway. The pond does not drain into the river, and should not be considered an outfall of the Salt River.	3/7/95	3/7/00
SR45	40th Street & Salt River - south side	54		Inches	Active			12/15/94	12/15/99
SR47	51st Avenue & Salt River - north side, 50ft no. of SR01	48		Inches	Active			7/23/97	7/23/02

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR48	45th Street & Salt River - south side	48		Inches	Active			3/28/94	3/28/99
SR49	67th Avenue & Salt River - north side	96		Inches	Active			3/31/95	3/31/00
SR52	52nd Street & Hohokam Freeway - north side of Salt River		97 X 61	Inches	Active			1/27/98	1/27/03
SR53	37th Street & Salt River - north side (sanitary)	42		Inches	Eliminated	3/30/94	Has steel bulkhead half buried in sand. According to Aviation, this 42" outfall is really an overflow for the sanitary sewer system	3/30/94	3/30/99
SR56	Approx. 28th Street & Salt River - north side	36		Inches	Active			1/21/98	1/21/03
SR58	35th Avenue & Salt River - north side of river, east side of road	60		Inches	Eliminated	8/5/96	Eliminated Only for WWTP discharge, not storm water. Changed 8/5/96.	8/5/96	8/5/01
SR59	2333 W. Durango - 23rd Ave. WWTP - on east side of SR05	48		Inches	Active			7/30/97	7/30/02
SR61	32nd Street & Salt River - north side		7 x 5	Feet	Active		New outfall ties in SR21 & SR22 as of 7/9/96	1/23/98	1/23/03
SW01	33rd Avenue & Deer Valley Road	42		Inches	Active		open ditch	3/31/95	3/31/00
SW04	29th Avenue & Lone Cactus	42		Inches	Active			9/22/94	9/22/99
SW05	29th Avenue & Lone Cactus	42		Inches	Active			9/22/94	9/22/99

Outfall ID Symbols

AC = Arizona Canal Diversion Channel
AZ = Arizona Canal
CC = Cave Creek Wash
EF = East Fork of Cave Creek Wash
GC = Grand Canal
IB = Indian Bend Wash
OC = Old Crosscut Canal
PD = Papago Diversion Channel
SC = Skunk Creek Wash
SR = Salt River
SW = Scatter Wash

BEST MANAGEMENT PRACTICE 9

Continue to respond to unintended spills or releases of hazardous material to the storm drain system.

In Fiscal Year 1998/99, a multi-departmental task force worked on a Spill Response Administrative Regulation (AR), which will be distributed during Fiscal Year 1999/2000. The AR requires departments to implement a comprehensive spill program that includes plans, designated roles, and employee training. The AR is intended to ensure that regulatory reporting occurs as required and also helps departments consider spill prevention and response procedures.

Additionally, the Water Services Department, the Office of Environmental Programs, and Personnel Safety Section identified the need for mobile spill kits to be placed in trucks to handle incidental spills of hydraulic fluid and oils. A standardized list of materials will be stocked in the City's central warehouse to resupply the kits as needed. Other City departments will be trained on the materials and techniques to respond to incidental spills of these products.

The City's Fire and Personnel Departments both respond to unintended hazardous material spills or releases. In addition, those City departments that manage, use, store, transport, and dispose of hazardous wastes have policies and procedures for responding to spills within their respective operations. For example, the Public Works Department (PWD) has a policy for addressing petroleum product spills. All spills are to be immediately contained and cleaned using appropriate materials and disposal equipment. The PWD has similar policies for bulk delivery fuel releases and for spills of automotive coolant and/or antifreeze.

Fire Department

The Fire Department has operated a Hazardous Materials Response Team (HMRT) since 1980. The HMRT consists of three decentralized units that respond to calls within 460 square miles of the city limits and a rural area of 700 square miles. These teams are stationed in the north, south, and central corridors of the city.

There has been a substantial increase in hazardous materials incidents since the HMRT was first formed. From the approximate 50 incidents in 1980, there are now nearly 300 incidents annually. As commerce and the number of businesses increase, so does the frequency of these responses. The City has identified over 8,000 hazardous materials occupancies.

The Fire Department has first responder responsibility, and HMRT staff are trained to eliminate eminent hazards that threaten life and property. Once these hazards have been properly addressed and no immediate danger persists, the property owner is responsible for providing remediation and clean up.

The HMRT is equipped with a standard engine company, two Advanced Life Support engines, and a ladder company with a specially equipped support vehicle. The crews

combination of equipment and personnel is designed to provide standard fire-fighting equipment, specialized equipment, and advance life support personnel for hazardous materials response.

The Hazardous Materials Technicians undergo training that meets and exceeds all requirements of the Occupational Safety and Health Act and National Fire Protection Association guidelines. The training and education consists of at least 160 hours of initial training, followed by another 80 hours of annual hands-on and classroom training.

When hazardous materials are spilled or illegally disposed of onto City-owned property, the Fire Department investigates and makes initial contact with appropriate authorities, including the Arizona Attorney General's Office and Arizona Department of Environmental Quality. Both of these agencies may further investigate the incident to determine the responsible party.

Personnel Department

The Personnel Department, Personnel Safety Division, provides management and oversight services to ensure the proper clean up and disposal of hazardous materials and/or wastes spilled or illegally disposed onto City-owned property. When necessary, the Fire Department's HMRT assists to control unsafe conditions.

The Personnel Department handles the following activities

- Arranging for emergency cleanup and disposal of hazardous materials and wastes.
- Obtaining emergency identification numbers for transporting materials.
- Administering projects to ensure that site cleanup and hazardous waste disposal is performed in compliance with regulations, is cost effective, and is performed in an environmentally sound manner.
- Maintaining a project file for appropriate documentation.
- Submitting applications to EPA for reimbursement of costs incurred in responding to and handling illegal dumping and/or spills of hazardous materials and/or wastes.

TABLE 7-9

HAZARDOUS MATERIALS RESPONSE	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Fire Department		
Number of Hazardous Materials Incidents Responded to by HMRT	272	275
Personnel Department		
Number of Illegal Dumping or Spills Responded to by the Personnel Department	127	162

BEST MANAGEMENT PRACTICE 10

Continue to implement the city-wide program for proper disposal of hazardous waste generated by City operations including identifying all operations that generate hazardous waste and working with City departments to establish procedures for the proper handling, storage, transportation, and disposal of hazardous wastes.

Office of Environmental Programs

The City's Pollution Prevention (P2) Program promotes the practice of reducing hazardous materials in City operations, enhances the City's approach to environmental management, and provides ongoing technical assistance. The P2 Program is implemented by the City Manager's Office of Environmental Programs (OEP).

A P2 Team, composed of management-level staff from 17 City departments, oversees the Program, and several sub-committees assist in developing P2 elements. In addition, each major operating department has a designated P2 Coordinator to serve as the primary liaison between the P2 Team and the department.

The following goals guide the P2 Program

- Reduce the use of hazardous materials
- Enhance the City's approach to environmental management by reducing liability, reducing costs and improving worker safety
- Provide ongoing technical assistance

The City's P2 Program focuses on hazardous materials and waste management including

- Hazardous materials purchase and exchange
- Environmental data management
- Facility evaluations
- Regulatory assistance/policy development
- Training

The P2 Program has taken several steps to reduce hazardous materials in City operations, including implementing the Hazardous Materials Purchase Policy. The Purchase Policy helps departments select environmentally preferable products that also are cost effective and efficient.

The "Reviewed Products List" (RPL) is a list of products reviewed and rated by the P2 Program based on cost effectiveness, efficiency, environmental impacts, and worker safety. Over 500 products have been reviewed, resulting in more than 100 environmentally preferred products identified for purchase.

In October 1998, an environmental database was added to the City's intranet system, enabling staff to locate specific chemicals being considered for replacement by safer products. A web site for material safety data sheets provides easier access to documents that include health, safety, and environmental information. The database will be expanded to include waste tracking and environmental training information.

Another component of the P2 Program is the hazardous materials "Trading Post." This innovative program provides an opportunity for departments to "trade" excess hazardous materials, thereby reducing the volume of hazardous waste requiring disposal.

Departments phone in or forward information about their materials to the P2 Program staff, who then help to find uses for the materials in other departments. During 1998/99, the Trading Post was advertised to City employees through *EnviroNotes*, the P2 Poster Program, and in P2 training sessions. Table 7-10 contains information on successful exchanges.

The P2 staff assesses City facilities to acquire a baseline of environmental information, ensure compliance with environmental and safety requirements, and identify opportunities to reduce hazardous material use and hazardous waste generation. The P2 Program uses three assessment levels in its evaluation.

The basic assessment is the Level I Facility Profile that touches on 17 topic areas. The Level I establishes a facility's initial compliance level by gathering existing information from a variety of regulatory databases and reviewing compliance with selected environmental and safety requirements. The assessment team develops an action plan that identifies areas requiring improvement, assigns responsibility for appropriate action, and establishes a timeline for resolution.

Level II Facility Assessments involve a more detailed review of a facility's compliance with environmental regulatory requirements. The results of a Level II may highlight a specific environmental issue. For example, one project involves a detailed review of the processes and storm water management practices of a specific facility.

A Level III P2 Opportunity Assessment, or P2 Plan, evaluates facility operations, and identifies opportunities to reduce hazardous materials use and hazardous waste generation. Educating staff on environmental issues, including P2 concepts, enhances their ability to actively participate in improving Phoenix's environmental quality.

The P2 Program offers the following:

- The OEP works with the Personnel Department to include an environmental overview during New Employee Orientation. P2 training also is offered through the City's Supervisory Academy, an in-house training program for all supervisors.
- P2 University (P2 U) - an incentive-based training program intended to complement training conducted by Personnel Safety. Some P2 U Courses include: *"Storm Water: Dilution is Not a Solution," "Hazardous Materials Purchasing: How to Buy Smart," "Inventory Management: How to Clean Up Your Room,"* and *"Spills and Emergency Response."*

Every year, one week in September is recognized as "National Pollution Prevention Week." The City takes this opportunity to highlight P2 activities and other environmental programs. Displays and events educate employees on storm water management, pollution prevention, water conservation, alternative fuels, urban forestry, recycling, and ride share.

Other forms of outreach that reinforce the basic concepts of the P2 Program include:

- *EnviroNotes*, a bimonthly newsletter that reaches employees by subscription or through the intranet. *EnviroNotes* provides P2 tips, information on efforts to reduce hazardous waste, and more.
- *Brownbag lunches* provide presentations and discussions detailing current environmental issues for City staff members.
- *City Connection* is the weekly employee newsletter that is sent to over 11,000 employees. This publication includes articles that highlight the P2 Program, as well as environmental tips.
- *What's New in P2?* Uses posters to help keep City employees familiar with P2 concepts. The posters are updated monthly and are located in high traffic areas throughout City facilities.
- *"P2 at Work"* encourages employees to demonstrate P2 in their workplace. A brochure introduces the "P2 at Work" concept and provides a consultation form that can be used to request information on possible alternatives for work activities. Employees receive a small reward for completing the consultation form.

The OEP staff also works with and establishes interdepartmental teams to develop environmental policies and regulations. In conjunction with other departments, the OEP helps determine the impact of existing rules and regulations on City operations and recommends compliance and planning strategies. Below are a few examples:

- Storm water discharges
- Hazardous waste regulatory issues
- Underground storage tank cleanups
- Contaminated soil disposal
- Environmental investigations on City property
- Citations and notices of violations

Policy development helps build consistency within the City's environmental management system. OEP staff, through its P2 Program activities, participate in or coordinate a number of policy issues, such as operating procedures affecting storm water and non-hazardous waste at facilities, and reporting policies for Notices of Violation.

TABLE 7-10

HAZARDOUS WASTE DISPOSAL/TRAINING	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Office of Environmental Programs		
P2 Training Sessions Held	41	19
Successful Trading Post Exchanges	3	15
Cost Savings From Trading Post Exchanges	$470,000	$3,600,000
Tons of Waste Reduced Through Trading Post Program	350	482
Level I Facility Assessments Completed	27	27

Appendix A includes a variety of brochures and pamphlets designed to educate City staff on pollution prevention opportunities. The materials are distributed at a variety of events, including employee orientation, National P2 Week, and employee newsletters.

Personnel Department

The Personnel Department, Personnel Safety Section, monitors department activities related to hazardous wastes, including centralized waste disposal and tracking. The Section also provides training and technical assistance.

Qualified City safety personnel assist with

- Hazardous waste identification
- Purchasing alternative products
- Spill procedures
- Waste minimization

Examples of wastes generated by City operations include paints, thinners, pesticides, solvents, acids, laboratory chemicals, and batteries. Some of these wastes, including solvents and batteries, are recycled. The City handles the proper disposal of these materials through a contracted hazardous waste management firm. All state and federally required reports and paperwork are prepared and maintained by qualified City safety personnel. The City also generates and submits an annual hazardous waste report to the Arizona Department of Environmental Quality and the Local Emergency Planning Committee.

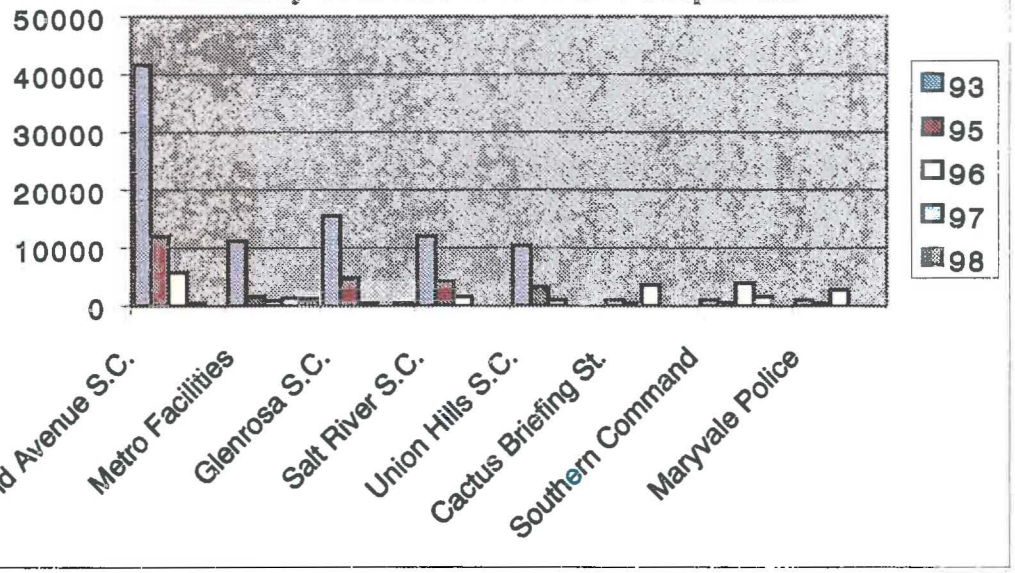
Hazardous waste materials rules and policies address specific waste streams, and departments receive assistance to assure proper implementation and compliance with the rules and regulations. The City also has a hazardous materials management manual for staff to follow. Personnel Safety provides hazardous material transportation training, and also coordinates training for pesticide application.

Public Works Department

The Public Works Department has developed a specialized assessment program to reduce employee exposure to chemicals. The PWD's program is divided into a Facility Assessment and an Opportunity Assessment. Facility Assessments consist of inspecting a facility and reviewing operational compliance with a variety of regulatory requirements. Once completed, any discrepancies are listed as action items with completion dates. Based on the results, an Opportunity Assessment will be performed. In the Opportunity Assessment, the chemical inventory used on site will be reviewed to determine if less hazardous or less toxic material can be substituted. Vendors are informed of the City's desire to purchase less toxic materials and are asked to assist in substituting products.

In May 1998, the PWD established a Department directive aimed at reducing the purchase of new hazardous material products. Staff are trained to review MSDS sheets before purchasing products. Figure 7-5 illustrates how the PWD has been successful in reducing the volume of hazardous wastes shipped between calendar years 1993 to 1998. Between 1993 and 1998, the volume of hazardous waste disposal was reduced by 98%. Between 1997 and 1998 there was a 43% reduction in the volume of hazardous waste disposed.

Figure 7-5
Public Works Department
Summary of Hazardous Waste Shipments



*S.C. = Service Center

The City continues to participate in the Partnership for Pollution Prevention (P3) sponsored by the Arizona Department of Environmental Quality. P3 is a voluntary, non-regulatory government-industry partnership to reduce hazardous waste in Arizona. The goal of P3 is to reduce hazardous wastes, and to improve communications and cooperation among government and industry.

