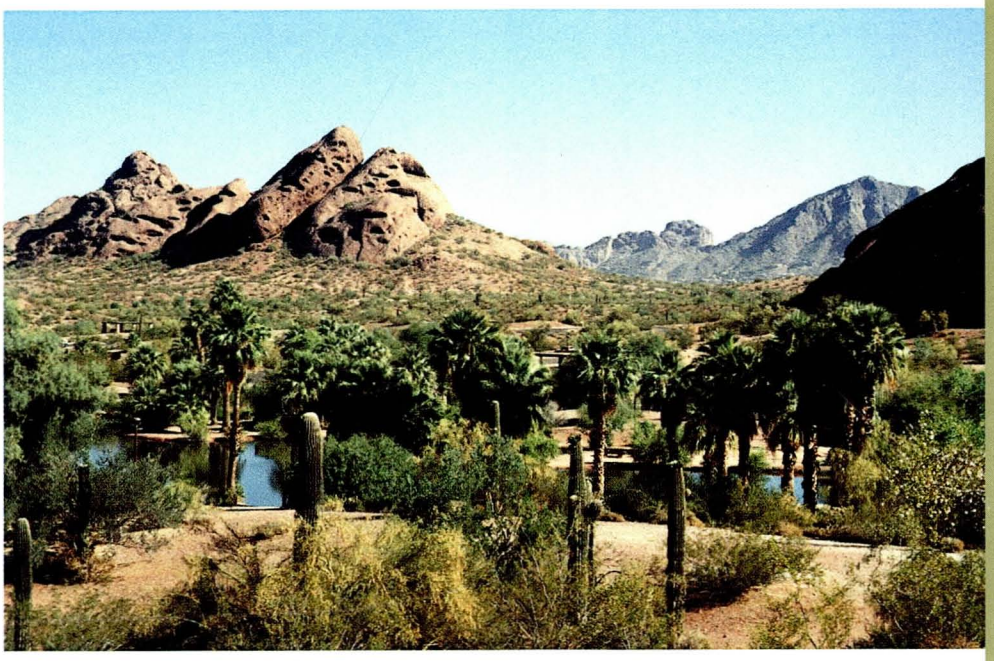
Municipal Separate Storm Sewer System



Annual Report

Year ending June 30, 1998

NPDES Permit Number AZS000003

City of Phoenix, Arizona

City of Phoenix
OFFICE OF THE CITY MANAGER

September 24, 1998

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

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

This report also includes information about the implementation status of eight best management practices (BMPs) which the City indicated in its November, 1992 permit application were new or evolving activities. The City did implement all eight BMPs according to the previously submitted schedule, and these activities are summarized in Chapter 2.

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

Sincerely,

Frank Fairbanks
City Manager

cc: Karen Smith, Arizona Department of Environmental Quality
Alton Washington, Deputy City Manager
Les Thomas, Interim EAS Director
Lori Sundstrom, Environmental Affairs Supervisor

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CERTIFICATION STATEMENT

MUNICIPAL SEPARATE STORM SEWER SYSTEM
ANNUAL REPORT
FOR THE YEAR ENDING JUNE 30, 1998

NPDES Permit Holder: City of Phoenix, Arizona

Period Covered by This Report: July 1, 1997 through June 30, 1998

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 24, 1998
Date

Chapter 2

STATUS OF COMPLIANCE WITH IMPLEMENTATION SCHEDULE FOR NEW BEST MANAGEMENT PRACTICES

STATUS OF COMPLIANCE WITH IMPLEMENTATION SCHEDULE FOR NEW BEST MANAGEMENT PRACTICES

The new best management practices (BMPs) in the program are identified in the New Storm Water Management Program Implementation Schedule, which is attached as Figure 2-1. All new BMPs were to be implemented beginning July 1997. The new BMPs were implemented as follows:

BMP 12 - Consult with Environmental Protection Agency and Arizona Department of Environmental Quality as needed relative to NPDES permits issued to third parties for any discharge to storm drains or drainage channels.

- In October 1996, the Engineering and Architectural Services Department asked the Arizona Department of Environmental Quality and the U.S. Environmental Protection Agency to place the City on the list of public notice recipients for NPDES permits proposed for issuance within the city limits or to the storm drain system.

BMP 13 - Re-evaluate as needed previous policies to allow certain relatively clean waters to be discharged to the storm water system.

- In 1993, the Grading and Drainage Ordinance was revised. In Fiscal Year 1997/98, several departments developed a BMP for the Fire Department's use of BioSolve, an agent used for small-size oil and fuel spills at accident scenes.

BMP 25 - Educate City employees and high volume users regarding the proper use and proper management of fertilizers, herbicides, and other potentially harmful chemicals through the use of brochures, pamphlets, and other documents or methods acceptable to the City.

- In 1996, the City modified its commodities purchasing policy to encourage the purchase of non-hazardous or less hazardous materials. The policy established environmental performance criteria, including specifying requirements for vendors to recover spent material containers and to provide staff with product use training. Since July 1995, it has been City policy to train and certify employees who apply or may apply pesticides. Finally, in January 1996, the Street Transportation Department developed a number of information sheets that cover BMPs for the proper use and management of a number of potentially harmful chemicals, including pesticides, herbicides, and fertilizers. The BMPs are available to the public as well as City personnel.

  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 involves planting native vegetation that is low in water use and is naturally resistant to pests, hand weeding, selective use of various pesticides applied by a contractor, and managing bees found in irrigation valve boxes 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.

BMP 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.

- In December 1994, the Phoenix City Council approved the implementation of a Pollution Prevention (P2) Program to help reduce the City's use of hazardous chemicals and generation of hazardous waste. The P2 Program involves facility assessments and includes facilities that use herbicides, pesticides, and fertilizers. The facility assessments analyze specific tasks performed by groundskeepers, landscapers, and maintenance personnel.

BMP 27 - Develop and implement a program which provides a means of recording the observations of personnel who inspect and maintain the City's storm drain system.

- On January 1, 1988, the Street Transportation Department Storm Water Section implemented a Request for Service (RFS) System to record the observations of personnel who inspect and maintain the storm drain system. All requests for service are logged into a computer system. The information then is sent to the appropriate service center where it is assigned to staff. 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.

BMP 33 - Implement a program to educate architects, design engineers, and contractors about the need for and practical methods for erosion control, sediment control, use of drywells, and site waste.

- In June 1998, the Development Services Department (DSD) completed its 106th monthly meeting with architects, engineers, design groups, development companies, and others. The meetings are held to discuss and review policies, proposed changes to DSD procedures and requirements, implementation of new requirements, and other related issues. Monthly meetings also have been ongoing with representatives from the Homebuilders' Association of Central Arizona. These monthly meetings were used to provide interest groups with opportunities to review and discuss the SWMP development review and permitting process that was implemented in October 1996.

BMP 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.

- In October 1996, policies and procedures for implementing the Storm Water Ordinance were fully implemented. As of October 17, 1996, a storm water management plan and a copy of the NPDES Notice of Intent must be submitted to the City for all developments greater than five acres, or that are part of an overall storm water management plan. The revised Storm Water Ordinance creates institutionalized procedures, fees, and documentation requirements for developers and builders.

BMP 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.

- As mentioned in BMP 25, in January 1996, the Street Transportation Department developed a number of information pamphlets that cover BMPs. The BMPs help various industries prevent storm water contamination. Specific BMPs are targeted at a variety of audiences, including food processors, liquid waste recyclers, automotive salvage yards, and plant and tree nurseries. The BMPs are available to the public as well as City personnel.

In addition to the new BMPs, the revised SWMP includes an implementation schedule for the Illicit Discharge Identification and Elimination Program (Figure 2-2). The Program has been implemented as follows:

In February 1994, the Street Transportation Department began inspecting storm water outfalls and dry weather flows to identify the potential sources of illicit flows. Since that time, staff has worked at refining a prioritization schedule for inspecting industries and outfalls. Also in 1994, staff developed a policy and procedure manual to provide guidance during inspections. Ongoing training occurs for new staff responsible for industrial inspections.

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

The City follows an Enforcement Response Plan (ERP), which 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 staff to enforce the Program.

Information on illicit discharge cases is compiled using inspection forms and phone logs. The two sources are used to determine caseload and cycle time.

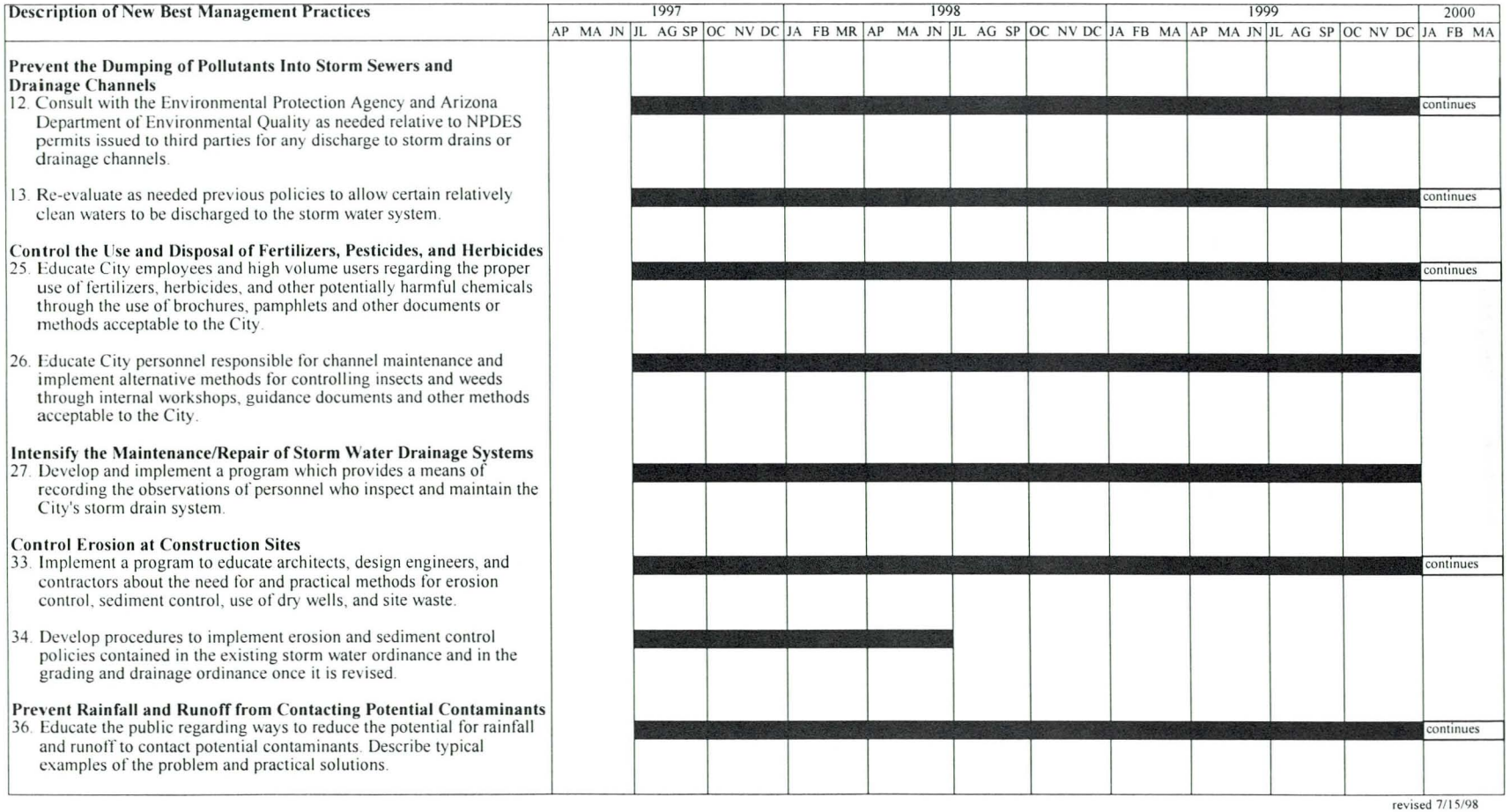
The information also helps target education and outreach efforts. The Storm Water Management Section of the Street Transportation Department developed a series of BMPs targeted at specific industries, based on information from previous inspections and derived from the Environmental Protection Agency's list of regulated industries, including those businesses most common to Phoenix.

The BMPs provide businesses with examples of common practices or operating procedures that might result in storm water contamination. The information sheets provide information on correcting potential problems. These BMPs were established in January 1996, and are updated or added to as the need arises.

Figures 2-1 and 2-2 demonstrate that the City has implemented the new components of the SWMP. Specific activities accomplished during the reporting year are provided in Chapter 8.

FIGURE 2-1

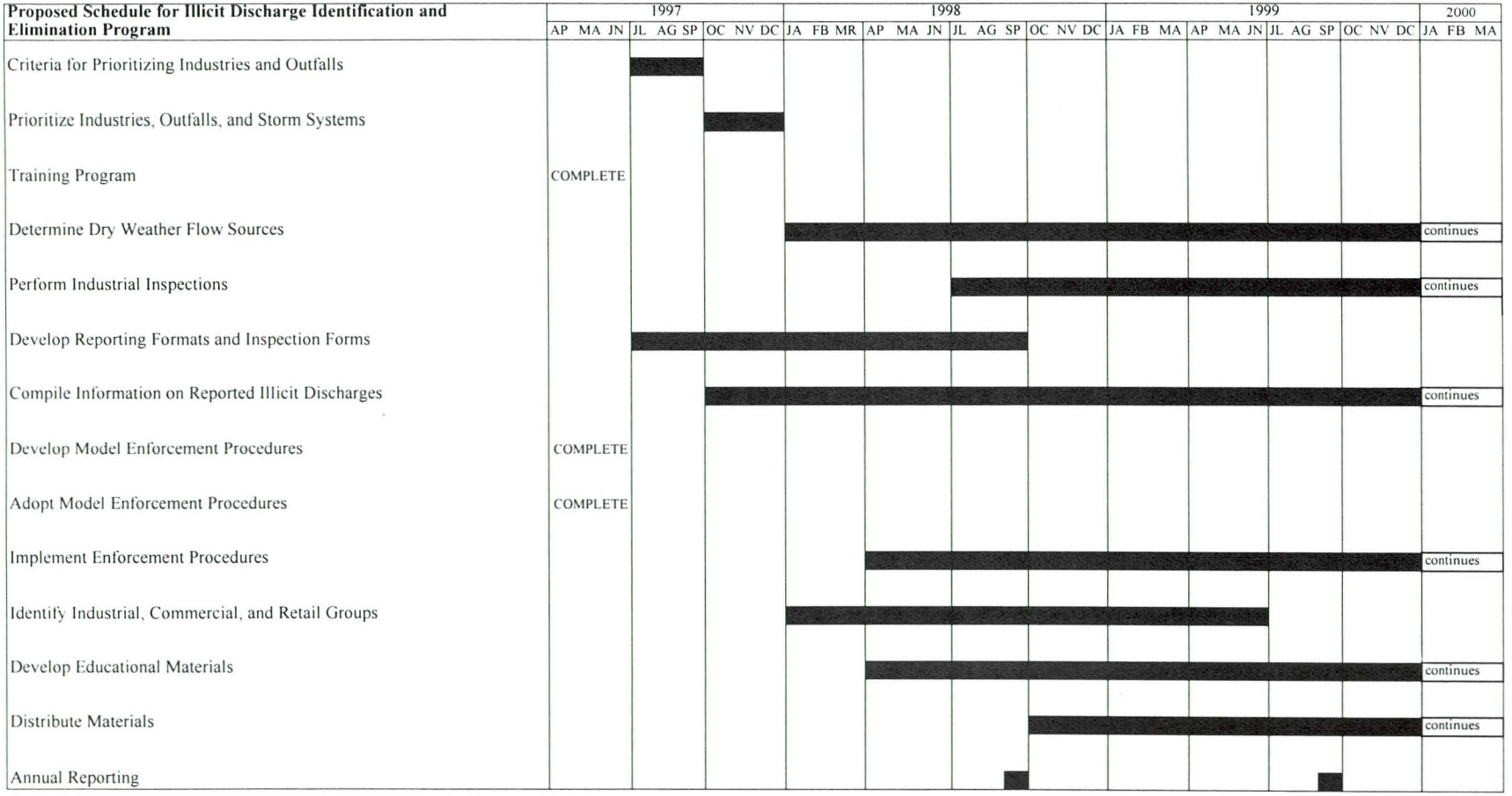
NEW STORM WATER MANAGEMENT PROGRAM IMPLEMENTATION SCHEDULE



revised 7/15/98
kaw:h:/npdedimplement.xls

FIGURE 2-2

ILLICIT DISCHARGE IDENTIFICATION AND ELIMINATION PROGRAM IMPLEMENTATION SCHEDULE



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Chapter 3

DESCRIPTION OF OUTFALL MONITORING SITES

DESCRIPTION OF OUTFALL MONITORING SITES

The City has a total of nine storm water monitoring sites. Five of these are outfall monitoring locations, which have been strategically placed to represent various land uses throughout the city. Three in-stream sites characterize storm water quality in various 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.

This chapter provides descriptions of the nine monitoring sites and includes the following information:

- a photo of the site;
- exact site location;
- type of equipment;
- maps showing relative locations of monitoring sites and rain gauges.

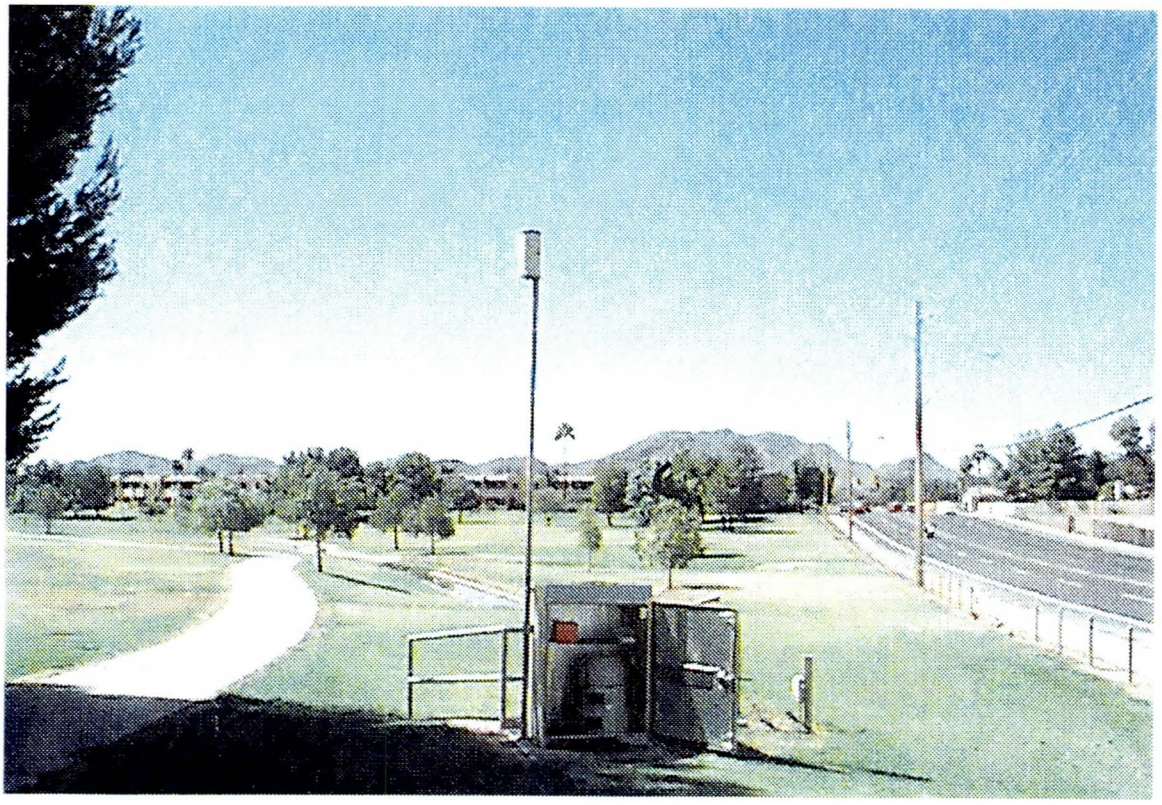
The outfall monitoring site descriptions also indicate the size of the catchment basin they serve. Chapter 4 provides detailed results of storm water outfall monitoring data, by outfall.

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:

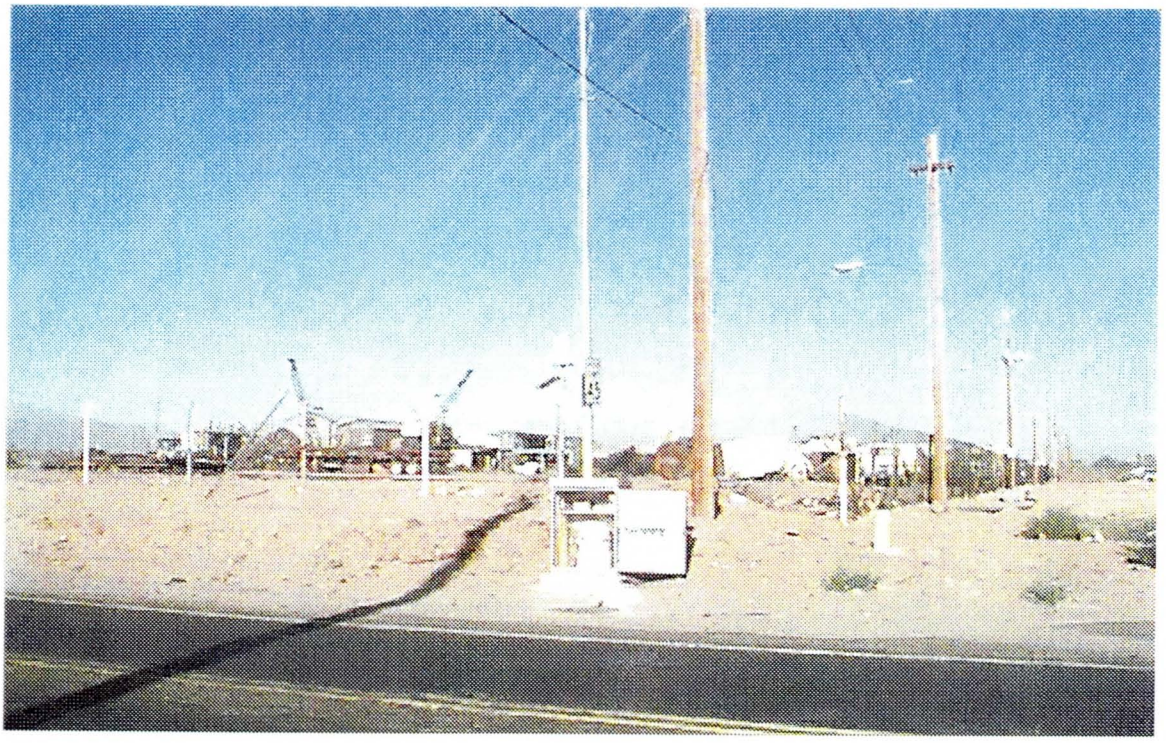
Sigma 900 MAX sampler with integral flowmeter. Installed June 1997.

SR03

3501 West Elwood Street

In pipe station, approximately 1200feet 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	0.00%
Agricultural	7.06%
Light residential	0.00%
Medium residential	36.45%
Heavy residential	6.48%



Equipment:

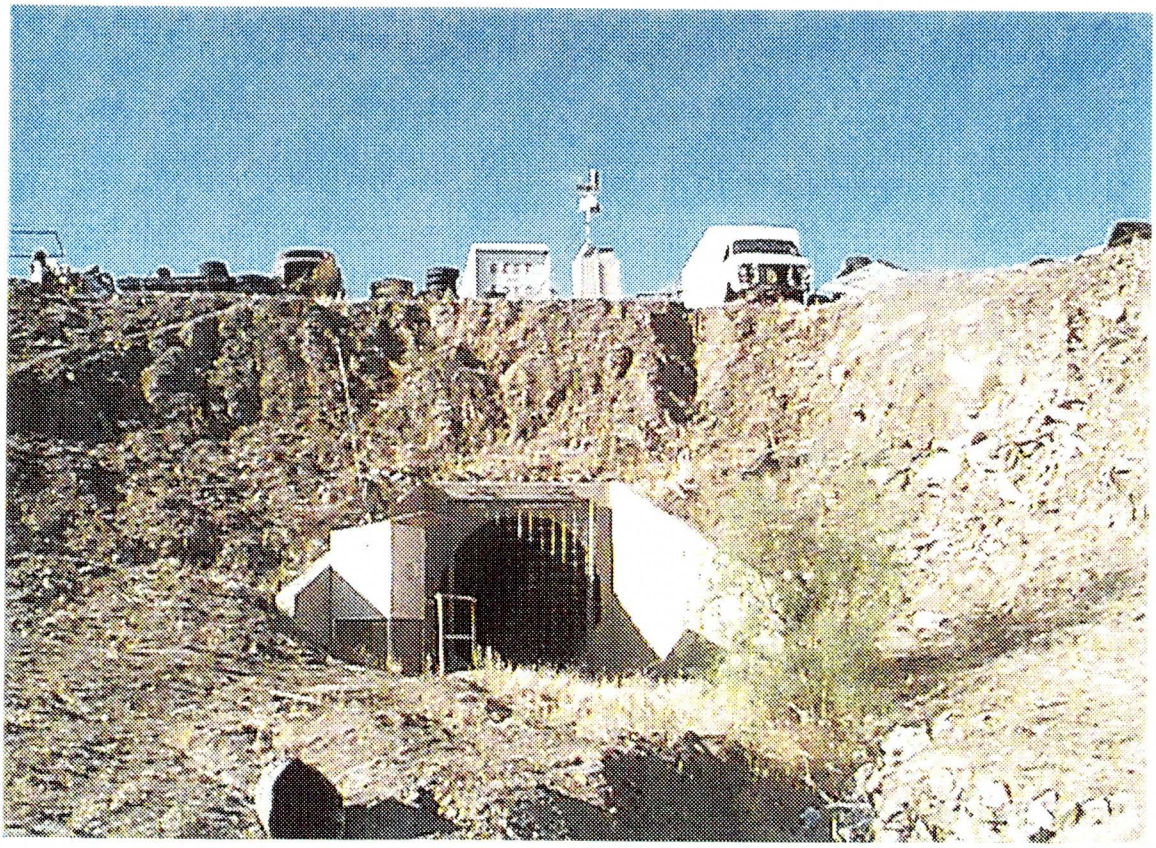
Sigma 900 MAX sampler with integral flowmeter. Installed in June 1997.

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%

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:

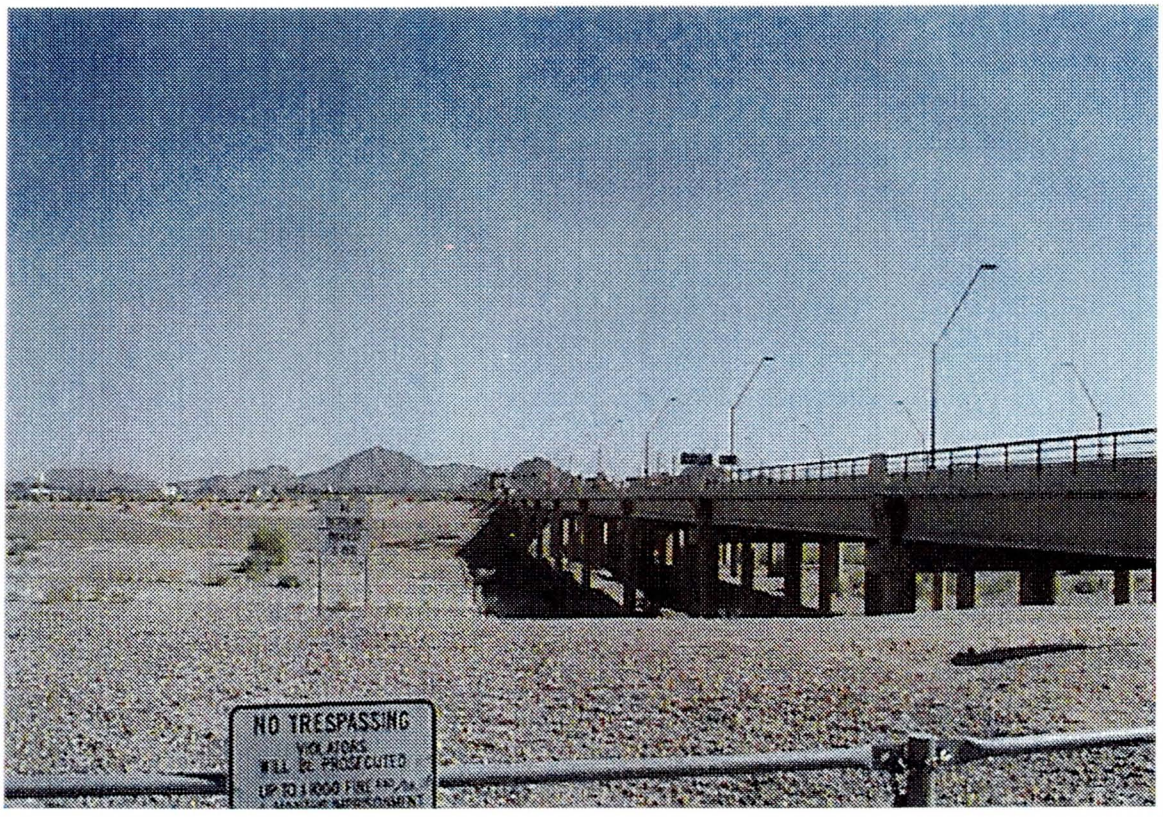
Heavy industrial	8.00%
Light industrial	18.20%
Commercial	0.00%
Transportation	1.05%
Open land	7.98%
Public owned	0.00%
Agriculture	52.09%
Light residential	6.36%
Medium residential	4.42%
Heavy residential	1.67%

Equipment:

Sigma 900 MAX sampler with integral flowmeter. Installed 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.