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BEST MANAGEMENT PRACTICE 11

Continue to educate the public regarding the impacts that result when oil, antifreeze, pesticides, herbicides, paints, solvents, or potentially harmful chemicals are dumped into storm drains or drainage channels.

Street Transportation Department

Public education and awareness regarding the environmental impacts caused by dumping hazardous chemicals into drains and drainage channels is a major element of the City's Storm Water Management Program. The City has a multi-disciplined and adaptable educational program. Specific efforts include

- Pollution Awareness Markers (PAMs) for marking catch basins
- A Storm Water Management Hotline to report illegal dumping
- Educational brochures that describe appropriate best management practices for industries, commercial facilities, and households
- Public Service Announcements on television, radio, and billboards
- Public outreach materials such as games, prizes, coloring books, slide shows and bilingual bookmarks for distribution at public outreach events

PAMs have been installed on 714 catch basins in downtown areas and known trouble spots. The cast aluminum disks are nearly 5 inches in diameter and contain the storm water management logo and the words "Storm Drain No Dumping." They were developed as an alternative to other forms of anti-dumping catch basin labeling, such as painting and stenciling, because of the need to withstand our harsh climatic conditions. PAMs are inexpensive to make and install, require little maintenance, and have a life expectancy of at least 10 years.

Photo 7-2: Pollution Awareness Marker

The Storm Water Management Hotline allows businesses and citizens to report any illegal dumping to the storm drains or to receive information on the Storm Water Management Program. Storm Water Management personnel answer the Hotline Monday through Friday between the hours of 7:30 a.m. and 5:00 p.m. Messages left on weekends, after hours, and when the phone is busy are taken by voice mail and a response is provided as soon as possible. Calls regarding non-storm water related issues are referred to the appropriate department or agency. Since beginning the advertisement and promotional campaign, the number of calls received on the Hotline has steadily increased.

The Street Transportation Department created educational brochures describing best management practices that apply to specific industries. The brochures are distributed at City facilities, schools, and to attendees at seminars, presentations, and special public events. They are also provided to property and business owners during inspections and complaint investigations (see BMP 36 and Appendix A).

Coloring books featuring "Storm Drain Dan" have proven to be very popular with the City's younger residents. The coloring books are distributed at school presentations, special events, neighborhood festivals, City facilities, and are included with promotional materials distributed in conjunction with other programs, such as the BOPA (battery, oil, paint and antifreeze) collection events.

A slide show educates adolescents and adults about storm water pollution prevention practices. The presentation is approximately five minutes long and is shown at meetings, seminars, workshops, school visits, and special events. The Storm Water Management Program staff also distributes a number of public outreach materials, including bookmarks, refrigerator magnets, rulers, note pads, pencils, and mugs. The items are designed to raise public awareness of storm water quality.

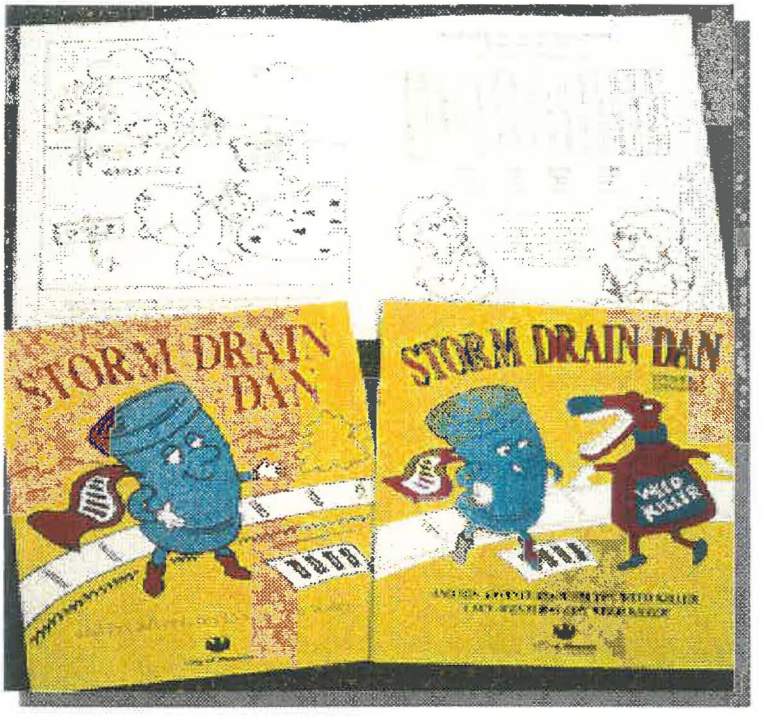

Photo 7-3 Storm Drain Dan Coloring Books

Photo 7-4 Storm Water Management Program Public Outreach Materials

TABLE 7-11

STORM WATER EDUCATION EFFORTS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Storm Water Related Calls Received by the Storm Water Management Hotline	388	383
Educational Materials Distributed (Includes the City Code, Best Management Practices, bookmarks, educational pamphlets, and Storm Drain Dan coloring books)	15,950	30,738
Public Outreach Events Attended	22	12

Water Services Department

The Water Customer Services Field Offices of the Water Services Department implement an information and enforcement program to address illegal discharge of water into streets, alleys, or right-of-ways. The Water Services Department has concluded that most of the water in the streets is the result of improper irrigation practices, and the occasional dumping of swimming pool water into residential neighborhoods. The information and enforcement program is directed at property owners and commercial irrigators, and contains information on proper pool drainage and tips to reduce irrigation street flooding.

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BEST MANAGEMENT PRACTICE 12

Consult with the Environmental Protection Agency and the Arizona Department of Environmental Quality as needed relative to NPDES permits to third parties for any discharges to storm drains or drainage channels.

The City has asked the Arizona Department of Environmental Quality and the United States Environmental Protection Agency, Region IX, to be included on their lists of public notice recipients for NPDES permits proposed for issuance within the City's limits or to the City's storm drain system.

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BEST MANAGEMENT PRACTICE 13

Re-evaluate as needed previous policies that allow certain relatively clean waters to be discharged to the storm water system.

In Fiscal Year 1998/99, a multi-departmental task force worked on a Spill Response Administrative Regulation (AR), which will be distributed during Fiscal Year 1999/2000. The AR requires departments to implement comprehensive spill program that includes plans, designated roles, and employee training. The AR is intended to ensure that regulatory reporting occurs and also helps departments consider spill prevention and response procedures.

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BEST MANAGEMENT PRACTICE 14

Continue programs to educate the public and City personnel regarding the environmental impacts that result from leaks and spills from gasoline, fuel oil, and chemical tanks.

A number of departments within the City have programs to provide education and awareness of the environmental impacts caused by tank leaks, spills, and improper disposal practices. Programs have been developed in the Fire, Street Transportation, and Water Services Departments. The Aviation, Personnel, and Public Works Departments, and the Office of Environmental Programs all implement training programs designed specifically for City-owned or operated facilities.

Street Transportation Department

The Storm Water Management Program staff assigned to the Street Transportation Department distribute materials to educate tank owners regarding the impacts caused by leaks and spills of gasoline, fuel oil, and other chemicals. Educational materials include seven brochures that describe management practices for industrial and commercial facilities that store, handle, use, or sell these materials.

Presentations also are made to industrial associations, public interest groups, professional associations, and trade groups. Displays and interactive activities are provided at large public festivals and events to enhance public awareness. Enforcement activities, including inspections and complaint investigations, also provide opportunities to educate regarding the environmental impacts caused by leaks and spills.

Fire Department

The Fire Department also educates fuel tank owners on the hazards and impacts associated with spills and leaks of gasoline, fuel oil, and chemicals. The Department has identified over 8,000 facilities that store and use these materials. The Fire Prevention Division performs inspections to enforce underground storage tank (UST) requirements and to educate operators of these facilities. Inspectors provide information regarding proper installation and maintenance throughout the permitting and/or closure process.

In addition, the Department's Hazardous Materials Response Team often educates the public regarding these hazards. Public speaking engagements and presentations are made to a variety of trade and professional associations, public interest groups, and schools. Media interviews provided at response incidents or on public interest programs allow information to be delivered to large audiences.

Public Works Department

The Public Works Department (PWD) manages the City's UST program and fueling facilities for PWD vehicles. At each fueling location, placards that list the steps to take if a spill occurs are posted near fuel dispensing equipment. Forty-five Spill Prevention, Countermeasures and Containment (SPCC) plans have been completed, and facility employees are trained in the SPCC requirements, hazard communications, and hazardous materials operations.

TABLE 7-12

HAZARDOUS MATERIALS PROGRAMS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
Employees Receiving Hazard Communications Training	860	0*
Employees Receiving 40-hour CFR Hazwoper Training (Hazardous Waste Operations and Emergency Response)	25	2
Hazardous Material Safety Pads at Service Centers	5	5

*Hazard Communications Training was offered in June 1998, the end of the last reporting year.

Personnel Department

The Personnel Department, Personnel Safety Section, ensures that City operations comply with state and federal Community Right-to-Know regulations. Facilities using or storing reportable quantities of hazardous substances listed in SARA Title III are required to report that information to appropriate regulatory agencies. The Personnel Safety Section compiles an annual report and submits it to the Fire Department, Maricopa County Emergency Management Department, and the Local Emergency Planning Committee.

In addition, Arizona Occupational Safety and Health regulations require employers to provide hazard training regarding chemical products used on the job. The Personnel Safety Section provides procedures to all City operations to assure employee protection and regulatory compliance. These procedures include a written program at each facility, chemical inventories, material safety data sheets, container labeling, and employee training. The Section maintains a central library of chemical products used by City workers.

The Personnel Department presents training programs in conjunction with training offered by various departments. They also develop specialized training programs upon request. Training is followed up with inspections to determine compliance with the hazard communication standard and chemical handling requirements.

Office of Environmental Programs

The Office of Environmental Programs staffs and coordinates the Pollution Prevention (P2) Program, which is described in detail in BMP 10. Established to help reduce the City's use of hazardous chemicals and the generation of hazardous waste, the P2 Program also provides employee training and awareness programs. Facility assessments are performed to help establish baseline information regarding compliance and to offer technical assistance on environmental issues.

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BEST MANAGEMENT PRACTICE 15

Continue to implement City ordinances for new tanks, and continue the City's aggressive self-monitoring program for City-owned tanks. Implement a strategically focused spot-check program to search for, identify, test, and control storage tanks.

As required by the Code of Federal Regulations ,Title 40, Part 280, the City follows federal regulations dealing with the installation, maintenance, and operation of petroleum underground storage tanks (UST). All tanks located within the City are regulated through the Phoenix Fire Code, Articles 52, 79, and 80 and associated appendices; and by the Arizona Revised Statutes, Title 18. The Phoenix Fire Code is based on the 1997 Uniform Fire Code.

Fire Department

The Fire Department has used a formal permitting process to monitor the installation and removal of underground flammable and combustible liquid storage tanks since the early 1970s. Over the years, the level of oversight has become more sophisticated with increased knowledge of physical and environmental hazards. The City provides safeguards by adopting new requirements as new technologies emerge and national codes change.

In 1995 the Fire Department entered an Inter-Governmental Agreement with the Arizona Department of Environmental Quality (ADEQ) to perform the required environmental inspections for tank installations and closures in conjunction with the Fire Code inspections. ADEQ pays the City for each facility installation inspection or facility closure inspection.

Public Works Department

The Public Works Department (PWD) operates USTs that contain petroleum products, such as gasoline, motor oil, hydraulic fluid, and used oil. The PWD conducts daily monitoring of physical quantities and transaction records of City-owned storage tanks in compliance with established federal tank monitoring regulations. If the daily monitoring process indicates a possible product release, tank and line tightness testing is conducted. This testing process certifies that the tank and piping are free of leaks.

Under an aggressive schedule, the PWD periodically tests, upgrades, and replaces tanks to meet required standards and to protect against leaks. All single-walled fiberglass and steel USTs are being replaced with double-walled fiberglass USTs or above ground storage Tanks (ASTs). Where possible, low volume UST sites are replaced with AST facilities to reduce environmental liability and installation costs. In addition, all fuel sites are inspected annually for compliance with current codes and ordinances.

Part of the PWD's Tank Reconciliation Program includes annual tank tightness testing on all underground storage tanks. Tank tightness testing certifies that the tank and piping are free from leaks. Tank tightness testing is being phased out due to new Federal regulations, effective January 1, 1999. However, PWD will continue to reconcile fuel storage tanks as a BMP backup program. As of January 1, 1999, the new regulations

require electronic tank monitoring with yearly certification of the monitoring system and annual testing of underground piping.

The Aviation Department also operates a number of ASTs and USTs. A separate NPDES industrial storm water permit covers the three airports owned and operated by the City.

TABLE 7-13

STORAGE TANK MANAGEMENT	FISCAL YEAR 1997/98	FISCAL YEAR 1998/1999
Public Works Department		
Number of USTs Upgraded or Replaced	23	4
Number of Tanks Removed From Service	10	3
Total City-Owned USTs	87	84
Total City-Owned ASTs	79	83
Number of USTs Replaced With ASTs to Date	79	79
Fire Department		
Number of UST Site Plans Reviewed	89	37
UST Installation Inspections	59	16
Tank Closure Inspections Conducted	83	104

BEST MANAGEMENT PRACTICE 16

Continue to educate the public through brochures regarding the need to clean up and properly dispose of pet wastes.

Public Works Department

The Public Works Department's Solid Waste Disposal Division hangs notices on doorknobs to educate the public regarding the need to clean up and properly dispose of pet wastes. The hangers serve both to educate and to enforce the requirements of the Phoenix City Code, Chapter 27, Section 27-8. The notices describe the requirements of the Code, and identify the activities that must be performed to assure compliance. These door hangers, or similarly worded placards, are posted at public facilities, such as parks, libraries, and other locations, and are included with other solid waste management educational materials distributed by the City.

BEST MANAGEMENT PRACTICE 17
Continue to implement and enforce leash laws and pet waste clean up ordinances in selected public use areas.

Public Works Department
The Phoenix City Code, Chapter 27, Section 27-8 requires all animal owners and custodians to immediately clean up and properly dispose of animal wastes left on any public street, gutter, sidewalk, right-of-way, park, or private property. All animal wastes must be removed from pens, stables, yards, cages, and other enclosures and be disposed of as often as necessary to prevent a public nuisance or health hazard.

Failure to comply with the Code can result in a criminal complaint being filed. Any person convicted of violating any of the provisions of this chapter of the City Code is guilty of a Class I misdemeanor.

Parks, Recreation and Library Department
The Parks, Recreation and Library Department posts signs in parks having recurring problems associated with pet waste. The photo below shows a sign used in Phoenix mountain preserves. Bags are available to park patrons for pet waste disposal.

Photo 7-5: Pet Waste/Leash Ordinance Sign
South Mountain Park, Phoenix, Arizona

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BEST MANAGEMENT PRACTICE 18

Continue to provide or participate in City or regional education programs, both public and private, regarding the need to reduce automotive use by various means.

Public Works Department

The City participates in the Rideshare Program, as developed by Valley Metro. The Rideshare Program's goal is to reduce single-occupancy vehicle miles and/or trips to targeted employer sites. The Public Works Department has a Transportation Coordinator who manages the Rideshare Program and prepares the annual Trip Reduction Plan.

The Maricopa County Regional Trip Reduction Task Force approved the City's 1999 Trip Reduction Plan in May 1999. The plan provides a list of 20 measures and/or strategies to reduce the use of single occupancy automotive vehicles. As submitted and approved, the Plan is one of the most comprehensive incentive-based rideshare programs of all area employers. Some of the measures identified in the Plan include:

- Encouraging alternate work schedules. (A survey conducted in May 1999 confirmed that over 90% of City employees work a schedule other than the standard five day per week 8 a.m. to 5 p.m. schedule)
- Providing all employees with 100% subsidized use of public transit
- Subsidized or preferential carpool parking
- Guaranteed Emergency Ride Home Program (see Appendix A)
- Participation in the Clean Air Campaign
- Meetings and training for Rideshare Representatives
- Providing bus subsidies for seniors and the disabled

Rideshare and Trip Reduction information regularly is included in the weekly employee newsletter. The City also sponsors recruitment drives once every other year. Departmental Rideshare coordinators distribute information to employees, and new employees receive full information about the Plan in new employee orientations. Rideshare information also is provided at employee fairs and other City-sponsored events.

Valley Metro Rideshare also provides speakers that offer detailed information on any specific mode of transportation, alternate work schedules, telecommuting, air pollution facts, or general clean air strategies. One-on-one consultation also is available to help Rideshare representatives and others implement the Trip Reduction Plan strategies, incentives, and marketing goals.

Street Transportation Department

In addition to the Rideshare Program, the City also maintains an extensive system of bikeways to encourage its employees and residents to use bicycles. Since 1989, the Phoenix bikeway system has expanded from 75 miles to over 450 miles. It is the largest such system in the state. Approximately 10 miles of additions to the bikeways are planned for each year.

Public Transit Department

As a means of expanding travel options for people who ride the buses, the Public Transit Department has developed an innovative Bikes on Buses Program. Specially designed bike racks, which can carry two bikes, have been mounted on the front of all public transit buses in the Phoenix area. The bikes can be loaded independently of one another, and the loading and unloading process does very little to disrupt the delivery of scheduled bus service. There is no additional charge for using the bike racks.

TABLE 7-14

PHOENIX BIKEWAY SYSTEM	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Approximate Number of Bikeway Miles Added	17	5
Approximate Number of Bikeway Miles in Phoenix	439*	454

*This number represents a correction from the 1997/98 Annual Report

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BEST MANAGEMENT PRACTICE 19

Continue to comply with state and federal laws for emission control inspections and maintenance of City vehicles.

The Phoenix metropolitan area is a designated "Area A" non-attainment area for carbon monoxide. As such, motor vehicles registered to the City must undergo vehicle emissions control testing once every 24 months at State certified inspection stations. The City fully complies with these requirements. General fleet vehicles are inspected at State inspection and maintenance stations as required, and are not released for fleet operation until they meet mandated emission standards.

Public Works Department

In addition to emissions control testing and inspections, all City vehicles and equipment receive routine preventive maintenance and safety inspections based on either operating hours or mileage. A complete safety inspection is performed and repairs are made as needed. The fleet consists of the following types of vehicles and equipment:

TABLE 7-15

CITY VEHICLE FLEET BY TYPE	
Light Vehicles	3,989
Heavy Vehicles	765
Heavy Equipment	476
Trailers	593
Miscellaneous Equipment	217
Number of Vehicles Replaced (Fiscal Year 1998/99)	475 (or 7%)

To address chlorofluorocarbon (CFC) emissions and ensure compliance with regulatory requirements, the Public Works (PWD) and Aviation Departments have implemented Automotive CFC Recycling Programs. CFC recycling units capable of recycling R-134A, R-11, and R-22 refrigerants are used at vehicle service and repair centers. Mechanics receive mandated training, and must follow appropriate policies and procedures for recovering and recycling CFC refrigerants.

All equipment is scheduled for preventative maintenance inspections based on either time or mileage. A complete safety inspection is performed and any repairs are made as needed. Used oil and batteries are collected and recycled.

Normal vehicle maintenance procedures include routine washings. For the majority of fleet vehicles, commercial car wash establishments provide this service. For large trucks and heavy equipment, the PWD has automated wash facilities that can recycle up to 80 percent of the water used in the cleaning process. All wash waters not recycled are captured and disposed of in the sanitary sewer system. Three wash facilities have been constructed to date, and a fourth facility is planned.

BEST MANAGEMENT PRACTICE 20

Continue to comply with state and federal laws to provide pollution controls and alternative fuels on City-owned vehicles and motorized equipment.

Public Works Department

The City first started using alternative fuels in its vehicles during the mid-1980s, and began escalating its use in 1991. Recent changes to Arizona law require the City to operate 75 percent of fleet vehicles on alternative fuels by December 31, 2000. The City has tested a variety of fuels in passenger vehicles, trash collection, police, and other vehicles, and currently operates electric, liquefied petroleum gas (more commonly known as *propane*), and compressed natural gas (CNG) vehicles. Most alternative fuel vehicles are bi-fuel, capable of using both CNG and some other fuels, such as unleaded gasoline or diesel. The City continues to study alternative fuel options.

Public Transit Department

The City is committed to reducing tailpipe emissions in the bus fleet. The Public Transit Department operates 156 buses powered by alternative fuel. This represents 46 percent of the bus fleet. The City expects significant reductions in the tailpipe emissions of the transit fleet as older buses are retired.

Transit is also testing a new catalytic converter/muffler to reduce visible particulates. While tests are not yet complete, the Department objective is a 25 percent reduction in particulates for all buses.

TABLE 7-16

VEHICLE EMISSION REDUCTION MEASURES	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Public Works Department		
City Vehicles Equipped to Use Compressed Natural Gas	580	1,167
Average Pounds Per Month of Air Pollution Prevented Through the Use of CNG Vehicles	65	151
Existing CNG Fueling Facilities	4	7
CNG Fueling Facilities Under Construction	3	2

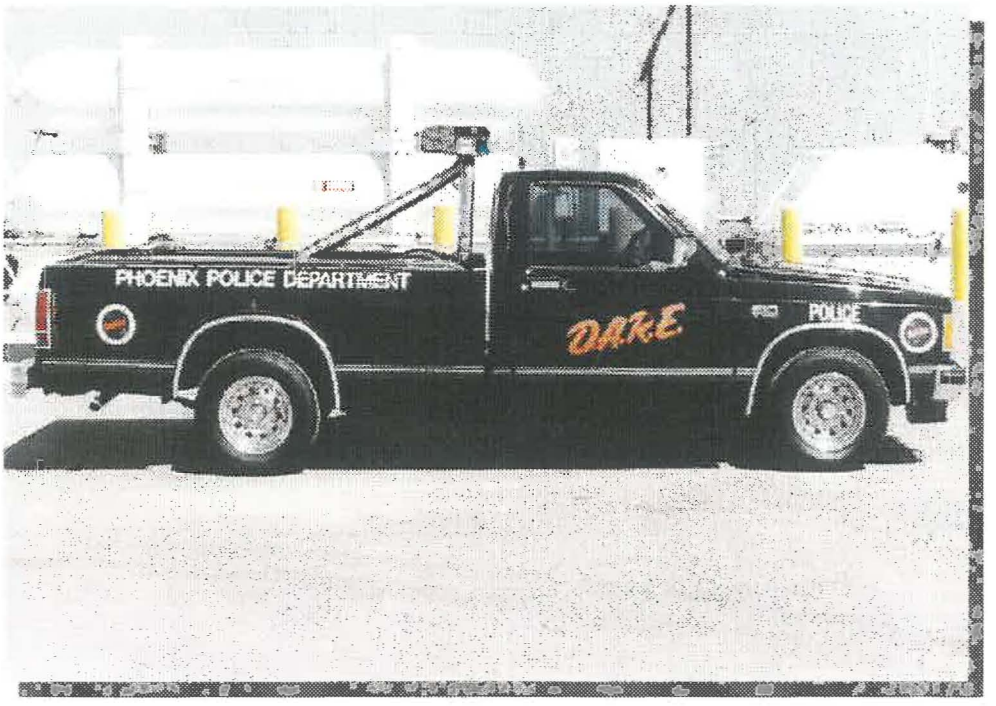

Photo 7-6 DARE CNG-Powered Vehicle

Photo 7-7 CNG-Powered Side-Loader

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BEST MANAGEMENT PRACTICE 21
Continue pavement repair and maintenance on streets and parking areas.

Street Transportation Department
The Street Transportation Department is responsible for design, construction, and maintenance of all City streets. Street surfaces are maintained (including crack sealing, pothole repair, and more extensive pavement restoration) with the aid of a computerized pavement management system to analyze ride quality. The operator provides the computer with surface distress information (cracking, rutting, raveling, bleeding, etc.), and the computer develops a series of pavement quality indices. This data, coupled with dynaflex analyses of the pavement's structural adequacy, is used to prioritize maintenance needs on a citywide basis. Additional modules in the computer application allow the costs of needed repairs to be forecast. This, in turn, allows the City to prioritize its maintenance needs in relation to available budget.

The City implements a parking lot sweeping schedule based on the type of facility the lot serves. Parking lots at parks and other related facilities are swept approximately twice per month. City Service Center and landfill parking lots are swept every week. Other lots are swept on an as-needed basis. Please see BMP 23 for more information on the City's street sweeping programs.

TABLE 7-17

STREET AND PARKING LOT MAINTENANCE	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Number of Potholes Repaired	27,175	21,903
Miles of Streets Crack Sealed	606	616
Approximate Miles of Streets Repaired/Retrofitted	195	240

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BEST MANAGEMENT PRACTICE 22

Continue programs to pave dirt streets.

Street Transportation Department

At the end of the reporting year, the City had approximately 10 miles of unpaved streets located within its jurisdiction. Unpaved streets contribute to particulate pollution through aerial suspension caused by cars traveling on the unpaved roadway, or tracking dirt onto adjacent dirt streets. Unpaved streets can prevent efficient storm water drainage, contribute to neighborhood deterioration, and increase traffic hazards for vehicles, bicyclists, and pedestrians.

The City has implemented a strategy to address unpaved roads and City-owned vacant lots in order to comply with dust control rules established by the Environmental Protection Agency. The strategy includes stabilizing all unpaved roads, regardless of traffic volume, to increase efficiency and provide equity for residents in the area. By addressing all unpaved roads, the City is exceeding the federal requirements, which require roads to be treated based on a minimum number of vehicle trips per day.

The implementation is prioritized beginning with the highest volume streets in the areas of the city with the highest particulate pollution (PM-10) levels. During the reporting year, approximately 65 miles of streets were treated.

In addition to paving dirt streets, the City has implemented a program to stabilize all City-owned vacant lots and parking lots or other open areas. This program includes contract and administration services that include:

- A final property inventory
- A tracking/mapping system for ongoing maintenance
- Site inspections and soils testing
- Detailed bid specifications
- Stabilization supplies and services
- Pilot projects to evaluate options for longer-term stabilization with natural vegetation

During the reporting year, 300 vacant lots were inspected, of which, 36 required stabilization. Treatment options for these 36 lots included hydro-seeding, watering and compaction, chemical treatment, or rock overlay. In addition to the lot stabilization, berms were constructed on 48 lots, and barricades installed on 24 vacant lots.

The City is in the process of paving its all of its unpaved parking lots. By the end of Fiscal Year 1999/2000, the project will be completed and over 40 City-owned parking lots will have been paved.

BEST MANAGEMENT PRACTICE 23
Continue street sweeping programs that include streets in commercial/industrial and residential areas, and City-owned parking lots.

Street Transportation Department
The City maintains a fleet of 20 motor brooms to implement the street sweeping program. All areas of the City are included, but the schedule varies based on the type of street. Currently, the street sweeping schedule is as follows:

- Major and collector streets are swept once every 21 days
- Local streets and industrial/commercial streets are swept once every three months

The Street Transportation Department also has an Adopt-A-Street Program that was developed in response to public and corporate interest in improving the streetscape. While the program's main goal is street beautification, litter removal also has benefits for storm water runoff.

The program enables interested individuals or organizations to "adopt" a one-mile section of major or collector streets to care for and improve the landscaping on both sides of the street. In return, the City provides trash bags, contained trash pick-up and a road sign acknowledging the effort. Adopters are encouraged to schedule quarterly cleanups and recycle what they can.

TABLE 7-18

STREET CLEANING ACTIVITIES	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Total Miles of Streets	4,000	4,000
Total Miles of Streets Swept	39,711	50,733
Tons of Material Collected From Street Sweeping	20,137	19,010
New Miles of Streets Adopted Fiscal Year 1998/99	72	36
Miles of Streets Adopted as of June 30, 1999	619	655

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Street Transportation Department

The City has a long-established program to assure the proper maintenance of its drainage system. Program policies and procedures provide for

- Inspecting and cleaning all City-owned facilities and dedicated natural washes
- Inspecting natural washes not dedicated to the City

All citizen complaints regarding clogged or blocked drainage facilities are responded to and corrected within five working days of notification.

Structural controls, such as retention and detention basins, catch basins, and man-made drainage channels, are inspected monthly, and are cleaned at least once per month or more frequently if needed. Dedicated natural washes are also inspected monthly, but cleaning generally is provided twice during the year. The inspection and cleaning activities of all drainage facilities may be adjusted in response to citizen complaints.

In addition to the facilities and washes owned by or dedicated to the City, the program also addresses natural washes not dedicated to the City. These washes are inspected twice per year, and adjacent property owners are notified to clean as needed.

TABLE 7-19

STORM SEWER SYSTEM MAINTENANCE ACTIVITIES	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Street Transportation Department		
Acres of Retention / Detention Basins Cleaned	330	552
Number of Catch Basins Cleaned	51,462	49,047
Miles of Drainage Channels and Washes Cleaned	454	635
Miles of New Storm Sewers Constructed	4.5	1.5

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BEST MANAGEMENT PRACTICE 25

Educate City employees and high volume users regarding the proper use and proper management of fertilizers, pesticides, herbicides, and other potentially harmful chemicals through the use of brochures, pamphlets, and other documents or methods acceptable to the City.

Office of Environmental Programs, Personnel Department, Miscellaneous Departments

Storm water impacts resulting from the use of pesticides, including insecticides, herbicides, and fertilizers, are included in the technical assistance and educational activities performed by the Pollution Prevention (P2) Program and the Personnel Safety Section of the Personnel Department. Particular attention is given to these chemicals during facility assessments, technical assistance, and training sessions that are performed by City operations that use harmful chemicals. They also are addressed in the material safety data sheet (MSDS) inventory and review process. Brochures and informational pamphlets that are distributed by the P2 Program contain storm water best management practices for all types of hazardous materials, including pesticides.

In 1996, the City modified its commodities purchasing policy to encourage the purchase of non-hazardous or less hazardous materials by evaluating environmental performance criteria, requiring vendors to recover used empty containers, and providing product use training to staff. The Parks, Recreation and Library Department (PRLD), for example, has implemented this policy by purchasing pesticides based on criteria that consider the safety of the applicator, the public, and the environment. PRLD does not purchase products with cholinesterase inhibitors, nor does the department purchase products that require restricted access to areas of application.

The City requires that all employees who apply pesticides in the course of their work be certified through the Structural Pest Control Commission (SPCC) and be registered with that agency. For many of the City's employees who apply pesticides, this is beyond the requirements of the SPCC regulations. Those regulations state that employees of a city or town who apply pesticides only as incidental to their work and who use pesticides other than those in Toxicity Category I do not have to be certified or licensed.

All City employees who are certified to apply pesticides attend at least six hours of continuing education (CEU) annually. These CEU programs are provided at no cost to the employee, and are approved by the SPCC. The classes are tailored to the specific need of the certified employee to ensure that they have the requisite hours.

The Personnel Department's Safety Section prepares employees for the Structural Pest Control Commission test through the Pesticide Application Training Program. The Training Program includes a slide presentation that emphasizes that chemicals and pesticides should not be released into the storm drain system.

At this time, approximately 200 City employees are certified and registered with the SPCC to apply pesticides. Many employees hold Weed Control or General Pest certifications, some have both and some also have Turf and Ornamental certifications.

The City has developed a number of brochures that cover best management practices for the proper use and management of a number of potentially harmful chemicals, including pesticides, herbicides, and fertilizers. These brochures are available to the public as well as staff. A number of presentations are made annually by qualified environmental and safety personnel to staff who use pesticides to help ensure general knowledge of proper chemical management procedures. These training programs emphasize the importance of eliminating the direct discharge of pesticides to the storm drain system.

Street Transportation Department

The Street Transportation Department has an Integrated Pest Management (IPM) program for maintaining 40 linear miles (or 200acres) of frontage roads and areas adjacent to urban freeway facilities. The IPM program consists of the following components

- Planting native vegetation that is low in water use and is naturally resistant to pests
- Hand weeding
- Selective use of various pesticides, which are applied by a contractor
- Bees found in irrigation valve boxes are managed with soap and water

The Street Transportation Department has veto power over the chemicals used by the contractor and also must approve the contractor's application schedule. Chemicals that have an active life of greater than four months are not used. In addition, the Department stopped using soil sterilizers under roadbeds in 1989.

TABLE 7-20

PESTICIDE MANAGEMENT	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Personnel Department		
Approximate Number of Employees Registered with the Structural Pest Control Commission as of June 30, 1998	200	250
Employees Receiving Pesticide Applicators Training	122	250

BEST MANAGEMENT PRACTICE 26

Educate City personnel responsible for channel maintenance and implement alternative methods for controlling insects and weeds through internal workshops, guidance documents, and other methods acceptable to the City.

Office of Environmental Programs

The Pollution Prevention (P2) Program assesses facilities that use herbicides, pesticides, and fertilizers. Through the process of analyzing specific tasks performed by groundskeepers, landscapers, and maintenance personnel, the P2 Team is able to identify alternative products to these hazardous materials that can be used in some instances. This, in turn, moves the City toward its goal of preventing pollution at the source.