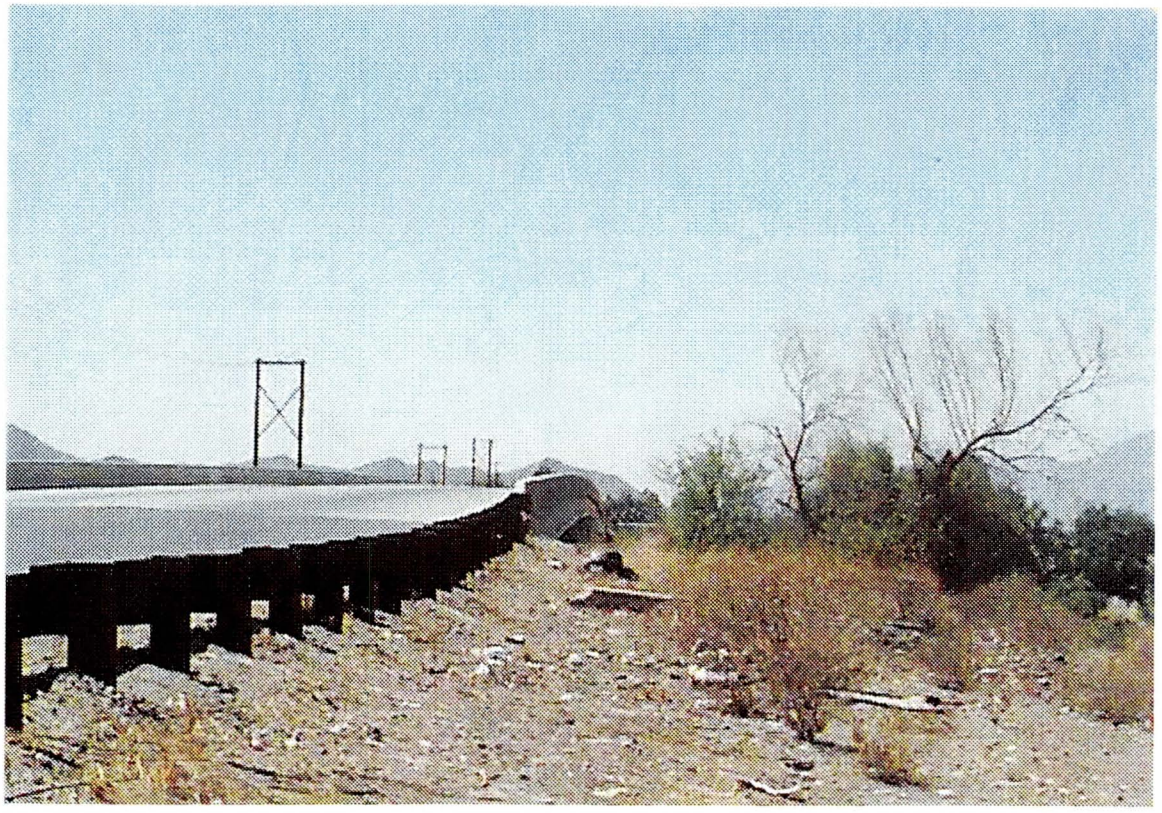


Equipment:

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

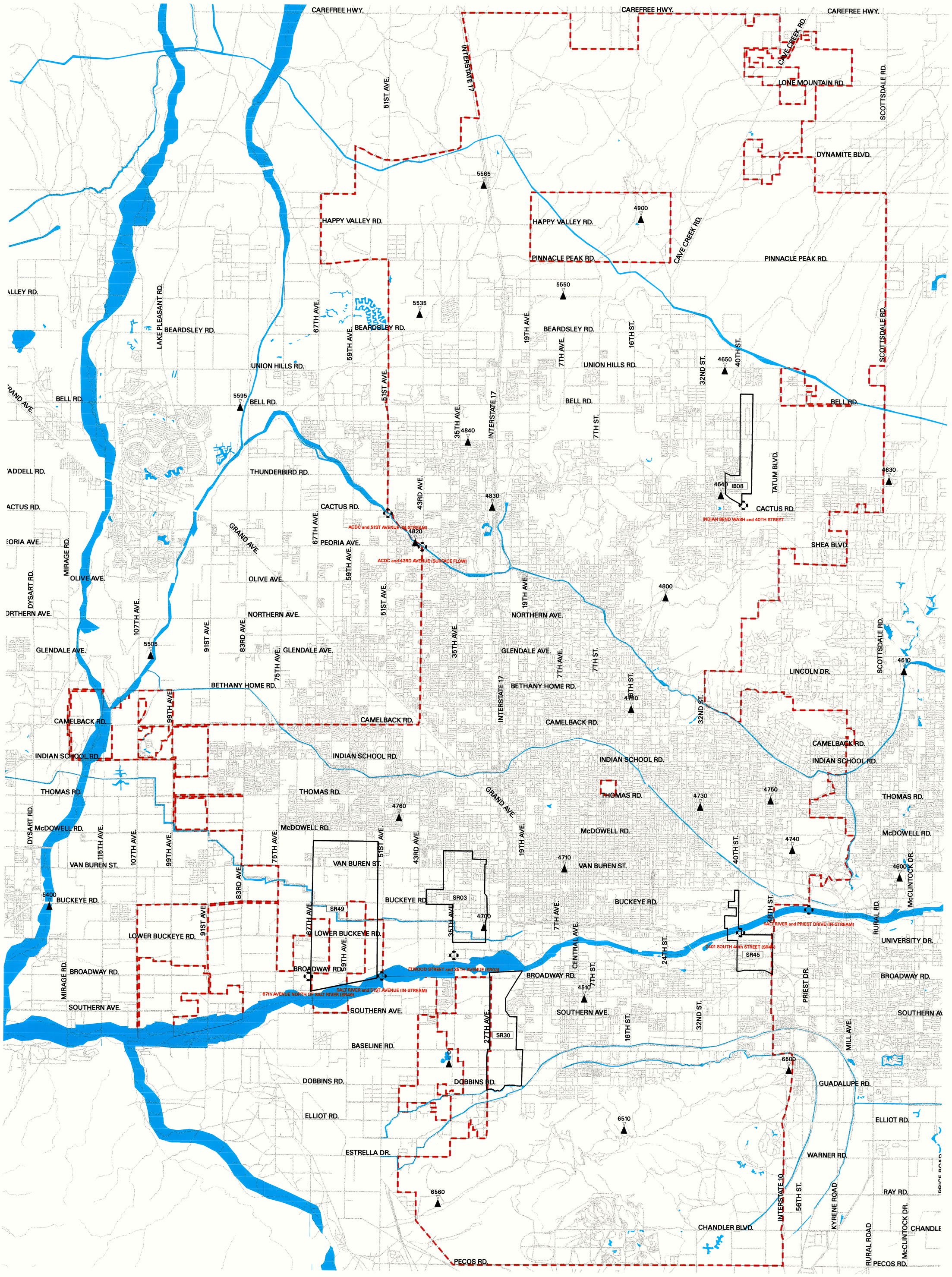
Arizona Canal Diversion Channel at 43rd Avenue

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.

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
1992 City Limits
Hydrography

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, 1998
NPDES Permit No. AZS000003

Chapter 4

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 per year. Most of the precipitation occurs in two distinct seasons, summer (July through September) and winter (October through March). Rainfall patterns of typical storms in the Phoenix area are highly variable, especially for localized thunderstorms during the summer season. Rainfall can be variable within a single catchment, as well as fluctuate from catchment to catchment.

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

Summer storms usually last from one to three days and generally consist of numerous locally heavy storm cells embedded in more widespread, generally 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 that the summer storms and tend to produce less runoff.

A representative storm event is defined by this permit 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 II Permit application. A representative summer storm has a volume between 0.24 inches to 0.71 inches and a duration between 2.2 and 6.5 hours. A representative winter storm has a volume between 0.22 inches and 0.65 inches and a duration between 5.2 and 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 this permit. This chapter also includes storm event hydrographs for the ten representative storm events that occurred during the reporting period.

Outfall Monitoring

Outfall monitoring was conducted by the Flood Control District of Maricopa County (FCDMC) under an intergovernmental agreement (IGA) at six locations as listed in the City's Part 2 NPDES Permit Application. The following tables summarize the results of water quality monitoring data for qualifying storm events from July 1, 1997 through June 30, 1998. All data that is reported 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 and 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 that were be evaluated 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 results that did not meet the required data quality objectives are not reported because it is felt that this data is not suitable for compliance purposes. Additionally, monitoring for certain parameters was not performed, as discussed below:

- Temperature and pH were not recorded at the time of sampling for monitoring performed at outfall SR-03 (North Bank of Salt River at 35th Avenue) and outfall SR-45 (South Bank of Salt River at 40th Street).

- Analysis for total petroleum hydrocarbons was not performed at any of the outfalls.

- Analyses for fecal coliform, fecal streptococci, and biochemical oxygen demand were not performed at the outfalls located at 27th Avenue at the South Bank of Salt River and 43rd Avenue at the Arizona Canal Diversion Channel.

The City and the FCDMC currently are revising the storm water monitoring IGA to correct sampling and analytical deficiencies. It should also be noted that several monitoring stations are serviced by the United Stated Geological Survey (USGS) pursuant to a separate IGA between the USGS and the FCDMC. This process should be completed and presented to the appropriate governing bodies for approval in the Spring of 1999. In the meantime, the FCDMC has begun implementing changes to its sampling program.

SR-03 North Bank of Salt River at 35th Avenue		
Date of Sampling	**12/21/97**	**2/4/98**
Representative Storm Event	Y	Y
Agency Collecting Sample	FCD	FCD
Agency Analyzing Sample	BOLIN	BOLIN
Drainage Area (acres) (DA)	1363	1363
Land Use - Residential	286	286
Land Use - Commercial	95	95
Land Use - Industrial	586	586
Land Use - Undeveloped	395	395
Sampling Duration (minutes)	451	483
Storm Duration (minutes) (DRN)	417	460
Runoff Sampled (cubic feet) (RUN)	53,500	133,800
Total Storm Runoff (cubic feet)	60,000	185,000
Instantaneous Discharge (cfs)	7.8	25.9
Preceeding Dry Period (days) (ANT)	14	25
Total Storm Rainfall (inch)	0.46	0.56
Rainfall Sampled (inch) (TRN)	0.21	0.56
Maximum 5-minute rain intensity (MAX5)	1.2	1.2
Effluent Temperature (deg. C)	NM	10.4
pH, Effluent (standard units)	NM	8.3
Electrical Conductivity (umhos/cm)	400	682
BOD5 (mg/l)	13	73
COD High Level (mg/l)	700	174
Chloride (mg/l as Cl)	35	69
Cyanide Total (mg/l as Cn)	0.03	<0.01
Fecal Coliform (CFU/100mL)	1,600	
Fecal Streptococci (CFU/100mL)	9,000	90,000
Solids Residue at 180 Deg. C (TDS) (mg/l)	227	444
Residue, Total at 105 Deg. C (TSS) (mg/l)	1360	132

SR-03 North Bank of Salt River at 35th Avenue		
Date of Sampling	12/21/97	2/4/98
Representative Storm Event	Y	Y
Nitrogen No2 + No3, Total (mg/l as N)	1	0.44
TKN Nitrogen (mg/l as N)	4.47	1.4
Nitrogen, Ammonia + Organic, Total (mg/l as N)	4.47	3
Nitrogen Nitrate Total (mg/l as N)	1	0.44
Nitrogen Nitrite Total (mg/l as N)	0.1	<0.1
Nitrogen Ammonia Total (mg/l as N)	1.54	3
Nitrogen Organic Total (mg/l as N)	2.93	<0.01
Phosphorous Total (mg/l as P)	0.9	1.0
Phosphorous Dissolved (mg/l as P)	0.52	0.84
Phosphorous Ortho (mg/l as P)	0.31	0.72
Sulfate Dissolved (mg/l)	31	60
Hexavalent Chromium Total (mg/l)	<0.010	<0.010
Phenols Total Recoverable (ug/l)	550	54
Oil and Grease Total Recoverable (mg/l)	<10.0	<10.0
Organic Carbon, Total (mg/l)	31	27
Alkalinity LAB (mg/l as CaCo3)	148	158
Hardness (mg/l)	172	230
Antimony (ug/l as Sb)	<5	<5
Antimony Dissolved (ug/l as Sb)	<4	<4
Arsenic Total (ug/l as As)	8	<5
Arsenic Dissolved (ug/l as As)	5	5
Beryllium Total Recoverable (ug/l as Be)	<2	<2
Beryllium Dissolved (ug/l as Be)	<2	<2
Cadmium Total Recoverable (ug/l as Cd)	1.8	1.3
Cadmium Dissolved (ug/l as Cd)	0.78	2.5
Chromium Total Recoverable (ug/l as Cr)	26	14
Chromium Dissolved (ug/l as Cr)	6.1	2.2

SR-03 North Bank of Salt River at 35th Avenue		
Date of Sampling	**12/21/97**	**2/4/98**
Representative Storm Event	Y	Y
Copper, Total Recoverable, (ug/l as Cu)	63	59
Copper, Dissolved, (ug/l as Cu)	22	10
Lead, Total Recoverable, (ug/l as Pb)	70	38
Lead, Dissolved, (ug/l as Pb)	20	<5
Mercury, Total Recoverable, (ug/l as Hg)	<0.2	<0.2
Mercury, Dissolved, (ug/l as Hg)	<0.2	0.6
Nickel, Total Recoverable, (ug/l as Ni)	26	14
Nickel, Dissolved, (ug/l as Ni)	9.7	11
Selenium, Total, (ug/l as Se)	<5	<5
Selenium, Dissolved, (ug/l as Se)	<5	<5
Silver, Total Recoverable, (ug/l as Ag)	<50	<50
Silver, Dissolved, (ug/l as Ag)	<50	<50
Thallium, Total, (ug/l as Tl)	<1	<1
Thallium, Dissolved, (ug/l as Tl)	<1	<1
Zinc, Total Recoverable, (ug/l as Zn)	490	310
Zinc, Dissolved, (ug/l as Zn)	<20	180
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	--

SR-03 North Bank of Salt River at 35th Avenue		
Date of Sampling	12/21/97	2/4/98
Representative Storm Event	Y	Y
Chlordane, Total, (ug/l)	<1.0	--
P,P' DDD, Total, (ug/l)	<1.0	--
P,P' DDE, Total, (ug/l)	<1.0	--
P, P' DDT, Total, (ug/l)	<1.0	--
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, Total, (ug/l)	<1.0	--
Heptachlor, Total, (ug/l)	<1.0	--
Heptachlor Epoxide, Total, (ug/l)	<1.0	--
Toxaphene, Total, (ug/l)	<1.0	--
Beta Benzene Hexachloride, Total, (ug/l)	<1.0	--
Acenaphthene, Total, (ug/l)	<3.0	<10
Acenaphthylene, Total, (ug/l)	<3.0	<10
Anthracene, Total, (ug/l)	<3.0	<10
Benzidine, Total, (ug/l)	<50	<100
Benzoic Acid, Total, (ug/l)	<5.0	<10
Benzo (a) Anthracene, Total, (ug/l)	<3.0	<10
Benzo (b) Fluoranthene, Total, (ug/l)	<5.0	<10
Benzo (k) Fluoranthene, Total, (ug/l)	<5.0	<10
Benzo (ghi) Perylene, Total, (ug/l)	<3.0	<10
Benzo (a) Pyrene, Total, (ug/l)	<3.0	<10
Benzyl Alcohol, Total, (ug/l)	<3.0	<10
Bis-(2-Chloroethoxy)-Methane, Total, (ug/l)	<3.0	<10
Bis-(2-Chloroethyl)-Ether, Total, (ug/l)	<3.0	<10
Bis-(2-Chloroisopropyl)-Ether, Total, (ug/l)	<10.0	<20

SR-03 North Bank of Salt River at 35th Avenue		
Date of Sampling	12/21/97	2/4/98
Representative Storm Event	Y	Y
4-Bromo-Phenyl Phenyl Ether, Total, (ug/l)	<3.0	<10
Butyl Benzyl Phthalate, Total, (ug/l)	<10.0	<20
2-Chloronapthalene, Total, (ug/l)	<3.0	<10
2-Chlorophenol, Total, (ug/l)	<3.0	<10
4-Chloro-Phenyl Phenyl Ether, Total, (ug/l)	<3.0	<10
Chrysene, Total, (ug/l)	<5.0	<10
Dibenzo-[a,h]-Anthracene, Total, (ug/l)	<5.0	<10
Di-N-Butyl Phthalate, Total, (ug/l)	<3.0	<10
3,3'- Dichlorobenzidine, Total, (ug/l)	<5.0	<10
2,4- Dichlorophenol, Total, (ug/l)	<3.0	<10
Diethyl Phthalate, Total, (ug/l)	<3.0	<10
2,4- Dimethylphenol, Total, (ug/l)	<5.0	<10
Dimethyl Phthalate, Total, (ug/l)	<3.0	<10
2-Methyl-4,6-Dinitrophenol, Total, (ug/l)	<10.0	<20
2,4- Dinitrophenol, Total, (ug/l)	<10	<10
2,4- Dinitrotoluene, Total, (ug/l)	<5.0	<10
2,6- Dinitrotoluene, Total, (ug/l)	<5.0	<10
Di-N-Octyl-Phthalate, Total, (ug/l)		<10
Fluoranthene, Total, (ug/l)	<3.0	<10
Fluorene, Total, (ug/l)	<3.0	<10
Hexachlorobenzene, Total, (ug/l)	<3.0	<10
Hexachlorobutadiene, Total, (ug/l)	<3.0	<10
Hexachlorocyclopentadiene, Total, (ug/l)	<10	<10
Hexachloroethane, Total, (ug/l)	<3.0	<20
Indeno (1,2,3-CD) Pyrene, Total, (ug/l)	<5.0	<10
Isophorone, Total, (ug/l)	<3.0	<10
Naphthalene, Total, (ug/l)	<3.0	<10

SR-03 North Bank of Salt River at 35th Avenue		
Date of Sampling	12/21/97	2/4/98
Representative Storm Event	Y	Y
Nitrobenzene, Total, (ug/l)	<3.0	<10
2-Nitrophenol, Total, (ug/l)	<5.0	<10
4-Nitrophenol, Total, (ug/l)	<5.0	<10
N-Nitrosodiphenylamine, Total, (ug/l)	<3.0	<10
N-Nitrosodi-N-Propylamine, Total, (ug/l)	<3.0	<10
Pentachlorophenol, Total, (ug/l)	<5.0	<10
Phenanthrene, Total, (ug/l)	<3.0	<10
Phenol, Total, (ug/l)	<3.0	<10
Pyrene, Total, (ug/l)	<3.0	<10
1,2,4-Trichlorobenzene, Total, (ug/l)	<3.0	<10
2,4,5- Trichlorophenol, Total, (ug/l)	<3.0	<10
2,4,6- Trichlorophenol, Total, (ug/l)	<3.0	<10

SR-30 27th Avenue at south bank of Salt River		
Date of Sampling	12/22/97	2/4/98
Representative Storm Event	Y	Y
Agency Collecting Sample	USGS	USGS
Agency Analyzing Sample	NWQL	NWQL
Drainage Area (acres) (DA)	0.0703	0.0703
Impervious Area (acres) (IA)	0.0105	0.0105
Land Use - Residential	6	6
Land Use - Commercial	0	0
Land Use - Industrial	94	94
Land Use - Undeveloped	0	0
Sampling Duration (minutes)	UA	UA
Storm Duration (minutes) (DRN)	624	396
Runoff Sampled (cubic feet) (RUN)	0.04	0.05
Total Storm Runoff (cubic feet)	UA	UA
Instantaneous Discharge (cfs)	1.70	1.30
Preceeding Dry Period (days) (ANT)	14	24
Total Storm Rainfall (inch)	UA	UA
Rainfall Sampled (inch) (TRN)	0.28	0.37
Maximum 5-minute rain intensity (MAX5)	0.03	0.03
Sample Temperature (deg. C)	15	14.5
pH, Effluent (standard units)	7.7	7.9
Specific Conductance, LAB (us/cm)	918	274
Oxygen Dissolved (mg/l)	5.2	9.1
COD High Level (mg/l)	160	260
Chloride (mg/l as Cl)	23	22
Cyanide Total (mg/l as Cn)	0.019	--
Solids Residue at 180 Deg. C (TDS) (mg/l)	1290	236
Residue, Total at 105 Deg. C (TSS) (mg/l)	125	304
Nitrogen No2 + No3, Total (mg/l as N)	0.96	3.6
Nitrogen, Ammonia + Organic, Total (mg/l as N)	120	12

SR-30 27th Avenue at south bank of Salt River		
Date of Sampling	12/22/97	2/4/98
Nitrogen Nitrate Total (mg/l as N)	0.25	3.4
Nitrogen Nitrite Total (mg/l as N)	0.71	0.2
Nitrogen Ammonia Total (mg/l as N)	64	5.2
Phosphorous Total (mg/l as P)	0.96	0.75
Phosphorous Dissolved (mg/l as P)	0.3	0.14
Phosphorous Ortho (mg/l as P)	0.62	0.14
Sulfate Dissolved (mg/l)	63	22
Phenols Total Recoverable (ug/l)	19	9
Oil and Grease Total Recoverable (mg/l)	14	11
Organic Carbon, Total (mg/l)	670	79
Carbonate Water Field (mg/l as Co3)	0	0
Carbonate Water Dissolved, Field, (mg/l as Co3)	0	0
Alkalinity LAB (mg/l as CaCo3)	187	73
Arsenic Total (ug/l as As)	13	12
Beryllium Total Recoverable (ug/l as Be)	<10	<10
Cadmium Total Recoverable (ug/l as Cd)	3	1
Chromium Total Recoverable (ug/l as Cr)	25	12
Copper, Total Recoverable, (ug/l as Cu)	340	110
Lead, Total Recoverable, (ug/l as Pb)	460	130
Mercury, Total Recoverable, (ug/l as Hg)	<0.10	<0.10
Nickel, Total Recoverable, (ug/l as Ni)	60	23
Selenium, Total, (ug/l as Se)	<1	<1
Silver, Total Recoverable, (ug/l as Ag)	<1	<1
Zinc, Total Recoverable, (ug/l as Zn)	660	270

SR-45 South Bank of Salt River at 40th Street			
Date of Sampling	**1/10/98**	**2/4/98**	**2/24/98**
Representative Storm Event	Y	Y	Y
Agency Collecting Sample	FCD	FCD	FCD
Agency Analyzing Sample	BOLIN	BOLIN	BOLIN
Drainage Area (acres) (DA)	880	880	880
Land Use - Residential	0	0	0
Land Use - Commercial	0	0	0
Land Use - Industrial	650	650	650
Land Use - Undeveloped	230	230	230
Sampling Duration (minutes)	401	303	483
Storm Duration (minutes) (DRN)	340	664	395
Runoff Sampled (cubic feet) (RUN)	13,200	15,000	5,600
Total Storm Runoff (cubic feet)	13,520	21,250	5,800
Instantaneous Discharge (cfs)	3.6	2.5	1.5
Preceeding Dry Period (days) (ANT)	19	25	4
Total Storm Rainfall (inch)	0.47	0.54	0.48
Rainfall Sampled (inch) (TRN)	0.47	0.43	0.48
Maximum 5-minute rain intensity (MAX5)	0.72	0.48	0.48
Effluent Temperature (deg. C)	NM	9.7	NM
pH, Effluent (standard units)	NM	7.4	NM
Electrical Conductivity (umhos/cm)	--	348	--
BOD5 (mg/l)		328	
COD High Level (mg/l)	328	453	1061
Chloride (mg/l as Cl)	17	29	10
Cyanide Total (mg/l as Cn)	--	<0.01	--
Fecal Coliform (CFU/100mL)	50,000	50,000	900
Fecal Streptococci (CFU/100mL)	160,000		160,000
Solids Residue at 180 Deg. C (TDS) (mg/l)	167	243	123
Residue, Total at 105 Deg. C (TSS) (mg/l)	328	462	596

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South Bank of Salt River at 40th Street

Date of Sampling	1/10/98	2/4/98	2/24/98
Nitrogen No2 + No3, Total (mg/l as N)	0.6	0.45	0.7
TKN Nitrogen (mg/l as N)	3.65	2.1	0.9
Nitrogen, Ammonia + Organic, Total (mg/l as N)	3.65	4.07	0.86
Nitrogen Nitrate Total (mg/l as N)	0.4	0.3	0.7
Nitrogen Nitrite Total (mg/l as N)	0.22	0.15	<0.1
Nitrogen Ammonia Total (mg/l as N)	1.07	4.07	0.76
Nitrogen Organic Total (mg/l as N)	2.58	<0.01	0.1
Phosphorous Total (mg/l as P)	1.52	0.9	1.1
Phosphorous Dissolved (mg/l as P)	1.13	0.71	1
Phosphorous Ortho (mg/l as P)	0.22	0.38	0.22
Sulfate Dissolved (mg/l)	27	64	15
Hexavalent Chromium Total (mg/l)	<0.010	<0.010	<0.010
Phenols Total Recoverable (ug/l)	66	99	--
Oil and Grease Total Recoverable (mg/l)	--	<10.0	<10.0
Organic Carbon, Total (mg/l)	27	60	--
Alkalinity LAB (mg/l as CaCo3)	68	60	59
Hardness (mg/l)	128	262	148
Antimony (ug/l as Sb)	<5	8	<5
Antimony Dissolved (ug/l as Sb)	<4	4	<4
Arsenic Total (ug/l as As)	6	8	10
Arsenic Dissolved (ug/l as As)	<5	<5	<5
Beryllium Total Recoverable (ug/l as Be)	<2	<2	<2
Beryllium Dissolved (ug/l as Be)	<2	<2	<2
Cadmium Total Recoverable (ug/l as Cd)	1.9	4.1	1.8
Cadmium Dissolved (ug/l as Cd)	0.47	0.87	0.37
Chromium Total Recoverable (ug/l as Cr)	20	20	37
Chromium Dissolved (ug/l as Cr)	3.4	4.6	3.3
Copper, Total Recoverable, (ug/l as Cu)		314	206

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South Bank of Salt River at 40th Street

Date of Sampling	1/10/98	2/4/98	2/24/98
Copper, Dissolved, (ug/l as Cu)	34	61	36
Lead, Total Recoverable, (ug/l as Pb)	61	81	69
Lead, Dissolved, (ug/l as Pb)	9	12	8
Mercury, Total Recoverable, (ug/l as Hg)	0.2	<0.2	<0.2
Mercury, Dissolved, (ug/l as Hg)	<0.2	0.8	<0.2
Nickel, Total Recoverable, (ug/l as Ni)	22	17	38
Nickel, Dissolved, (ug/l as Ni)	<10	7	7.3
Selenium, Total, (ug/l as Se)	<5	<5	<5
Selenium, Dissolved, (ug/l as Se)	<5	<5	<5
Silver, Total Recoverable, (ug/l as Ag)	<50	<50	<50
Silver, Dissolved, (ug/l as Ag)	<50	<50	<50
Thallium, Total, (ug/l as Tl)	<1	<1	<1
Thallium, Dissolved, (ug/l as Tl)	<1	<1	<1
Zinc, Total Recoverable, (ug/l as Zn)	370	520	470
Zinc, Dissolved, (ug/l as Zn)	90	170	100
Aldrin, Total, (ug/l)	<1.0	<1.0	--
BHC - ALPHA, (ug/l)	<1.0	<1.0	--
BHC - Gamma (Lindane), (ug/l)	<1.0	<1.0	--
BHC - DELTA, (ug/l)	<1.0	<1.0	--
Aroclor 1016, PCB, Total, (ug/l)	<1.0	<1.0	--
Aroclor 1221, PCB, Total, (ug/l)	<10	<10	--
Aroclor 1232, PCB, Total, (ug/l)	<1.0	<1.0	--
Aroclor 1242, PCB, Total, (ug/l)	<1.0	<1.0	--
Aroclor 1248, PCB, Total, (ug/l)	<1.0	<1.0	--
Aroclor 1254, PCB, Total, (ug/l)	<1.0	<1.0	--
Aroclor 1260, PCB, Total, (ug/L)	<1.0	<1.0	--
Chlordane, Total, (ug/l)	<1.0	<1.0	--
P,P' DDD, Total, (ug/l)	<1.0	<1.0	--

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South Bank of Salt River at 40th Street

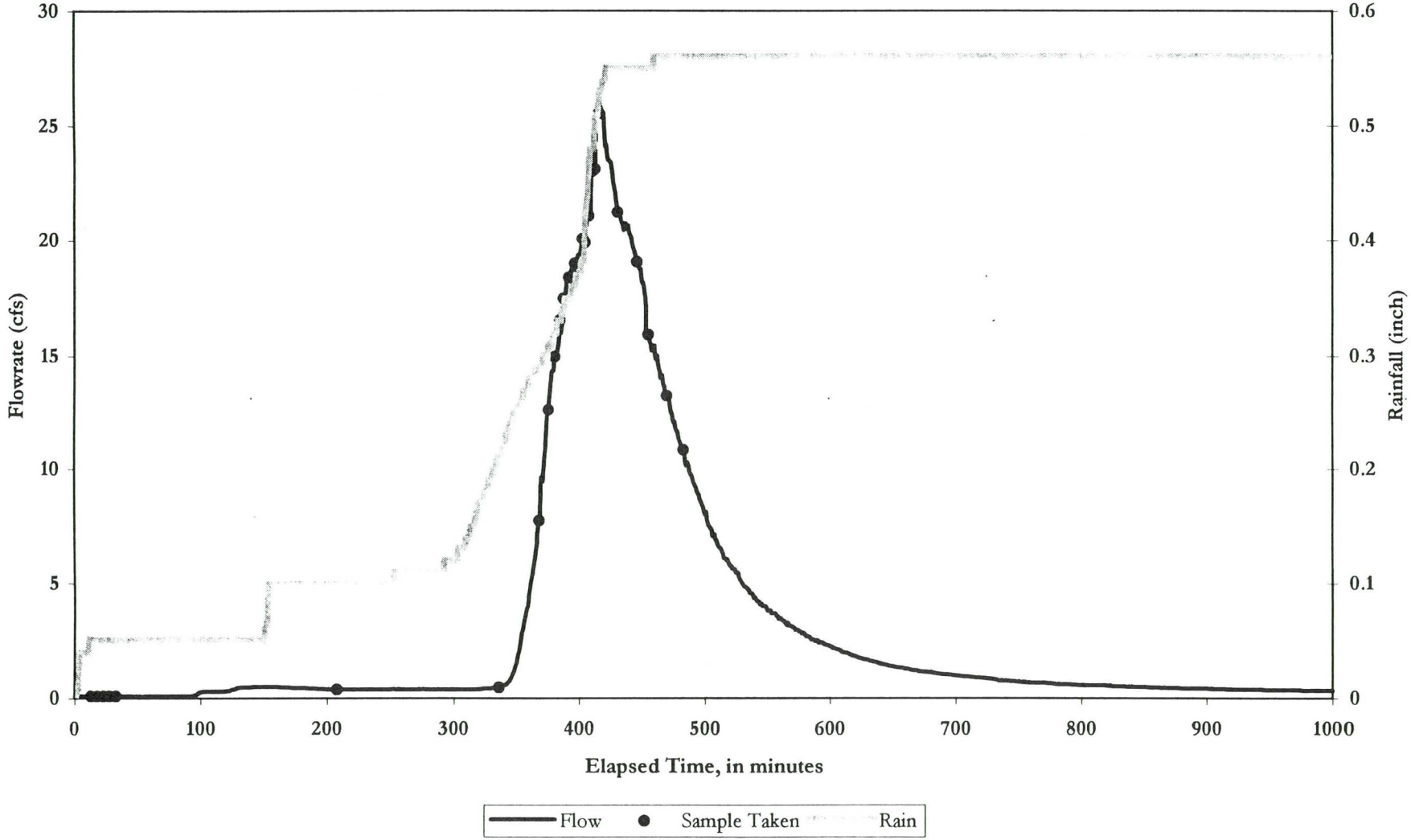
Date of Sampling	1/10/98	2/4/98	2/24/98
P,P' DDE, Total, (ug/l)	<1.0	<1.0	--
P, P' DDT, Total, (ug/l)	<1.0	<1.0	--
Dieldrin, Total, (ug/l)	<1.0	<1.0	--
Endo-Sulfan Alpha, Total, (ug/l)	<1.0	<1.0	--
Endo-Sulfan Beta, Total, (ug/l)	<1.0	<1.0	--
Endo-Sulfan Sulfate, Total, (ug/l)	<1.0	<1.0	--
Endrin Aldehyde, Total, (ug/l)	<1.0	<1.0	--
Endrin, Total, (ug/l)	<1.0	<1.0	--
Heptachlor, Total, (ug/l)	<1.0	<1.0	--
Heptachlor Epoxide, Total, (ug/l)	<1.0	<1.0	--
Toxaphene, Total, (ug/l)	<1.0	<1.0	--
Methoxychlor, Total, (ug/l)	<1.0	<1.0	--
Beta Benzene Hexachloride, Total, (ug/l)	<1.0	<1.0	--
Acenaphthene, Total, (ug/l)	<3.0	<10	--
Acenaphthylene, Total, (ug/l)	<3.0	<10	--
Anthracene, Total, (ug/l)	<3.0	<10	--
Benzidine, Total, (ug/l)	<50	<100	--
Benzoic Acid, Total, (ug/l)	<5.0	18	--
Benzo (a) Anthracene, Total, (ug/l)	<3.0	<10	--
Benzo (b) Fluoranthene, Total, (ug/l)	<5.0	<10	--
Benzo (k) Fluoranthene, Total, (ug/l)	<5.0	<10	--
Benzo (ghi) Perylene, Total, (ug/l)	<3.0	<10	--
Benzo (a) Pyrene, Total, (ug/l)	<3.0	<10	--
Benzyl Alcohol, Total, (ug/l)	<3.0	<10	--
Bis-(2-Chloroethoxy)-Methane, Total, (ug/l)	<3.0	<10	--
Bis-(2-Chloroethyl)-Ether, Total, (ug/l)	<3.0	<10	--
Bis-(2-Chloroisopropyl)-Ether, Total, (ug/l)	<10.0	<20	--
4-Bromo-Phenyl Phenyl Ether, Total, (ug/l)	<3.0	<10	--

SR-45 South Bank of Salt River at 40th Street			
Date of Sampling	1/10/98	2/4/98	2/24/98
Butyl Benzyl Phthalate, Total, (ug/l)	<10.0	<20	--
2-Chloronapthalene, Total, (ug/l)	<3.0	<10	--
2-Chlorophenol, Total, (ug/l)	<3.0	<10	--
4-Chloro-Phenyl Phenyl Ether, Total, (ug/l)	<3.0	<10	--
Chrysene, Total, (ug/l)	<3.0	<10	--
Dibenzo-[a,h]-Anthracene, Total, (ug/l)	<5.0	<10	--
Di-N-Butyl Phthalate, Total, (ug/l)	<3.0	<10	--
3,3'- Dichlorobenzidine, Total, (ug/l)	<5.0	<10	--
2,4- Dichlorophenol, Total, (ug/l)	<3.0	<10	--
Diethyl Phthalate, Total, (ug/l)	<3.0	<10	--
2,4- Dimethylphenol, Total, (ug/l)	<5.0	<10	--
Dimethyl Phthalate, Total, (ug/l)	<3.0	<10	--
2-Methyl-4,6-Dinitrophenol, Total, (ug/l)	<10.0	<10	--
2,4- Dinitrophenol, Total, (ug/l)	<10	<10	--
2,4- Dinitrotoluene, Total, (ug/l)	<5.0	<10	--
2,6- Dinitrotoluene, Total, (ug/l)	<5.0	<10	--
Di-N-Octyl-Phthalate, Total, (ug/l)	18		--
Fluoranthene, Total, (ug/l)	<3.0	<10	--
Fluorene, Total, (ug/l)	<3.0	<10	--
Hexachlorobenzene, Total, (ug/l)	<3.0	<10	--
Hexachlorobutadiene, Total, (ug/l)	<3.0	<10	--
Hexachlorocyclopentadiene, Total, (ug/l)	<10	<10	--
Hexachloroethane, Total, (ug/l)	<3.0	<10	--
Indeno (1,2,3-CD) Pyrene, Total, (ug/l)	<5.0	<10	--
Isophorone, Total, (ug/l)	<3.0	<10	--
Naphthalene, Total, (ug/l)	<3.0	<10	--
Nitrobenzene, Total, (ug/l)	<3.0	<10	--
2-Nitrophenol, Total, (ug/l)	<5.0	<10	--