Street Transportation Department

The Street Transportation Department has an Integrated Pest Management (IPM) program for maintaining 40 linear miles (or 200 acres) of frontage roads and areas adjacent to urban freeway facilities. Please see BMP 25 for additional information.

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BEST MANAGEMENT PRACTICE 27

Develop and implement a program that provides a means of recording the observations of personnel who inspect and maintain the City's storm drain system.

Street Transportation Department

On January 1, 1988, the Street Transportation Department implemented a Request for Service (RFS) System to record the observations of personnel who inspect and maintain the storm drain system. Some typical examples of service requests include cleaning streets, catch basins, and outfalls; and responding to spills or illegal dumps in the roadway. Requests come from both residents and staff.

All requests for service are logged into a computer system. The information is sent to the appropriate service center where it is assigned to staff. The location and responsible party for each service request are included in the system, as well as a description of the work completed. The case is closed once the problem has been resolved. The RFS system provides a convenient mechanism for tracking cases, and also provides access to historical data, which may be used to trace project histories and note trends.

Inspection personnel use computers, digital cameras, specially equipped vans, and computer applications to inspect and maintain the storm drain system. Inspectors use laptop computers and digital cameras to simplify and improve field observation notes and provide visual records that can easily be transferred to computer databases and centralized digital tracking systems.

Photo 7-8: Sewer Rover

The City owns and operates a large van with a remote control video camera and video recorder. The specially built camera is mounted to a small tractor equipped with lights that can be lowered into storm sewers. The tractor can be directed from the van's command center up to distances of 1,200 feet. Nicknamed the "Sewer Rover," the tractor, lights, and camera are completely submersible, so they can be used in and under water. This tool assists field personnel in their efforts to document observations by creating permanent visual records of the condition of storm sewers and drainage facilities, particularly areas that may be too hazardous or difficult to access through other means. The combination of these efforts provides the ability to properly record and document the observations of field personnel and contribute to the storm drain system maintenance program.

Photo 7-9: Storm Water Management Van

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BEST MANAGEMENT PRACTICE 28

Implement City ordinances that provide the legal authority to prohibit new direct connections from roof drains directly to storm drains or drainage channels.

Development Services Department

Retention areas for buildings are required to account for drainage collected from the structure's roof drains. When the Development Services Department reviews site plans, staff ensures that the site retention area is adequate to maintain runoff resulting from roof drains. If inspectors find that the plans are not being followed, they may stop work on the project. If the problem continues, staff may request court-ordered injunctions or civil penalties.

BEST MANAGEMENT PRACTICE 29

Continue to educate regarding the need to minimize both the total volume of runoff and the peak rate of runoff that roof drains contribute directly to storm drains and drainage channels.

Development Services Department

Staff from the Development Services Department (DSD) attend monthly focus groups with engineers to discuss many issues, including the need to minimize the total volume of runoff and the peak rate of runoff from roof drains. In addition, DSD staff participate as guest speakers at professional organization meetings, such as the American Society of Plumbing Engineers and the Arizona Chapter of the National Society of Professional Engineers.

Education and outreach also are key components of new policy development or code interpretation. New policies and code interpretations are preceded by outreach to professionals in the community.

BEST MANAGEMENT PRACTICE 30

Continue to implement City ordinances that provide the legal authority to require site drainage designs and systems that minimize the total volume of runoff and the peak rate of runoff.

Development Services Department

Chapter 32A of the Phoenix City Code is the Grading and Drainage Ordinance. It establishes minimum requirements for regulating grading and drainage so as to safeguard life, limb, property, and the public welfare. It also establishes implementation and enforcement procedures. The Development Services Department (DSD), Project Management Division Field Inspection Team, which consists of 30 full-time staff, is responsible for implementing, managing, and enforcing the Ordinance.

A grading and drainage permit is required for anyone seeking a building permit for work in or over any natural watercourse, drainage way, canyon, arroyo, or other potential flood hazard. A grading and drainage permit also is required for anyone seeking a building permit for construction in special flood hazard areas, as delineated by the Federal Emergency Management Agency. Finally, a grading and drainage permit is required for anyone seeking a building permit for grading work, such as filling and excavating. Exceptions to these requirements include: excavation and soil depositions within properties dedicated or used for cemetery purposes; minor excavations; selected mining and quarrying activities; sanitary landfills regulated by Maricopa County; and grading activities in private easements by public utilities that do not obstruct a natural water course. All required grading and drainage permits must be obtained prior to issuance of a building permit for the site.

The grading and drainage permit process is fully integrated with DSD's Development Review Process. The Development Review Process promotes orderly development within the city, and ensures compliance with established City codes and ordinances. New development and significant redevelopment is subject to the Development Review Process.

To obtain a grading and drainage permit, applicants must submit the appropriate application form for each site for which a building permit is desired. The application must identify and describe the work to be covered by the permit. It must also describe the land and its location, indicate the intended use of the property, provide the location of any areas where excavated materials will be deposited, and be accompanied by plans, specifications, and a soil report prepared and signed by an engineer licensed by the State of Arizona. A storm water management plan must also accompany the application, if required by a federally issued NPDES storm water permit for construction sites.

The grading and drainage permit terms and conditions include general requirements that limit the authorization to only that work described in the permit or on the approved plans and specifications. The permit holder also is responsible for securing all other required permits, either by the City or by other agencies. Approved work must be completed within the time frames specified in the permit; or, if unspecified, within 180 days of the date the permit is issued.

All persons performing any grading must put into effect all necessary safety precautions, and provide adequate erosion control and storm water management including, but not limited to anti-erosion and/or drainage devices, debris basins, and any other required devices. The grading and drainage permit is revocable if the person or owner obtaining the permit fails to implement required elements, or fails to make needed revisions or corrections within specified time frames when requested to do so by the City.

In addition to revocation, the City can also deny grading and drainage permits. If the proposed construction area is subject to geological or flood hazards to the extent that proposed corrective measures will not eliminate or sufficiently reduce the hazard, then the permit can be denied. The permit can also be denied if the proposed work will endanger private property, result in deposition of debris on any public right of way, or seriously interfere with any existing drainage way.

The Grading and Drainage Ordinance includes design standards for grading and drainage activities. Standards have been established for cuts, fills, and setbacks. Established drainage design standards include requirements for protecting existing drainage courses and facilities from flooding and damage, providing appropriate storm water disposal, preventing erosion, and providing proper drainage for terraces. Standards have also been developed for designing on-site retention and detention facilities, and identifying when these facilities are required. Hillside lots and mountain preserve lots that are subject to the City's Subdivision Ordinance (Phoenix City Code, Chapter 32) must meet special design standards for their grading and drainage activities.

TABLE 7-21

SITE DRAINAGE CONTROLS	FISCAL YEAR 1997/98	FISCAL YEAR 1998/99
Development Services Department		
Grading and Drainage Permits Issued	768	622
Grading and Drainage Inspections Performed	13,829	11,287
Storm Water Management Permits Issued	134	138
Construction Site Inspections Performed	2,766	2,483

Each of the activities regulated by the Grading and Drainage Ordinance are subject to inspection by the City. Appropriate enforcement is pursued for failure to comply with requirements. Enforcement steps begin with a verbal warning, which, if not heeded, can lead to a written warning, a civil citation with associated fees ranging from $500 to $2500, and finally criminal enforcement. The DSD Director has full authority to ensure compliance with all aspects of the Ordinance. Building permits and occupancy permits are not issued until all requirements of the Grading and Drainage Ordinance have been satisfied and the work is completed as approved by the City.

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BEST MANAGEMENT PRACTICE 31

Continue to implement City ordinances that require new commercial, industrial, institutional, and major multi-family residential building complexes to have drainage facilities that incorporate on-site retention and/or filtration to ensure that neither the total volume of runoff nor the peak rate of runoff exceed pre-project conditions.

Development Services Department

Section 32A-24 of the Grading and Drainage Ordinance (Phoenix City Code, Chapter 32A) requires on-site retention for all developments equal to or exceeding 0.5 acres in size. If not part of a master drainage plan, individual lots less than one-half of an acre are reviewed on a case-by-case basis to determine if retention is required.

On-site storm water retention areas shall be adequate to contain the volume of water required by the latest edition of the *Subdivision Grading and Drainage Manual*, published by the Street Transportation Department (the current standard is a 100-year, 2-hour duration storm). The tributary area used in the computation shall be the area of the site to be developed. The method of calculating the volume of water shall be in accordance with the standards established in the *City of Phoenix Storm Drain Design Manual*. No development is allowed to increase the 100-year, two-hour duration peak runoff, change the time of the peak, or increase the total runoff from its predevelopment values.

Depending on the type of development and its zoning, multi-lot developments have the option of providing required retention through either on-lot or common area facilities. Multi-lot industrial subdivisions may provide either common or on-lot retention. Multi-family developments, such as townhomes and condominiums, are required to provide common retention facilities. Multi-family residential subdivisions and average-lot subdivisions are also required to provide common retention areas if they are in the following zoning districts:

TABLE 7-22
ZONING DISTRICTS REQUIRING COMMON RETENTION AREAS

Zoning District	Dwelling Units per Acre
R-2	10
R-3	14.5
R-3A	22
R-4	29
R-5	43.5
R1-6	5.3

Other multi-lot developments can provide on-lot retention if the area of coverage by impervious materials is less than 45 percent of the lot. Development zoned as "Planned Community Development" shall provide common retention facilities that serve more than one parcel, whenever possible.

When a multi-lot residential development is required to provide a common retention area, the facility must be appropriately located to intercept at least 50 percent of the runoff from the entire development. The remaining lots with runoff not intercepted by the common retention facility shall have on-lot retention. A homeowners' association must be formed to ensure maintenance of the common retention area, and the City must approve a landscaping plan for the common retention area before a grading and drainage permit is issued.

In cases where City Master Plans designate areas as potential public spaces or proposed amenities suitable for joint use retention, such as common open spaces, scenic corridors, parks, etc., the developer may provide a common retention facility. The City must agree to maintain the facility, and the facility must be constructed in accordance with the standards of the Parks, Recreation, and Library Department. When completed, the facility must be dedicated to the City.

In designated infill areas that have storm drainage facilities installed in adjacent streets, retention facilities can be sized to address the runoff from a 10-year, 2-hour duration storm event. This only is allowed, however, if the area to be developed does not exceed five acres. Developments exceeding five acres must follow the 100-year, two-hour duration peak runoff standard.

Where possible, shallow ponding areas, such as ditched or bermed yards and/or open areas should provide the required storage volume. Retention facilities that have a depth greater than three feet must receive special approval from the City Engineer. The retention volume must be fully provided on private property, and not intrude onto public right-of-way. These retention areas must be appropriately designed to drain within 36 hours of the storm event. Approved methods for draining include infiltration, controlled bleed off, dry well, and pumping. Dry wells, when used, must be designed and constructed in accordance with all regulatory requirements, and must be registered with the Arizona Department of Environmental Quality.

All developments must be designed to drain to the adjacent streets once the on-site retention facilities are filled. In the event this criterion cannot be met, the final grades must be adjusted to allow runoff to pond within one inch of the proposed finished floor elevation before outfalling storm water from the site.

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BEST MANAGEMENT PRACTICE 32

Implement City storm water ordinance, which requires all construction storm water management plans to explicitly address the topics of erosion potential, proposed erosion and sediment control plans, proposed inspection programs, related environmental impacts, and unforeseeable mitigation measures to minimize environmental impacts.

Development Services Department

The Phoenix City Code, Chapter 32C, is the Storm Water Management Ordinance. The City has the legal authority to regulate grading, paving, maintenance, and operation of public rights-of-way and public storm drain systems. The goal is to reduce, to the maximum extent practicable, the addition of pollutants to storm water such that they may contribute to violations of water quality standards, conditions of the City's storm water NPDES permit, or other acts that may result in damage to the public storm drain system. The City may regulate the use of the public storm drain system through administrative rules, permits, and other written forms of approval for activities that could release pollutants or storm water to a public storm drain system.

Anyone seeking authorization to perform construction activities that could affect storm water must prepare a detailed written storm water management plan for the management of the volume, velocity, and quality of storm water to be discharged off site during the construction process. The plan must include provisions for providing, installing, maintaining, removing, and disposing of erosion control measures. Control measures can include filter berms, dikes, catch basin inlet protection, end-of-pipe filtering devices, silt fences, dams, sediment basins, netting, straw bale barriers, and slope drains.

Construction site storm water management plans must provide practicable measures for managing litter and waste materials generated during the construction process. Management measures must also be provided for solvents, detergents, fuels, and hazardous substances that are used and/or stored at the construction site to help ensure that these materials are not exposed to direct contact with storm water. Finally, storm water management plans must provide appropriate practices to ensure that erosion and pollution control devices and measures are maintained and functional.

Chapter 32C requires the construction site operator to conduct inspections to determine if their best management practices (BMPs) are effectively controlling site runoff. Inspections revealing problems with the BMPs must note the problems and proposed remedies. Inspectors from the Development Services Department review the storm water management plan to ensure that it is in compliance with Chapter 32C and conduct site visits to determine if the plan's elements are being implemented.

Photo 7-10 Silt Screen

Photo 7-11: Straw Bales

Photos 7-10 and 7-11: Examples of Successful Best Management Practices

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BEST MANAGEMENT PRACTICE 33

Implement a program to educate architects, design engineers, and contractors about the need for, and practical methods for, erosion control, sediment control, dry wells, and site waste.

Development Services Department

The Development Services Department (DSD) meets monthly to discuss and review policies, proposed changes to DSD procedures and requirements, implementation of new requirements, and other related issues. Representative groups attending these monthly meetings include architects, engineers, design groups, development companies, other municipalities, public utility companies, contractors, realtors, and private citizens.

This forum was used to educate homebuilders, engineers, and architects about the City's requirements for storm water management plans and permits. These meetings were held from February 1996 until October 1996, when the permit requirements were implemented.

Other Departments

In addition to DSD's monthly meetings, staff from DSD and other departments, including Engineering and Architectural Services (EAS) and Street Transportation, deliver presentations to staff and the public. During Fiscal Year 1998/99, DSD presented a seminar titled "Avoiding common Plan Review Pitfalls."

Interdepartmental coordination also is a critical component of the Storm Water Management Program. Staff from EAS have held briefings on NPDES requirements for all City departments, and also have had more focused presentations for project managers in the Street Transportation Department, DSD, and EAS.

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BEST MANAGEMENT PRACTICE 34

Develop procedures to implement erosion and sediment control policies contained in the existing storm water ordinance and in the Grading and Drainage Ordinance once it has been revised.

Development Services Department

This BMP was submitted to the Environmental Protection Agency in November, 1992. At that time, the Grading and Drainage Ordinance was in the process of being revised. The storm water elements of the Grading and Drainage Ordinance were finalized in 1993. Policies and procedures for implementing those elements were developed from 1993 through 1996.

In October 1996, The Development Services Department (DSD) implemented a permitting process to help assure compliance with the storm water management section of the Grading and Drainage Ordinance. The permit process requires applicants to provide a storm water management plan (SWMP) for consideration during the first review of the grading and drainage plan. The SWMP must be prepared by a civil engineer and the applicant must pay appropriate review and permit fees. The applicant also must submit a copy of their federal Notice of Intent (NOI) for all planned developments over five acres, or that are part of an overall storm water management plan. Upon City approval of the SWMP, a storm water management permit is issued. This permit is a separate document from the Grading and Drainage Permit, and will remain in effect until the construction site has undergone final stabilization. Certificates of Occupancy are not issued until all elements of the SWMP have been met.

DSD distributes a checklist to help civil engineers prepare the storm water management plan. DSD plan reviewers also use this checklist in their approval process. The list helps to reduce the number of revisions that are needed to obtain adequate plans, and it helps to provide a measure of consistency among reviewers.

Additional information and guidance on preparing appropriate storm water management plans is available from the Flood Control District of Maricopa County publication, *Drainage Design Manual for Maricopa County, Volume III, Erosion Control*. Published in 1993, this manual addresses technical and administrative questions regarding compliance with the Environmental Protection Agency's requirements and procedures for the NPDES General Permit for storm water discharges from construction sites. The manual uses the General Permit requirements for the NOI and Storm Water Pollution Prevention Plans (SWPPP), and provides examples of structural controls, references, and forms that are appropriate for the climate, soils, and construction practices of Maricopa County.

The City-issued storm water management permit specifically requires that the operator of the construction site implement the SWMP before beginning construction activities. The operator must perform inspections once per month and within 24 hours of rainfall equal to or greater than one-half of an inch. The operator shall prepare reports documenting inspection findings and problem areas. Copies of the reports prepared after a rainfall

equal to or greater than one-half of an inch must be submitted to DSD for review and approval.

Facilities shall be maintained as necessary to ensure continued functioning of storm water controls. In addition, all temporary controls shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed, permanent drainage controls and facilities are operational, and the potential for construction-related erosion has passed. Finally, the operator shall amend the SWMP as necessary throughout construction to resolve any problem areas that become evident during construction and/or during rainfall events.

DSD construction inspectors perform periodic inspections of the permitted activities to ensure that the operator is complying with requirements. The operator is required to maintain the SWMP on the construction site, and have it available for review by DSD inspection staff. Inspectors work with site operators to correct noted deficiencies.

BEST MANAGEMENT PRACTICE 35

Implement City ordinances that require landowners or tenants to provide covers and other devices that keep rain off areas that contain contaminants, and keep runoff from draining through areas that contain contaminants.

Fire Department

The City has adopted the 1997 Uniform Fire Code, with amendments. Section 7901.8 of the Code requires that liquid and solid hazardous waste be stored such that spills or drain-off spillage be controlled and contained. Floors must be constructed to provide a liquid-tight raised sill at least four inches high. Drainage must divert any flow of liquids to an approved location.

Street Transportation Department

If, during an inspection Development Services Department staff discover that inappropriate contaminant storage could negatively impact storm water runoff, the inspector can require corrective actions. If the facility failed to comply, enforcement actions would be initiated. See BMP 8 or Chapter 8 for more information on inspections or enforcement activities.

BEST MANAGEMENT PRACTICE 36

Educate the public regarding ways to reduce the potential for rainfall and runoff to contact potential contaminants. Describe typical examples of the problem and practical solutions.

Street Transportation Department

The Street Transportation Department has prepared a series of Best Management Practices (BMPs) to help various industries prevent storm water contamination. During industrial inspections, Street Transportation staff use these BMPs to educate plant managers on the potential for rainfall and runoff to contact contaminants. The BMPs describe typical examples of practical methods to prevent storm water contamination. These BMPs include:

- Asphalt and lubricant manufacturers
- Automotive repairs and maintenance facilities
- Automotive salvage yards
- Boat builders and repairers
- Carpet, building and food-related mobile cleaning businesses
- Chemical manufacturers
- Electrical, photographic and optical manufacturers
- Equipment maintenance yards
- Fabricated metal products industries
- Food processors
- Furniture and fixture manufacturers
- Glass, clay, cement, concrete and gypsum manufacturers
- Hazardous waste facilities
- Liquid waste recyclers
- Transportation equipment and industrial or commercial machinery manufacturers
- Paper processors
- Plant and tree nurseries
- Primary metals facilities
- Printers and publishers
- Rubber, plastic and other product manufacturers
- Solid waste recyclers
- Vehicle and equipment maintenance facilities
- Vehicle and equipment mobile cleaners
- "Are You Environmentally Correct?" - A homeowner's guide to chemical use
- Solutions to Pollution – Construction Industry Tips

Please refer to Appendix A for a sample of these BMPs.

♦♦♦

Chapter 8

Summary of Enforcement Actions

SUMMARY OF ENFORCEMENT ACTIONS

Street Transportation Department

The City has an Enforcement Response Plan (ERP) and Storm Water Civil Penalty Policy (SCPP) to assist in obtaining compliance with the Phoenix City Code, Chapter 32C (Storm Water Management Ordinance). The goal of these documents is two-fold:

- To provide a simple enforcement response plan that is easy to understand and can be applied fairly and uniformly
- To guide violators into compliance through education and warnings

Monetary penalties are sought if the education and warnings fail to achieve compliance and escalated enforcement action becomes necessary.

The ERP provides a sequence of actions to be followed by staff in the event that a violation of Chapter 32C is found. The initial response is informal and consists of a written notification to the facility owner or operator, such as a warning letter or inspection report, that identifies the violation and corrective measures. This type of informal action generally follows a phone call or an on-site visit and discussion with the owner, operator, or manager of the facility. In most situations, this informal enforcement action is successful in obtaining compliance.

If these actions fail to obtain the desired result, a Notice of Violation (NOV) is issued to the violator. The NOV describes the violation and provides a completion date for all corrective measures. If all elements of the NOV are met and compliance with Chapter 32C is achieved, a closure letter is sent to the violator.

Where informal actions fail to elicit compliance, formal enforcement is initiated. The violator is ordered to show cause as to why the City should not pursue legal action. Ideally, this results in a negotiated settlement, perhaps with civil penalties to resolve the situation. This is documented in a settlement agreement.

Administrative Orders are legal documents prepared by the City Attorney's Office that require the recipient to comply with specific regulations or ordinances, take specific corrective actions, perform monitoring and analysis, or address the threat of harm to human health or the environment. The order may require immediate compliance or may establish a timetable to be followed in achieving compliance. Administrative Orders generally are used to place a facility on an enforceable compliance schedule.

While local governments in Arizona do not have administrative penalty authority, the City may seek civil and criminal penalties in a court of law. The maximum civil penalty the City can seek is $2,500 per day for each violation, each day of continuing violation constituting a separate civil offense.

Procedures for calculating civil penalties are contained in the SCPP. Used in conjunction with escalated enforcement actions, the SCPP assists efforts to calculate civil penalties

that reflect the seriousness, frequency, and persistence of each violation, while also deterring the violator from future violations and sending a general message of deterrence to the community. It is important to remove the economic benefit that may be gained through non-compliance and to encourage full compliance with the requirements, while also being fair and equitable.

Development Services Department

The Development Services Department (DSD) reviews storm water management plans (SWMPs), performs inspections and investigations, and maintains records and compliance documents. DSD incorporates SWMP requirements into permitting activities. This provides DSD with the opportunity to withhold or revoke permits at construction sites that fail to comply with the requirements of the Phoenix City Code. Table 8-1 summarizes the enforcement activities performed during the last two reporting years.

TABLE 8-1

SUMMARY OF ENFORCEMENT ACTIVITIES

Enforcement Action	Fiscal Year 1997/98	Fiscal Year 1998/99	Comments
Street Transportation Department			
Illicit Discharge and Illegal Dumping Inspections	118	92	Includes inspections of facilities subject to Section 313 of Title III of the Superfund Amendments and Reauthorization Act, and other industrial and complaint-based inspections.
Illicit Discharge Complaints	178	122	Reflects calls to the Storm Water Hotline and includes storm water-related complaints and requests for information.
Major Outfalls Inspected	57	73	Field Screening activities
Warning Letters Issued	6	7	Identifies a facility's violations and provide recommendations for corrective action.
Notices of Violation Issued	3	0	Describes the violation and provides a completion date for corrective measures.

TABLE 8-1 (continued)

SUMMARY OF ENFORCEMENT ACTIVITIES

Enforcement Action	Fiscal Year 1997/98	Fiscal Year 1998/99	Comments
Development Services Department			
Storm Water Permits Issued	134	138	Granted after an approved storm water management plan has been submitted.
Storm Water Inspections at Construction Sites	2,766	2,483	Includes multiple inspections at all permitted sites

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Chapter 9

Summary of Public Education Programs

SUMMARY OF PUBLIC EDUCATION PROGRAMS

As described in Chapter 7, the City has numerous public education programs regarding storm water runoff. Many of the Best Management Practices (BMPs) describe in detail education programs and materials delivered to the public, businesses, and City staff. Some examples of education programs implemented by the City include:

Development Services Department (DSD)

- DSD meets monthly with architects, design engineers, and contractors about policies, proposed changes to procedures and requirements, implementation of new requirements, and other related issues. - *BMP 33*

- DSD distributes a checklist to help civil engineers responsible for preparing storm water management plans. The checklist provides information that can be used to guide plan development, allowing for fewer revisions. The checklist also establishes a measure of consistency among reviewers. - *BMP 34*

Engineering and Architectural Services Department (EASD)

- EASD staff participate in conferences and seminars to educate various audiences about the City of Phoenix's efforts to control storm water runoff. - *BMP 33*

Fire Department

- Part of the Fire Department's efforts to minimize the hazards and impacts associated with spills and leaks of gasoline, fuel oil, and chemicals include distributing information to businesses on proper installation and maintenance for underground storage tanks. - *BMP 14*

Office of Environmental Programs (OEP)

- OEP implements the Pollution Prevention (P2) program for City employees to promote the practice of reducing hazardous materials in City operations, enhance the City's approach to environmental management, and provide ongoing technical assistance. A few of the P2 Program's education and outreach efforts include monthly newsletters, posters and flyers, and an annual celebration of National Pollution Prevention Week. - *BMP 10*

- In addition to the training programs established as part of the City's P2 efforts, OEP also provides training through a creative concept called P2 University ("P2 U"). P2 U is an incentive-based training program intended to help complement training by the Personnel Safety Section of the Personnel Department. - *BMP 10*

Personnel Department

- The Safety Section of the Personnel Department distributes to all City operations procedures for hazardous chemical use and storage, including a written program, chemical inventories, material safety data sheets, container labeling and employee training. - *BMP 14*

- The Safety Section administers a Pesticide Application Training Program to prepare employees to take the Certified Applicators Test, issued by the Arizona Structural Pest Control Commission. - *BMP 25*

Public Works Department

- The Public Works Department educates the public on proper solid waste disposal practices via the Internet, flyers, or articles in the City Page of local newspapers or in the water bills. In addition, the City sponsors activities undertaken by Phoenix Clean and Beautiful, a non-profit organization that promotes responsible solid waste disposal practices. - *BMP 3*

- The BOPA (battery, oil, paint and antifreeze) collection days remind Phoenix residents that hazardous wastes must be disposed of properly. Residents also gain a greater understanding of what types of materials are hazardous and require special disposal. - *BMP 6*

- Placards at fueling stations inform employees about steps to take should a spill occur. Also, Public Works employees stationed at the City's fueling facilities routinely are provided with training in the Spill Prevention, Countermeasures, and Containment plan activities, responsibilities, and requirements. - *BMP 14*

- The public is made aware of the need to cleanup and properly dispose of pet wastes, in part through the distribution of warning notices placed on doorknobs at facilities where improper animal waste disposal is occurring. - *BMP 16*

- Signs and degradable pet waste disposal bags are placed at parks where pet waste is an issue. – *BMP 17*

- The Public Works Departments is responsible for making City employees aware of opportunities to reduce automotive use. The Rideshare Program and Trip Reduction Plan have been developed to reduce single-occupancy vehicle miles and/or trips to targeted employer sites. Departmental Rideshare Coordinators distribute written information to staff on carpool opportunities, bus schedules, and other rideshare programs. - *BMP 18*

Parks, Recreation and Library Department (PRLD)

- PRLD provides community outreach programs that contribute to Phoenix residents' knowledge about the balance of storm water within the greater desert ecosystem. Included in the Department's education efforts are the Urban Forestry and Living Tree Celebration programs. - *BMP 5*

Street Transportation Department

- The Street Transportation Department implements various activities aimed at educating the public on problems associated with illicit discharges to the storm sewer. The education component of the Illicit Discharge Identification and Elimination Program involves written materials, workshops, and a hotline for reporting illegal dumping. - *BMP 8*

- The Street Transportation Department installs Pollution Awareness Markers at storm drain inlets. Staff distributes public outreach materials, including games, coloring books, pencils, and magnets, at public events and speaking engagements. - *BMP 11*

- A series of Best Management Practice information sheets are distributed to educate targeted industries about ways to reduce the potential for rainfall and runoff to contact potential contaminants. The flyers provide business owners with typical problems and practical solutions associated with storm water. - *BMP 36*

Water Services Department

- The Water Services Department implements a Pollution Prevention (P2) Program directed at industrial and commercial facilities located in Phoenix. Program materials include an interactive "Pollution Prevention Pays" game, brochures, posters, P2 promotional items and graphics that can be used in a variety of settings and forums. The graphics feature real Phoenix facilities that have implemented P2 measures and its benefits. During calendar year 1998, the Water Services P2 Industrial Program was presented at the Annual IPP Achievement Recognition Awards Ceremony, to the Arizona Restaurant Association, and the Chinese Restaurant Association Board Meeting. - *BMP 14*

This is only a summary of the education and outreach activities described throughout Chapter 7. The City has an extensive and far-reaching focus on education. Efforts to enhance the education component of the Storm Water Management Program will continue.

Chapter 10

Annual Expenditures for Fiscal Year 1998/99 and Estimated Expenditures for Fiscal Year 1999/2000

ANNUAL EXPENDITURES FOR FISCAL YEARS 1998/99 AND 1999/2000

The City implements many programs that directly and indirectly impact the quality of storm water runoff. These programs are housed in various departments and are further broken down into different divisions and sections within each department.

Table 10-1 provides the budget for new activities implemented as a result of NPDES permit requirements. Table 10-2 reflects budgets of departments, divisions, sections, and/or programs that in some way impact the quality of storm water runoff; though the program may have been established to meet a more immediate need. For example, the Public Works Department, Solid Waste Field Services Division, is responsible for collecting solid waste throughout the City. The Division's budget was established primarily for the purposes of solid waste collection; however, removing solid waste and ensuring its proper disposal prevents debris from entering the storm sewer system.

TABLE 10-1

STORM WATER MANAGEMENT PROGRAM
DIRECT IMPACT BUDGET

Program/Activity	Actual Fiscal Year 1997/98	Actual Fiscal Year 1998/99	Estimated Fiscal Year 1999/2000	Associated BMP(s)
Development Services Department				
Infrastructure Review - Plan Review	$ 242,562	$ 247,000	$ 254,000	28, 29, 30, 31, 32, 33, 34, 35
Infrastructure Review - Inspections	$ 551,344	$ 565,000	$ 581,000	28, 29, 30, 31, 32, 33, 34, 35
Engineering and Architectural Services Department				
NPDES Administration	$ 449,398	$ 414,326	$ 508,966	1, 33
Street Transportation Department				
Storm Water Management Section	$ 429,586	$ 480,169	$ 509,943	1, 7, 8, 11, 13, 14, 27, 36
TOTAL	**$ 1,672,890**	**$ 1,706,495**	**$ 1,853,909**	

TABLE 10-2

STORM WATER MANAGEMENT PROGRAM
COMPREHENSIVE ANNUAL BUDGET

Program/Activity	Actual Fiscal Year 1997/98	Actual Fiscal Year 1998/99	Estimated Fiscal Year 1999/2000	Associated BMP(s)
Development Services Department				
Infrastructure Review - Plan Review	$ 1,386,067	$ 1,982,331	$ 2,168,000	28, 29, 30, 31, 32, 33, 34, 35
Infrastructure Review - Inspections	$ 3,150,535	$ 2,187,590	$ 2,352,533	28, 29, 30, 31, 32, 33, 34, 35
Engineering and Architectural Services Department				
NPDES Administration	$ 449,398	$ 414,326	$ 508,966	1, 33
Fire Department				
Hazardous Materials Response	$ 191,000	$ 451,000	$ 492,260	9
Underground Storage Tank Regulation	$ 25,000	$ 25,000	$ 50,000	14, 15
Office of Environmental Programs				
Pollution Prevention Program	$ 332,200	$ 349,790	$ 513,533	10, 14, 25, 26
Parks, Recreation and Library Department				
Urban Forestry and Living Tree Programs	$ 55,626	$ 66,000	$ 75,000	5
Pesticide Application, Training and Disposal	$ 17,077	$ 16,274	$ 22,725	25
Personnel Department				
Illegal Dumping Cleanup	$ 182,844	$ 102,000	$ 100,000	9
Public Works Department				
Administrative Services Division	$ 3,129,840	$ 4,702,566	$ 4,608,585	10, 18
Equipment Management Division	$ 30,272,287	$ 30,099,044	$ 33,458,356	14, 15, 19, 20
Solid Waste Field Services	$ 43,211,226	$ 47,163,704	$ 51,748,436	2, 3, 4, 5, 6
Solid Waste Disposal	$ 10,419,556	$ 11,031,884	$ 10,524,620	2, 6
Solid Waste Recycling*	$ 1,174,578	$ 2,641,848	$ 5,994,482	2, 6
Street Transportation Department				
Storm Water Management Section	$ 429,586	$ 480,169	$ 509,943	1, 7, 8, 11, 13, 14, 27, 36
Adopt-A-Street Program	$ 25,080	$ 25,550	$ 26,217	23
Bikeway System	$ 367,797	$ 1,183,438**	$ 338,394	18
Street Maintenance	$ 38,990,773	$ 40,958,198	$ 45,051,598	21, 23, 24
Improvement District	$ 1,418,769	$ 4,270,467	$ 5,406,296	22
Water Services Department				
Industrial Pretreatment Program***	$ 2,305,462	$ 2,808,733	$ 2,878,950	14
Wastewater Collection Division	$ 10,175,000	$ 11,730,350	$ 12,289,834	7
TOTAL	**$ 146,535,123**	**$ 162,290,262**	**$ 179,118,728**	

*Reflects program/activity not included in the 1997/98 report
**The significant increase reflects a federal grant awarded to the bikeway program.
***Calendar Year 1997 and 1998, respectively

Appendix A

• PHOENIX RESIDENTS ONLY •

FREE

"BOPA" COLLECTION EVENT

Deer Valley Park
19601 N. 19th Ave.