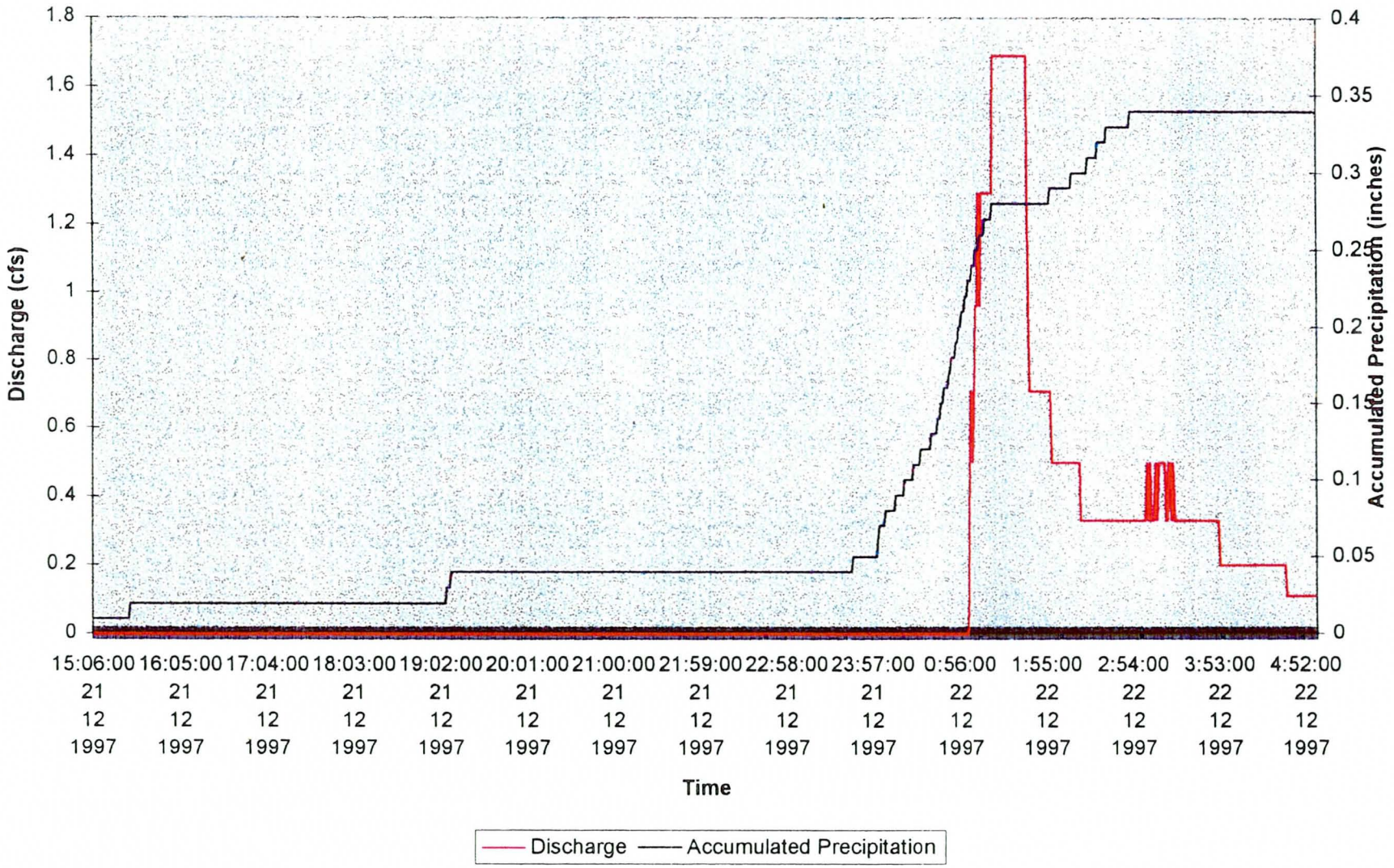
SR-45 South Bank of Salt River at 40th Street			
Date of Sampling	1/10/98	2/4/98	2/24/98
4-Nitrophenol, Total, (ug/l)	<5.0	<10	--
N-Nitrosodiphenylamine, Total, (ug/l)	<3.0	<10	--
N-Nitrosodi-N-Propylamine, Total, (ug/l)	<3.0	<10	--
Pentachlorophenol, Total, (ug/l)	<5.0	<10	--
Phenanthrene, Total, (ug/l)	<3.0	<10	--
Phenol, Total, (ug/l)	<3.0	<10	--
Pyrene, Total, (ug/l)	<3.0	<10	--
1,2,4-Trichlorobenzene, Total, (ug/l)	<3.0	<10	--
2,4,5- Trichlorophenol, Total, (ug/l)	<3.0	<10	--
2,4,6- Trichlorophenol, Total, (ug/l)	<3.0	<10	--

ACDC at 43rd Avenue			
Date of Sampling	8/3/97	12/22/97	2/4/98
Representative Storm Event	Y	Y	Y
Agency Collecting Sample	USGS	USGS	USGS
Agency Analyzing Sample	NWQL	NWQL	NWQL
Drainage Area (acres) (DA)	0.0053	0.0053	0.0053
Impervious Area (acres) (IA)	0.0050	0.0050	0.0050
Land Use - Residential	0	0	0
Land Use - Commercial	97	97	97
Land Use - Industrial	0	0	0
Land Use - Undeveloped	3	3	3
Sampling Duration (minutes)	UA	UA	UA
Storm Duration (minutes) (DRN)	330	486	474
Runoff Sampled (cubic feet) (RUN)	0.01	0.03	0.03
Total Storm Runoff (cubic feet)	UA	UA	UA
Instantaneous Discharge (cfs)	0.34	0.54	0.90
Preceeding Dry Period (days) (ANT)	15	14	24
Total Storm Rainfall (inch)	UA	UA	UA
Rainfall Sampled (inch) (TRN)	0.26	0.43	0.69
Maximum 5-minute rain intensity (MAX5)	0.03	0.07	0.05
Sample Temperature (deg. C)	29.5	14.5	11.5
pH, Effluent (standard units)	6.9	7.4	6.5
Specific Conductance, LAB (us/cm)	162	75	57
Oxygen Dissolved (mg/l)	6.7	--	10
COD High Level (mg/l)	310	150	97
Chloride (mg/l as Cl)	4.9	5.3	2.2
Cyanide Total (mg/l as Cn)	0.014	<0.010	<0.010
Solids Residue at 180 Deg. C (TDS) (mg/l)	224	66	56
Residue, Total at 105 Deg. C (TSS) (mg/l)	60	178	64
Nitrogen No2 + No3, Total (mg/l as N)	2.1	0.52	0.35
Nitrogen, Ammonia + Organic, Total (mg/l as N)	8.9	3.1	2.2

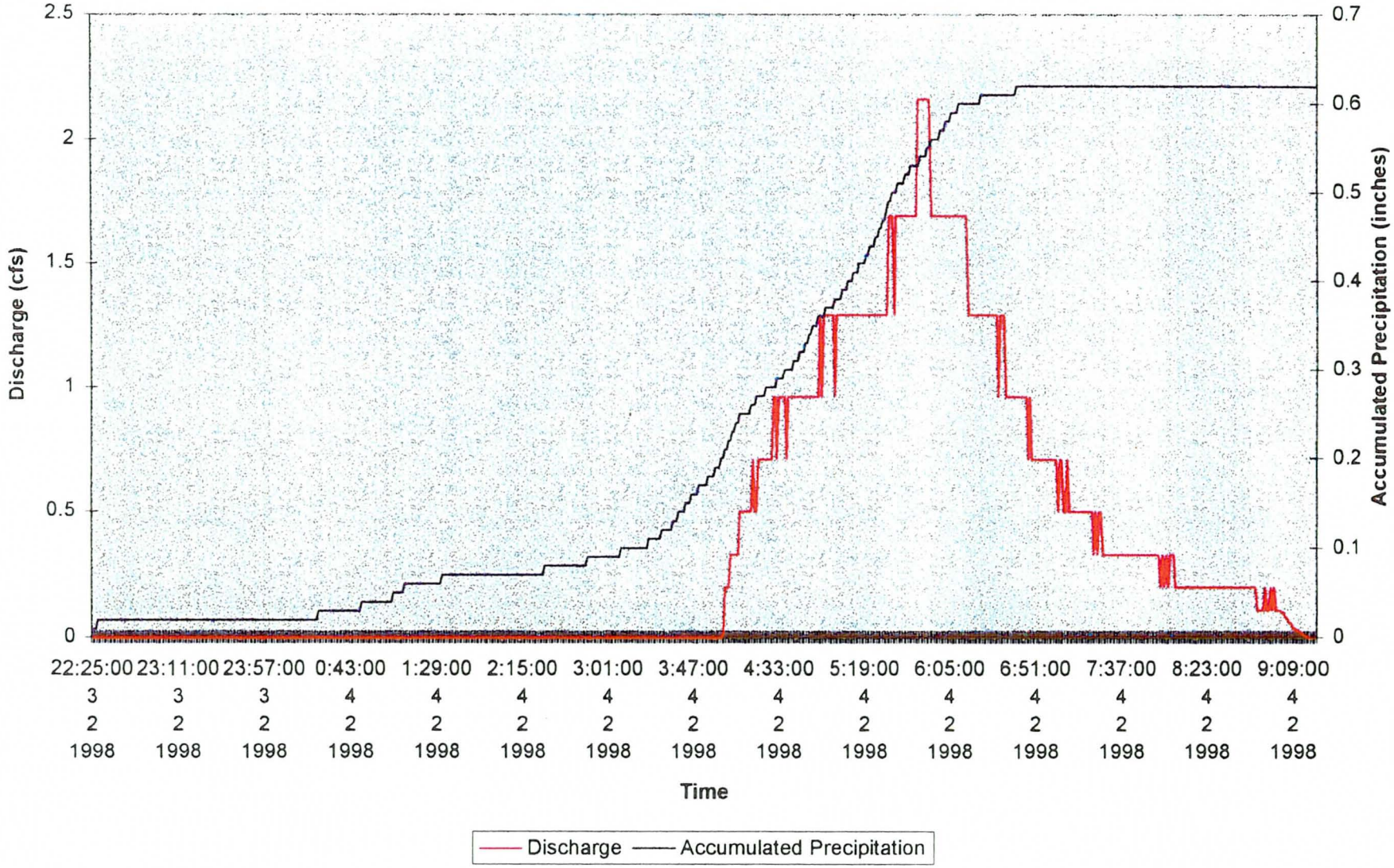
Phoenix SR-03: Salt River and 35th Avenue
04 February 1998



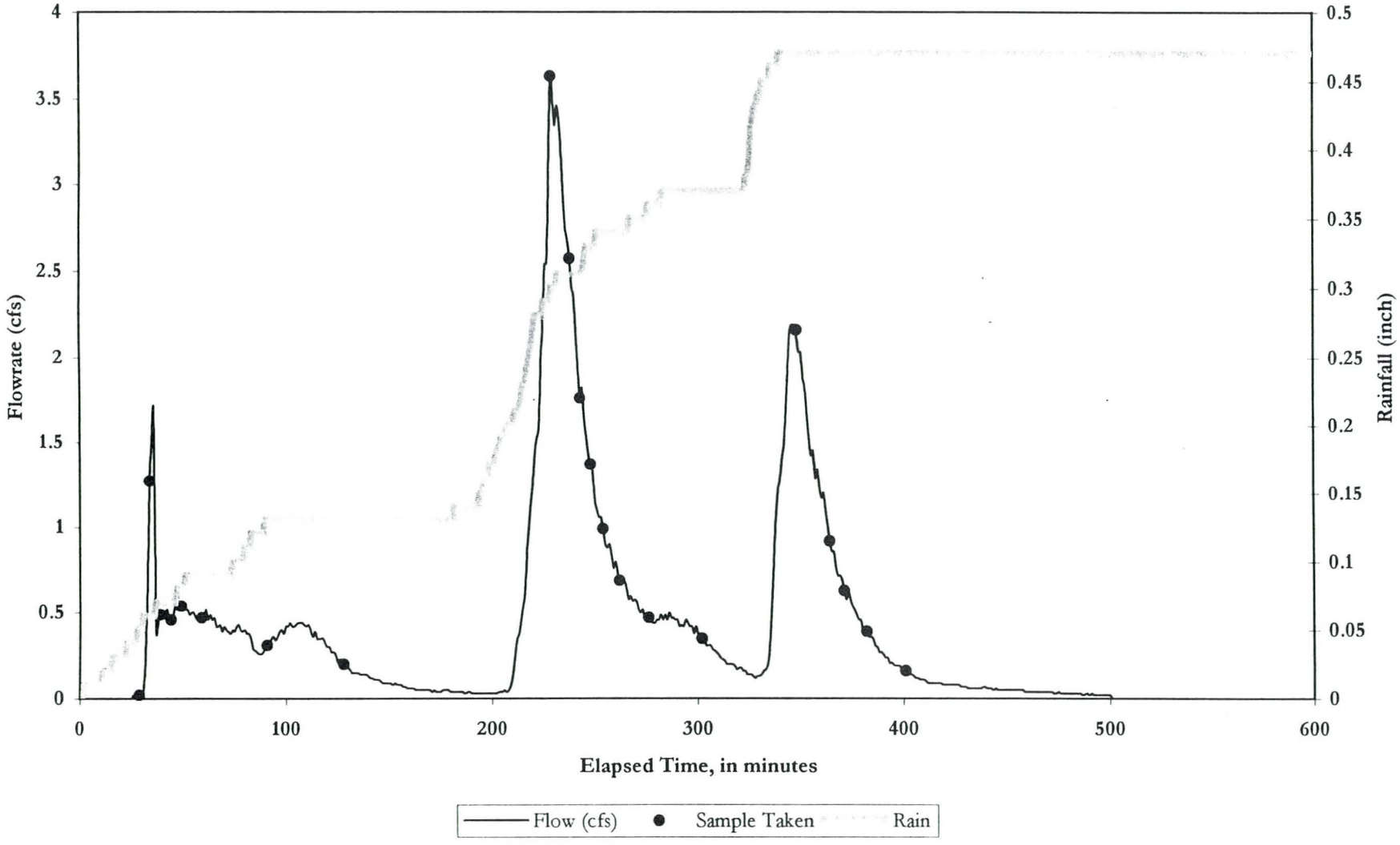
27th Avenue 12-22-97



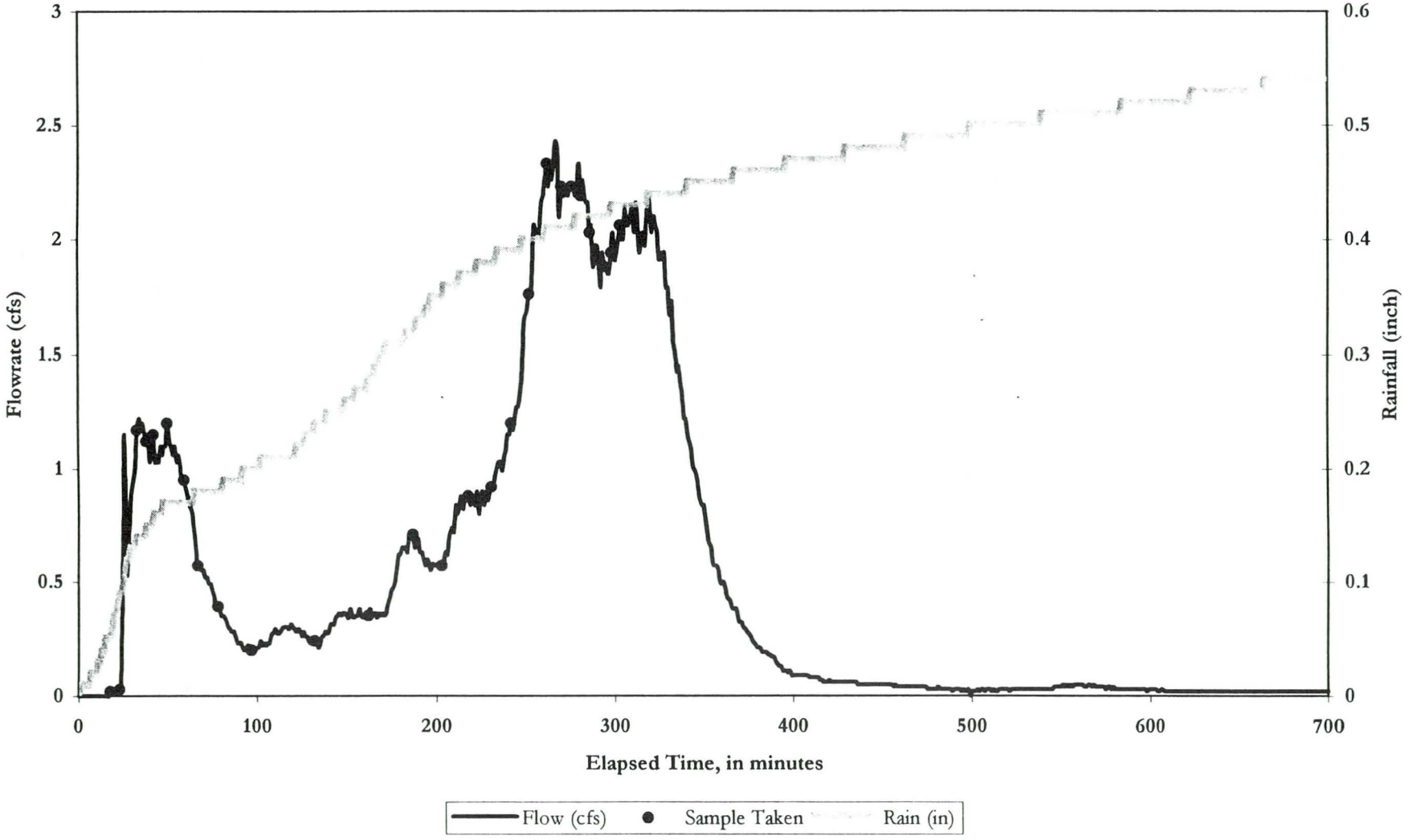
27th Avenue 2-4-98



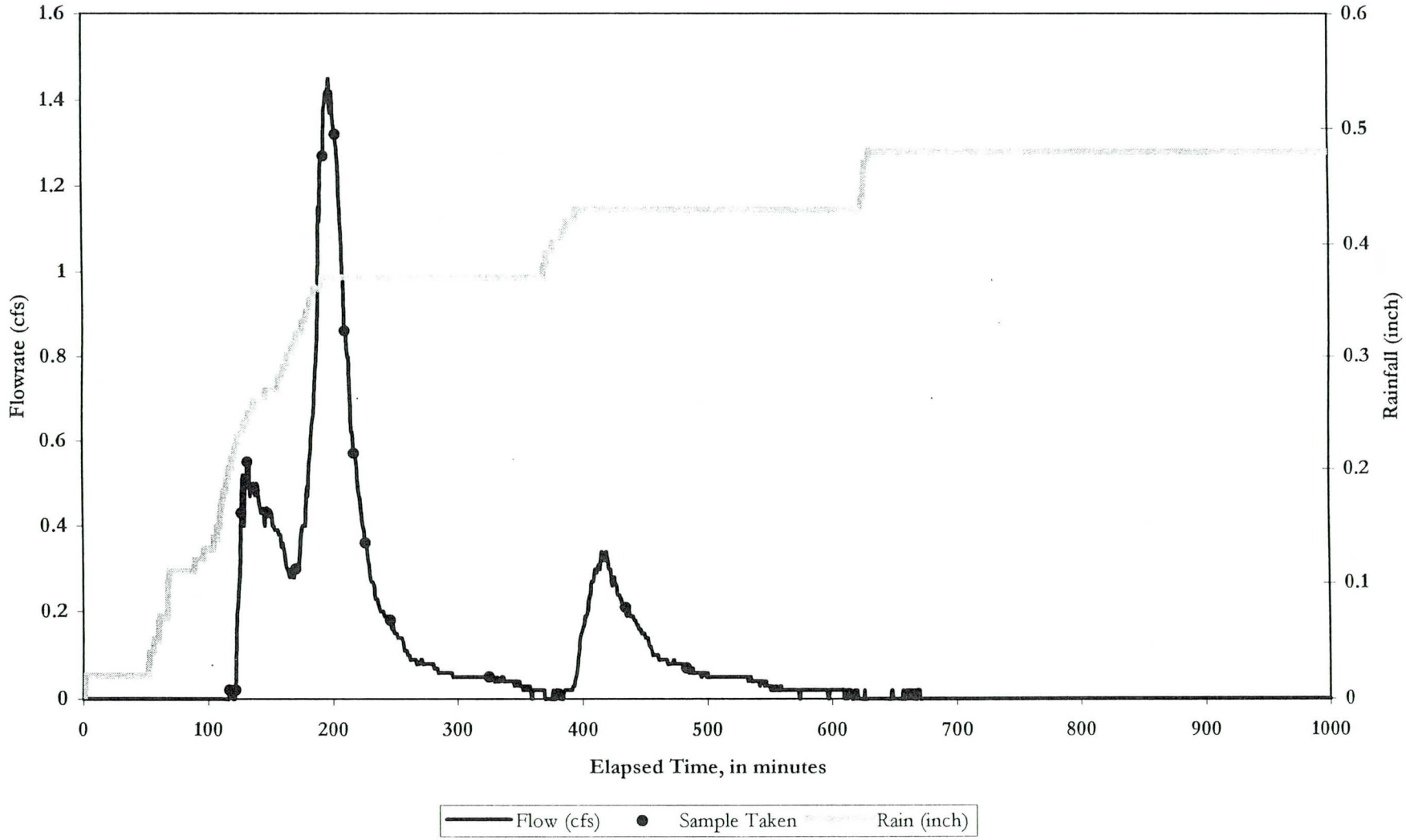
Phoenix SR-45: Salt River and 40th Street
10 January 1998

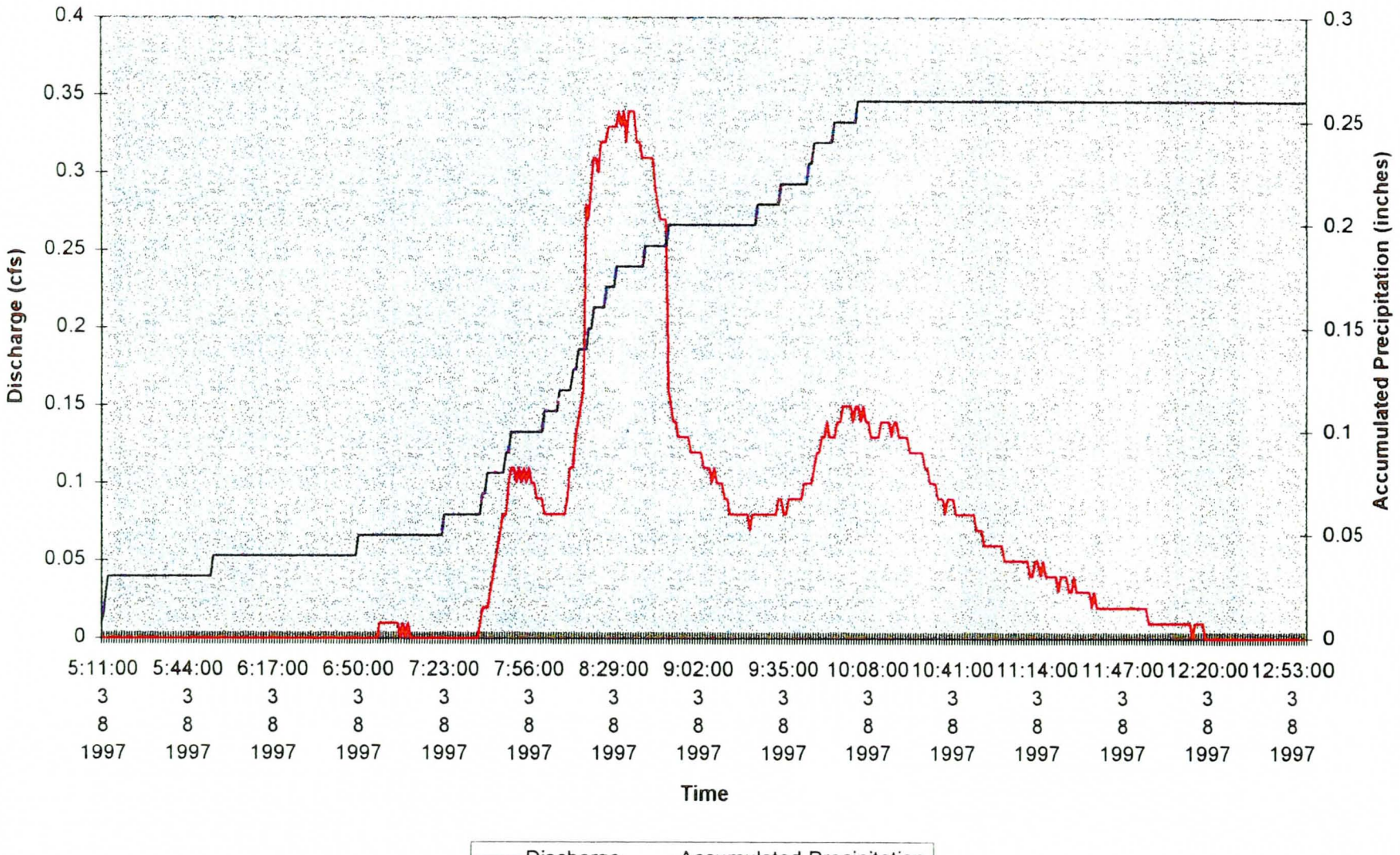


Phoenix SR-45: Salt River and 40th Street
04 February 1998



Phoenix SR-45: 40th Street at Salt River
24 February 1998

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Accumulated Precipitation (inches)
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0.25
0.2
0.15
0.1
0.05
0
0.3
0.25
0.2
0.15
0.1
0.05
0
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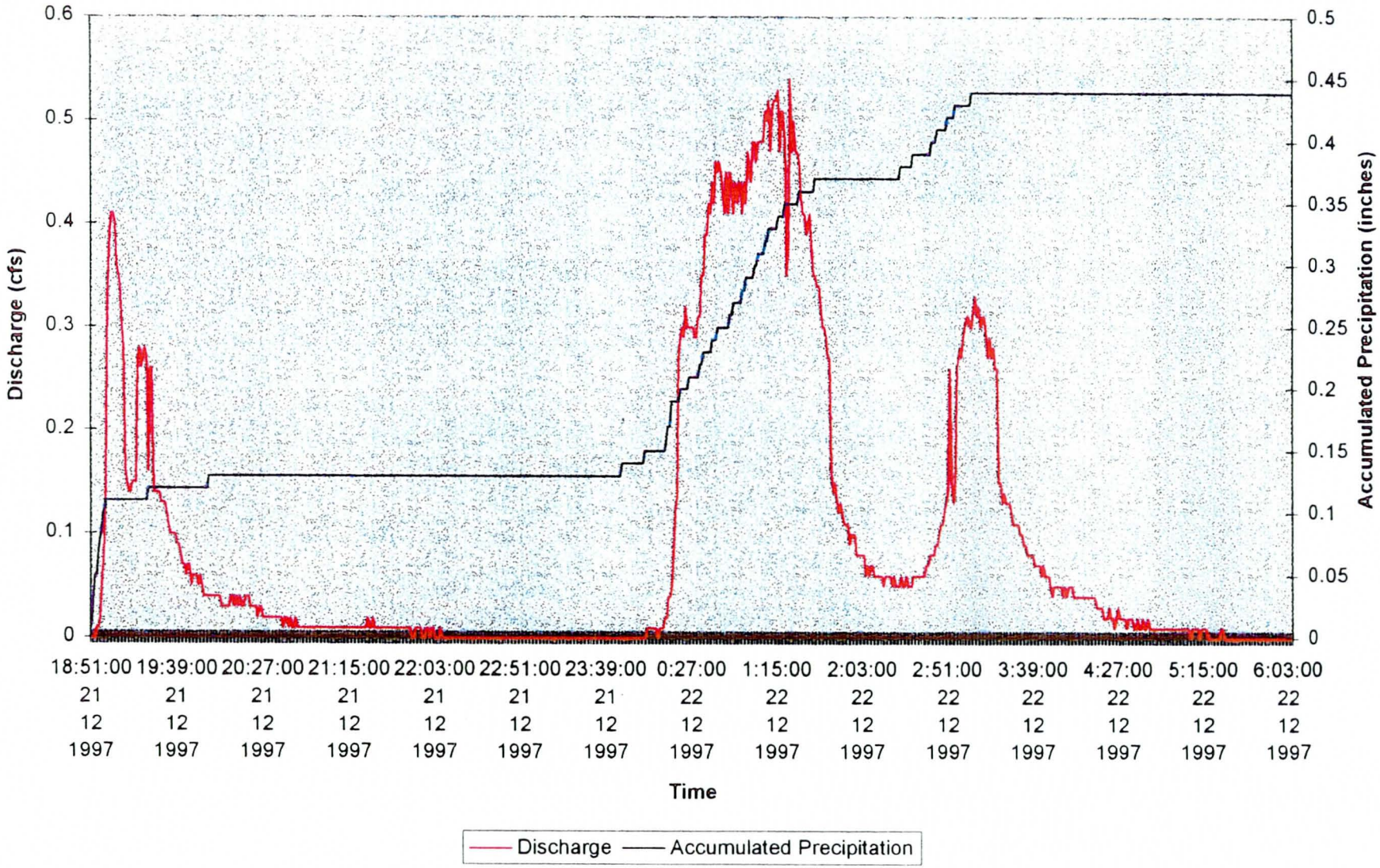
Time
Discharge
Accumulated Precipitation

Peoria 12-22-97



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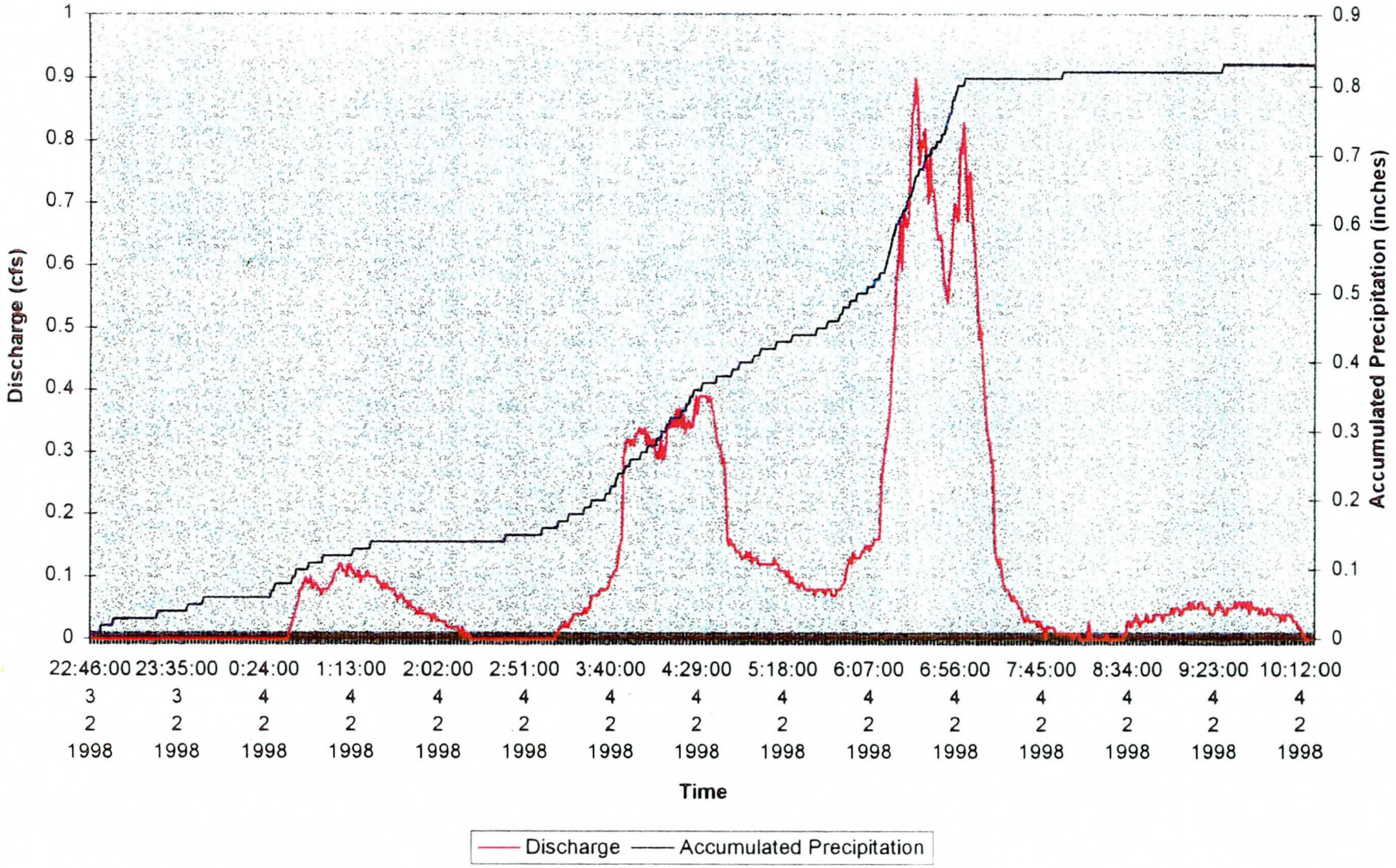
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0.1
0
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10:12:00 4 2 1998
Time
Discharge
Accumulated Precipitation

Chapter 5

POLLUTANT LOADING ESTIMATES

POLLUTANT LOADING ESTIMATES

The City of Phoenix 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 5-1. An in-depth description of the approach and methods used to determine the pollutant load estimates is presented from page 5-3 through page 5-6. Finally, land use specific concentration information and tables summarizing pollutant load estimates for individual watershed basins are provided beginning on page 5-7.

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 Agency1 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 5-3 through 5-6.

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

Table 5-1: Total Pollutant Load Estimates Phoenix Municipal Separate Storm Sewer System

Constituent	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5	1,120,143	3,588,249	4,708,391
COD High Level	3,570,526	11,656,737	15,227,263
Chloride	199,866	645,911	845,778
Cyanide Total	111	358	469
Fecal Coliform			
Fecal Streptococci			
Solids Residue at 180 Deg. C (TDS)	2,340,058	7,539,787	9,879,846
Residue, Total at 105 Deg. C (TSS)	6,815,917	22,206,786	29,022,703
Nitrogen No2 + No3, Total	21,025	68,210	89,235
Nitrogen, Ammonia + Organic, Total	100,687	320,766	421,454
Nitrogen Nitrate Total	20,400	66,230	86,630
Nitrogen Nitrite Total	1,114	3,581	4,695
Nitrogen Ammonia Total	60,945	195,087	256,032
Phosphorous Total	18,080	59,085	77,165
Phosphorous Ortho	3,770	12,286	16,057
Sulfate Dissolved	474,644	1,550,276	2,024,921
Phenols Total Recoverable	1,602	5,264	6,866
Oil and Grease Total Recoverable	99,487	322	99,809
Organic Carbon, Total	818,552	2,629,470	3,448,022
Arsenic Total	88	283	371
Beryllium Total Recoverable	19	62	82
Cadmium Total Recoverable	25	81	106
Chromium Total Recoverable	278	905	1,183
Copper, Total Recoverable	2,091	6,859	8,950
Lead, Total Recoverable	838	2,682	3,519
Mercury, Total Recoverable	3	10	13
Nickel, Total Recoverable	251	811	1,062
Selenium, Total	49	160	209
Silver, Total Recoverable	511	1,683	2,194
Zinc, Total Recoverable	3,545	11,501	15,046

Citywide Pollutant Loads

Seasonal and annual pollutant loads were developed for all 10 of the City's hydrologic basins for the period of July 1, 1997 through June 30, 1998. Winter, summer, and total annual loads were computed for all water quality parameters where sufficient validated data was available. The "Simple Method" as described in the Environmental Protection Agency's (EPA) guidance documents was used in performing this analysis.[2]

The following methodology was used in developing pollutant loads:

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

2. Weighted average runoff coefficients ("C" factors) were developed for each catchment based on published literature values that were adjusted for local conditions.[3]

   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. Runoff volumes were calculated using the formula Q = C x I x A, where Q is the runoff volume in

acre-inch, C is the weighted average runoff coefficient, and A is the catchment area in acres.

3. Monthly rainfall data from July 1997 to June 1998 was obtained for 28 rain gauges in the Phoenix area from the Maricopa County Flood Control District's Internet web page. A corresponding rain gauge that was most representative of rainfall within the area was identified for each catchment. 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 $Q = 0.9 \times C \times I \times A$. This is similar to the formula discussed earlier except that 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 Avenue at SR) – pollutant concentrations from this outfall were assumed to be representative of industrial activity.

6. Pollutant concentrations for residential activities were developed using flow-weighted averages of measured values from the north bank of Indian Bend Wash and 40th Street outfall (catchment IB-08) and the ACDC at 43rd Avenue data. Since the IB-08 catchment is comprised of residential and commercial land uses, pollutant concentrations for residential activities were obtained using the following equation:

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

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

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

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

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)
%Industrial Land Use = percent of area in SR-45 that has industrial uses
%Open Space = percent of area in SR-45 that is open space

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 5-1. 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.

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 citywide total are presented in Tables 5-2 through 5-12.

The approach presented above represents the simple method for determining seasonal and annual pollutant loads, as per EPA's guidance criteria. Results from the City's 1997 and 1998 monitoring data were used to correlate pollutant concentrations with land uses for 10 hydrologic basins in Phoenix.

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

[3] Viessman (1972) and Viessman et al. (1977), *Urban Stormwater Hydrology*

Table 5-2: Land Use Specific Pollutant Concentrations

Parameter	Open Space Pollutant Concentrations	Residential Land Use Pollutant Concentrations	Industrial Land Use Pollutant Concentrations	Comercial Land Use Pollutant Concentrations
BOD5 (mg/l)	0.00	44.94	348.00	32.00
COD High Level (mg/l)	304.08	245.78	244.67	112.80
Chloride (mg/l as Cl)	0.00	13.94	37.67	3.94
Cyanide Total (mg/l as Cn)	0.00	0.00	0.02	0.03
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	130.66	523.47	102.60
Residue, Total at 105 Deg. C (TSS) (mg/l)	0.00	658.41	501.07	105.80
Nitrogen No2 + No3, Total (mg/l as N)	0.00	1.65	2.67	0.86
Nitrogen, Ammonia + Organic, Total (mg/l	0.00	2.21	38.97	3.31
Nitrogen Nitrate Total (mg/l as N)	0.00	1.65	2.38	0.83
Nitrogen Nitrite Total (mg/l as N)	0.00	0.06	0.29	0.03
Nitrogen Ammonia Total (mg/l as N)	0.00	2.29	19.55	1.81
Phosphorous Total (mg/l as P)	2.46	0.99	1.33	0.44
Phosphorous Ortho (mg/l as P)	0.22	0.26	0.30	0.20
Sulfate Dissolved (mg/l)	51.94	30.03	34.93	9.93
Phenols Total Recoverable (ug/l)	223.80	117.75	9.93	8.30
Oil and Grease Total Recoverable (mg/l)	0.00	4.23	10.47	20.30
Organic Carbon, Total (mg/l)	0.00	38.15	218.67	34.18
Arsenic Total (ug/l as As)	0.00	6.30	14.93	2.35
Beryllium Total Recoverable (ug/l as Be)	0.00	0.15	5.00	4.00
Cadmium Total Recoverable (ug/l as Cd)	5.37	0.65	2.47	0.55
Chromium Total Recoverable (ug/l as Cr)	15.78	22.28	21.07	3.40
Copper, Total Recoverable, (ug/l as Cu)	566.70	41.22	151.20	15.60
Lead, Total Recoverable, (ug/l as Pb)	0.00	35.06	272.67	6.90
Mercury, Total Recoverable, (ug/l as Hg)	0.43	0.21	0.05	0.04
Nickel, Total Recoverable, (ug/l as Ni)	0.00	17.26	43.97	8.90
Selenium, Total, (ug/l as Se)	8.19	3.09	0.50	0.40
Silver, Total Recoverable, (ug/l as Ag)	94.73	31.94	0.50	0.40
Zinc, Total Recoverable, (ug/l as Zn)	247.13	185.39	522.00	160.00

Table 5-3: East Fork of Cave Creek Basin Pollutant Loadings

TOTAL AREA: 3179.82 acres Residential: 45.21% Industrial : 5.80% Undeveloped: 36.54% Commercial: 2.45%
Total summer (Apr-Sept) Runoff, cubic feet: 5,357,072 Total Winter (Oct-Mar) Runoff, cubic feet: 21,438,719

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	41.29	13,797	55,217	69,014
COD High Level (mg/l)	239.18	79,933	319,888	399,821
Chloride (mg/l as Cl)	8.58	2,869	11,481	14,350
Cyanide Total (mg/l as Cn)	0.003	1	4	4
Fecal Coliform (CFU/100mL)	38,600.24			
Fecal Streptococci (CFU/100mL)	114,406.23			
Solids Residue at 180 Deg. C (TDS) (mg/l)	91.95	30,728	122,971	153,699
Residue, Total at 105 Deg. C (TSS) (mg/l)	329.32	110,057	440,441	550,498
Nitrogen No2 + No3, Total (mg/l as N)	0.92	307	1,230	1,538
Nitrogen, Ammonia + Organic, Total (mg/l as N)	3.34	1,116	4,465	5,581
Nitrogen Nitrate Total (mg/l as N)	0.90	302	1,207	1,508
Nitrogen Nitrite Total (mg/l as N)	0.04	15	58	73
Nitrogen Ammonia Total (mg/l as N)	2.21	740	2,960	3,700
Phosphorous Total (mg/l as P)	1.43	479	1,918	2,397
Phosphorous Ortho (mg/l as P)	0.22	73	293	366
Sulfate Dissolved (mg/l)	34.83	11,638	46,576	58,214
Phenols Total Recoverable (ug/l)	135.79	45	182	227
Oil and Grease Total Recoverable (mg/l)	3.02	1,008	4	1,012
Organic Carbon, Total (mg/l)	30.77	10,282	41,149	51,432
Arsenic Total (ug/l as As)	3.77	1	5	6
Beryllium Total Recoverable (ug/l as Be)	0.46	0	1	1
Cadmium Total Recoverable (ug/l as Cd)	2.42	1	3	4
Chromium Total Recoverable (ug/l as Cr)	17.14	6	23	29
Copper, Total Recoverable, (ug/l as Cu)	234.86	78	314	393
Lead, Total Recoverable, (ug/l as Pb)	31.83	11	43	53
Mercury, Total Recoverable, (ug/l as Hg)	0.25	0	0	0
Nickel, Total Recoverable, (ug/l as Ni)	10.57	4	14	18
Selenium, Total, (ug/l as Se)	4.43	1	6	7
Silver, Total Recoverable, (ug/l as Ag)	49.09	16	66	82
Zinc, Total Recoverable, (ug/l as Zn)	208.31	70	279	348

Table 5-4: Grand Canal Basin Pollutant Loadings

TOTAL AREA: 313.5 acres Residential: 27.90% Industrial : 22.95% Undeveloped: 6.79% Commercial: 42.35%
Total summer (Apr-Sept) Runoff, cubic feet: 895,062 Total Winter (Oct-Mar) Runoff, cubic feet: 2,569,694

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	105.96	5,916	16,985	22,902
COD High Level (mg/l)	193.14	10,784	30,962	41,746
Chloride (mg/l as Cl)	14.20	793	2,277	3,070
Cyanide Total (mg/l as Cn)	0.02	1	3	4
Fecal Coliform (CFU/100mL)	9,099.39			
Fecal Streptococci (CFU/100mL)	27,035.85			
Solids Residue at 180 Deg. C (TDS) (mg/l)	200.04	11,170	32,068	43,237
Residue, Total at 105 Deg. C (TSS) (mg/l)	343.50	19,180	55,065	74,245
Nitrogen No2 + No3, Total (mg/l as N)	1.44	80	230	310
Nitrogen, Ammonia + Organic, Total (mg/l as N)	10.96	612	1,757	2,369
Nitrogen Nitrate Total (mg/l as N)	1.36	76	217	293
Nitrogen Nitrite Total (mg/l as N)	0.10	5	15	21
Nitrogen Ammonia Total (mg/l as N)	5.89	329	945	1,273
Phosphorous Total (mg/l as P)	0.93	52	150	202
Phosphorous Ortho (mg/l as P)	0.24	13	39	52
Sulfate Dissolved (mg/l)	24.13	1,347	3,868	5,215
Phenols Total Recoverable (ug/l)	53.84	3	9	12
Oil and Grease Total Recoverable (mg/l)	12.18	680	2	682
Organic Carbon, Total (mg/l)	75.30	4,205	12,072	16,276
Arsenic Total (ug/l as As)	6.18	0	1	1
Beryllium Total Recoverable (ug/l as Be)	2.88	0	0	1
Cadmium Total Recoverable (ug/l as Cd)	1.35	0	0	0
Chromium Total Recoverable (ug/l as Cr)	13.56	1	2	3
Copper, Total Recoverable, (ug/l as Cu)	91.29	5	15	20
Lead, Total Recoverable, (ug/l as Pb)	75.28	4	12	16
Mercury, Total Recoverable, (ug/l as Hg)	0.11	0	0	0
Nickel, Total Recoverable, (ug/l as Ni)	18.67	1	3	4
Selenium, Total, (ug/l as Se)	1.70	0	0	0
Silver, Total Recoverable, (ug/l as Ag)	15.63	1	3	3
Zinc, Total Recoverable, (ug/l as Zn)	256.06	14	41	55

Table 5-5: Indian Bend Wash Basin Pollutant Loadings

TOTAL AREA: 6985.37 acres Residential: 73.55% Industrial : 0.00% Undeveloped: 13.24% Commercial: 13.20%
Total summer (Apr-Sept) Runoff, cubic feet: 15,924,107 Total Winter (Oct-Mar) Runoff, cubic feet: 52,308,787

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	37.28	37,032	121,647	158,679
COD High Level (mg/l)	235.92	234,366	769,865	1,004,232
Chloride (mg/l as Cl)	10.77	10,703	35,159	45,863
Cyanide Total (mg/l as Cn)	0.01	5	17	22
Fecal Coliform (CFU/100mL)	14,668.13			
Fecal Streptococci (CFU/100mL)	46,026.23			
Solids Residue at 180 Deg. C (TDS) (mg/l)	109.64	108,920	357,791	466,711
Residue, Total at 105 Deg. C (TSS) (mg/l)	498.23	494,939	1,625,814	2,120,753
Nitrogen No2 + No3, Total (mg/l as N)	1.32	1,315	4,321	5,636
Nitrogen, Ammonia + Organic, Total (mg/l as N)	2.06	2,045	6,718	8,764
Nitrogen Nitrate Total (mg/l as N)	1.32	1,310	4,305	5,615
Nitrogen Nitrite Total (mg/l as N)	0.05	47	153	200
Nitrogen Ammonia Total (mg/l as N)	1.92	1,911	6,277	8,188
Phosphorous Total (mg/l as P)	1.11	1,103	3,623	4,725
Phosphorous Ortho (mg/l as P)	0.25	245	806	1,051
Sulfate Dissolved (mg/l)	30.27	30,074	98,790	128,864
Phenols Total Recoverable (ug/l)	117.33	117	383	499
Oil and Grease Total Recoverable (mg/l)	5.79	5,753	19	5,772
Organic Carbon, Total (mg/l)	32.57	32,356	106,286	138,643
Arsenic Total (ug/l as As)	4.94	5	16	21
Beryllium Total Recoverable (ug/l as Be)	0.64	1	2	3
Cadmium Total Recoverable (ug/l as Cd)	1.26	1	4	5
Chromium Total Recoverable (ug/l as Cr)	18.92	19	62	81
Copper, Total Recoverable, (ug/l as Cu)	107.41	107	351	457
Lead, Total Recoverable, (ug/l as Pb)	26.70	27	87	114
Mercury, Total Recoverable, (ug/l as Hg)	0.21	0	1	1
Nickel, Total Recoverable, (ug/l as Ni)	13.87	14	45	59
Selenium, Total, (ug/l as Se)	3.41	3	11	15
Silver, Total Recoverable, (ug/l as Ag)	36.09	36	118	154
Zinc, Total Recoverable, (ug/l as Zn)	190.19	189	621	810

Table 5-6: Old Cross Cut Canal Basin Pollutant Loadings

TOTAL AREA: 1683.13 acres Residential: 64.39% Industrial : 5.71% Undeveloped: 15.88% Commercial 14.01%
Total summer (Apr-Sept) Runoff, cubic feet: 3,335,291 Total Winter (Oct-Mar) Runoff, cubic feet: 9,311,775

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	53.29	11,088	30,957	42,045
COD High Level (mg/l)	236.32	49,171	137,279	186,450
Chloride (mg/l as Cl)	11.68	2,430	6,785	9,215
Cyanide Total (mg/l as Cn)	0.01	1	4	5
Fecal Coliform (CFU/100mL)	17,652.33			
Fecal Streptococci (CFU/100mL)	54,179.11			
Solids Residue at 180 Deg. C (TDS) (mg/l)	128.40	26,715	74,586	101,301
Residue, Total at 105 Deg. C (TSS) (mg/l)	467.39	97,247	271,504	368,751
Nitrogen No2 + No3, Total (mg/l as N)	1.33	277	774	1,051
Nitrogen, Ammonia + Organic, Total (mg/l as N)	4.11	855	2,387	3,242
Nitrogen Nitrate Total (mg/l as N)	1.31	273	762	1,035
Nitrogen Nitrite Total (mg/l as N)	0.06	12	34	46
Nitrogen Ammonia Total (mg/l as N)	2.84	592	1,652	2,244
Phosphorous Total (mg/l as P)	1.16	242	676	919
Phosphorous Ortho (mg/l as P)	0.25	51	144	195
Sulfate Dissolved (mg/l)	30.97	6,444	17,990	24,434
Phenols Total Recoverable (ug/l)	113.09	24	66	89
Oil and Grease Total Recoverable (mg/l)	6.17	1,283	4	1,286
Organic Carbon, Total (mg/l)	41.84	8,705	24,304	33,010
Arsenic Total (ug/l as As)	5.24	1	3	4
Beryllium Total Recoverable (ug/l as Be)	0.94	0	1	1
Cadmium Total Recoverable (ug/l as Cd)	1.49	0	1	1
Chromium Total Recoverable (ug/l as Cr)	18.53	4	11	15
Copper, Total Recoverable, (ug/l as Cu)	127.36	26	74	100
Lead, Total Recoverable, (ug/l as Pb)	39.11	8	23	31
Mercury, Total Recoverable, (ug/l as Hg)	0.21	0	0	0
Nickel, Total Recoverable, (ug/l as Ni)	14.87	3	9	12
Selenium, Total, (ug/l as Se)	3.38	1	2	3
Silver, Total Recoverable, (ug/l as Ag)	35.69	7	21	28
Zinc, Total Recoverable, (ug/l as Zn)	210.84	44	122	166

Table 5-7: Arizona Canal Basin Pollutant Loadings

TOTAL AREA: 10640.67 acres Residential: 63.28% Industrial : 4.82% Undeveloped: 15.79% Commercial: 16.11%
Total summer (Apr-Sept) Runoff, cubic feet: 18,709,013 Total Winter (Oct-Mar) Runoff, cubic feet: 77,635,717

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	50.37	58,786	243,939	302,725
COD High Level (mg/l)	233.51	272,538	1,130,935	1,403,472
Chloride (mg/l as Cl)	11.27	13,157	54,596	67,753
Cyanide Total (mg/l as Cn)	0.01	8	32	40
Fecal Coliform (CFU/100mL)	17,492.30			
Fecal Streptococci (CFU/100mL)	53,664.57			
Solids Residue at 180 Deg. C (TDS) (mg/l)	124.44	145,240	602,694	747,935
Residue, Total at 105 Deg. C (TSS) (mg/l)	457.84	534,358	2,217,393	2,751,750
Nitrogen No2 + No3, Total (mg/l as N)	1.31	1,527	6,338	7,866
Nitrogen, Ammonia + Organic, Total (mg/l as N)	3.81	4,444	18,439	22,883
Nitrogen Nitrate Total (mg/l as N)	1.29	1,505	6,243	7,748
Nitrogen Nitrite Total (mg/l as N)	0.06	65	270	335
Nitrogen Ammonia Total (mg/l as N)	2.68	3,132	12,995	16,127
Phosphorous Total (mg/l as P)	1.15	1,340	5,561	6,902
Phosphorous Ortho (mg/l as P)	0.25	287	1,190	1,477
Sulfate Dissolved (mg/l)	30.49	35,583	147,656	183,238
Phenols Total Recoverable (ug/l)	111.67	130	541	671
Oil and Grease Total Recoverable (mg/l)	6.45	7,530	31	7,561
Organic Carbon, Total (mg/l)	40.19	46,904	194,636	241,540
Arsenic Total (ug/l as As)	5.09	6	25	31
Beryllium Total Recoverable (ug/l as Be)	0.98	1	5	6
Cadmium Total Recoverable (ug/l as Cd)	1.47	2	7	9
Chromium Total Recoverable (ug/l as Cr)	18.15	21	88	109
Copper, Total Recoverable, (ug/l as Cu)	125.37	146	607	754
Lead, Total Recoverable, (ug/l as Pb)	36.44	43	176	219
Mercury, Total Recoverable, (ug/l as Hg)	0.21	0	1	1
Nickel, Total Recoverable, (ug/l as Ni)	14.47	17	70	87
Selenium, Total, (ug/l as Se)	3.34	4	16	20
Silver, Total Recoverable, (ug/l as Ag)	35.26	41	171	212
Zinc, Total Recoverable, (ug/l as Zn)	207.27	242	1,004	1,246

Table 5-8: Cave Creek Basin Pollutant Loadings

TOTAL AREA: 4328.31 acres Residential: 53.80% Industrial : 6.89% Undeveloped: 20.40% Commercial: 18.91%
Total summer (Apr-Sept) Runoff, cubic feet: 8,329,820 Total Winter (Oct-Mar) Runoff, cubic feet: 31,579,414

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	54.21	28,168	106,789	134,957
COD High Level (mg/l)	232.45	120,792	457,936	578,728
Chloride (mg/l as Cl)	10.84	5,633	21,357	26,991
Cyanide Total (mg/l as Cn)	0.01	4	15	19
Fecal Coliform (CFU/100mL)	22,257.53			
Fecal Streptococci (CFU/100mL)	67,049.98			
Solids Residue at 180 Deg. C (TDS) (mg/l)	125.76	65,352	247,759	313,111
Residue, Total at 105 Deg. C (TSS) (mg/l)	408.76	212,407	805,261	1,017,667
Nitrogen No2 + No3, Total (mg/l as N)	1.23	640	2,427	3,067
Nitrogen, Ammonia + Organic, Total (mg/l as N)	4.50	2,337	8,860	11,198
Nitrogen Nitrate Total (mg/l as N)	1.21	627	2,375	3,002
Nitrogen Nitrite Total (mg/l as N)	0.06	30	113	142
Nitrogen Ammonia Total (mg/l as N)	2.92	1,518	5,755	7,273
Phosphorous Total (mg/l as P)	1.21	628	2,380	3,007
Phosphorous Ortho (mg/l as P)	0.24	126	478	604
Sulfate Dissolved (mg/l)	31.04	16,128	61,142	77,270
Phenols Total Recoverable (ug/l)	111.26	58	219	277
Oil and Grease Total Recoverable (mg/l)	6.84	3,552	13	3,566
Organic Carbon, Total (mg/l)	42.05	21,853	82,848	104,702
Arsenic Total (ug/l as As)	4.86	3	10	12
Beryllium Total Recoverable (ug/l as Be)	1.18	1	2	3
Cadmium Total Recoverable (ug/l as Cd)	1.72	1	3	4
Chromium Total Recoverable (ug/l as Cr)	17.30	9	34	43
Copper, Total Recoverable, (ug/l as Cu)	151.15	79	298	376
Lead, Total Recoverable, (ug/l as Pb)	38.95	20	77	97
Mercury, Total Recoverable, (ug/l as Hg)	0.21	0	0	1
Nickel, Total Recoverable, (ug/l as Ni)	13.99	7	28	35
Selenium, Total, (ug/l as Se)	3.44	2	7	9
Silver, Total Recoverable, (ug/l as Ag)	36.62	19	72	91
Zinc, Total Recoverable, (ug/l as Zn)	216.37	112	426	539

Table 5-9: Skunk Creek Basin Pollutant Loadings

TOTAL AREA: 2742.7 acres Residential: 45.95% Industrial : 12.39% Undeveloped: 32.66% Commercial: 9.00%
Total summer (Apr-Sept) Runoff, cubic feet: 3,416,591 Total Winter (Oct-Mar) Runoff, cubic feet: 16,278,732

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	66.65	14,205	67,682	81,887
COD High Level (mg/l)	252.72	53,863	256,638	310,501
Chloride (mg/l as Cl)	11.43	2,436	11,605	14,041
Cyanide Total (mg/l as Cn)	0.01	1	6	7
Fecal Coliform (CFU/100mL)	35,096.23			
Fecal Streptococci (CFU/100mL)	104,053.73			
Solids Residue at 180 Deg. C (TDS) (mg/l)	134.13	28,588	136,212	164,800
Residue, Total at 105 Deg. C (TSS) (mg/l)	374.15	79,744	379,952	459,696
Nitrogen No2 + No3, Total (mg/l as N)	1.16	248	1,182	1,431
Nitrogen, Ammonia + Organic, Total (mg/l as N)	6.14	1,309	6,235	7,544
Nitrogen Nitrate Total (mg/l as N)	1.13	240	1,143	1,383
Nitrogen Nitrite Total (mg/l as N)	0.06	14	66	80
Nitrogen Ammonia Total (mg/l as N)	3.64	775	3,694	4,469
Phosphorous Total (mg/l as P)	1.46	312	1,485	1,796
Phosphorous Ortho (mg/l as P)	0.25	52	249	302
Sulfate Dissolved (mg/l)	35.98	7,670	36,543	44,213
Phenols Total Recoverable (ug/l)	129.18	28	131	159
Oil and Grease Total Recoverable (mg/l)	5.07	1,080	5	1,085
Organic Carbon, Total (mg/l)	47.70	10,166	48,439	58,606
Arsenic Total (ug/l as As)	4.96	1	5	6
Beryllium Total Recoverable (ug/l as Be)	1.05	0	1	1
Cadmium Total Recoverable (ug/l as Cd)	2.41	1	2	3
Chromium Total Recoverable (ug/l as Cr)	18.31	4	19	22
Copper, Total Recoverable, (ug/l as Cu)	224.16	48	228	275
Lead, Total Recoverable, (ug/l as Pb)	50.51	11	51	62
Mercury, Total Recoverable, (ug/l as Hg)	0.24	0	0	0
Nickel, Total Recoverable, (ug/l as Ni)	14.17	3	14	17
Selenium, Total, (ug/l as Se)	4.19	1	4	5
Silver, Total Recoverable, (ug/l as Ag)	45.71	10	46	56
Zinc, Total Recoverable, (ug/l as Zn)	244.97	52	249	301

Table 5-10: Papago Diversion Channel Basin Pollutant Loadings

TOTAL AREA: 20605.56 acres Residential: 67.34% Industrial : 7.70% Undeveloped: 14.93% Commercial: 10.02%
Total summer (Apr-Sept) Runoff, cubic feet: 43,113,547 Total Winter (Oct-Mar) Runoff, cubic feet: 141,879,680

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	60.27	162,089	533,409	695,498
COD High Level (mg/l)	241.05	648,325	2,133,531	2,781,855
Chloride (mg/l as Cl)	12.68	34,114	112,262	146,376
Cyanide Total (mg/l as Cn)	0.01	15	49	64
Fecal Coliform (CFU/100mL)	16,835.31			
Fecal Streptococci (CFU/100mL)	51,923.34			
Solids Residue at 180 Deg. C (TDS) (mg/l)	138.57	372,705	1,226,511	1,599,216
Residue, Total at 105 Deg. C (TSS) (mg/l)	492.56	1,324,767	4,359,592	5,684,359
Nitrogen No2 + No3, Total (mg/l as N)	1.40	3,765	12,391	16,156
Nitrogen, Ammonia + Organic, Total (mg/l as N)	4.82	12,957	42,640	55,598
Nitrogen Nitrate Total (mg/l as N)	1.37	3,696	12,163	15,859
Nitrogen Nitrite Total (mg/l as N)	0.06	173	569	741
Nitrogen Ammonia Total (mg/l as N)	3.23	8,684	28,578	37,262
Phosphorous Total (mg/l as P)	1.18	3,171	10,436	13,607
Phosphorous Ortho (mg/l as P)	0.25	675	2,223	2,898
Sulfate Dissolved (mg/l)	31.66	85,155	280,231	365,386
Phenols Total Recoverable (ug/l)	114.30	307	1,012	1,319
Oil and Grease Total Recoverable (mg/l)	5.69	15,301	50	15,351
Organic Carbon, Total (mg/l)	45.95	123,592	406,722	530,315
Arsenic Total (ug/l as As)	5.63	15	50	65
Beryllium Total Recoverable (ug/l as Be)	0.89	2	8	10
Cadmium Total Recoverable (ug/l as Cd)	1.49	4	13	17
Chromium Total Recoverable (ug/l as Cr)	19.32	52	171	223
Copper, Total Recoverable, (ug/l as Cu)	125.57	338	1,111	1,449
Lead, Total Recoverable, (ug/l as Pb)	45.29	122	401	523
Mercury, Total Recoverable, (ug/l as Hg)	0.21	1	2	2
Nickel, Total Recoverable, (ug/l as Ni)	15.89	43	141	183
Selenium, Total, (ug/l as Se)	3.38	9	30	39
Silver, Total Recoverable, (ug/l as Ag)	35.73	96	316	412
Zinc, Total Recoverable, (ug/l as Zn)	217.96	586	1,929	2,515

Table 5-11: Salt River Basin Pollutant Loadings

TOTAL AREA: 72349.39 acres Residential: 51.27% Industrial : 17.30% Undeveloped: 16.19% Commercial: 15.24%

Total summer (Apr-Sept) Runoff, cubic feet: 143,127,149 Total Winter (Oct-Mar) Runoff, cubic feet: 437,174,732

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	88.12	786,820	2,403,303	3,190,123
COD High Level (mg/l)	234.76	2,096,127	6,402,515	8,498,642
Chloride (mg/l as Cl)	14.26	127,367	389,037	516,405
Cyanide Total (mg/l as Cn)	0.01	75	228	303
Fecal Coliform (CFU/100mL)	18,589.83			
Fecal Streptococci (CFU/100mL)	56,066.64			
Solids Residue at 180 Deg. C (TDS) (mg/l)	173.19	1,546,330	4,723,188	6,269,519
Residue, Total at 105 Deg. C (TSS) (mg/l)	440.38	3,932,006	12,010,117	15,942,123
Nitrogen No2 + No3, Total (mg/l as N)	1.44	12,828	39,183	52,011
Nitrogen, Ammonia + Organic, Total (mg/l as N)	8.38	74,800	228,473	303,273
Nitrogen Nitrate Total (mg/l as N)	1.38	12,338	37,687	50,026
Nitrogen Nitrite Total (mg/l as N)	0.08	751	2,295	3,047
Nitrogen Ammonia Total (mg/l as N)	4.83	43,142	131,775	174,917
Phosphorous Total (mg/l as P)	1.20	10,732	32,781	43,514
Phosphorous Ortho (mg/l as P)	0.25	2,241	6,845	9,086
Sulfate Dissolved (mg/l)	31.36	280,023	855,316	1,135,339
Phenols Total Recoverable (ug/l)	99.59	889	2,716	3,605
Oil and Grease Total Recoverable (mg/l)	7.07	63,157	193	63,350
Organic Carbon, Total (mg/l)	62.60	558,921	1,707,196	2,266,118
Arsenic Total (ug/l as As)	6.17	55	168	223
Beryllium Total Recoverable (ug/l as Be)	1.55	14	42	56
Cadmium Total Recoverable (ug/l as Cd)	1.72	15	47	62
Chromium Total Recoverable (ug/l as Cr)	18.14	162	495	657
Copper, Total Recoverable, (ug/l as Cu)	141.42	1,263	3,857	5,120
Lead, Total Recoverable, (ug/l as Pb)	66.20	591	1,805	2,396
Mercury, Total Recoverable, (ug/l as Hg)	0.19	2	5	7
Nickel, Total Recoverable, (ug/l as Ni)	17.80	159	486	645
Selenium, Total, (ug/l as Se)	3.06	27	83	111
Silver, Total Recoverable, (ug/l as Ag)	31.86	284	869	1,153
Zinc, Total Recoverable, (ug/l as Zn)	249.75	2,230	6,811	9,041

Table 5-12: Scatter Wash Basin Pollutant Loadings

TOTAL AREA: 135.97 acres Residential: 66.82% Industrial : 22.92% Undeveloped: 0.66% Commercial: 9.61%
Total summer (Apr-Sept) Runoff, cubic feet 318,154 Total Winter (Oct-Mar) Runoff, cubic feet: 1,181,715