Thursday-Saturday
March 4, 5, 6

8 a.m.-2 p.m.

- ✔ BATTERY
- ✔ OIL
- ✔ PAINT
- ✔ ANTI-FREEZE
- ✔ TIRES for a limited time

DO NOT BRING other types of household hazardous waste to this special limited event without prior approval. Call for guidelines. BOPA collection events will be held monthly at different city locations.

Commercial loads will NOT be accepted! Limit of 5 tires per resident.

Deer Valley Park
19601 N. 19th Ave.

FUTURE EVENTS

April 8-10	May 6-8
Pierce Park 2150 N. 46th St.	Palma Park 12th St. & Dunlap

For more information call
262-7251 or e-mail to
pwserve@ci.phoenix.az.us

City of Phoenix
Public Works Department

Be on your guard before you discard
BOPA and Tire Collection Event

A maximum of five (5) over the road tires per resident will be accepted.

No tractor or oversize tires will be allowed.

BOPA items include: Batteries, Oil, Paint, and Antifreeze. These items are being collected so as to keep them out of the City landfill and sewers, and to provide safe, environmental disposal or recycling.

When bringing BOPA items, please:

a) Seal items in their original container if at all possible, or CLEARLY label all items not in their original container.
b) Place items in a cardboard box. Wrap glass bottles in cloth or newspaper so they do not break during transportation.
c) Place the cardboard box in the trunk of your car or in the bed of your pickup truck. Please keep items away from passengers.
d) Follow directions once you reach the event site.
e) At the site, event staff will unload the BOPA materials from your vehicle (you will be asked to stay inside your vehicle).

What happens to all of the items collected?

a) Recycling companies will recycle the used motor oil, batteries, and antifreeze.
b) Useable paints will be bulked and reused or recycled.
c) Unusable materials will be disposed of properly.

Unacceptable materials:

a) Commercial waste.
b) Large quantities of residential wastes may not be accepted.
Please contact private disposal companies for proper and responsible disposal of commercial and large quantity wastes.
c) Non BOPA household hazardous wastes such as chemicals, insecticides, pesticides, cleaners, solvents, etc. will be accepted at this collection event, but only with prior approval. Call Solid Waste Field Services at 262-7251 for specific guidelines.

Special Needs Pickup Service: Call 262-7251 for information on special needs pickup service. *Call one week prior* to the event to schedule a special pickup. Special needs pickups will be scheduled on the Thursday and Friday of the collection events.

Proof of city residency will be requested.

Residents of other cities, call your local solid waste authority for information.

FOR MORE INFORMATION CALL 262-7251
or E-mail to pwserve@ci.phoenix.az.us

Programs for Pollution Prevention

The Valley of the Sun is composed of desert communities with uniquely adapted plants and wildlife, majestic mountains, vital waterways and spectacular sunsets. The cities of Glendale, Mesa, Peoria, Phoenix, Scottsdale, Tempe and the Town of Gilbert recognize the importance of preserving these precious natural resources so we can live in an urban environment and enjoy the surrounding beauty and recreational benefits.

Concern for the environment has prompted community leaders to develop environmental programs that focus on preserving natural resources and improving the quality of life for Valley residents. The ultimate goal is to make the Valley shine today, tomorrow and for future generations.

Join us in our effort to prevent pollution. Buy alternatives to hazardous products; use hazardous products safely and correctly; properly dispose of your wastes. Help protect our environment.

Glendale

Sanitary Sewer Protection & to Report Illegal Dumping
Police Dept. 930-3040

Storm Drain Protection & to Report Illegal Dumping
Code Enforcement 930-3610

Household Hazardous Waste Hotline/General Info
Fire Dept. 930-3410

Recycling Program
Sanitation Dept. 930-2681

Mesa

Sanitary Sewer Protection & to Report Illegal Dumping
Utilities Operations Dept. 644-2142

Storm Drain Protection & to Report Illegal Dumping
Utilities Operations Dept. 644-2142

Household Hazardous Waste General Info
Solid Waste Dept. 644-3673

Recycling Program
Solid Waste Dept. 644-3673

Peoria

Sanitary Sewer Protection & to Report Illegal Dumping
Public Services Dept. 412-8642

Storm Drain Protection & to Report Illegal Dumping
Public Services Dept. 412-8642

Household Hazardous Waste Hotline
Fire Dept. 412-7490

Recycling Program
Sanitation Dept. 412-7431

Phoenix

Sanitary Sewer Protection & to Report Illegal Dumping
Water Services Dept. 262-1859

Storm Drain Protection & to Report Illegal Dumping
Street Transportation Dept. 256-3190

Household Hazardous Waste Hotline
Public Works Dept. 262-7251

Recycling Program
Public Works Dept. 262-7251

Scottsdale

Sanitary Sewer Protection & to Report Illegal Dumping
Water Resources Dept. 391-5650

Storm Drain Protection & to Report Illegal Dumping
Water Resources Dept. 391-5650

Household Hazardous Waste Hotline
Environmental Affairs 391-5602

Recycling Program
Environmental Affairs 391-5602; 994-7899 (general info)

Tempe

Sanitary Sewer Protection & to Report Illegal Dumping
Environmental Services Section 350-2678

Storm Drain Protection & to Report Illegal Dumping
Public Works Dept. 350-2811

Household Products Recycling
Environmental Management Section 350-8200

Town of Gilbert

Sanitary Sewer Protection & to Report Illegal Dumping
Public Works Operations 503-6411

Storm Drain Protection & to Report Illegal Dumping
Public Works Operations 497-9191

Household Hazardous Waste General Info
Public Works Operations 497-9191

Recycling Program
Public Works Operations 497-9191

Valleywide

Environmental Recycling Hotline 253-2687

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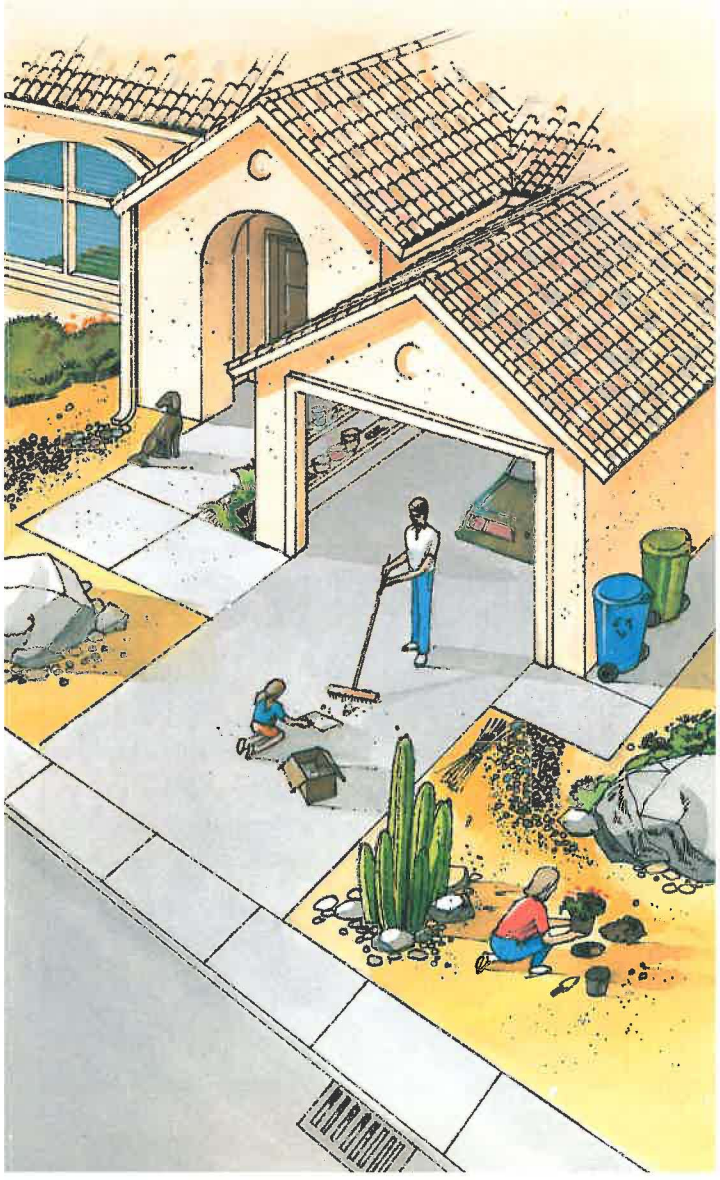
Printed on Recycled Paper

Pollution Prevention Begins With You

A Guide to Protecting the Salt River and Our Environment



How you use and dispose of products containing toxic substances, has a direct impact on the environment and our quality of life.

Dumping one quart of motor oil down the drain can contaminate 250,000 gallons of water.

There are two wastewater collection systems — one collects street runoff (storm drains) and the other collects wastewater from homes, businesses and industry (sanitary sewers). The storm drain system delivers water directly to the Salt River. The sanitary sewer system delivers wastewater to treatment plants. Some of the treated water is discharged to the Salt River.

The Salt River currently supports a riparian habitat rich in wildlife. Fish, birds and mammals depend on this valuable resource for survival. People also use the river for recreation.

When products containing heavy metals and pollutants (such as motor oil, paints and pesticides) are flushed down toilets or poured into the sink, only part of these substances can be removed by wastewater treatment facilities. These facilities also may be damaged. When these same products are discharged into storm drains, no removal is possible. Heavy metals and other pollutants harm fish, birds and wildlife.

How you can help.

By changing your buying and disposal practices for commonly used products, you will be helping the environment. This is easy to do and doesn't require much time.

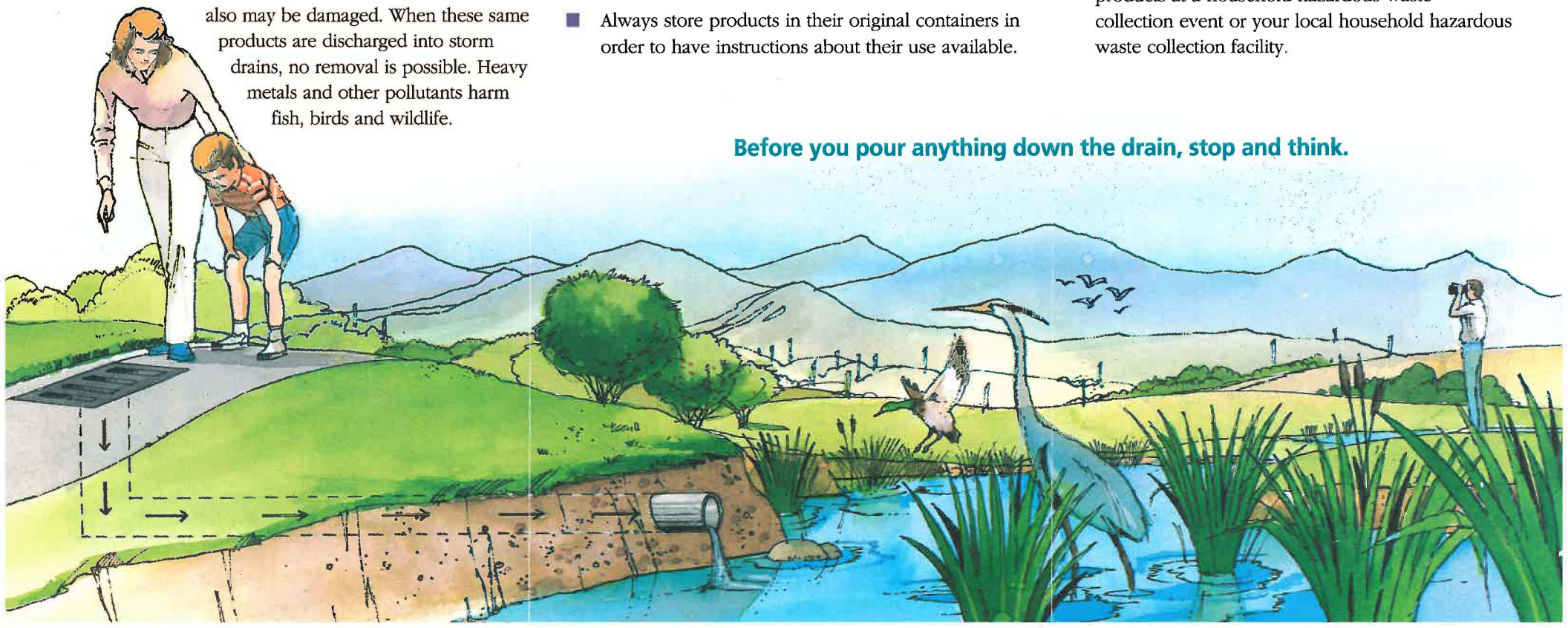
Become a responsible consumer.

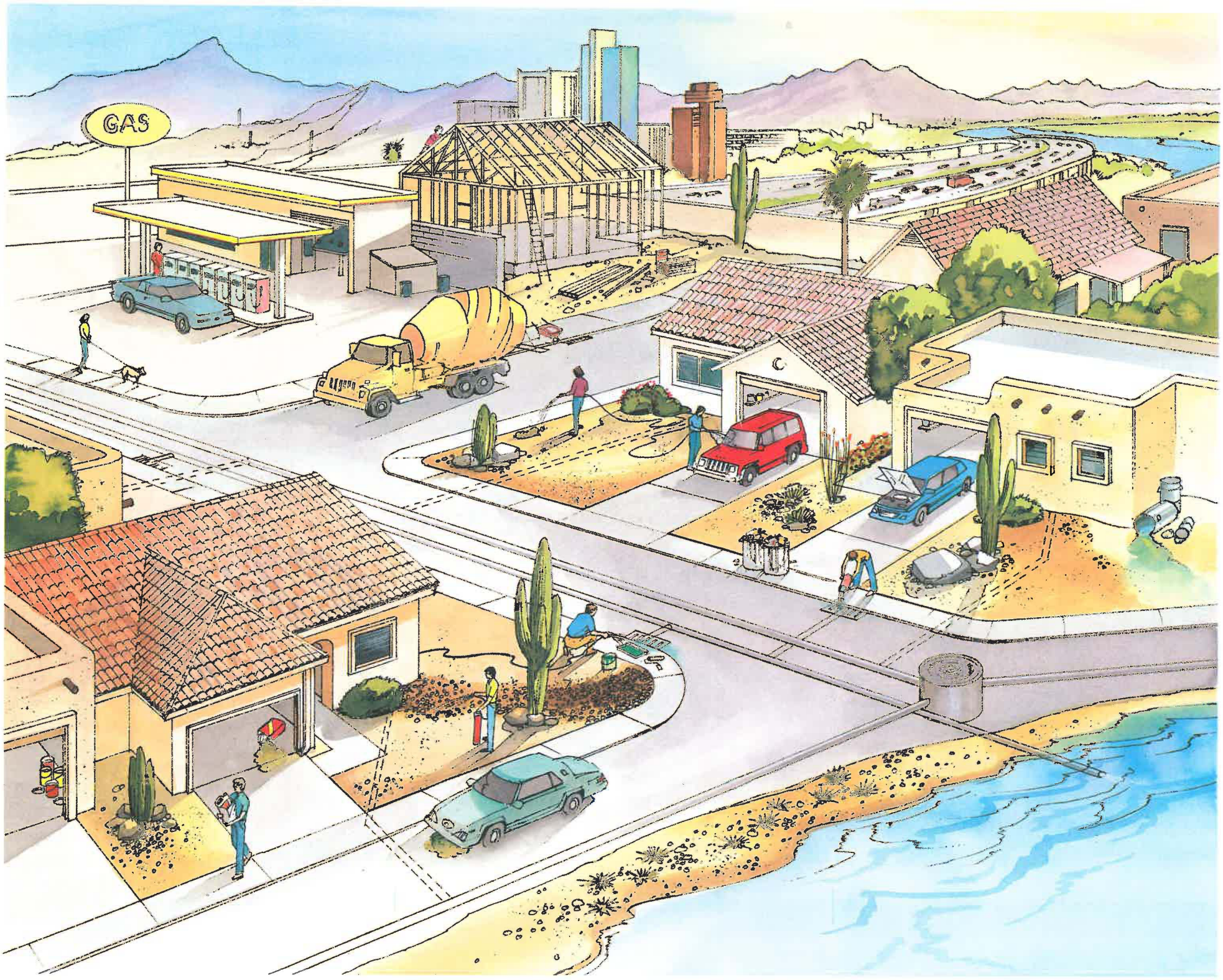
- Avoid buying products that contain metals or other toxic compounds by selecting safe, convenient alternatives. Call your city or town representative listed in this brochure for more information.
- Purchase the right amount of products to avoid having "leftovers."
- Give "leftovers" to a neighbor or group that can use them.
- Always store products in their original containers in order to have instructions about their use available.