Constituent	Land Use weighted concentrations	Summer Pollutant Load (pounds)	Winter Pollutant Load (pounds)	Total Annual Pollutant Load (pounds)
BOD5 (mg/l)	112.87	2,240	8,320	10,561
COD High Level (mg/l)	233.16	4,628	17,188	21,816
Chloride (mg/l as Cl)	18.33	364	1,351	1,715
Cyanide Total (mg/l as Cn)	0.01	0	1	1
Fecal Coliform (CFU/100mL)	3,190.08			
Fecal Streptococci (CFU/100mL)	11,844.90			
Solids Residue at 180 Deg C (TDS) (mg/l)	217.15	4,310	16,008	20,318
Residue, Total at 105 Deg C (TSS) (mg/l)	564.96	11,213	41,649	52,862
Nitrogen No2 + No3, Total (mg/l as N)	1.79	36	132	168
Nitrogen, Ammonia + Organic, Total (mg/l as N)	10.72	213	791	1,003
Nitrogen Nitrate Total (mg/l as N)	1.73	34	127	161
Nitrogen Nitrite Total (mg/l as N)	0.11	2	8	10
Nitrogen Ammonia Total (mg/l as N)	6.18	123	456	579
Phosphorous Total (mg/l as P)	1.02	20	75	96
Phosphorous Ortho (mg/l as P)	0.26	5	19	25
Sulfate Dissolved (mg/l)	29.37	583	2,165	2,748
Phenols Total Recoverable (ug/l)	83.23	2	6	8
Oil and Grease Total Recoverable (mg/l)	7.18	142	1	143
Organic Carbon, Total (mg/l)	78.90	1,566	5,816	7,382
Arsenic Total (ug/l as As)	7.86	0	1	1
Beryllium Total Recoverable (ug/l as Be)	1.63	0	0	0
Cadmium Total Recoverable (ug/l as Cd)	1.09	0	0	0
Chromium Total Recoverable (ug/l as Cr)	20.15	0	1	2
Copper, Total Recoverable, (ug/l as Cu)	67.44	1	5	6
Lead, Total Recoverable, (ug/l as Pb)	86.58	2	6	8
Mercury, Total Recoverable, (ug/l as Hg)	0.16	0	0	0
Nickel, Total Recoverable, (ug/l as Ni)	22.45	0	2	2
Selenium, Total, (ug/l as Se)	2.27	0	0	0
Silver, Total Recoverable, (ug/l as Ag)	22.12	0	2	2
Zinc, Total Recoverable, (ug/l as Zn)	260.53	5	19	24

Chapter 6

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] This 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

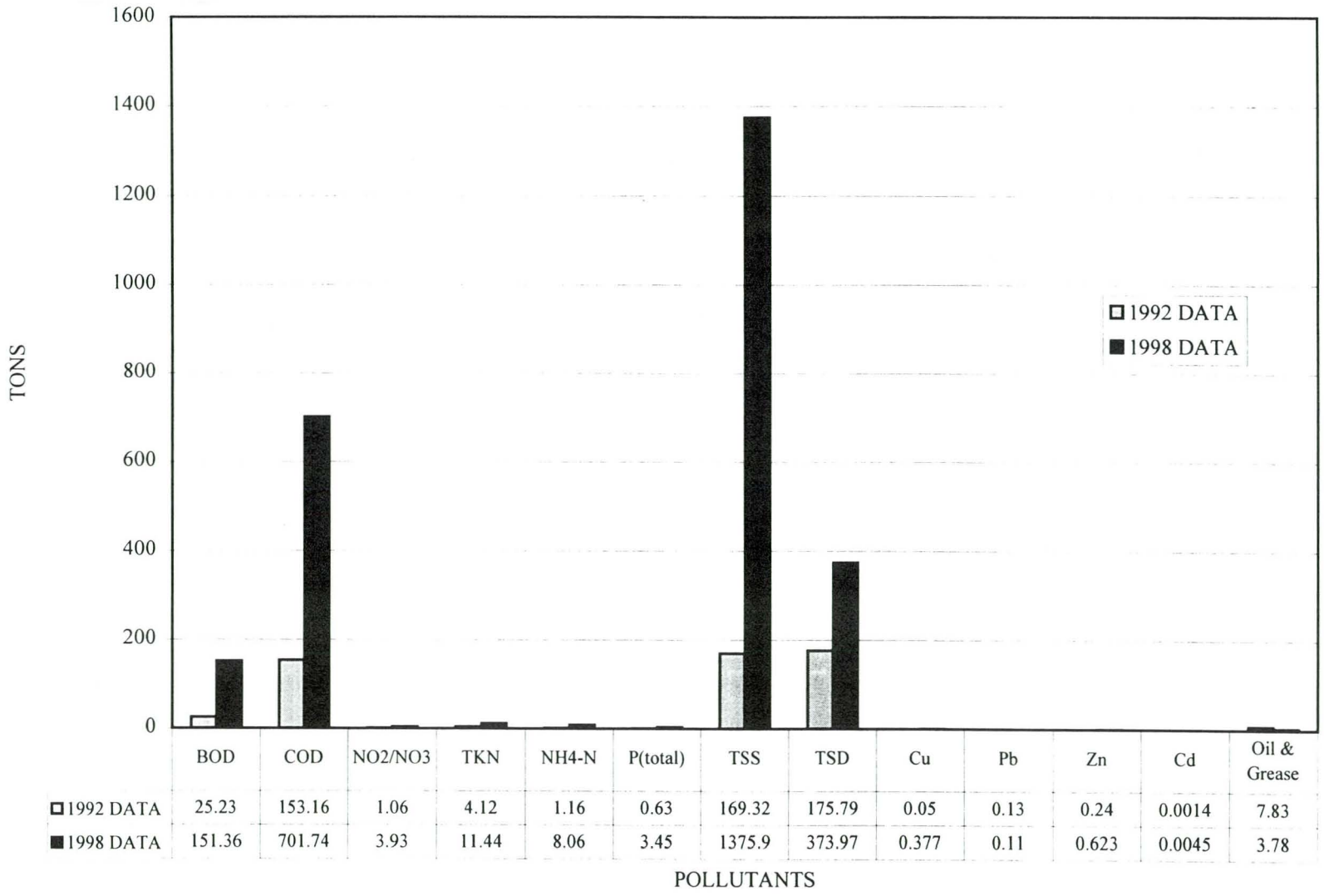
Phoenix averages just over seven inches of rainfall per year. The water bodies that receive storm water discharges from the City's storm drain system are normally dry. The Salt and Gila Rivers typically run only when enough water has been released from upstream dams. During dam releases, the rivers may 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, will flow short distances for a few days to a few weeks in response to particularly heavy rains. The ACDC, however, 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. Thus, limited water quality information is available to use to quantitatively measure the effectiveness of the City's SWMP on water quality in general.

Table 6-1 contains a comparison of storm water pollutant loading data reported in the City's Part II Permit application to loading data calculated during this reporting period. There is not enough data, however, to conclude that storm water quality has improved, worsened or stayed the same. The infrequent and variable nature of storm events frustrates attempts to reach conclusions about the quality of storm water; much less its impact on receiving streams. As the monitoring program continues over time, perhaps the data will allow conclusions.

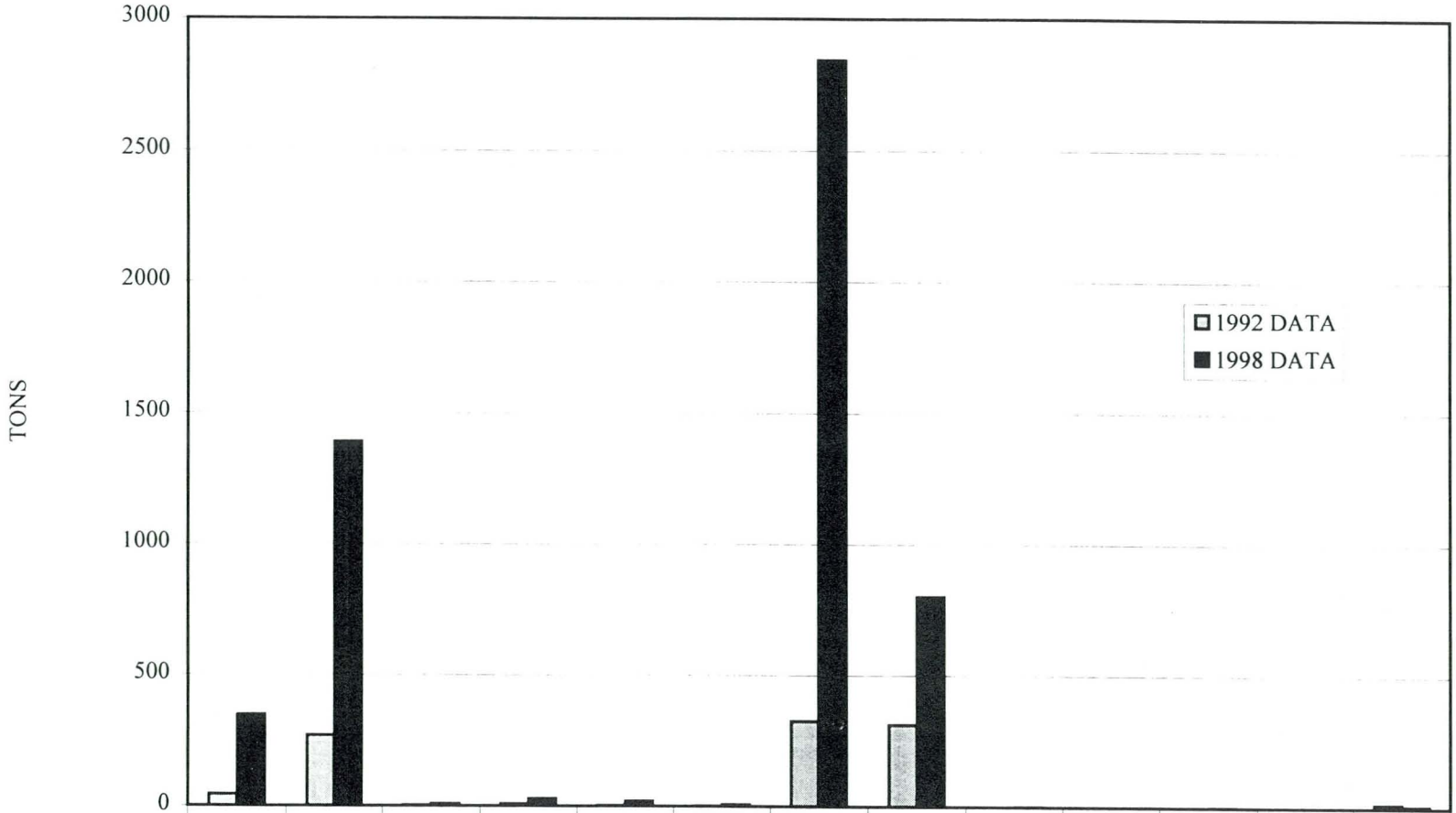
[1] R.A. Claytor and W.E. Brown, Environmental Indicators to Assess Storm Water Control Programs and Practices, (Silver Spring, Maryland).

FIGURE 6-1a ARIZONA CANAL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TSD	Cu	Pb	Zn	Cd	Oil & Grease
1992 DATA	25.23	153.16	1.06	4.12	1.16	0.63	169.32	175.79	0.05	0.13	0.24	0.0014	7.83
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

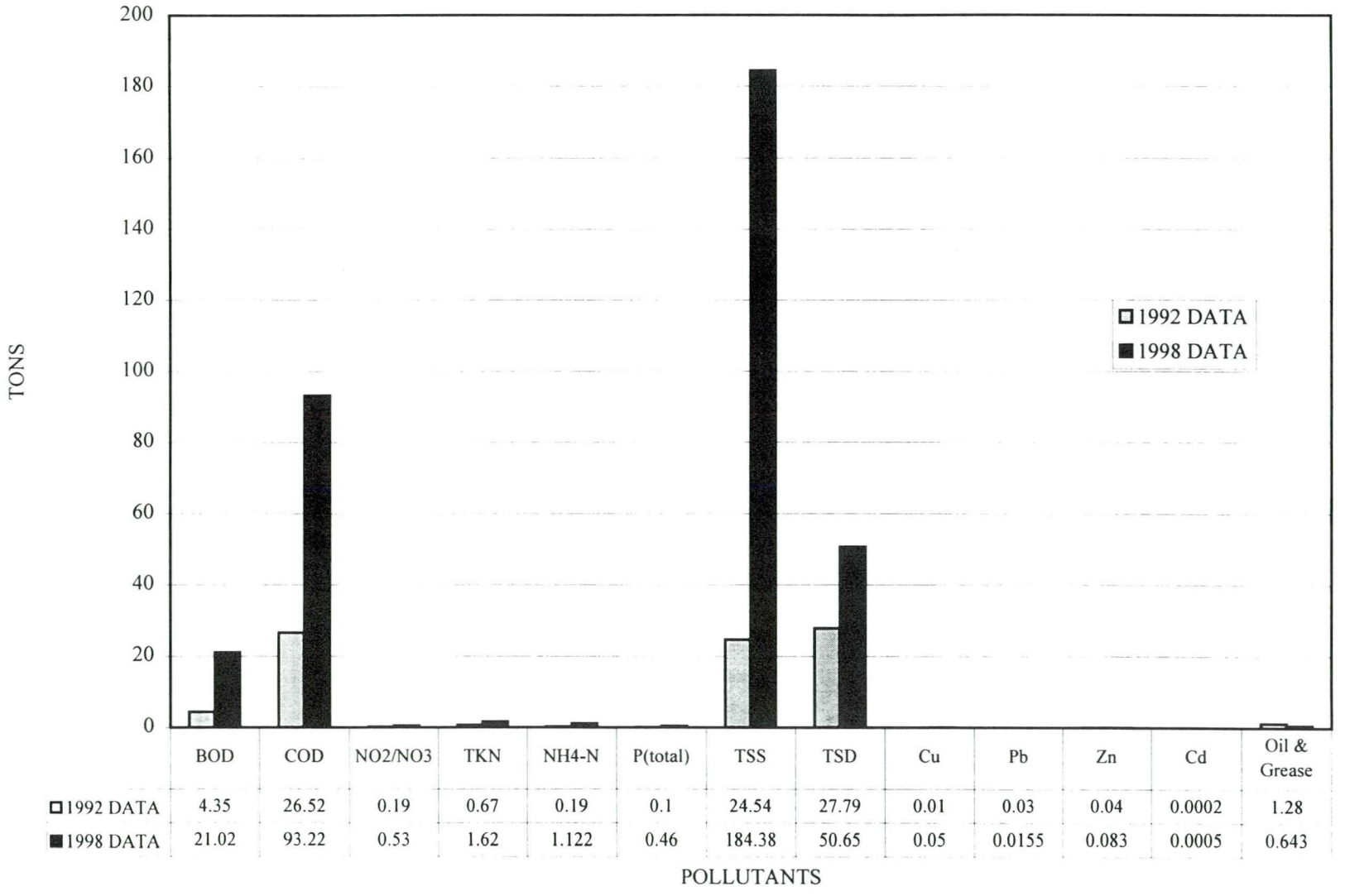
TABLE 6-1b PAPAGO DIVERSION CHANNEL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TSD	Cu	Pb	Zn	Cd	Oil & Grease
1992 DATA	43.32	267.99	1.98	7.38	2.05	1.13	325.7	312.16	0.1	0.18	0.4	0.0027	14.14
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

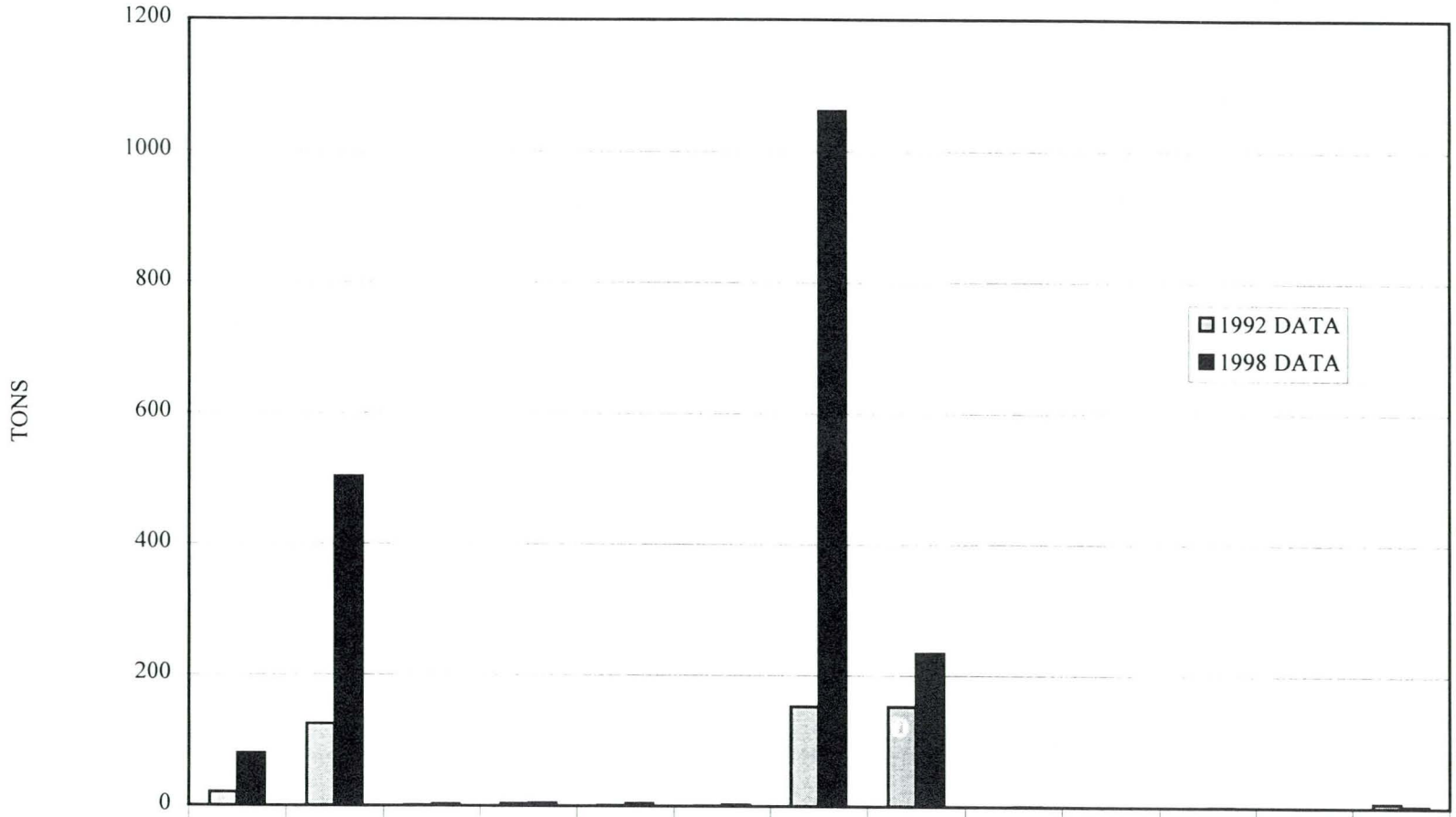
POLLUTANTS

FIGURE 6-1c OLD CROSS CUT CANAL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TSD	Cu	Pb	Zn	Cd	Oil & Grease
1992 DATA	4.35	26.52	0.19	0.67	0.19	0.1	24.54	27.79	0.01	0.03	0.04	0.0002	1.28
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

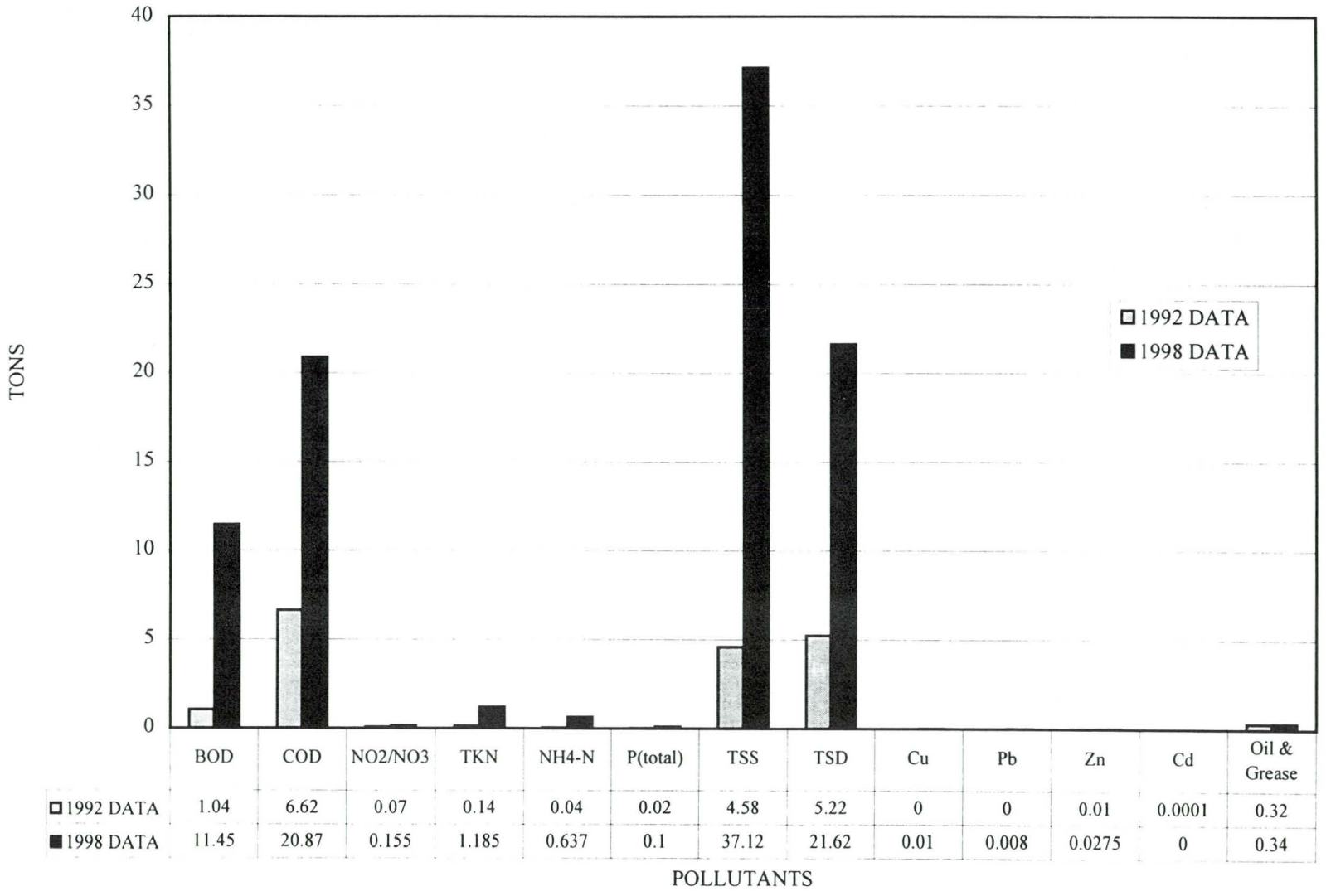
FIGURE 6-1d INDIAN BEND WASH ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TSD	Cu	Pb	Zn	Cd	Oil & Grease
1992 DATA	20.65	125.01	0.82	3.51	0.98	0.54	152.4	152.26	0.05	0.1	0.2	0.0012	6.56
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

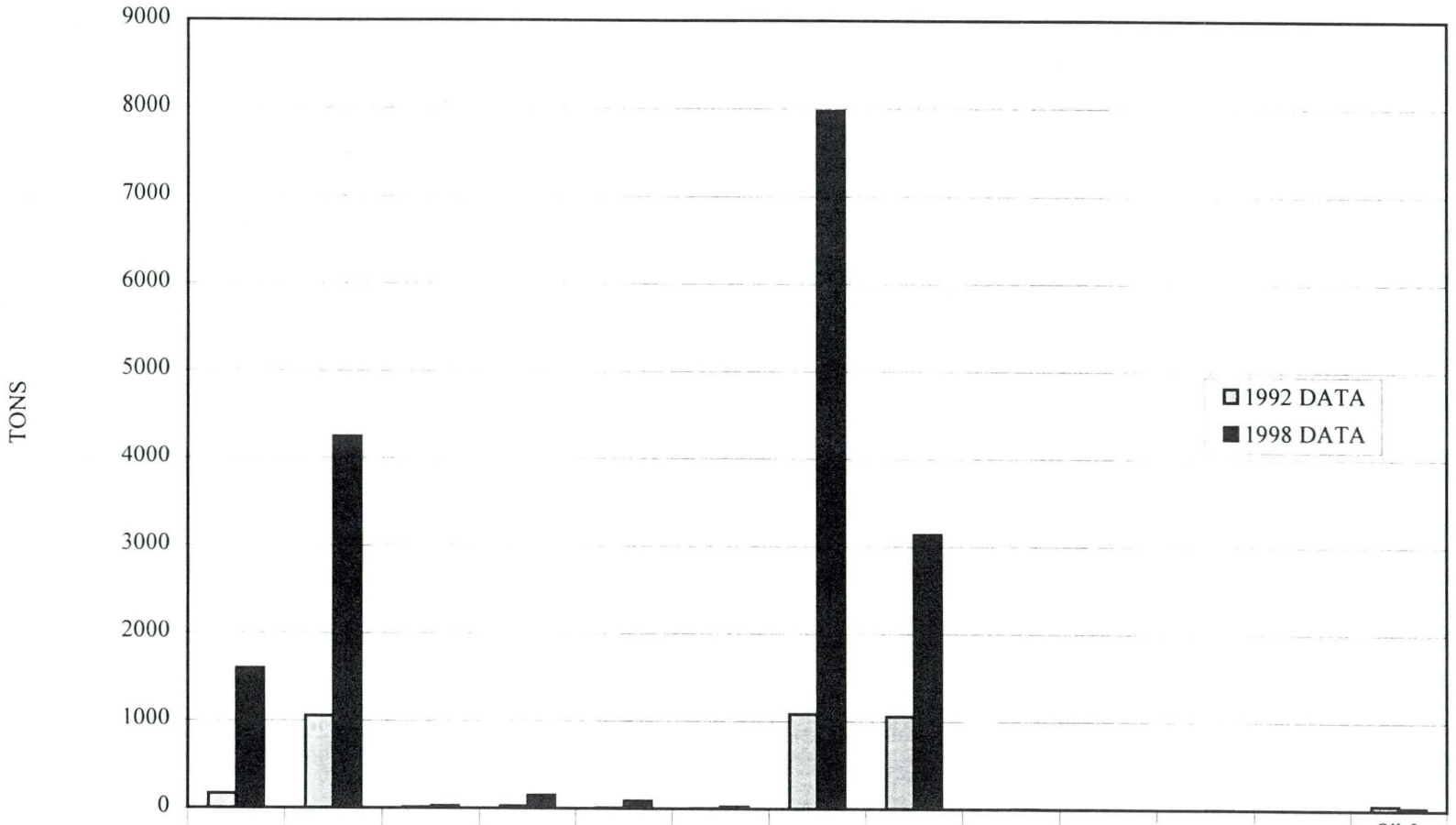
POLLUTANTS

FIGURE 6-1e GRAND CANAL ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TSD	Cu	Pb	Zn	Cd	Oil & Grease
1992 DATA	1.04	6.62	0.07	0.14	0.04	0.02	4.58	5.22	0	0	0.01	0.0001	0.32
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

FIGURE 6-1f SALT RIVER ANNUAL POLLUTANT LOADS



	BOD	COD	NO2/NO3	TKN	NH4-N	P(total)	TSS	TSD	Cu	Pb	Zn	Cd	Oil & Grease
1992 DATA	165.3	1052.67	8.86	26.65	7.44	4.02	1084.15	1057.55	0.4	0.66	1.53	0.0094	52.46
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

POLLUTANTS

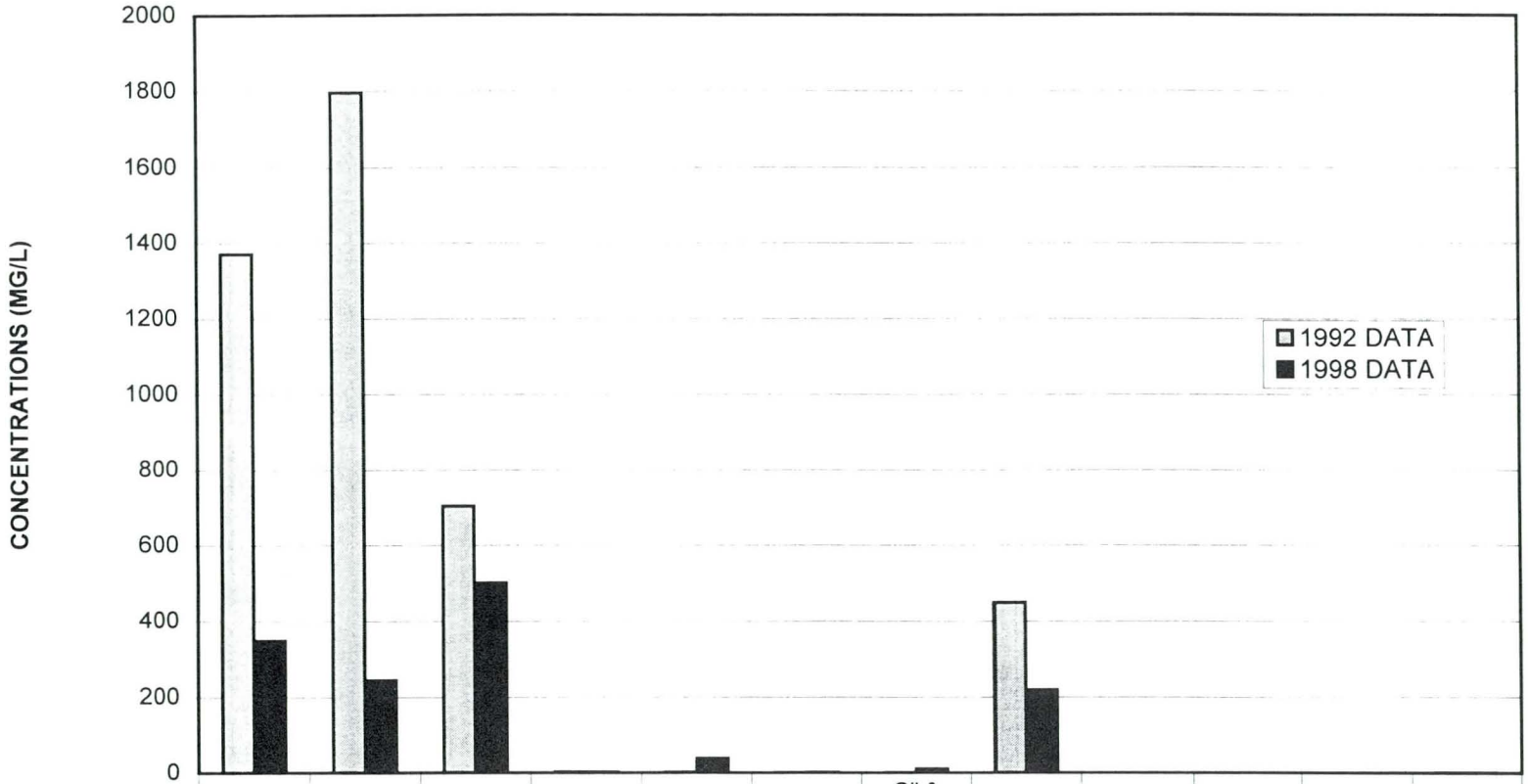
Given the limited utility of storm water quality data in reaching conclusions about water quality, it is appropriate to base an evaluation of the effectiveness of the City's SWMP on programmatic and social indicators.

As an alternative approach for evaluating the effectiveness of the BMPs, the City is testing the method of comparing flow-weighted average concentrations of pollutants at the sampling locations. This method may allow a more meaningful evaluation because actual data measurements are compared, using similar protocols for both 1992 and 1998 within a single catchment. Total pollutant loads, as shown in Figure 6-1, are calculated values and may not accurately reflect actual loading. It is presumed that actual data within specific land uses may be of more benefit in evaluating effective BMP's than calculated values.

Figure 6-2 depicts the comparison of data collected in 1992 with the data collected in 1998. For purposes of this trial, sampling data collected at 27th Avenue and the Salt River, a catchment that is predominantly industrial land use; and 43rd Avenue and the Arizona Canal Diversion Channel (ACDC), predominantly commercial land use, are used.

The City will continue to evaluate this approach to assessing the effectiveness of its BMPs. We believe that the comparisons depicted in Figure 6-2a and Figure 6-2b offer promise as a potential method for evaluating our program's effectiveness.