Be sure to:

- Follow product instructions carefully and never mix products.
- Never pour toxic materials on the land or down the drain. Waste handled that way eventually will pollute the river, Valley and underground water supplies.
- Recycle as many liquid products as you can, such as used motor oil and latex paint.
- Recycle product containers, such as glass jars, cans, bottles, paper and cardboard.
- Buy recycled products to "close the loop" and fully support the recycling effort.
- Dispose of unwanted household hazardous products at a household hazardous waste collection event or your local household hazardous waste collection facility.

Before you pour anything down the drain, stop and think.





Find the Activities Above that Contribute Pollution to the Salt River and the Valley?

Watch what "goes down the drain." Help keep pollutants from entering the Salt River by following the suggestions below.

HOUSEHOLD AND HOME MAINTENANCE

Buy household products, such as cleaners and furniture polish, labeled "non-toxic." Use small quantities and purchase only the amount you need.

Properly use and store all hazardous products, including cleaners, solvents and paints. Keep products covered at all times.

Take unwanted household hazardous products to a household hazardous waste collection facility or collection event.

Use kitty litter or other absorbent material to clean spills from paved surfaces. Depending on the substance, dispose of absorbents in the garbage or at a household hazardous waste collection facility or collection event.

Use cleaning solvent only with stains and varnishes. Keep the solvent. Particles that are removed will settle to the bottom while the solvent on top is clean and reusable.

Use blue bins for recyclable materials. Throw litter into trash cans and keep them tightly covered to prevent foraging by neighborhood animals.

Prevent dirt and debris at construction sites and home improvement projects from entering storm drains. Cover or dampen soil and remove debris.

LAWN AND GARDEN

Use pesticides, herbicides and fertilizers carefully and sparingly in accordance with label instructions. Do not apply if rain is forecast. Take unwanted products to a household hazardous waste collection facility or collection event.

Use a rake or broom rather than a hose to clean up garden clippings. Put leaves and clippings in a compost pile or garbage can.

Direct rain spouts onto grass, flower beds or shrubbery to water your lawn and garden.

Pick up animal waste and flush the waste down the toilet or dispose of it in a plastic bag in the garbage.

AUTOMOTIVE

Take used motor oil and antifreeze to a household hazardous waste collection facility or collection event. For a recycling location close to you, contact your local representative listed in this brochure.

Have your car inspected and maintained regularly to reduce leakage of oil, anti-freeze and other fluids.

Reduce automotive emissions through regular auto maintenance, ride sharing and by using public transportation.

When washing your car, save water by using a bucket and biodegradable soap. Use a hose with a shut-off nozzle to rinse.

You can protect the Salt River and Valley by taking all unwanted household hazardous products to a household hazardous waste collection facility or a local household hazardous waste collection event.

Most people don't realize they are polluting the river, Valley and its underground water supplies. So spread the word and get your neighbors and co-workers involved.

You can make a difference in keeping the river and Valley clean and healthy for fish, birds, wildlife and ourselves.

IN THE TRASH BIN

A potpourri of people, events and places making the news in solid waste management

Tree Progress

PC&B has received two Urban Forestry grants. One grant is to work with junior and senior high school students and the other grant works with new subdivisions. Both grants offer a presentation on low water usage plants and trees that will be planted on the school campus or on public right-away.

The school project involves eight schools, one in each city council district. During the month of March participating schools will be engaged in a workshop. The workshop includes leadership training provided by the Volunteer Center and an informational slide show on low water use trees presented by the Phoenix Urban Forestry Program. The Volunteer Center will post the progress of the project on its website. You can follow the progress of the students by logging on to *http://volunteerphoenix.org.*

The new subdivision project involves residents in an informational workshop on low water use trees. In addition to the workshop, residents will receive 20 low water use trees to plant in common areas. Interested residents who live in new subdivions should contact the PC&B office.

Compost Project Update

Fifth grade students at Constitution Elementary recently completed a waste assessment. After careful analysis of the data collected, they concluded that each fifth grade class was generating three to five kg of waste daily.The waste included: food, Styrofoam food trays, plastic silverware and other lunch time items. PC&B gave an overview of the solid waste stream in Phoenix and then students were given the challenge to design a process to recycle food waste.

Students will be experimenting with worm bottles to gain a better understanding of the composting process. The compost project provides for a unique partnership between PC&B, Constitution Neighbors at Work and Constitution Elementary School. PC&B would like to thank Fernando Reyna from the ASU Horticultural Resource Center for donating red worms for this project.

Teacher Workshop

PC&B is offering a workshop for teachers and youth educators on solid waste management. The three day workshop, June 14th to the 16th, will be held at the 27th Ave. Transfer Station, a premier solid waste facility. Participants will be immersed in solid waste! — that is - they will follow the city's solid waste stream, bag compost, view the city from the top of a covered landfill, tour the MRF (materials recovery facility) and much more.

Educators will be engaged in lessons and activities from several solid waste resource guides as well as hear from the experts in the industry. Eighteen professional development hours will be available to all participants. University credits are also available through Dr. Fred Staley, College of Education at ASU. For more information or to sign up for the workshop, please call the PC&B office.

Calling all phone directories

It's that time of year to recycle your phone books. US WEST Dex has partnered with Safeway Food & Drug Stores to make it convenient for Valley residents to recycle their books from March 18 to May 7. New books are being made using 40% recycled materials from last year's books. More information about this community service can be found by calling US WEST Dex's hotline at 602/651-2400, ext. BOOK (2665).

The Case of the Expanding Staff — New Gals on Board

The PC&B staff has hit a new high. We've expanded our office to four gals, who are working to make Phoenix a cleaner, more beautiful place to live. Check out the newest members to the staff.

Donna

MY NAME IS DONNA and I was hired in January as the first Administrative Assistant. With the expanding opportunities that PC&B is involved in, the administrative assistant's position was added to the team. My responsibilities include: overseeing the vehicle removal program, scheduling the roll-off bin program, tracking resource materials, and managing the organization's database.

At an early age I was certain that I wanted to be a scientist. My fascination with nature dominated my educational goals. I graduated from Edinboro University of Pennsylvania with a Bachelor of Science degree in Biology. After graduation I worked in a food chemistry lab as the head technician until I was accepted into the Post Baccalaureate Teacher Certification program at ASU. I complete my studies in May with a Masters of Education degree in Curriculum and Instruction in Secondary Education programs.

When I moved to the Valley almost two years ago, I was eager to become an active participant in my new community. I look to PC&B to help me develop and reach my goal. I couldn't be more pleased.

Lydia

I AM PROUD to introduce myself as the newest member of the Phoenix Clean & Beautiful team. As a second-generation Arizona native, its beauty and majesty are dear to my heart. My skills in the areas of event planning, problem solving, management and software applications will allow me to help reach the goals of the organization. I am currently completing my degrees in Management and Information Systems at the University of Phoenix. As a coordinator and community volunteer, I encourage you to get involved in your community and neighborhood. If you are already involved...*Kudos to you!* If not, please feel free to contact our office for more information on volunteer opportunities.

PITCH-IN

Dreaming...

By Bella D. Forsythe

Do you ever dream about making home improvements? Installing wood floors in the dining room or just hanging an antique light fixture in the hallway? Almost everyone dreams about his or her next project around the house. But what if your next project was necessary to keep your family healthy and safe? and what if you couldn't afford it? For Valley residents living in sub-standard conditions, their dreams for a better home are much simpler. They might only need to replace a deadbolt that doesn't lock; or carpeting on cold concrete bedroom floors, or a toilet in their one bathroom.

Stardust Building Supplies is a 25,000 square foot non-profit store in Phoenix. Because Stardust's slightly used or discontinued merchandise is donated by homeowners, builders, remodelers, and manufacturers - doors, windows, toilets, paint and more - can be sold at dramatically reduced prices. And, while the shoppers save money, Stardust is putting money back into the community through other non-profits like Habitat for Humanity and Christmas in April.

Stardust Building Supplies, located on 28th Avenue, south of Indian School Road, is planning an Open House inviting everyone to come to the store to attend any of a series of free workshops. These workshops will focus on popular at-home projects and be taught by a diverse group of professionals. You might even be lucky enough to attend a session broadcast live on KTAR, led by their own local 'do-it-yourself' expert, Rosie Romero! Or maybe you'll catch a class on laying tile, taught by Councilman Doug Lingner! Because Stardust is able to salvage tons of usable building materials that may otherwise crowd our local landfills; the event is planned for Saturday, April 24 to coincide with Earth Month.

Phoenix Clean and Beautiful is happy to partner with Stardust to help make this event fun for the entire family. We'll even have activities available for the kids!

So don't forget, next time you start a project around the house, don't leave those old ceiling fans in the dumpster just because you don't like the color! Call Stardust Building Supplies to make arrangements for your donation and check out what they have - it might be exactly what YOU need!

Bella D. Forsythe is a guest writer representing Ad 2 Phoenix. Ad 2 recently adopted Stardust to develop a pro-bono advertising and public relations campaign. For more information about Ad 2 Phoenix, please contact Ms. Forsythe at bella_d_forsythe@mail.bankone.com.

For more information about Stardust Building Supplies, please contact Executive Director, Alan Goodyke, at 604-0605.

Contain that trash

The Pop-Up Cardboard Trash Containers are a ***hit*** around the community. Many organizations call weekly to request the use of our recycled trash boxes. These boxes are free for any group organizing an event or project to borrow and return. A small deposit is required to ensure their return in good condition. You may have seen them making appearances around town...

- KZON Bike-A-Thon
- Roosevelt Project
- Heard Museum
- Great Human Race
- Phoenix Suns Events
- Jesse Owens Urgent Care 20th Anniversary

Divert your waste & support PC&B

PC&B is initiating a recycling program for computer ink jet cartridges. We are looking for businesses, agencies, city offices and corporations that are interested in partnering with us on this worthwhile program. Program partners would make space for a small receptacle and encourage employees to recycle their ink jet cartridges. This program diverts solid waste from the landfill and supports PC&B by returning $1 for every cartridge recycled. If you would like more information or would like to become a program partner, call Kristina in the PC&B office.

PHOENIX CLEAN & BEAUTIFUL
101 S. Central Ave., Ste. 200
Phoenix, AZ 85004
262-4820
phxcandb@ci.phoenix.az.us

1999 CALENDAR OF EVENTS

To volunteer or request additional information contact Phoenix Clean & Beautiful.

April 10, 24, 28
Book readings

Readings of books from PC&B's Green Shelf Collection. Books from the GreenShelf collection will be read by special guests at several Phoenix libraries. Readings will be followed by an activity and a possible surprise visit from Recyclesaurus and Book Breath.

- **April 10 - 2 - 4pm**
  Palo Verde Library
- **April 24 - 2 - 4pm**
  Burton Barr Central Library
  Bring a recyclable!
- **April 28 - 4 - 5pm**
  Cholla Branch Library

Do you like to 'ham-it-up?" PC&B needs your help. We are looking for volunteers to wear PC&B's mascot suit, Recyclesaurus, at the readings listed above.

April 17
Papago Park Shoreline Stabilization

The Papago Park project is PC&B's signature event for the Great American CleanUp. Over 100 volunteers will lend a helping hand to beautify this magnificent park. The day's events will begin at 8am and conclude by 2pm Volunteers will work on one of eight projects which will be followed with an urban fishing clinic by the AZ Game & Fish Dept. In addition a barbecue lunch will be offered. Call the office today to sign up! Photographers needed desperately for this event.

April 19-23
Paint-A-Can Project

Trash cans painted by five city of Phoenix schools will be displayed in the City Hall Atrium. PC&B has organized a celebration for Tuesday, April 20 at 11:30 am to acknowledge the efforts of the students involved in the project. Join us for the celebration.

April 24
Education Day

PC&B in partnership with StarDust Building Supplies is organizing an education day. Youth, ages 4 to 11, are welcome to participate in fun activites that reuse materials. Activities will take place between 10am and 2pm at the StarDust Building Supplies center located at 3840 N. 28th Ave., Phoenix.

April 24
Madison Meadows

The sixth grade student council from Madison Meadows Elementary School has organized a community service project. On April 24th students will make Phoenix a cleaner, more beautiful place to live by cleaning up Margaret T. Hance Park. Hats off to these civic minded youth.

June 14-16
Solid Waste Workshop

PC&B is offering a workshop for teachers and youth educators on solid waste management. Educators will be engaged in lessons and activities from several solid waste resource guides as well as hear from the experts in the industry. Eighteen professional development hours will be available and arrangements have been made for University credit.

Education Volunteer Opportunities

If you are interested, e-mail us at *phxcandb@ci.phoenix.az.us* or drop us a postcard.

PC&B is looking for individuals to assist with the education program. If you are interested in assisting with one of the projects listed below or would like to be considered for other projects in the future, please contact Charlene Saltz at the PC&B office.

TREE PRESENTATIONS

Individuals will be trained to provide presentations on low water use plants suitable to Arizona. Targeted months for these presentations will be June-August 1999.

TEACHER ADVISORY COMMITTEE

Teachers, we need your help! Join our new Teacher Advisory Council and share your wealth of experiences and ideas with PC&B.

YAHOO!

You are tops in our book!

Christmas card thank you

PC&B would like to thank the teachers and students at C.O. Greenfield School for designing PC&B's 1998 Christmas cards. They were fabulous! We would also like to acknowledge the Valley of the Sun volunteers for their help in preparing the cards for mailing. Thanks!

phoenix
CLEAN & BEAUTIFUL
101 S. Central Avenue
Phoenix, Arizona 85004
Address correction requested

Litter-Ally Speaking

A quarterly publication of
phoenix CLEAN & BEAUTIFUL
262-4820
phxcandb@ci.phoenix.az.us

Mission Statement To involve and educate the residents on positive solid waste management and beautification practices

News and views for a cleaner, greener community March 1999 Vol. 3 Issue 1

The Great American CleanUP

PC&B is an affiliate of Keep America Beautiful and has participated over the years in its major event, the GLAD Bag-a-thon. Well times have changed!! The GLAD Bag-a-thon has been replaced with the Great American CleanUp. The Great American CleanUp (GAC) is a national event promoting litter prevention and beautification projects. Under the umbrella of the GAC, PC&B has organized several special events. Our signature event is taking place at Papago Park on April 17th. Over 100 youth and adult volunteers will be working on several projects during the day including shoreline stabilization at the lagoon. The day will be celebrated with a barbecue lunch and a fishing clinic by The Arizona Game & Fish Department. In addition, the Maricopa Audubon Society will lead a birdwatching walk through the park. PC&B is looking for volunteers to assist with this event. If you are interested, please call the PC&B office.

Green Shelf Collection Readings

In 1996 PC&B initiated the Green Shelf Collection, which consists of 27 children's books all having an environmental theme. During the month of April, PC&B will highlight the Collection by offering readings at three different city libraries.

Special guest speakers from the community have been asked to read a book from the Collection. At the conclusion of the reading, participants will be engaged in a discussion on the importance of not littering and how to assist in keeping our communities clean. Pledge cards and garbage bags will be provided to those who wish to organize a cleanup in their neighborhood.

The Phoenix Public Library Teen Council will be doing earth friendly crafts and games along with face painting at the Burton Barr Central Library reading on April 24. Below is a listing of the reading locations, times and guest readers. PC&B would like to invite you to attend one or all of the scheduled readings.

Green Shelf reading schedule

- **Palo Verde Library**
  April 10, 2 to 4pm
  Guest Reader: Juan Martin
  Director, Public Works Department
- **Burton Barr Central Library**
  April 24, 2 to 4pm
  Guest Reader: Councilmember Cody Williams
  (bring a recyclable)
- **Cholla Branch Library**
  April 28, 4 to 5pm
  Guest Reader: Amanda Ormond, Director, Energy Office and PC&B Board Member

Painting the parks red, green, blue...