FIGURE 6-2a 27TH AVENUE AT SALT RIVER AVERAGE CONCENTRATIONS



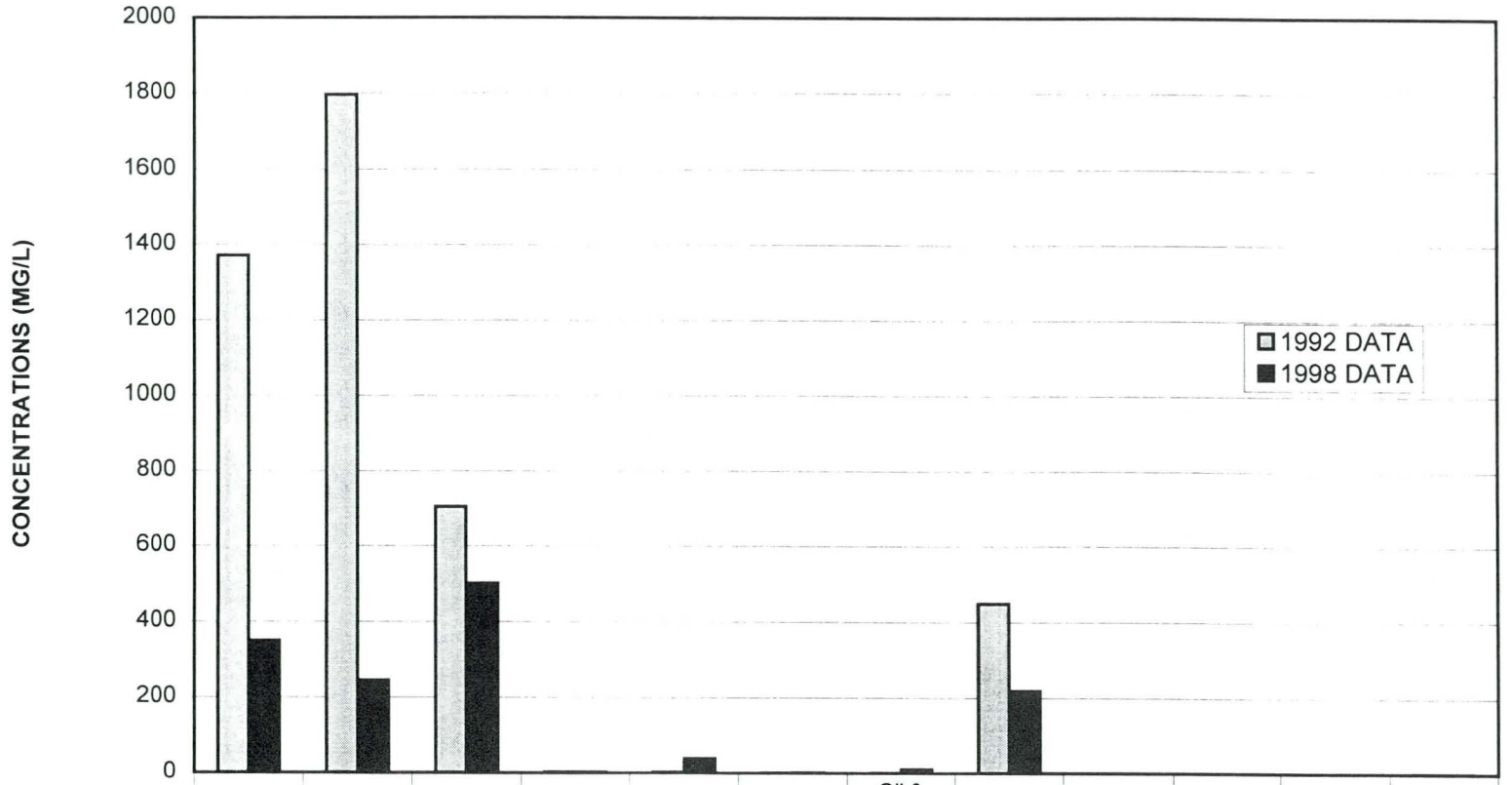
	BOD	COD	TSS	NO3/NO2	TKN	P (total)	Oil & Grease	TOC	Cr	Cu	Pb	Zn
1992 DATA	1371	1796	703	2.1	2.1	0.83	1	449	0.028	0.2	0.256	0.442
1998 DATA	348	244.7	501	2.67	38.97	1.33	10.47	218.7	0.021	0.151	0.273	0.522

POLLUTANTS

Five out of ten (50 %) would contact their city government if they wanted information on proper waste disposal while 17 % said they would contact the Arizona Department of Environmental Quality. Nearly 20% are not sure whom they would contact for such information.

This survey provides a basis against which to evaluate education and outreach efforts.

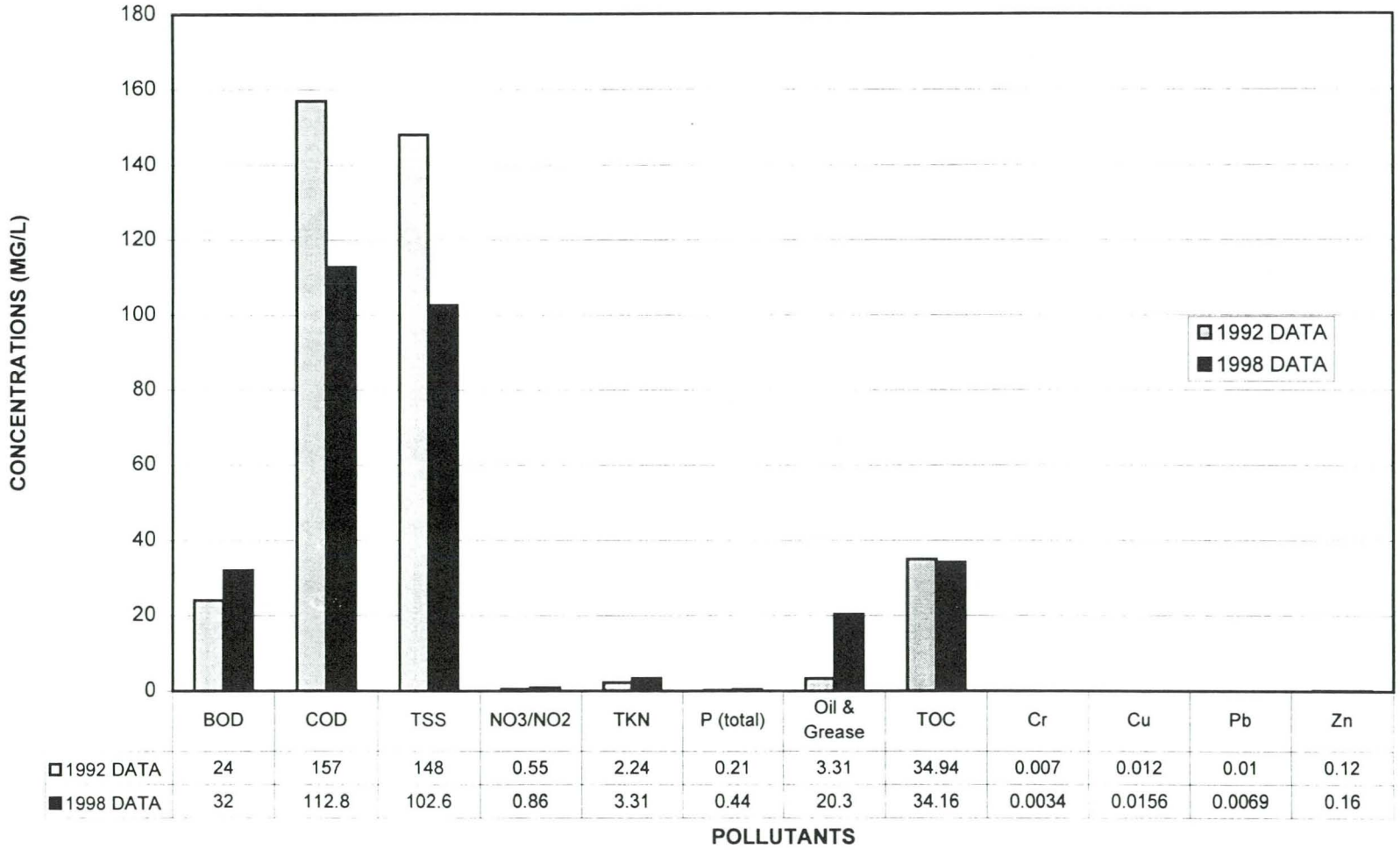
FIGURE 6-2a 27TH AVENUE AT SALT RIVER AVERAGE CONCENTRATIONS



	BOD	COD	TSS	NO3/NO2	TKN	P (total)	Oil & Grease	TOC	Cr	Cu	Pb	Zn
1992 DATA	1371	1796	703	2.1	2.1	0.83	1	449	0.028	0.2	0.256	0.442
1998 DATA	348	244.7	501	2.67	38.97	1.33	10.47	218.7	0.021	0.151	0.273	0.522

POLLUTANTS

FIGURE 6-2b 43RD AVENUE AT THE ACDC AVERAGE CONCENTRATIONS



	BOD	COD	TSS	NO3/NO2	TKN	P (total)	Oil & Grease	TOC	Cr	Cu	Pb	Zn
1992 DATA	24	157	148	0.55	2.24	0.21	3.31	34.94	0.007	0.012	0.01	0.12
1998 DATA	32	112.8	102.6	0.86	3.31	0.44	20.3	34.16	0.0034	0.0156	0.0069	0.16

Programmatic Indicators

The Programmatic Indicators measured by the City include identifying and correcting illicit connections; installing, inspecting, and maintaining best management practices (BMPs); and monitoring permitting and compliance. The City has inspection teams that identify and correct illicit connections and address cross-connections between the sanitary and storm sewer system (see Chapter 2 and Chapter 8-BMPs 7 and 8).

The Illicit Discharge Identification and Elimination Program consists of field compliance, regulatory enforcement and illicit discharge education. Teams inspect outfalls, industrial facilities, and investigate complaints. Inspections are prioritized and areas previously identified as having illicit 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 9). 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 hazardous and other materials that may contribute pollutants to the storm drain system.

Cross-connections between the sanitary and storm sewer systems are investigated through the use of closed-circuit television, video cameras and recorders, smoke testing, and dye testing. Monitoring and dry weather field screening methods also are used.

Table 6-1 includes the outcome measures used to evaluate the City's Illicit Discharge Identification and Elimination Program. Illicit connections to the storm sewer system may have a substantial contribution to pollutant loads; therefore, the number of illicit discharge inspections completed provides an evaluative measure that may be linked to a decrease in pollutant loads. These measures also help the City determine staffing and budgetary information needed to continue effective Program implementation. These indicators have proved to be helpful measures in prioritizing inspections and in evaluating and refining the overall effectiveness of the SWMP.

As with all policies and procedures, these are evaluated on an ongoing basis and are considered in the context of a variety of elements to determine their effectiveness in meeting the current goals 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 successfully help employees understand the importance of properly using pesticides and other harmful chemicals, and allowed employees to be more successful in taking the certification test required for SPCC registration. 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 (BMP 34). 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 6-1 lists the number of permits issued and site inspections completed.

Permitting and Compliance Indicators are useful programmatic indicators 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. Information on which BMPs have proven to be most effective is passed along to builders, property owners, and other professional organizations during meetings or conference presentations, as well as during plan reviews and inspections.

The Street Transportation Department's Storm Water Management Team ensures that property owners comply with City ordinances by investigating illicit discharges. As indicated in Table 6-1, over one hundred illicit discharge investigations were conducted last Fiscal Year. Information gathered from these investigations allows staff to identify potentially significant pollutants and pollutant sources.

TABLE 6-1
PROGRAMMATIC INDICATORS

Total Illicit Discharge Complaints Received	178
Total Illicit Discharge Inspections Performed	118
Total Illicit Discharge Public Outreach Events	22
Total Cross-Connection Investigations	1
Approximate Number of Employees Registered with the Structural Pest Control Commission	165
Total Employees Receiving Pesticide Applicator Training	118

Continued...

TABLE 6-1 (continued)
PROGRAMMATIC INDICATORS

Total Storm Water Management Permits Issued to Construction Sites	134
Total Storm Water Management Permit Inspections Performed	2,766
Total Grading and Drainage Permits Issued	768
Total Grading and Drainage Inspections Performed	13,829

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 ends up;
- 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 are aware that storm drain water ends up in the river while the remaining 77 % are either not sure or have an incorrect perception. About 39% view storm drain pollution as only a moderate or minor problem in the Valley. Few residents (8 %) view 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 indicate they dispose of household chemicals and fluids by simply 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 dispose of such material via service stations (11 %), hazardous waste collection day (18 %), auto parts stores (17 %) or some other recycler (6 %).

Nearly four-fifths of Valley residents (38%) would report 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 or the Environmental Protection Agency.

Five out of ten (50 %) would contact their city government if they wanted information on proper waste disposal while 17 % said they would contact the Arizona Department of Environmental Quality. Nearly 20% are not sure whom they would contact for such information.

This survey provides a basis against which to evaluate education and outreach efforts.

Chapter 7

PROPOSED CHANGES TO THE STORM WATER MANAGEMENT PROGRAM

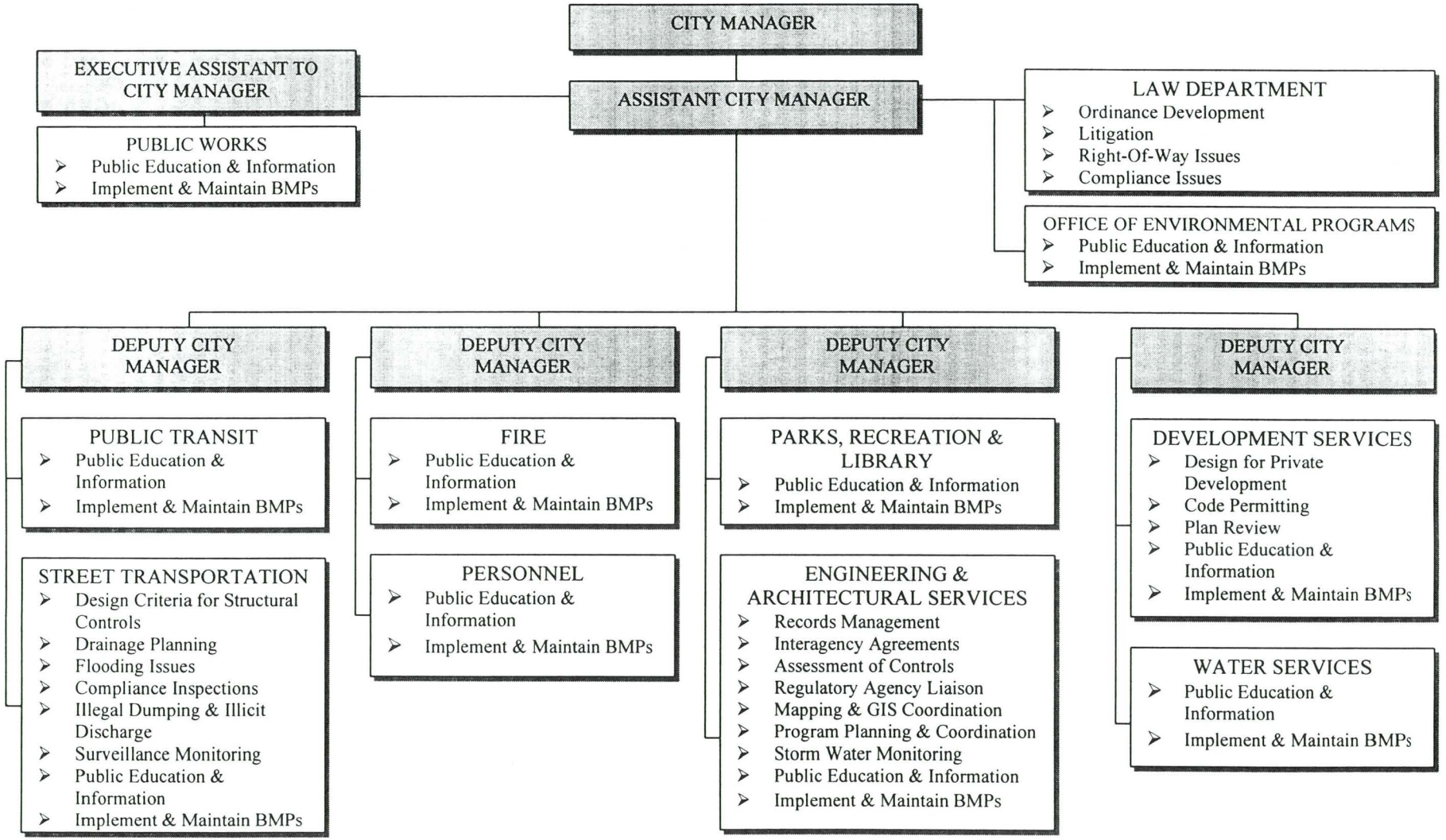
PROPOSED CHANGES TO THE STORM WATER MANAGEMENT PROGRAM

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 1998/99, the City will continue to implement and evaluate existing BMPs. There are, however, programmatic and organizational changes that will occur in the next reporting year.

The Paving Dirt Streets Program, discussed in BMP 22 will change as a result of the Federal Implementation Plan for Maricopa County. The plan requires that all public roads that have an average traffic volume above 150 trips per day be paved by June 2000. The Street Transportation Department will use rubberized asphalt as the primary treatment. A significant portion of the City's 95 miles of unpaved streets will be paved during the next reporting year.

There will be one organizational change to the Storm Water Management Program (SWMP) during the next reporting year. The City's management structure has undergone changes. Some of the departments with direct and/or indirect responsibility of implementing the SWMP will report to new Deputy City Managers. While the impacts associated with the organizational changes should be minor, they will be considered when the BMPs are evaluated for the next annual report. The new organizational chart is depicted in Figure 7-1.

FIGURE 7-1
CITY OF PHOENIX, ARIZONA
STORM WATER MANAGEMENT PROGRAM
ORGANIZATION CHART FOR REPORTING YEAR ENDING JUNE 30, 1999



Chapter 8

STATUS OF IMPLEMENTING STORM WATER MANAGEMENT PROGRAM COMPONENTS

STATUS OF IMPLEMETING STORM WATER MANAGEMENT PROGRAM COMPONENTS

FIGURE 8-1
BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES

Introduction

Chapter 8 lists the Best Management Practices (BMPs) established by the City of Phoenix (the City) for its Storm Water Management Program (SWMP). The City's success in carrying out these BMPs also is described. Each description is organized to provide a clear link between the BMP's implementation and the required elements of a storm water management program, 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 for storm water management. Also included are education and outreach programs that provide technical assistance in meeting City requirements to developers and contractors.

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

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

Minimizing the nature and volume of pollutants entering storm water flows from the City's roadways is achieved by maintaining road surfaces. Maintenance activities include routine sweeping of street surfaces and gutters, continuing to pave dirt roads, and ensuring that City vehicles comply with Maricopa County Air Quality Control District air emissions 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 in the city under the terms of an Intergovernmental Agreement. FCDMC builds and maintains regional and local flood control structures throughout Maricopa County, including Phoenix. The City is responsible for construction and maintenance of its own municipal storm drain system, which interacts on a limited basis with FCDMC structures.

The focus of this program element is City enforcement of 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 (some closed) and one municipal solid waste transfer station. Each of these facilities is currently or is in the process of being covered by a National Pollutant Discharge Elimination System (NPDES) storm water permit. As a condition of their various permits, each facility has implemented or is finalizing a storm water management plan. 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 the contribution of pollutants associated with lawn and garden chemicals to the storm drain system. The City has implemented a variety of education and outreach activities for employees and the public using a number of different delivery vehicles. 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 BMP activities that help to 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 enforcing City ordinances covering the disposal of litter, trash, and debris. Staff have encouraged the Arizona Department of Environmental Quality (ADEQ) to provide an opportunity for the City to review copies of proposed NPDES storm water permits for industrial facilities located within Phoenix.

Relevant BMPs: 2, 4, 5, 6, 8, 10, 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 were developed to 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 any non-storm water flows.

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 have been implemented to emphasize the importance of preventive measures.

Relevant BMPs: 9 & 14

B-5. Public Awareness and Reporting Program

This program element is designed to enhance the public's understanding of the benefits and need for storm water management. The public is encouraged to report to a telephone hotline 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 due to the exfiltration of sanitary 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 (most of which are closed) 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 developing an industrial inspection prioritization system to determine compliance with the City's storm water management ordinance, and the implementation of the facility inspection program.

C-1. Identifying Priorities and Implementing Controls

The City prioritizes industrial facilities for inspections, including municipal landfills, based on whether the facility is a hazardous waste treatment, storage or disposal facility, and 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 an 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 the existing grading and drainage, and corrosion 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 SWP3, 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 and 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

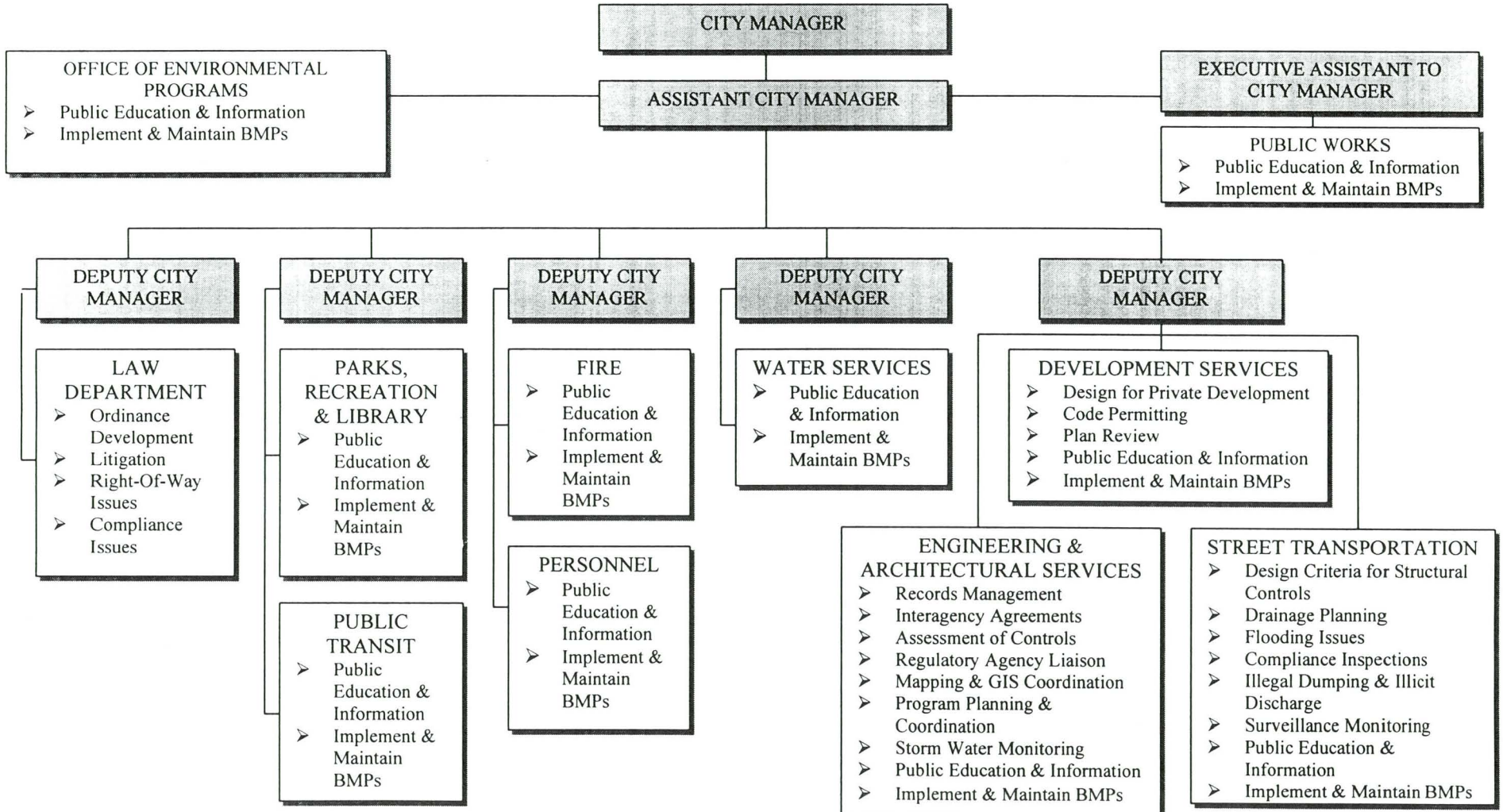
D-4. Site Inspections and Enforcement

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 8 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 8-2 depicts the organizational structure of the City's SWMP.

FIGURE 8-2
CITY OF PHOENIX, ARIZONA
STORM WATER MANAGEMENT PROGRAM
REPORTING YEAR ENDING JUNE 30, 1998



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 is responsible for coordinating all program activities and participants; managing all required records and documents; preparing all compliance reports; developing and negotiating intergovernmental and interagency agreements; and assessing 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.

The Law Department also 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.

Contributing Departments and Agencies
The Flood Control District of Maricopa County (FCDMC) also contributes to Phoenix's SWMP activities. The FCMDC 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 the following pages of 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
- 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.

The Phoenix City Code, Chapter 27, regulates the collection of solid waste and recyclable materials. 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, is responsible for enforcing the Solid Waste Ordinance, as well as complying 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 46 employees who respond to complaints and requests for services, and investigate illegal dumping. Compliance with the Ordinance is primarily sought through education and persuasive negotiations. A person convicted of an Ordinance violation is guilty of a Class I misdemeanor, punishable by a fine of not less than $250 or more than $2,500, and possible imprisonment for a term of six months. Violations under the criminal code are prosecuted in those instances where it is not possible to obtain voluntary compliance.

In September 1990, the PWD established an Illegal Dumping Inspections Team to identify, report, and prosecute illegal dumping of solid waste in north Phoenix. Since that time, illegal dumping in north Phoenix has been reduced by 50 percent and seven illegal dumping "hot spots" have been eliminated. The team has since expanded to south Phoenix and both teams include two inspectors.

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 Inspections 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 ensure prevention and successful prosecution of 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 must complete a four-hour training class conducted by the PWD, Police Department, and the Law Department. Volunteers are recruited through civic and neighborhood groups.

In April 1989, the Solid Waste Field Services Division implemented "Phoenix Recycles," an innovative recycling pilot 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 most residential areas served by the City. 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. One hundred 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 Skunk Creek Landfill operates under a 1972 State Land Patent Agreement, and is expected to close in the year 2006. The landfill comprises 688 acres, has an approximate capacity of 18 million tons, and receives approximately 2,600 tons of solid waste each day.

The following provides a summary of selected landfill operations:

- A waste screening program prevents the dumping of prohibited materials. The program includes random unannounced inspections of incoming loads, which are individually screened for unacceptable materials. These inspections are performed at least twice per day at both the Skunk Creek Landfill and the Solid Waste Management Facility.
- Quarterly groundwater monitoring is conducted at the Skunk Creek Landfill, as well as at three closed landfill sites (27th Avenue Landfill, 19th Avenue Landfill, and the Del Rio Landfill). In addition, the City has installed landfill gas migration control systems at the 19th Avenue, 27th Avenue, Del Rio, and Deer Valley Landfills.
- The Skunk Creek Landfill accepts appliances, scrap metal, oil, aluminum, tires, batteries, cardboard, clear glass, mattresses, bed springs, and other materials. Most of these materials are sold to the private sector for recycling. The PWD uses a contractor to recover all available chlorofluorocarbons in disposed materials.

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.

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. The mulching program is being expanded to include an experimental compost element. 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. Appendix A provides a sample of litter control, recycling, and composting pamphlets available to the public.

TABLE 8-1

SOLID WASTE DISPOSAL MEASURES	FISCAL YEAR 1997/98
Public Works Department	
Number of Households Receiving Trash Collection	312,282
Tons of Contained Solid Waste Collected	493,507
Tons of Uncontained Solid Waste Collected	78,883
Tons of Waste Recycled	80,494
Number of Tires Collected (Special Cleanups and BOPA Collections)	7,911
Tons of Illegally Dumped Materials Collected	1,835
Percent of Materials Entering Skunk Creek Landfill Sold for Recycling	10
Tons of Vegetation and Wood Waste Mulched at Skunk Creek Landfill	3,200

Law Department

In August 1997, the Phoenix Law Department, Criminal Division, was given an Environmental Awareness Award by the Maricopa County Bar Association Young Lawyers Division. This award recognizes members of the legal community who have

demonstrated exemplary achievement toward environmental responsibility. The Division was recognized for efforts to support the environment, including prosecuting illegal dumping, unlawful littering and zoning violations. They also were recognized for their efforts in recycling, purchasing recycled products, and promoting trip reduction programs.

Figure 8-3 (pages 8-16 through 8-17) provide a sample of solid waste and recycling information that is available on the City's Internet site. While browsing the Garbage/Recycling section of this site, residents can find information on solid waste collection schedules, uncontained trash collection, and recycling.

FIGURE 8-3

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.

UNCONTAINED TRASH COLLECTION

Uncontained 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

Return to Garbage/Recycling

Return to Water Billing and Rates

City of Phoenix Source 1995-97

FIGURE 8-3

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.

Approximately 240,000 homeowners participate in the citywide "Phoenix Recycles" program, which kicked off in June 1992. By 1999, all 310,000 Phoenix homes that receive city garbage collection also will have recycling.

Each home will receive two storage containers - one for the kitchen or utility room and the other, a large blue container, for outside the house. For "Phoenix Recycles" 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 (SWC)
Smith's	19th Avenue/Bell Road (NWC)
CRInc Facility	1919 E. University Drive
Skunk Creek Landfill	3165 W. Happy Valley Road
27th Avenue Solid Waste Management Facility	27th Avenue/Lower Buckeye Road

Recycle these items only: plastics with codes 1, 2, 6; foam plastics like egg cartons/meat trays; food or beverage glass; paper; junk mail; magazines; newspapers; cardboard/chipboard; milk cartons; juice boxes; aluminum; and metal.

All material must be clean, dry, empty and uncrushed. Do not bag, box or tie recyclables. Remove all caps and lids. No grass, yard or food waste. For more information, call 262-7251 or e-mail to pwserve@ci.phoenix.az.us.

Internet: pwserve@ci.phoenix.az.us

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

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, council district meetings, school shows, special events, and tours of the various solid waste facilities. Topics include:

- *Phoenix Recycles* - a residential recycling program;
- household hazardous waste 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 that is available to entertain and inform 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 educational programs to the public. PC&B, an affiliate of Keep America Beautiful, is a non-profit 501(c)3 organization with the mission of involving and educating Phoenix residents on positive solid waste management issues and beautification practices. PC&B is under contract with the City to provide additional support to residents through programs and special events.

PC&B administers a Neighborhood Program, a School/Youth Program, a Business Program and several miscellaneous programs. The Neighborhood Program includes informational presentations to homeowner associations, block watch groups and other neighborhood organizations. Neighborhood organizations and organized groups are provided with cleanup guides, trash bags, roll-off bins, landfill passes, and litter containers. Information on vehicle removal also is available.

The School/Youth 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 uses the Keep America Beautiful educational resource guides: *Waste in Place* and *Waste: A Hidden Resource*. The School/Youth Program also

includes the Greenshelf Collection, a special collection of books that focus on environmental topics. PC&B, in partnership with local corporations, has donated eight collections of the Greenshelf books to Phoenix libraries.

The Business Program includes two key resource guides: *Waste in the Workplace,* a seminar targeted to small businesses; and *Build America Beautiful*, a program that shows waste haulers and builders how to 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:

- PC&B, in partnership with the PWD, collected over 100,000 cut Christmas trees and recruited over 200 volunteers for the collection event.
- A GLAD Bag-A-Thon was held March through May. The event is the nation's largest organized cleanup. PC&B organized six cleanups, provided resources to 60 groups, distributed 31,490 bags, and provided 20 teacher resource guides.
- PC&B organized a two-day litter-free event, associated with the Phoenix Sun's Rock the Rim 3-on-3 basketball tournament.
- Sixty-five volunteers participated in Christmas in April by targeting a litter clean up in low-income neighborhoods in south Phoenix.
- Organized a cleanup of targeted public lands that resulted in the removal of 150 tons of illegally dumped trash.
- Organized 15 volunteers, who planted 40 mesquite trees as part of Make a Difference Day activities.

In addition to the events described above, PC&B participates in neighborhood fairs, parades, and partners with other non-profits 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 8-2

PUBLIC POLLUTION PREVENTION EDUCATION EFFORTS	FISCAL YEAR 1997/98
Public Works Department	
Number of Special Events and Neighborhood Meetings	40
Approximate Number of Residents Attending Special Events and Neighborhood Meetings	100,000
Number of School Shows Held	200
Approximate Number of Students Attending School Shows	30,000

(continued)

TABLE 8-2 (continued)

POLLUTION PREVENTION EDUCATION PROGRAMS	FISCAL YEAR 1997/98
Phoenix Clean and Beautiful	
Number of Clean Up Guides Distributed	56
Number of Trash Bags Distributed	31,490
Number Landfill Passes Distributed	482
Number of Litter Containers Distributed for Special Events & Cleanups	321
Number of Roll-off Bins Provided for Cleanups	89
Number of Materials Distributed at School/Youth Presentations	3,715
Number of Waste in the Workplace Seminars	15
Number of Build America Beautiful Programs	12

Appendix A includes the brochure used to describe PC&B's activities and programs.

BEST MANAGEMENT PRACTICE 4
Continue to collect uncontainerized trash and debris four times per year from curbside locations.

Public Works Department
Uncontained trash primarily consists of yard wastes, such as tree limbs, trunks, palm fronds, grass, leaves, weeds, twigs, and hedge clippings. The Public Works Department (PWD), Solid Waste Field Services Division's uncontained trash collection program minimizes the impact uncontained trash may have on the storm sewer system by requiring residents to bag and tie loose grass and leaves.

For those residents that have street side collection, the uncontained materials must be placed on the front edge of their property, either behind the sidewalk, or behind the curb if there is no sidewalk. The material cannot be placed on the curb or sidewalk, or in the street. For alley pickup, the trash must be placed along the resident's property line.

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 criminal prosecution.

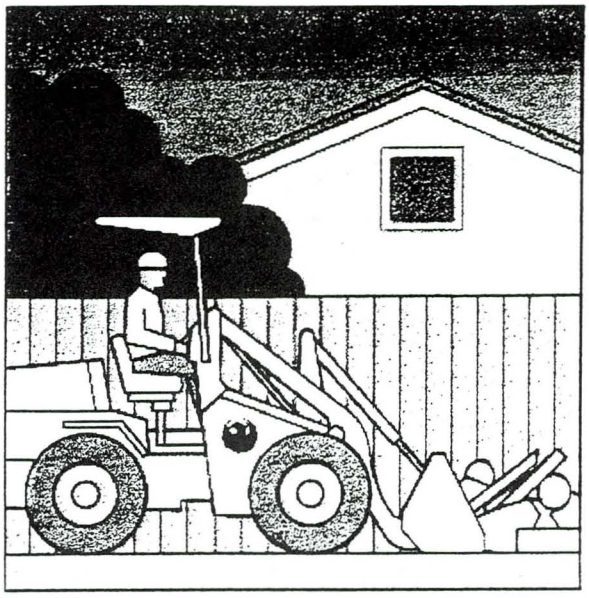
Finally, in a combined effort to control the amount of debris that may enter the storm sewer system, the Street Transportation Department coordinates their street sweeping schedule with the uncontained trash pickup schedule. Residential street sweeping follows uncontained trash collection.

TABLE 8-3

UNCONTAINED TRASH COLLECTION	FISCAL YEAR 1997/98
Public Works Department	
Tons of Uncontained Trash Collected	78,883

Figure 8-4 (pages 8-22 through 8-27) is an example of what can be found on the Public Works Department's Internet Site.

FIGURE 8-4



UNCONTAINED TRASH COLLECTION

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

Uncontained 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 solid waste services, click on these topics. This information contains either graphics or pictures that can be downloaded or expanded for easier viewing. Click on the small image to get a full size view.

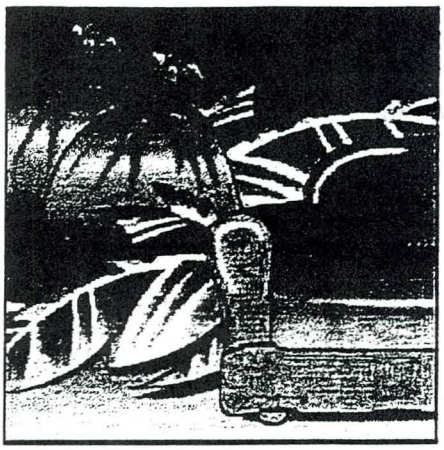
- Map/Calendar - Date of the next home collection
- **Uncontained Material Placement -** Areas allowed and not allowed - alley/street
- **Items Collected and Not Collected**
- **Collection Process -** See the process through photographs
- **Additional Information -** CFC appliances, recycling, dead animal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

Return to Garbage/Recycling

RETURN TO PHOENIX AT YOUR FINGERTIPS

City of Phoenix Source 1997

FIGURE 8-4



UNCONTAINED MATERIAL PLACEMENT

- Alley Collection
- Street Collection

Return to Uncontained Trash Collection

ALLEY COLLECTION

If you have alley garbage collection, uncontained trash must be placed on YOUR side of the alley and pulled back along your property line. DO NOT BLOCK THE ALLEY.

When placing your trash out, stack it as neatly as possible, parallel to your fence or property line and at least two feet away from any solid waste container. Material must be placed at least five feet from any fixed object, such as a telephone pole or cable box. Make sure to leave room for solid waste collection vehicles to travel through the alley behind your home.

Also do not block ***Utility Easements***, which is an **area five feet around any fixed utility equipment**. They can be found in used or unused alleys, sides of properties facing a street or in front yards. These may involve cable junction boxes, electrical junction boxes, gas meters, water meters, fire hydrants and mailboxes. If you're not sure if you have these types of service boxes on your property, call **(602) 262-7251**.

Collection Process


Alley Collection

Return to Top of Uncontained Material Placement

STREET COLLECTION

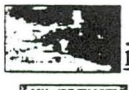
If you have curbside garbage collection, uncontained trash must be placed at the **front edge of your property, behind the sidewalk or behind the curb** if there is no sidewalk. It may **NOT** be placed on the curb or sidewalk or in the street. Material must be placed at least four to five feet from any fixed object such as a telephone pole, telephone or cable box, utility pole or wire, water meter box, fire hydrant or other utility junction box. Collecting improperly placed trash could damage these structures. Crews may refuse to attempt collection if trash is improperly placed or unsafe to collect.

FIGURE 8-4

COLLECTION PROCESS

The following photographs show the collection process including equipment, personnel and disposal.

Placement of Materials:

 behind fence in ally -  correct /  incorrect

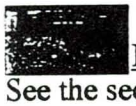
 behind curb or street -  correct /  incorrect

 behind sidewalk -  correct /  incorrect

 **Collection equipment - Bobcat**
Articulated loader is used to load materials into rearloading collection vehicle. This efficient collection method reduces the need for manual collection and reduces the chance for injuries.

 **Collection equipment - Rear loading vehicle**
Rear loading vehicles are used only for uncontained collection. They are designed similarly to ones used more than 20 years ago before Phoenix automated its garbage collection.

 **Cleaning alley or street**
If needed, the operator of the rear at 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.

 **Disposal at landfill**
Uncontained materials are taken either to the 27th Avenue Solid Waste Management Facility or the Skunk Creek Landfill for disposal. Approximately 25 percent of all materials taken to the landfill are yard wastes, such as tree limbs, palm fronds and grass.

FIGURE 8-4

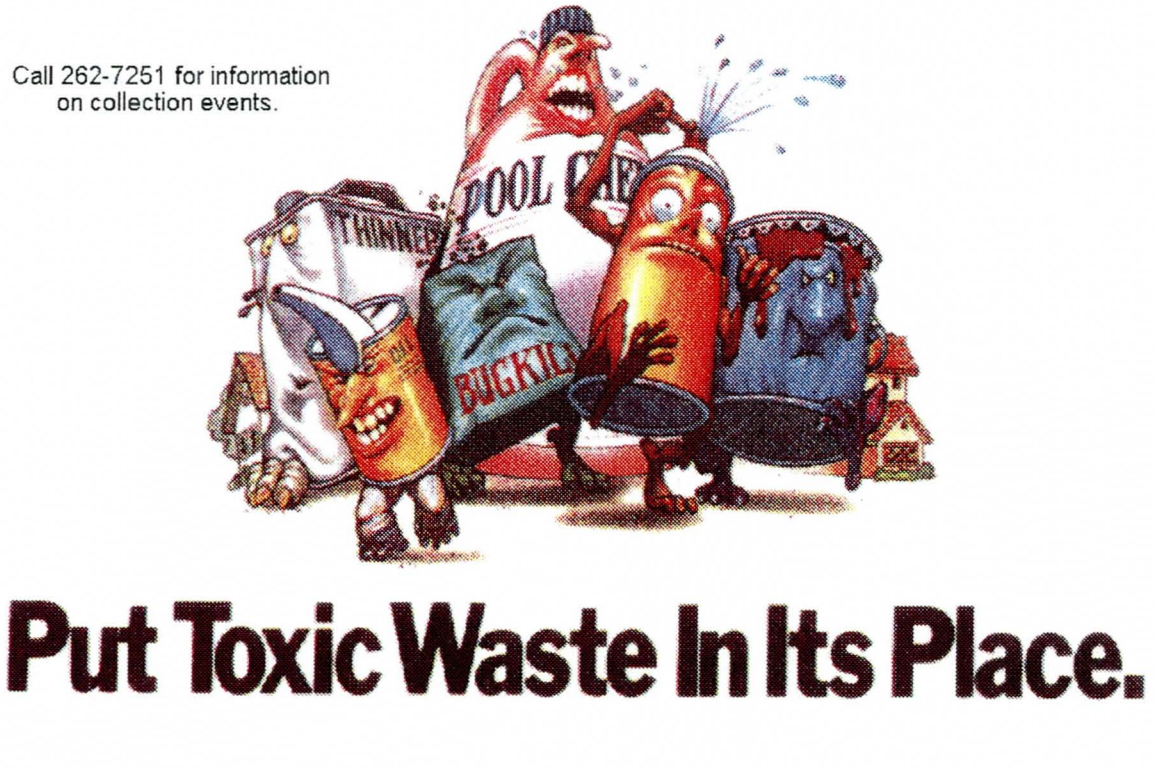
Solid Waste Field Collection Education - Internet Pages

FIGURE 8-4

Solid Waste Field Collection Education - Internet Pages

FIGURE 8-4

Solid Waste Field Collection Education - Internet Pages



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 provides and routinely collects litter from receptacles in public areas and 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 held 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 8-4 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) is responsible for operating and maintaining 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 depends on 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, parks, and surrounding areas. Citizens involved in *Preserve Watch* are formed into groups, provided with formal training, and 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 community centers, sports centers, and library facilities. 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 school grades Kindergarten through Third.
- 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 developed a Living Tree Celebration Program, which encourages 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 has made a number of brochures and pamphlets available 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 8-4

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

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 City Council approved the Household Hazardous Waste (HHW) Collection Program in 1988 as a way to provide to 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. Since its inception, citizen interest in the program has been high. Public surveys and general comments that have been received by staff indicate strong support for collection events.

In addition to the full-scale, single-day collection event for all types of household hazardous wastes, the Public Works Department (PWD), Solid Waste Field Services Division, holds smaller, regional events that are limited to the collection of batteries, oils, paints, and antifreeze (BOPA). The BOPA collection is a new program that began in January 1997, and has been very well received by the public. BOPA collections are held over three-day periods at various locations throughout the City.

Photo 8-1: April 1998 Household Hazardous Waste Day

A number of the materials collected at the HHW and BOPA events are recycled. Such materials include paints, motor oil, and batteries. Other hazardous materials collected include insecticides, herbicides, flammable solids, acids, bases, poisons, oxidizers, reactive substances, and heavy metals. These items are transported to a licensed hazardous waste facility for disposal. Please see Table 8-5 for more detailed information regarding these events, the materials collected, and participation levels. Appendix A includes an advertisement and information sheet for the April 1998 BOP event.

In addition to the special collection events, the PWD, Solid Waste Disposal Division, has implemented a collection and recycling program for 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 8-5

HAZARDOUS WASTE COLLECTION PROGRAMS	FISCAL YEAR 1997/98
Public Works Department	
Number of Household Hazardous Waste Collection Events Held	1
Number of Residents Participating in Household Hazardous Waste Collection Day	2,261
Gallons of Hazardous Waste Collected at Household Hazardous Waste Events	26,000
Number of BOPA Events Held	10
Number of Residents Participating in BOPA Events	3,600
Gallons of Hazardous Waste Collected at BOPA Events	24,000
Approximate Percent of HHW or BOPA Materials Recycled	65%

♦♦♦

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, and is 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 has responsibility for maintaining 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 is responsible for enforcing 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 primary goal of the program is to reduce the number of sewer blockages and the negative impact that blockages have on the public, businesses, and the City's wastewater treatment facilities.

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 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 are often 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 allows staff to sample discharges to the storm water drainage system and possibly identify the nature of the discharge through its chemical composition.

TABLE 8-6

CROSS-CONNECTION IDENTIFICATION	FISCAL YEAR 1997/98
Street Transportation Department	
Number of Storm Sewer Cross-Connection Investigations	1
Water Services Department	
Number of Industrial Facility Inspections	172
Number of Industrial Facilities Inspected	148

(See TABLE 8-7 for more information on Street Transportation Department inspection activities)

♦♦♦

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 three components including 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 of 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 may 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 have been prioritized for inspections based on the 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, 25% of the City's active outfalls were inspected, exceeding the 20% required by the Permit (See Table 8-8).

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:

- Industrial facilities required to comply with the federal NPDES Industrial Storm Water Permit requirements.
- Industrial facilities with a NPDES permit to discharge to the City's storm drain system.
- 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.

Other criteria include whether the facility uses chemicals which have been found in significant amounts in the City's storm water, the relative toxicity of those chemicals, the types of industry, the size of the facility, and whether it has been issued an NPDES storm water permit by the EPA 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 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), which 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 City staff to enforce the Program.

Information on illicit discharge cases is compiled using inspection forms and phone logs. The two sources provide caseload and cycle time information . The information is also 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 of the Street Transportation Department developed a series of pamphlets describing best management practices (BMPs) recommended for specific industries. the BMPs were researched using several sources including information from previous inspections from the Environmental Protection Agency. 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 potential problems and are updated or expanded as necessary (please see BMP 36 for more information).

The City also operates a "Storm Drain Hotline" for reporting illegal dumping activities. Some specific education efforts include the Storm Drain Dan coloring book, which is distributed to school aged children. Staff have also prepared Storm Water Protection Plan

presentations directed at teenagers, given in conjunction with the Gang Resistance and Training (GREAT) program.

TABLE 8-7

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

* As defined by the EPA

TABLE 8-8

CITY OF PHOENIX 36" OR GREATER OUTFALLS SERVING 50+ ACRES AND INDUSTRIAL OUTFALLS 12" OR GREATER SERVING 2+ ACRES

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	FY98-99
AC02	43rd Avenue & Peoria Avenue	90		Inches	Active			1/30/97	FY98-99
AC03	43rd Avenue & Peoria Avenue	42		Inches	Active			5/5/97	FY98-99
AC04	35th Avenue & ACDC Channel	96		Inches	Active			1/30/97	FY98-99
AC05	30th Avenue & Metrocenter	53		Inches	Active		Reported at 48" but measured at 53 inches - changed 6/2/95	12/8/95	FY98-99
AC06	29th Avenue & Metrocenter	48		Inches	Active			10/24/94	FY98-99
AC07	29th Avenue & Metrocenter	43		Inches	Active			12/8/95	FY98-99
AC08	Black Canyon Freeway & ACDC channel	36		Inches	Active			12/8/95	FY98-99
AC09	25th Avenue & ACDC channel	12		Inches	Active			12/8/95	FY98-99
AC10	19th Avenue & ACDC channel	36		Inches	Active			5/5/97	FY98-99
AC101	2 mile Tunnel & ACDC channel	36		Inches	Active			12/7/95	FY98-99
AC106	2 mile Tunnel & ACDC channel	36		Inches	Active			12/7/95	FY98-99
AC107	2 mile Tunnel & ACDC channel	48		Inches	Active			5/5/97	FY98-99
AC109	2 mile Tunnel & ACDC channel	96		Inches	Active			5/5/97	FY98-99
AC11	7th Street & ACDC channel	42		Inches	Active			12/7/95	FY98-99
AC110	2 mile Tunnel & ACDC channel	96		Inches	Active			5/5/97	FY98-99
AC113	2 mile Tunnel & ACDC channel	36		Inches	Active			12/7/95	FY98-99
AC12	18th Place & ACDC channel	48		Inches	Active			9/26/94	FY98-99
AC13	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/97	FY98-99
AC14	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/97	FY98-99
AC19	42nd Street & Arizona Canal	36		Inches	Changed	11/1/94	Changed from AC19 to AZ01 - goes to AZ canal. Changed 11/1/94	1/18/95	
AC33	7th Avenue & ACDC channel	42		Inches	Active			5/5/97	FY98-99

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
AC39	14th Street & ACDC channel	36		Inches	Active			5/5/97	FY98-99
AC44	6th Street & ACDC channel - east wall	36		Inches	Active			5/5/97	FY98-99
AC48	10th Street & ACDC channel	42		Inches	Active			5/5/97	FY98-99
AC70	Dunlap & ACDC tunnel	60		Inches	Active			1/9/97	FY98-99
AC72	Dunlap & ACDC tunnel	36		Inches	Active			5/5/97	FY98-99
AC81	1/2 mile Tunnel & ACDC channel		6 X 6	Feet	Active			5/5/97	FY98-99
AC83	2 mile Tunnel & ACDC channel	36		Inches	Active			5/5/97	FY98-99
AC94	2 mile Tunnel & ACDC channel	36		Inches	Active			12/7/95	FY98-99
AZ01	42nd Street & Arizona Canal	36		inches	Active		Changed from AC19 to AZ01 - goes to AZ canal. Changed 11/1/94	12/8/95	FY99-00
CC01	? - Unable to find	24		Inches	Eliminated	9/15/94	Unable to find - may be tapped into another storm drain	9/15/94	FY99-00
CC02	23rd Avenue & Mountain View Road	36		Inches	Active			1/9/97	FY99-00
CC03	Peoria & Cave Creek Wash	84		Inches	Active			9/15/94	FY99-00
CC04	23rd Avenue & Cholla Road, east wall of canal	78		Inches	Active			4/28/95	FY99-00
CC05	25th Avenue & Cactus Road	48		Inches	Active			4/28/95	FY99-00
CC06	23rd Avenue & Larkspur Dr.	30		Inches	Active			4/28/95	FY99-00
CC07	19th Avenue & Sweetwater Ave.	48		Inches	Active			9/15/94	FY99-00
CC08	23rd Avenue & Thunderbird Road	72		Inches	Active			9/15/94	FY99-00
CC09	12th Avenue & Thunderbird Avenue	54		Inches	Active			11/2/94	FY99-00
CC10	19th Avenue & Greenway Road	90		Inches	Active			9/15/94	FY99-00
CC11	7th Street & Greenway Parkway	84		Inches	Changed	9/14/94	Changed to EF10 as of 9/14/94	9/14/94	
CC12	7th Street & Greenway Parkway - north side	36		Inches	Changed	9/14/94	Changed from CC12 to EF12 on 9/14/94	9/14/94	
CC13	7th Street & Greenway Parkway - south side	36		Inches	Changed	9/14/94	Changed to EF11 as of 9/14/94	9/14/94	
CC14	7th Street & Tierra Buena		6 X 3	Feet	Active			9/16/94	FY99-00
CC15	11th Avenue & Cave Creek Wash	84		Inches	Active			9/16/94	FY99-00

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
CC21	23rd Avenue & Cactus Road	36		Inches	Active			4/28/95	FY99-00
EF01	Cave Creek Road & Greenway Parkway	72		Inches	Active			3/24/95	FY99-00
EF02	16th Street & Greenway Parkway	84		Inches	Active			9/19/94	FY99-00
EF03	18th Street & Greenway Parkway	84		Inches	Active			9/19/94	FY99-00
EF04	20th Street & Greenway Parkway	96		Inches	Active			9/19/94	FY99-00
EF06	9th Street & Greenway Parkway	96		Inches	Active			3/24/95	FY99-00
EF07	9th Street & Greenway Parkway	36		Inches	Active			3/24/95	FY99-00
EF08	Cave Creek Road & Greenway Parkway	72		Inches	Active			3/24/95	FY99-00
EF09	16th Street & Greenway Parkway	36		Inches	Active			9/19/94	FY99-00
EF10	7th Street & Greenway Parkway	84		Inches	Changed	9/14/94	Changed from CC11 as of 9/14/94	3/24/95	FY99-00
EF11	7th Street & Greenway Parkway - south side	36		Inches	Changed	9/14/94	Changed from CC13 to EF11 as of 9/14/94	3/24/95	FY99-00
EF12	7th Street & Greenway Parkway - north side	36		Inches	Changed	9/14/94	Changed from CC12 to EF12 on 9/14/94	3/24/95	FY99-00
GC01	Grand Avenue & Grand Canal	24		Inches	Active			9/19/94	FY00-01
GC02	Grand Avenue & Grand Canal	36		Inches	Active			9/19/94	FY00-01
GC03	Washington St & Hohokam Expressway		10 X 6	feet	Active			11/22/94	FY00-01
IB01	52nd Street & Shea	36		Inches	Active			3/31/95	FY00-01
IB02	52nd Street & Shea	84		Inches	Active			3/31/95	FY00-01
IB03	Tatum, near Indian Bend Wash	66		Inches	Active			6/16/94	FY00-01
IB04	Tatum, near Indian Bend Wash	66		Inches	Active			6/16/94	FY00-01
IB05	Shea & Indian Bend Wash	78		Inches	Active			6/15/94	FY00-01
IB06	35th Street & Cholla	60		Inches	Active			6/10/94	FY00-01
IB07	36th Street, south of Sweetwater	78		Inches	Active			2/9/95	FY00-01
IB08	40th Street, south of Sweetwater	66		Inches	Active			3/31/95	FY00-01
IB09	40th Street, south of Sweetwater	36		Inches	Active			3/31/95	FY00-01
IB10	32nd Street & Acoma	66		Inches	Active			2/9/95	FY00-01

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
IB11	56th Street & Indian Bend Wash	66		Inches	Active			3/31/95	FY00-01
IB13	40th Street & Cactus Rd., on Cactus Road	72		Inches	Active		South Outfall	3/31/95	FY00-01
IB17	52nd Street & Indian Bend Wash		8 X 3	Feet	Active			6/9/94	FY00-01
IB18	40th Street & Cactus Rd.	72		Inches	Active		North Outfall	3/31/95	FY00-01
OC01	Old Cross Cut canal tunnel	36		Inches	Active			11/3/94	FY00-01
OC02	Van Buren & Old Cross Cut canal tunnel	42		Inches	Active			11/4/94	FY00-01
OC03	47th Street & Roosevelt	66		Inches	Active			11/1/94	FY00-01
OC04	46th Street & McDowell Road	42		Inches	Active			8/23/94	FY00-01
OC05	48th Street & Thomas Road	36		Inches	Active			12/1/94	FY00-01
OC06	48th Street & Earll Drive	54		Inches	Active			12/1/94	FY00-01
OC07	48th Street & Indian School Road	36		Inches	Active			12/1/94	FY00-01
OC08	46th Street & McDowell Road	54		Inches	Active			8/23/94	FY00-01
OC35	Old Cross Cut canal	36		Inches	Active			8/31/94	FY00-01
OC39	Old Cross Cut canal		6 X 5	Feet	Active			8/31/94	FY00-01
OC40	Old Cross Cut canal		6 X 5	Feet	Active			11/4/94	FY00-01
OC43	Old Cross Cut canal	60		Inches	Active			8/31/94	FY00-01
OC49	Old Cross Cut canal tunnel	36		Inches	Active			8/30/94	FY00-01
PD01	91st Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	FY01-02
PD02	83rd Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	FY01-02
PD03	75th Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	FY01-02
PD04	67th Avenue & Papago Diversion channel	90		Inches	Active			3/31/95	FY01-02
PD05	59th Avenue & Papago Diversion channel	90		Inches	Active			3/9/95	FY01-02
PD06	51st Avenue & Papago Diversion channel	84		Inches	Active			3/9/95	FY01-02
PD07	43rd Avenue & Papago Diversion channel	72		Inches	Active			7/22/94	FY01-02
PD08	43rd Avenue & Papago Diversion channel	54		Inches	Active			7/22/94	FY01-02
PD09	39th Avenue & Papago Diversion channel	78		Inches	Active			7/22/94	FY01-02

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	FY01-02
PD11	31st Avenue & Papago Diversion channel		10 X 6	Feet	Active			11/30/94	FY01-02
PD15	32nd Avenue and Papago Diversion channel - west of PD11	40		Inches	Active			11/30/94	FY01-02
PD16	34th Avenue (approx) and Papago Diversion channel - west of PD11	42		Inches	Active			11/12/94	FY01-02
SC01	56th Avenue & Union Hill		12 X 12	Feet	Active			3/31/95	FY01-02
SC02	51st Avenue & Yorkshire Dr.	36		Inches	Active			9/22/94	FY01-02
SC04	40th Avenue and Beardsley Rd - south side	78		Inches	Discovered	3/29/95	Discovered on 3/29/95	3/29/95	FY01-02
SR01	51st Avenue & Salt River - north side	96		Inches	Active			7/23/97	FY02-03
SR02	43rd Avenue & Salt River - north side	90		Inches	Active			7/29/97	FY02-03
SR03	35th Avenue & Salt River - north side	75		Inches	Active			7/29/97	FY02-03
SR04	27th Avenue & Salt River - north side	72		Inches	Active			7/30/97	FY02-03
SR05	Approx. 25th Avenue & Salt River - north side	102		Inches	Active			7/29/97	FY02-03
SR06	22nd Avenue & Salt River - north side	78		Inches	Active			10/17/97	FY02-03
SR07	19th Avenue & Salt River - North Side	54		Inches	Active			2/14/97	FY99-00
SR08	15th Avenue & Salt River - north side	96		Inches	Active			8/2/95	FY99-00
SR09	11th Avenue & Salt River - north side	81		Inches	Active			10/24/97	FY02-03
SR10	7th Avenue & Salt River - north side	54		Inches	Active			12/31/97	FY02-03
SR11	Central Avenue & Salt River - north side	30		Inches	Active			1/9/98	FY02-03
SR12	Central Avenue & Salt River - north side	42		Inches	Active			1/9/98	FY02-03
SR13	Central & Salt River - north side	21		Feet	Active		Tunnel	1/9/98	FY02-03
SR14	3rd Street & Salt River - north side (261 E. University Dr.)	36		Inches	Active			1/14/98	FY02-03
SR15	3rd Street & Salt River - North side	84		Inches	Active			1/14/98	FY02-03
SR15	3rd Street & Salt River - North side	84		Inches	Active			1/15/98	FY02-03
SR16	10th Street & Salt River - north side	54		Inches	Active			1/6/98	FY02-03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR17	12th Street & Salt River - north side	96		Inches	Active			1/7/98	FY02-03
SR18	16th Street & Salt River - north side	66		Inches	Active			1/20/98	FY02-03
SR19	20th Street & Salt River - north side	21		Feet	Active		Tunnel	1/20/98	FY02-03
SR20	24th Street & Salt River - north side	84		Inches	Active			1/21/98	FY02-03
SR21	32nd Street & Salt River - north side	90		Inches	Eliminated	7/9/96	Now is part of SR61. Changed 7/9/96.	6/20/95	
SR22	32nd Street & Salt River - north side	84		Inches	Eliminated	7/9/96	Now is part of SR61. Changed 7/9/96	3/7/95	
SR23	32nd Street & Salt River - north side	60		Inches	Eliminated	11/22/94	Not an outfall - part of SR21. Changed 11/22/94	11/22/94	
SR24	28th Street & Salt River - north side	90		Inches	Active			1/21/98	FY02-03
SR25	34th Street & Salt River - north side	27		Inches	Eliminated	6/20/95	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	
SR26	37th Street & Salt River - north side	42		Inches	Active			1/22/98	FY02-03
SR27	40th Street and Salt River - north side -west outfall	72		Inches	Active			1/22/98	FY02-03
SR28	40th Street & Salt River - north side	72		Inches	Active			1/23/98	FY02-03
SR29	44th Street & Salt River - north side	78		Inches	Active			1/26/98	FY02-03
SR30	27th Avenue & Salt River - south side	108		Inches	Active			7/3/95	FY99-00
SR31	19th Avenue & Salt River - South side	72		Inches	Active			2/14/97	FY99-00
SR32	7th Avenue & Salt River - south side	72		Inches	Active			1/7/98	FY02-03
SR33	Central Avenue & Salt River - south side	66		Inches	Active			1/9/98	FY02-03
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	
SR35	7th Street & Salt River - south side	72		Inches	Active			1/8/98	FY02-03
SR36	15th Street & Salt River - south side	72		Inches	Active		Galvanized	1/15/98	FY02-03

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR37	16th Street & Salt River - south side	36		Inches	Active			1/15/98	FY02-03
SR38	24th Street & Salt River - south side	72		Inches	Active			1/20/98	FY02-03
SR39	28th Street & Salt River - south side	96		Inches	Active			1/21/98	FY02-03
SR40	Elwood Street (@32nd Street) & Salt River - south side	30		Inches	Eliminated	3/7/95	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	
SR41	33rd Street & University - south side of Salt River	15		Inches	Eliminated	3/7/95	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	
SR42	35th Street & University - south side of Salt River	48		Inches	Eliminated	3/7/95	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	
SR43	37th Street & University - south side of Salt River	15		Inches	Eliminated	3/7/95	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	
SR44	36th Street & University - south side of Salt River	15		Inches	Eliminated	3/7/95	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	

Outfall ID	Site Address	Size	Box size	In or Ft	Current Status	Date (status change)	Other (comment)	Last Date Inspected	Next Inspection Year
SR45	40th Street & Salt River - south side	54		Inches	Active			12/15/94	FY99-00
SR47	51st Avenue & Salt River - north side, 50ft no. of SR01	48		Inches	Active			7/23/97	FY02-03
SR48	45th Street & Salt River - south side	48		Inches	Active			3/23/94	FY99-00
SR49	67th Avenue & Salt River - north side	96		Inches	Active			3/31/95	FY99-00
SR52	52nd Street & Hohokam Freeway - north side of Salt River		97 X 61	Inches	Active			1/27/98	FY02-03
SR53	37th Street & Salt River - north side (sanitary)	42		Inches	Eliminated	3/30/94	According to Aviation, this 42" outfall is really an overflow for the sanitary sewer system	3/30/94	
SR56	Approx. 28th Street & Salt River - north side	36		Inches	Active			1/21/98	FY02-03
SR58	35th Avenue & Salt River - north side of river, east side of road	60		Inches	Eliminated	8/5/96	Only for WWTP discharge, not stormwater. Changed 8/5/96.	8/5/96	
SR59	2333 W. Durango - 23rd Ave. WWTP - on east side of SR05	48		Inches	Active			7/30/97	FY02-03
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	FY02-03
SW01	33rd Avenue & Deer Valley Road	42		Inches	Active		open ditch	3/31/95	FY01-02
SW04	29th Avenue & Lone Cactus	42		Inches	Active			9/22/94	FY01-02
SW05	29th Avenue & Lone Cactus	42		Inches	Active			9/22/94	FY01-02

Outfall ID

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.

The City's Fire and Personnel Departments both have responsibility for responding to unintended hazardous material spills or releases. In addition, those City departments that manage, use, store, transport, and dispose of hazardous materials and wastes have implemented policies and procedures for responding to spills within their respective operations. For example, the Public Works Department (PWD) has developed and implemented 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 developed and implemented 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 teams that respond to calls within the city limits and within a 700 square mile rural area. These teams are stationed in the north, south, and central corridors of the city.

There has been a 300% increase in hazardous materials incidents since the HMRT was first formed. From the approximate 50 incidents in 1980, there are now over 500 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 consists of a standard engine and ladder company, with a specially equipped vehicle. The combination of equipment and personnel is designed to provide standard fire fighting equipment, specialized equipment for hazardous materials, and a crew of nine people.

All personnel working these stations are Hazardous Materials Technicians. Their training meets and exceeds all requirements of the Occupational Safety and Health Act, Code of Federal Regulations, and National Fire Protection Association guidelines, and is accredited through Oklahoma State University. The training and education consists of at least 200 hours of initial training, followed by another 100 hours of annual hands-on and classroom training.

When hazardous materials are spilled or illegally disposed of onto City-owned property, the Fire Department conducts an investigation 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 conduct further investigation of 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 that are 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:

- Contacting the City's contracted hazardous waste firm to provide emergency cleanup and disposal of hazardous materials and/or wastes.
- Obtaining emergency identification numbers for transporting materials.
- Maintaining a project file for appropriate documentation.
- Providing overall administration of 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.
- 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 8-9

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

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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 has implemented a Pollution Prevention (P2) Program to promote the practice of reducing hazardous materials in City operations, enhance the City's approach to environmental management, and provide ongoing technical assistance. Established within the City Manager's Office of Environmental Programs (OEP), the P2 Program displays the City's commitment to improve the quality of the environment while continuing to provide exceptional service to residents.

A P2 Team, composed of management-level staff from 17 City departments, provides oversight to the Program, and several sub-committees assist in developing Program elements. In addition, each major operating department has a designated P2 Coordinator who serves 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. The main elements of the Program are:

- hazardous materials purchase and exchange;
- environmental data management;
- facility evaluations to assess compliance and pollution prevention opportunities;
- regulatory assistance/policy development;
- training on environmental requirements and pollution prevention;
- communication, outreach and incentives.

The P2 Program has implemented several items to help reduce hazardous materials in City operations, beginning with development of the Hazardous Materials Purchase Policy. The Purchase Policy guides departments in the selection of environmentally preferable products that also are cost effective and efficient.

To assist in implementing the new purchase policy, a comprehensive guide and worksheet provides training to employees on how to use Material Safety Data Sheets (MSDS) to select alternatives to hazardous materials. Each hazardous material proposed for purchase is reviewed using the hazardous material purchasing guidelines. Often, this results in the

selection of an environmentally preferred substitute. Many of these preferred substitutes now are offered to departments through the City's Central Stores' catalogue.

Through the continued implementation of the purchase policy, the P2 Program will be able to provide a list of environmentally safe products to other departments. This "Reviewed Products List" allows departments access to a comprehensive list of reviewed products based on cost effectiveness, efficiency, environmental impacts, and worker safety.

Another activity implemented by the P2 Program is the hazardous materials "Trading Post." This innovative program provides an opportunity for departments to "trade" excess hazardous materials with each other, 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. Table 8-10 contains information on successful exchanges.

Presentations on the Trading Post have been made to organizations outside the City, including the University of Arizona, the sponsor of the AZ Resource Exchange (AZRE), the Arizona Department of Environmental Quality, and other local governments.