Five Phoenix schools are participating in a project to help their neighboring parks to become cleaner and more beautiful. The students will conduct a litter assessment at their local park. In addition they will assess where litter collects, who uses the park and will determine where trash cans should be placed.

The City of Phoenix Parks, Recreation and Library Department donated thirty 50 gallon containers for this project - Paint-A-Can. Students will design murals that they will paint on the trash cans. Once decorated the trash cans will be placed in their neighborhood park with one can on each school campus. The paints for the project were provided through recycling events such as: the City of Phoenix's BOPA (Battery, Oil, Paint and Anti-freeze) collection and Stardust Building Supplies, a reusable building materials outlet. Using recycled paints diverts hazardous waste from the solid waste stream and supports PC&B's mission.

The schools participating in the Paint-A-Can project are: Encanto Elementary, Phoenix Preparatory Academy, Ralph Waldo Emerson Elementary, Garfield Elementary and Thomas A. Edison Elementary. The cans will be displayed in the City Hall Atrium the week of April 19. On April 20 at 11:30am PC&B has planned a celebration to acknowledge the schools and to make a presentation to the Parks, Recreation and Library Department. Please join us at the celebration and see the new artistically designed trash cans.

Project Planning – Do You Know...

How to recognize if there could be harmful environmental effects from a project you are planning?

A Project Planning Checklist is now available to help you identify a broad range of potential environmental effects.

Complete the project planning checklist prior to:

- *A real estate action*
- *Disturbance of ground or structures (construction, demolition, renovation)*

Help avoid any potential negative effects or project delays.

POLLUTION PREVENTION (P2) AT WORK
PROTECTING THE ENVIRONMENT & YOU

For a copy of the checklist or more information,
call us at **256-5669**.
Office of Environmental Programs
April 1999

ENVIRONOTES

A Newsletter from the City of Phoenix Office of Environmental Programs (OEP)
August 1999

Excellence Award Given to Theresa Foster!

Theresa Foster, Environmental Programs Coordinator, Public Works Department, received a City of Phoenix Excellence Award for recovering funds from the AZ Department of Environmental Quality State Insurance Fund Reimbursement Program. This program provides participants like the City the ability to recoup funds expended for investigation and remediation of petroleum releases from underground storage tanks. Theresa has submitted $4.7 million dollars in invoices on behalf of the City, and has been able to recover $2.9 million. Additional payments to the City may also be possible as the State continues to process Theresa's reimbursement forms. Theresa's reimbursement project required her to research all invoices from 1989 to the present. She also created an electronic version of the ADEQ application to facilitate the process. Congratulations!

In this Issue:

Is or Was Wet? Clean Water Act Section 404 Says Stop and Check!

The City is developing an Employee Education and Training Program (EETP) on the Clean Water Act Section 404 requirements, with the help of OEP newly hired 404 Coordinator, Angela Brooks.

In the initial survey phase, departments are helping to identify hundreds of activities and projects that take place in waters of the U.S. to determine which would be regulated. Initial awareness training has been provided as part of the survey meetings.

Phase II will involve developing a training curricula and prioritizing City staff to be trained on the project planning process when it involves 404 issues. To meet requirements under 404, project planning needs to be expanded to consider how the project may be affected by environmental requirements.

Once fully implemented, the 404 Program will help ensure that the permits are in place for regulating activities such as cleaning lakes and ponds in City parks or new construction projects.

Locating MSDS – Use the Web!

Having a hard time finding MSDSs? OEP database specialist, Jeff Menke created a MSDS program, which operates like a web page. The program contains hyperlinks to approximately 50 sites that have manufacturer MSDSs online. From these 50 sites, other sites can be accessed. If you're interested, we can send you the program on a disc or via E-mail. Please e:mail Jeff or contact him at 256-3456.

Street Transportation Pilots Soy Substitute

Street Transportation Department's Chuck Stoltz has found a cheaper, more effective product "Soy-Solve," to use as an asphalt release agent and crew truck cleaner. Soy-Solve will potentially replace Neugenic and Slip-Eazee; all three products are similarly rated for health, fire, and reactivity risks.

POLLUTION PREVENTION (P2) AT WORK
PROTECTING THE ENVIRONMENT & YOU

Chuck is testing the product as a pilot program for two months. Workers are commenting that Soy-Solve works better and can do both jobs - bed release agent and solvent / degreaser. The new product reduces the number of line items in the department's chemical inventory as well as the number of products that require management and training.

Soy-Solve could help reduce the use of a hazardous material. Soy-Solve lasts for three loads as compared to the Slip-Eazee, which only lasts one load. Its' competitive pricing is another desirable feature. Soy-Solve is about one-half the price of the products which could be replaced. Chuck Stoltz can be reached at 261-8089 for additional information.

P2 Tip

Instead of charcoal lighter fluid, use self-starting charcoal which emits less volatile organic compound (VOCs) and is better for our air.

WELCOME! New Employees

We welcome **Linda Wheeler** to P2, who recently joined our P2 staff. Linda was formerly from Personnel Safety. Linda will be conducting facility assessments and helping departments prepare emergency plans. She will also be our key P2 Liaison for the Water Services Department. Glad you're aboard!

Other new staff members which have joined the Office of Environmental Programs (OEP):

Joe Gibbs, formerly with the Arizona Department of Environmental Quality, will be assisting in air quality programs.

Angela Brooks, previously with the U.S. Fish and Wildlife Service, will be assisting departments with natural resources and Clean Water Act Section 404 issues.

Sharron Jacquemart was promoted to OEP's Programs Assistant position. New administrative support include: **LeNora Hart**, Secretary III and **Maryanne Pedroza**, Secretary II U*8.

Executives and Mid-Manager To Be Rated on Environmental Management

Key Executive and Management staff will now be rated on Environmental Management as part of their annual performance appraisal. The City Manager requires designated executives and managers to include at least five points for environmental management on their performance plan for 1999/2000. Departments affected include those which use significant amounts of hazardous materials or who are responsible for environ-mental compliance. Department Directors will select at least one goal each year to enhance their department's environmental programs.

Supervisors can also participate in this program. The P2 staff developed a new manual, "*The Supervisor's Guide to Pollution Prevention.*" Contact Liz Gilman, 256-5669, if you would like to schedule a presentation.

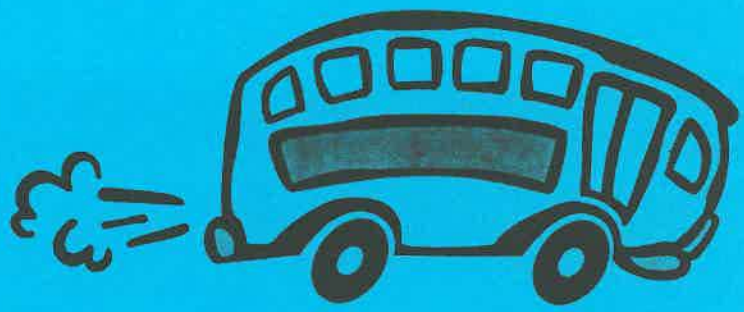
MAKING PHOENIX SHINE

POLLUTION PREVENTION AWARENESS

How are you saving money and helping the environment?
Fax your success stories to OEP at 534-0795
[Win Awards / Prizes]

Printed on recycled paper.

We're Back!
It's the P2 Roadshow,
On the road again...



Join in the fun and get P2 wise too. During October we will be visiting these locations. While on site we will play games, give away prizes, and have random drawings. But you've got to be there. Just 30 minutes and a whole lot of fun.

Look for us at these sites.

Monday, 10/11/99	Tuesday, 10/12/99	Tuesday, 10/12/99	Wednesday, 10/13/99	Thursday, 10/14/99	Friday, 10/15/99
Salt River Service Center	Okemah Service Center	Union Hills Service Center	Reservoir Yard	Glenrosa Service Center	Central Shop
AM Shift – 7am	AM shift – 7am	PM shift – 3pm	AM shift –7am	AM shift – 7am	AM shift – 7am

POLLUTION PREVENTION (P2) AT WORK
PROTECTING THE ENVIRONMENT & YOU

REMEMBER
P2 Week, October 4-8, 1999,
Phoenix City Hall
Watch for information on P2 Week and the P2 Roadshow in the next *City Connection.*

For more information on P2 call us at (602)256-5669
Office of Environmental Programs

Return to:

TRANSPORTATION COORDINATOR
PUBLIC WORKS DEPARTMENT

How to Use the Vouchers

1. Obtain supervisory approval to leave work.
2. Obtain supervisory signature on the voucher. Fill in the shaded areas.
3. Call a cab company from the list below. Tell the cab company dispatcher that you will be using a City of Phoenix voucher.
4. Have the cab driver fill out the trip data on the voucher.
5. Keep the yellow copy for your records. Leave the rest of the voucher with the driver.

Call the city transportation coordinator at 262–7786 if you have any questions.

IF YOU ENROLL,
KEEP THIS BROCHURE

PRIMARY CAB COMPANY
AAA Cab
437-4000

SECONDARY CAB COMPANY
Yellow Cab
252-5252

City of Phoenix
PUBLIC WORKS DEPARTMENT

101 South Central Avenue
Phoenix, Arizona 85004
(602) 262-7786

Rev. 10/98

Guaranteed Emergency Ride Home Program

Guaranteed Emergency Ride Home Program

The Guaranteed Emergency Ride Home Program provides emergency transportation vouchers for eligible employees. To be eligible, an employee must ride the bus, van or carpool, bike, or walk to work a minimum of one day per week.

How to enroll and what to expect

You must enroll for the program by completing an application. Send your application to the city transportation coordinator.

You will receive three vouchers for cab rides (one-100% subsidized ride and two-50% subsidized rides.) Using a 50% voucher requires you to pay half the cab fare. Unused vouchers do not expire as long as you continue to meet the eligibility requirements. You cannot accumulate vouchers. Any vouchers that you use in one year will be replaced the next fiscal year providing that you are still eligible.

Emergencies are:

- Sudden personal or family illness or injury.
- Unforeseen need to work overtime at the request of a supervisor.
- Unavoidable problem with your vanpool, carpool, or bike which leaves you stranded at work.

Emergencies are not:

- Regular or occasional overtime as a requirement of the job.
- Scheduled medical or dental appointments.
- Planned vehicle maintenance.
- Optional means of travel in bad weather.

GUARANTEED EMERGENCY RIDE HOME PROGRAM APPLICATION FORM

Name: _____ Department: _____

Work Address: _____ Work Telephone: _____

How will you be traveling to work? _____ How many days per week? _____

I understand the rules of the Guaranteed Emergency Ride Home Program.
I qualify by traveling to and from work at least once a week by bus, carpool, vanpool, bicycle or by walking.

Signature: _____ Date: _____

The City of Phoenix urges all its residents to do their part in implementing

SOLUTIONS TO POLLUTION

Urban storm water runoff pollution includes oil and grease dripped from trucks, paint products, cleaning solvents, concrete mixer washout, eroded sediments, construction debris, asphalt and equipment fluids. This pollution damages the environment, and may kill plants and animals.

Please join us in our effort to reduce urban storm water runoff pollution.

CONSTRUCTION INDUSTRY TIPS

DON'T...

allow sediment and materials to be blown or washed into the street, gutter or storm drain.

DON'T...

allow equipment fluids to leak into the dirt or street where they can be washed into the storm drain.

DON'T...

wash or hose down soiled or "dirty" pavement or surfaces where materials have spilled.

DON'T...

aggravate erosion by removing trees and shrubs unnecessarily.

DON'T...

allow trucks or equipment to "drag out" dirt and debris from the site.

DON'T...

forget to conduct an inspection after a rain event to make sure your BMPs are working properly.

Storm Drains Lead

To The River.

This logo is a registered trademark for the City of Phoenix Storm Water Management Section.

DO...

cover exposed piles of soil or construction materials with plastic sheeting.

DO...

designate an area for parking, for refueling and for routine equipment maintenance.

DO...

use dry cleanup methods; use absorbants, sweep, shovel and dispose of wastes in the trash.

DO...

plant fast-growing grasses to shield and bind the soil, and water lightly until the grass is established.

DO...

schedule excavation and grading activities for dry-weather periods.

DO...

keep surface runoff to a minimum. Lightly spray piles of dirt with water to reduce dust.

DO YOUR PART

Report illegal dumping in catch basins, streets or storm drains by calling (602) 256-3190.

City of Phoenix
Street Transportation Department
Storm Water Management Section
(602) 256-3190

Best Management Practices for
Vehicle & Equipment Maintenance
CONTINUED

Liquid storage in above ground storage

- Maintain good integrity of all storage containers.
- Install safeguards (such as diking or berming) against accidental releases at the storage area.
- Inspect storage tanks to detect potential leaks and perform preventive maintenance.
- Inspect piping systems (pipes. pumps, flanges, couplings, hoses and valves) for failures or leaks.
- Train employees on proper filling and transfer procedures.

Cold weather activities

- Minimize salt application.
- Use uncontaminated dirt or ash, if use is necessary.
- Train employees on proper salt, dirt, sand or ash application.

Improper connections to storm drain

- Plug all floor drains connected to sanitary sewer or storm drain or if connection is unknown. Alternatively, install a sump that is pumped regularly.
- Perform smoke or dye testing to determine if interconnections exist between sanitary sewer system and storm drain system.
- Update facility schematics to accurately reflect all plumbing connections.
- Install a safeguard against vehicle wash waters entering the storm drain.
- Maintain and inspect the integrity of all under ground storage tanks; replace when necessary.
- Train employees on proper disposal practices for all materials.

If spills occur:

- ***Stop the source of the spill immediately.***
- ***Contain the liquid until cleanup is complete.***
- ***Deploy oil containment booms if the spill may reach the water.***
- ***Cover the spill with absorbent material.***
- ***Keep the area well ventilated.***
- ***Dispose of clean-up materials properly.***
- ***Do not use emulsifier or dispersant.***

City of Phoenix
STREET TRANSPORTATION DEPARTMENT
STORM WATER MANAGEMENT SECTION
(602) 256-3190

1/96

PREVENT STORM WATER CONTAMINATION

Best Management Practices for

Vehicle & Equipment Maintenance Facilities

Fueling

- Use spill and overflow protection.
- Minimize run-on of storm water into the fueling area by grading the area such that storm water only runs off.
- Reduce exposure of the fuel area to storm water by covering the area.
- Use dry clean-up methods for fuel area rather than hosing the fuel area down.
- Use proper petroleum spill control.
- Perform preventive maintenance on storage tanks to detect potential leaks before they occur.
- Inspect the fueling area to detect problems before they occur.
- Train employees on proper fueling techniques.

Vehicle and equipment maintenance

- Maintain an organized inventory of materials used in the maintenance shop.
- Dispose of greasy rags, oil filters, air filters, batteries, spent coolant and degreasers properly.
- Label and track the recycling of waste materials (e.g. used oil, spent solvents, batteries).
- Drain oil filters before disposal or recycling.
- Drain and contain all fluids from wrecked vehicles and "parts" cars.
- Store cracked batteries in a non-leaking secondary container.
- Promptly transfer used fluid to the proper container; do not leave full drip pans or other open containers around the shop. Empty and clean drip pans and containers.
- Do not pour liquid waste down floor drains, sinks or outdoor storm drain inlets.
- Plug floor drains that are connected to the storm drain or sanitary sewer system; if necessary, install a sump that is pumped regularly.
- Inspect the maintenance area regularly for proper implementation of control measures.
- Train employees on proper waste control and disposal procedures.

Outdoor vehicle and equipment storage and parking

- Use drip pans under all vehicles and equipment waiting for maintenance.
- Cover the storage area with a roof.
- Inspect the storage yard for filling drip pans and other problems regularly.
- Train employees on procedures for storage and inspection items.

Locomotive sanding areas

- Cover sand storage piles.
- Install sediment traps.
- Install curbs or dikes around storage piles to minimize storm water run-on.

Painting areas

- Keep paint and paint thinner away from traffic areas to avoid spills.
- Spray paint in an Occupational Safety and Health Act (OSHA) approved hood.
- Use effective spray equipment that delivers more paint to the target and less over-spray.
- Avoid sanding in windy weather and collect and dispose of waste properly.
- Recycle paint, paint thinner and solvents.
- Inspect painting procedures to ensure that they are conducted properly.
- Train employees on proper sanding, painting and spraying techniques.

Vehicle or equipment washing areas

- Avoid washing parts or equipment outside.
- Use phosphate-free biodegradable detergents.
- Designate an area for cleaning activities.
- Contain and recycle wash waters.
- Ensure that wash waters drain well.
- Inspect cleaning area regularly.
- Train employees on proper washing procedures.