When fully developed and implemented, a key element of the P2 Program's technical support will be a computer database that will automate many environmental activities and allow City departments to share environmental data and information. Managed by OEP, the database will:

- automate department chemical inventories;
- provide a comprehensive Reviewed Products List;
- provide an on-line service for retrieving MSDSs, which are required by OSHA to be given to employees for every hazardous material used;
- provide emergency response plans for City facilities electronically to the Fire Department to aid their response activities;
- automate selected environmental reports, such as the annual Tier II form for chemical inventory reporting, required by the Emergency Planning and Community Right to Know Act;
- provide site plans of facilities and store environmental data, such as permits.

Currently the database is being tested in several departments and is projected to be operational in late 1998. The database will be expanded in the future to include waste tracking and environmental training information.

The P2 Program conducts assessments of 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. This program uses a team approach to evaluate the requirements of applicable regulations for City operations. Both potential compliance actions and best management practices are identified to enhance the work environment and to minimize the impact of City operations on the natural environment. 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. Its purpose is to establish an initial compliance level at a facility 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 Level II project involves a detailed review of the processes and storm water management practices of a specific facility. The assessment will result in improved standard operating procedures to help avoid negative environmental impacts.

A Level III P2 Opportunity Assessment, or P2 Plan, evaluates the operations at a facility, and identifies opportunities to reduce the use of hazardous materials and the generation of hazardous wastes. In 1996, several facilities were required to prepare a P2 Plan to meet a regulatory requirement.

Training staff on environmental issues, including P2 concepts, enhances their ability to actively participate and contribute to 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 and currently is developing P2 training, which will be 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 help 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."*

A communication plan has been developed that defines the methods used to communicate pollution prevention to all City employees. The plan combines outreach and training that is educational and fun, and helps build support for the P2 Program.

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

Other forms of outreach that have been implemented help to reinforce the basic concepts of the P2 Program include:

- *EnviroNotes*, a bi-monthly newsletter that reaches over 1,000 employees, discusses P2 activities in the departments and provides information on efforts to reduce the use of hazardous waste, P2 tips, and more. Efforts are underway to increase circulation of this newsletter.
- *Brownbag lunches* provide presentations and discussions detailing current environmental issues for City staff members.
- *City Connection* is the monthly employee newsletter that is sent to over 11,000 employees. This publication features 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 have a space to post flyers, and are located in high traffic areas throughout City facilities for easy visibility. Four hundred and fifty posters have been distributed, and to keep facilities interested in the program, a case of soda is provided when employees can point out their poster to visiting OEP staff members.
- *"P2 at Work"* uses a logo to encourage employees to demonstrate P2 in their workplace. A brochure provides an introduction to the "P2 at Work" concept. The brochure also provides a consultation form that employees can complete to request information on possible alternatives for any of their work activities. Employees receive a small reward for completing the consultation form.

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

The OEP staff also works with and establishes interdepartmental teams that 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;
- assistance on 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:

- standard operating procedures affecting storm water and non-hazardous waste at various facilities;
- a reporting policy for Notices of Violation to ensure coordination;

TABLE 8-10

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

*January 1 - December 31, 1997 Calendar Year

Appendix A includes a variety of brochures and pamphlets designed to make City staff aware of pollution prevention opportunities. As discussed above, the materials are distributed at a variety of events, including employee orientation, National P2 Week, and in employee newsletters.

Personnel Department

The Personnel Department, Safety Section, provides oversight and monitoring of departmental activities, centralized waste disposal and tracking, and training and technical assistance. 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 paperwork includes shipping manifests, sample analysis, waste profiles, work orders, billings, and destruction certificates. The City also generates and submits an annual hazardous waste report to the Arizona Department of Environmental Quality and the Local Emergency Planning Committee.

Qualified City safety personnel provide assistance upon department request in the following areas:

- hazardous waste identification;
- purchasing alternative products;
- spill procedures;
- waste minimization.

Hazardous waste materials rules and policies have been developed to address these specific areas, and assistance is provided to departments to help assure proper implementation and compliance with the rules and regulations. The City also has developed a hazardous materials management manual. The manual's primary purpose is to train City personnel in

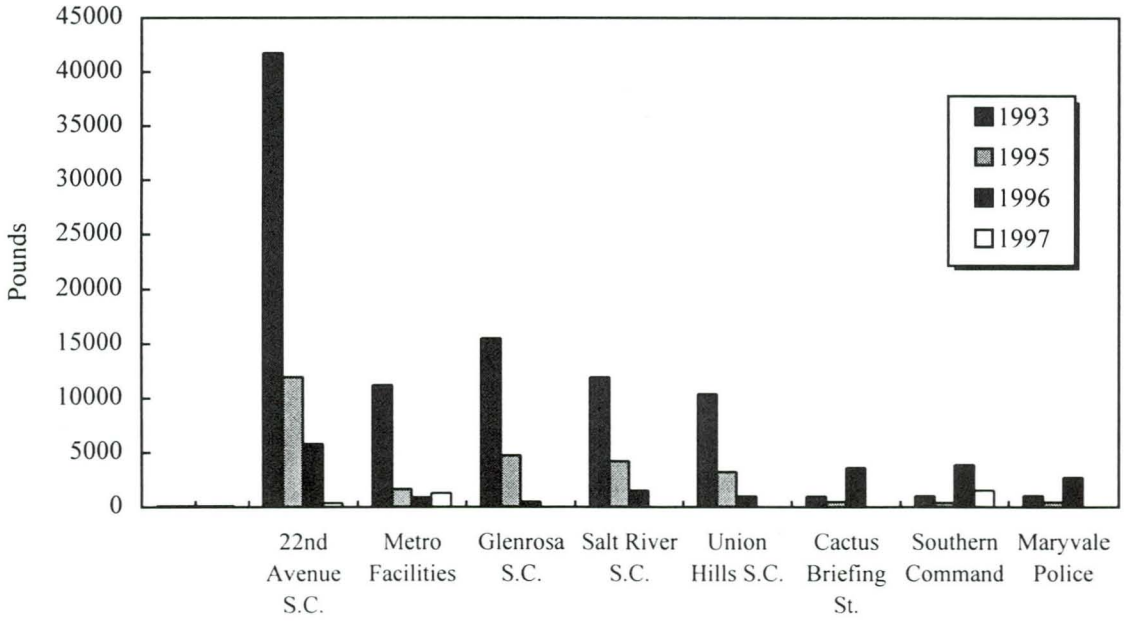
hazardous materials management. Personnel Safety provides hazardous material transportation training, and also coordinates training for pesticide application.

Public Works Department

The Public Works Department works in cooperation with OEP to reduce hazardous materials and to improve the quality of the work environment by reducing 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 will be 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 will be informed of the City's desire to purchase less toxic materials and will be 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 8-5 illustrates how the PWD has been successful in reducing the volume of hazardous wastes shipped between calendar years 1993 to 1997.

FIGURE 8-5
PUBLIC WORKS DEPARTMENT
SUMMARY OF HAZARDOUS WASTE SHIPMENTS



*S.C. = Service Center

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 developed and continues to implement a multi-disciplined and adaptable educational program. Specific efforts include:

- Pollution Awareness Markers (PAMs) for marking catch basins.
- A Storm Water Management Hotline which can be used by citizens or businesses to report illegal dumping.
- Educational brochures that describe appropriate best management practices for use by various kinds of 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 611 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 8-2: Pollution Awareness Marker

A Storm Water Management Hotline allows businesses and citizens to report any illegal dumping to the storm drains, as well as other related problems. 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. Since beginning the advertisement and promotional campaign, the number of calls received on the Hotline has steadily increased.

Billboards, newspapers, and radio advertisements have been used to educate the public about the problems caused by dumping chemicals down the storm drain, and to promote the City's Storm Water Management Hotline. A particularly creative television public service message broadcast on local stations featured a 1950s-style movie monster, composed of oily slime and debris, terrifying the community. As people run, screaming and trying to hide, an announcer advises, "It came from the storm drain, created by the chemicals that have been dumped down the drain." The final message is a request not to dump chemicals down the storm drain, and to report illegal dumping to the Storm Water Management Hotline.

The Street Transportation Department created educational brochures describing best management practices that apply to 23 specific industries. The brochures are made available at City facilities, are distributed to 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, and neighborhood festivals, are available at City facilities, and are included with promotional materials distributed in conjunction with other programs, such as the Household Hazardous Waste Collection events. A slide show is used to educate 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 has produced a number of public outreach materials, including bookmarks (see Appendix A), refrigerator magnets, rulers, note pads, pencils, and mugs. The items are designed to raise public awareness of storm water quality.

Photo 8-3 Storm Drain Dan Coloring Books

Photo 8-4 Storm Water Management Program Public Outreach Materials

TABLE 8-11

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

Water Services Department

The Water Customer Services Field Offices of the Water Services Department are responsible for implementing 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. During the reporting year, no draft permits were provided to the City for review and comment.

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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.

During Fiscal Year 1997/98, the Fire Department worked with the Personnel Department's Safety Section and the Street Transportation Department's Storm Water Management staff to develop a new Best Management Practice for the use of BioSolve on small oil and fuel spills at vehicle accident scenes.

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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 implemented programs that help 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 have developed 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 have implemented a program 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 are also made to industrial associations, public interest groups, professional associations, and trade groups. Displays and informational booths are provided at large public festivals and events, and a number of interactive activities have been developed 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 is active in making fuel tank owners aware of 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. Information regarding proper installation and maintenance is provided when the inspections are performed, and is also made available throughout the permitting and/or closure process.

In addition, the Department's Hazardous Materials Response Team activities often provide opportunities to educate 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 regarding the impacts caused by these chemicals 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. Spill Prevention, Countermeasures and Containment (SPCC) plans are being developed, and facility employees will routinely be provided with training in the SPCC plan activities,

responsibilities, and requirements. Inventories of chemicals used by both departments are maintained, and employees are trained in hazard communications and hazardous materials operations. Employees are trained in the proper operation of their facilities and receive periodic safety training to help assure that leaks and spills do not occur.

The Equipment Management Division has specific procedures in place that include Pollution Prevention activities. The procedures deal with bulk delivery fuel releases, temporary shop petroleum product spill disposal policies, and automotive coolant/antifreeze collection and disposal procedures.

TABLE 8-12

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

Personnel Department

The Safety Section of the Personnel Department is responsible for assuring that City operations are in compliance with state and federal Community Right-to-Know regulations. These regulations require that any facility using or storing reportable quantities of hazardous substances listed in SARA Title III to report that information to appropriate regulatory agencies. City departments subject to these regulations compile an annual report coordinated by the Safety Section and submit 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 train their workers on the hazards of the chemical products they use on the job. The Safety Section has developed and distributed procedures to all City operations to help assure employee protection and regulatory compliance. These procedures include a written program at each facility, an inventory of chemicals, material safety data sheets, container labeling, and employee training. The Safety Section has established a central library of chemical products used by City workers, as well as a library of material safety data sheets.

The Personnel Department has independent training programs that are presented in conjunction with training offered by various departments. They also will develop specialized training programs upon request. The training is followed up with inspections of departments to determine compliance with the hazard communication standard and chemical handling.

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. These programs are designed to encourage employee understanding and participation,. A number of educational materials have been developed and distributed. 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 is required to follow 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 1994 Uniform Fire Code.

Fire Department

The Fire Department has monitored the installation and removal of underground flammable and combustible liquid storage tanks through a formal permitting process since the early 1970s. Over the years, the level of oversight has become more sophisticated as knowledge of the physical and environmental hazards presented by these storage units has increased. The City adopts new requirements in an effort to protect its citizens as new technologies emerge and national codes change to include stronger safeguards.

In 1995 the Fire Department entered an Inter-Governmental Agreement with the Arizona Department of Environmental Quality (ADEQ) to perform the required environmental inspections in conjunction with the Fire Code inspections. ADEQ pays the City for each facility installation inspection or facility closure inspection that is performed. This is in addition to fees the City charges for plan reviews, installation permits, and closure permits.

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, because ASTs provide a significant reduction in 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 conducting 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 December 31, 1998. All USTs under the Department's control will be tested until that time.

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. This report does not include the three airports.

TABLE 8-13

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

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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 most direct method the City uses to educate the public regarding the need to clean up and properly dispose of pet wastes is a warning notice placed on doorknobs. Distributed by the Public Works Department's Solid Waste Disposal Division, these door hangers serve both to educate and to enforce the requirements of the Phoenix City Code, Chapter 27, Section 27-8. They generally are left at a facility where improper animal waste disposal activities are occurring. 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. A sample door hanger is included in Appendix A.

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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 wastes left by their animals 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 provided with proper disposal as often as necessary to prevent a public nuisance or health hazard. Wastes from small animals or pets must be put into a plastic bag, securely tied, and placed in a solid waste container. Wastes from larger animals, such as horses and other livestock kept as pets, may also be put out for collection, provided the waste is dry and contained in an approved plastic bag before being placed into a solid waste container. 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 also takes measures to educate the public and remind them that it is against the law to not cleanup after their pets. Signs are installed in parks having recurring problems associated with pet waste. The photo below shows a sign used in Phoenix parks. The sixth line of the sign reads, "Dogs Must be on a Leash," and the last line reads, "Animal Waste Must be Removed by Pet Owner."

Photo 8-5: Pet Waste/Leash Ordinance Sign
Margaret T. Hance Park, Phoenix, Arizona

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 1998 Trip Reduction Plan in February 1998. The plan provides a list of 22 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 January 1997 confirmed that over 95% of City employees work a schedule other than the standard five day per week 8 a.m. to 5 p.m. schedule).
- Providing subsidized use of public transit (all City employees have either 100% or 50% subsidies).
- Subsidized or preferential carpool parking.
- Guaranteed Emergency Ride Home Program.
- 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 employee newsletter. The newsletter is published and distributed weekly. The City also sponsors recruitment drives once every other year. Departmental rideshare representatives are provided with reminders to distribute information to employees, and new employees receive full information about the Plan in new employee orientations. Rideshare information is also provided at employee fairs and other similar City-sponsored events.

Valley Metro Rideshare also provides speakers that can 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 provide Rideshare representatives and others help with implementing 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. Over the next 15 years, additions and modifications planned by the Phoenix Bikeways Task Force will bring the total system up to nearly 700 miles.

Approximately 20 miles of additions to the bikeways are planned for each year. This planned expansion of the Phoenix Bikeway System has resulted in Phoenix being recognized by Bicycling Magazine as one of the "Up and Coming" bikeway systems in the United States.

The City is an active participant in several bicycle task forces. The Governor's Arizona Bicycle Task Force works on safety and education items, as well as legislation that affects bicyclists and bicycle facilities. The Maricopa Association of Governments (MAG) Regional Bicycle Task Force coordinates, standardizes, and promotes bicycle facilities throughout the Phoenix metropolitan area. The MAG Task Force recently completed a Regional Bikeways Plan that will supplement the various plans of the member cities with inter-city routes to be used primarily by commuter bicyclists.

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.

The City was the first in the nation to provide bike racks on its entire bus fleet. This initiative earned the Public Transit Department a Technology Achievement Award from Public Technology Incorporated in 1991. The innovative bike rack design has been made available to transit services nationwide.

TABLE 8-14

PHOENIX BIKEWAY SYSTEM	FISCAL YEAR 1997/98
Street Transportation Department	
Total Number of Bikeway Miles Added	17
Total Number of Bikeway Miles in Phoenix	458

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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 8-15

CITY VEHICLE FLEET BY TYPE	
Light Vehicles	2,945
Heavy Vehicles	866
Heavy Equipment	540
Trailers	433
Miscellaneous Equipment	211
Number of Vehicles Replaced (Fiscal Year 1997/98)	528 (or 11%)

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 appropriate policies and procedures for recovering and recycling CFC refrigerants have been implemented. These CFC recycling efforts have proven to be very successful. The PWD has reduced the use of virgin refrigerant from 7,875 pounds in Fiscal Year 1990-91 to 2,280 pounds in Fiscal Year 1997-98. Similar refrigerant recycling activities are performed for stationary air conditioning equipment that serve City facilities.

All equipment is scheduled for PM 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 are used to provide this service. The PWD administers annual contracts with local firms that use automated wash facilities. For those vehicles not able to use the contracted vender, mostly large trucks and heavy

equipment, the PWD has designed and constructed automated wash facilities that have the ability to recycle up to 80 percent of the water used in the cleaning process. All wash waters not recycled are captured and are disposed of in the sanitary sewer system. Three wash facilities have been constructed to date, and a fourth facility is planned.

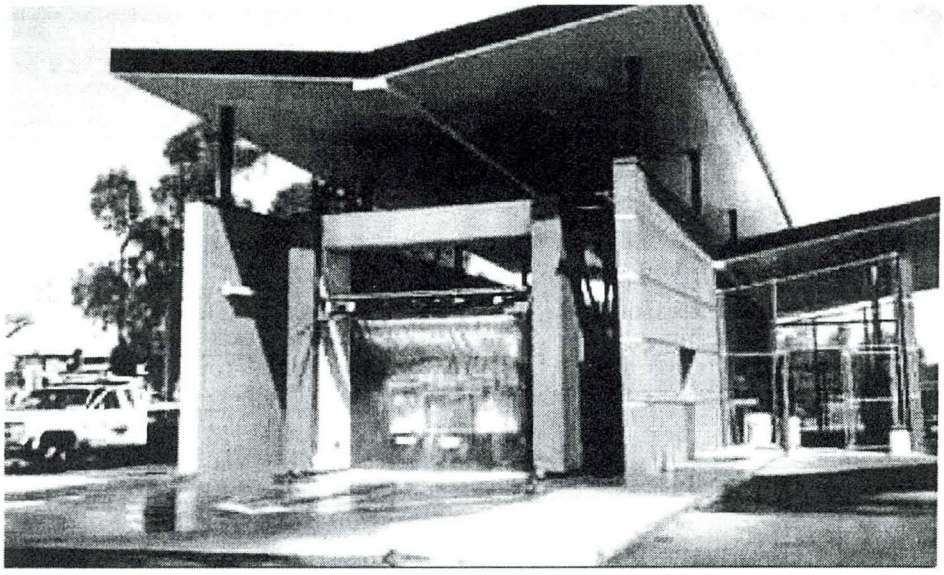

Photo 8-6: Public Works Automated Wash Facility

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 CNG, capable of using both CNG and some other fuels, such as diesel. The City may also use alcohol or hydrogen fuels, and will continue to study alternative fuel options.

Public Transit Department

The City is committed to reducing tailpipe emissions in the bus fleet. Between April and August 1998, the Public Transit Department will order 165 new CNG buses, thereby replacing approximately 50 percent of the aging bus fleet. The City expects significant reductions in the tailpipe emissions of the transit fleet as older buses are retired. By the year 2000, particulate matter emitted by the bus fleet is projected to be decreased by 80 percent; oxides of nitrogen are expected to be reduced by nearly 50 percent; and carbon monoxide emissions are anticipated to be at least 10 percent lower than the current fleet.

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 8-16

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

Photo 8-7 DARE CNG-Powered Vehicle

Photo 8-8 CNG-Powered Side-Loader

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Street Transportation Department

The Street Transportation Department is responsible for designing, constructing, and maintaining 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. This system uses a computerized van 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, then 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 owns 12 parking lots, each of which is swept monthly. In addition, four vehicle service center parking lots are swept every week. One landfill parking lot is swept weekly. Please see BMP 23 for more information on the City's street sweeping programs.

TABLE 8-17

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

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BEST MANAGEMENT PRACTICE 22

Continue programs to pave dirt streets.

Maricopa County is designated as a non-attainment area for particulate pollution. Unpaved streets contribute to particulate pollution through aerial suspension caused by vehicular disturbance on the street itself and re-suspension of dirt tracked onto adjacent paved streets. Unpaved streets also can prevent efficient storm water drainage, contribute to neighborhood deterioration, and increase traffic hazards for vehicles, bicyclists, and pedestrians.

Street Transportation Department

The City currently has approximately 95 miles of unpaved streets located within its jurisdiction. For the most part, paving is provided to these streets through an assessment process known as the Improvement District

On April 15, 1997, the City Council approved a program offering a reduced assessment rate for single-family residential property owners in low income, high particulate pollution areas. Known as the "Paving Dirt Streets" program, this reduced rate assessment program is designed to assist in paving more of the unpaved streets that directly impact particulate levels.

Approximately eight miles of unpaved streets are known to qualify for the reduced assessment rate at this time. This number is expected to increase with further study. Unpaved streets that qualify for the reduced assessment rate must meet the following criteria:

- an overwhelming majority of abutting development is single-family residential.;
- the area is identified as one with low to moderate-income residents;
- the road must be a full dirt street;
- and the area is within the parts of the City having the highest levels of particulate pollution.

The City also has received financial assistance through Federal Community Development Block Grant funds for five areas that meet the Paving Dirt Streets program criteria. The assistance is used to pay the property owner's assessment for paving neighborhood streets, and helps provide other infrastructure enhancements such as curbs, gutters, and sidewalks. Although no paving projects were completed during Fiscal Year 1997/98, four projects are in the design phase.

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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 17 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 collector streets are swept once every 21 days.
- Local streets and industrial/commercial streets are swept once every three months.
- The twelve City owned parking lots are swept once each month.
- Four City Service Center parking lots are swept once each week.
- One landfill parking lot is swept once each week.

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 minimum of 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 sign along the road recognizing the effort. Right-of-ways are maintained on an as-needed basis and quarterly cleanups are recommended. Adopters are encouraged to recycle what they can.

TABLE 8-18

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

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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 is generally 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 8-19

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

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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 at those City operations that use harmful chemicals. They are also 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 providing environmental performance criteria, including specifying requirements for vendors to recover used, empty containers, and to provide training on the use of a product 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 must 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 a "Qualified Party," in compliance with SPCC regulations.

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 8-20

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

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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 conducts assessments of facilities that use herbicides, pesticides, and fertilizers. Through the process of analyzing specific tasks performed by groundskeepers, landscapers, and maintenance personnel, the P2 Program 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 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.

Please see BMP 25 for additional information.

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 then 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. Currently, the RFS system is being upgraded. The new system will have more features and will allow staff to attach documents, photos, and maps to individual RFS files.

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 transferred be to computer databases and centralized digital tracking systems.

Photo 8-9: 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 8-10: Storm Water Management Van

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 25 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 is also 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 8-21

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

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 written 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 8-22
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 being implemented.

Photo 8-11 Silt Screen

Photo 8-12: Straw Bales

Photos 8-11 and 8-12: 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.

During Fiscal Year 1997/98 some of the topics discussed relative to storm water management included grading and drainage, plumbing codes, and green buildings. Meeting participants also were briefed on the sewer inspection program and associated charges, as well as the City's civil citation authority.

DSD also conducts monthly meetings with the Homebuilders' Association of Central Arizona. Topics of these meetings were similar to those mentioned above, but also included several discussions on water use on construction sites.

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. Information on best management practices for site runoff was presented to area contractors and staff at the Aviation Department. In June 1998, DSD staff discussed the City's storm water management plan review procedures at a conference sponsored by the Arizona Public Works Association, and EAS staff discussed issues relating to the City's NPDES Municipal Separate Storm Sewer permit at an American Society of Civil Engineers' conference.

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 has developed 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 1994 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 9 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.

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

SUMMARY OF ENFORCEMENT ACTIONS

SUMMARY OF ENFORCEMENT ACTIONS

Street Transportation Department

The City has developed an Enforcement Response Plan (ERP) and Storm Water Civil Penalty Policy (SCPP) to assist efforts to obtain 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, and
- to guide violators into compliance through education and warnings.

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

The ERP establishes criteria for pursuing enforcement action and 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 providing a written notification to the owner or operator of the facility, such as a warning letter or inspection report that identifies the violation and required 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 or activity causing the violation. 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 against the violator. 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, and each day of continuing violation constitutes 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 the Department with the opportunity to withhold or revoke permits at construction sites that fail to comply with the requirements of the Phoenix City Code. Table 9-1 summarizes the enforcement activities performed during Fiscal Year 1997/98.

TABLE 9-1

SUMMARY OF ENFORCEMENT ACTIVITIES
FISCAL YEAR 1997/98

Enforcement Action	Number	Comments
Street Transportation Department		
Illicit Discharge and Illegal Dumping Inspections	118	Includes all inspections performed by Street Transportation
Illicit Discharge Complaint Investigations	178	
Major Outfalls Inspected	57	Field Screening activities
Warning Letters Issued	6	Five facilities came into compliance, one has pending enforcement action.
Notices of Violation Issued	3	One facility came into compliance, one has pending enforcement action, and one was referred to ADEQ as a potential groundwater violation.
Development Services Department		
Storm Water Permits Issued	134	
Storm Water Inspections at Construction Sites	2,766	Includes multiple inspections at all permitted sites

Chapter 10

SUMMARY OF PUBLIC EDUCATION PROGRAMS

SUMMARY OF PUBLIC EDUCATION PROGRAMS

As described in Chapter 8, 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 staff educates various audiences about the need to minimize runoff from roof drains to storm drains and drainage channels - *BMP 29.*

- 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 has developed 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

- The Engineering and Architectural Services Department 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.*

- The P2 Program educates the public and City staff about the hazards associated with using pesticides, including insecticides, herbicides, and fertilizers - *BMP 25.*

- In addition to the training programs established as part of the City's P2 efforts, OEP also has developed 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 has developed and distributed 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. 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 Household Hazardous Waste Day and Battery, Oil, Paint and Anti-freeze 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.*

- The Public Works Department uses Spill Prevention, Countermeasures and Containment Plans (SPCC) for underground and aboveground storage tanks. Employees at the City's fueling facilities routinely are provided with training in the SPCC plan activities, responsibilities, and requirements - *BMP 14.*

- The public is made aware of the need to clean up 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.*

- 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 - *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 implements the public education and awareness component of the City's Storm Water Management Program. These efforts include Pollution Awareness Markers installed over storm drain inlets and public outreach materials including games, coloring books, pencils, and magnets. These materials are distributed at public events and speaking engagements - *BMP 11.*

- The Department also has developed a program to educate tank owners about the impacts caused by leaks and spills of gasoline, fuel, oil, and other chemicals - *BMP 14.*

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

Water Services Department

- The Water Services Department implements a community-focused Pollution Prevention Program. The Program is designed to educate businesses and consumers on methods to prevent or minimize the generation of hazardous and non-hazardous waste - *BMP 14.*

This is only a summary of the education and outreach activities described throughout Chapter 8. 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 11

ANNUAL EXPENDITURES FOR FISCAL YEAR 1997/98 AND 1998/99

ANNUAL EXPENDITURES FOR FISCAL YEARS 1997/98 AND 1998/99

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 11-1 provides the budget for new activities implemented as a result of NPDES permit requirements. Table 11-2 does not indicate values that have specifically been set aside for Storm Water Management Program (SWMP) implementation and management. The numbers reflect 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 11-1

STORM WATER MANAGEMENT PROGRAM
DIRECT IMPACT BUDGET
FISCAL YEAR 1997/98

Program/Activity	Actual Fiscal Year 1997/98	Estimated Fiscal Year 1998/99	Associated BMP(s)
Development Services Department			
Infrastructure Review - Plan Review	$ 242,562	$ 243,000	28, 29, 30, 31, 32, 33, 34, 35
Infrastructure Review - Inspections	$ 551,344	$ 552,000	28, 29, 30, 31, 32, 33, 34, 35
Engineering and Architectural Services Department			
NPDES Administration	$ 449,398	$ 388,743	1, 33
Street Transportation Department			
Storm Water Management Section	$ 429,586	$ 487,308	1, 7, 8, 11, 13, 14, 27, 36
TOTAL	**$ 1,672,890**	**$ 1,671,051**	

TABLE 11-2

STORM WATER MANAGEMENT PROGRAM
COMPREHENSIVE ANNUAL BUDGET
FISCAL YEAR 1997/98

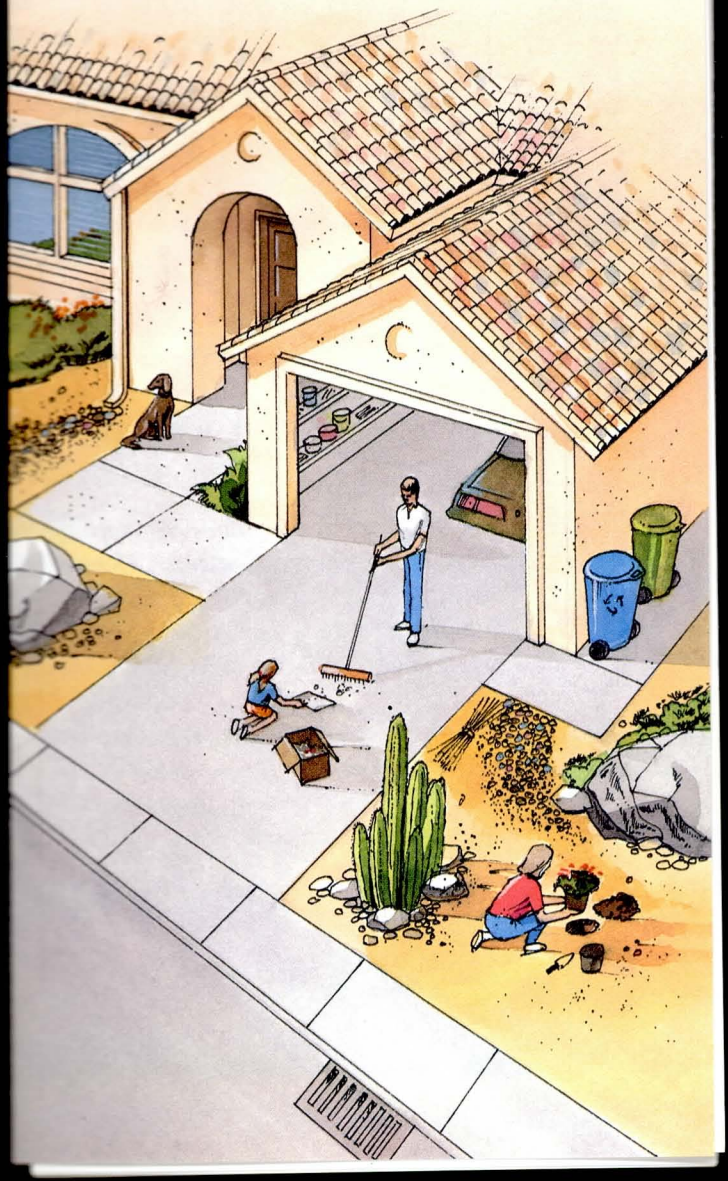
Program/Activity	Actual Fiscal Year 1997/98	Estimated Fiscal Year 1998/99	Associated BMP(s)
Development Services Department			
Infrastructure Review - Plan Review	$ 1,386,067	$ 1,387,000	28, 29, 30, 31, 32, 33, 34, 35
Infrastructure Review - Inspections	$ 3,150,535	$ 3,151,000	28, 29, 30, 31, 32, 33, 34, 35
Engineering and Architectural Services Department			
NPDES Administration	$ 449,398	$ 388,743	1, 33
Fire Department			
Hazardous Materials Response Team	$ 191,000	$ 175,600	9
Underground Storage Tank Regulation	$ 25,000	$ 50,000	14, 15
Office of Environmental Programs			
Pollution Prevention Program	$ 332,200	$ 385,800	10, 14, 25, 26
Parks, Recreation and Library Department			
Urban Forestry and Living Tree Programs	$ 55,626	$ 63,048	5
Pesticide Application, Training and Disposal	$ 17,077	$ 15,185	25
Personnel Department			
Illegal Dumping Cleanup	$ 182,844	$ 200,000	9
Public Works Department			
Administrative Services Division	$ 3,129,840	$ 3,332,269	10, 18
Equipment Management Division	$ 30,272,287	$ 31,973,728	14, 15, 19, 20
Solid Waste Field Services Division	$ 43,211,226	$ 45,392,104	2, 3, 4, 5, 6
Solid Waste Disposal Division	$ 10,419,556	$ 13,081,820	2, 6
Street Transportation Department			
Storm Water Management Section	$ 429,586	$ 487,308	1, 7, 8, 11, 13, 14, 27, 36
Adopt-A-Street Program	$ 25,080	$ 25,550	23
Bikeway System	$ 367,797	$ 1,237,551	18
Street Maintenance	$ 38,990,773	$ 41,685,648	21, 23, 24
Improvement District	$ 1,418,769	$ 8,794,689	22
Water Services Department			
Industrial Pretreatment Program*	$ 2,305,462	$ 2,363,100	14
Wastewater Collection Division	$ 10,175,000	$ 10,500,000	7
TOTAL	**$146,535,123**	**$164,690,143**	

*Calendar Year 1997

APPENDIX A

Pollution Prevention Begins With You

A Guide to Protecting the Salt River and Our Environment



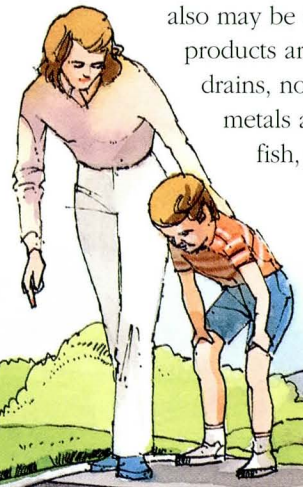
How you use and dispose of products containing toxic substances, has a direct impact on the environment and our quality of life.

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.

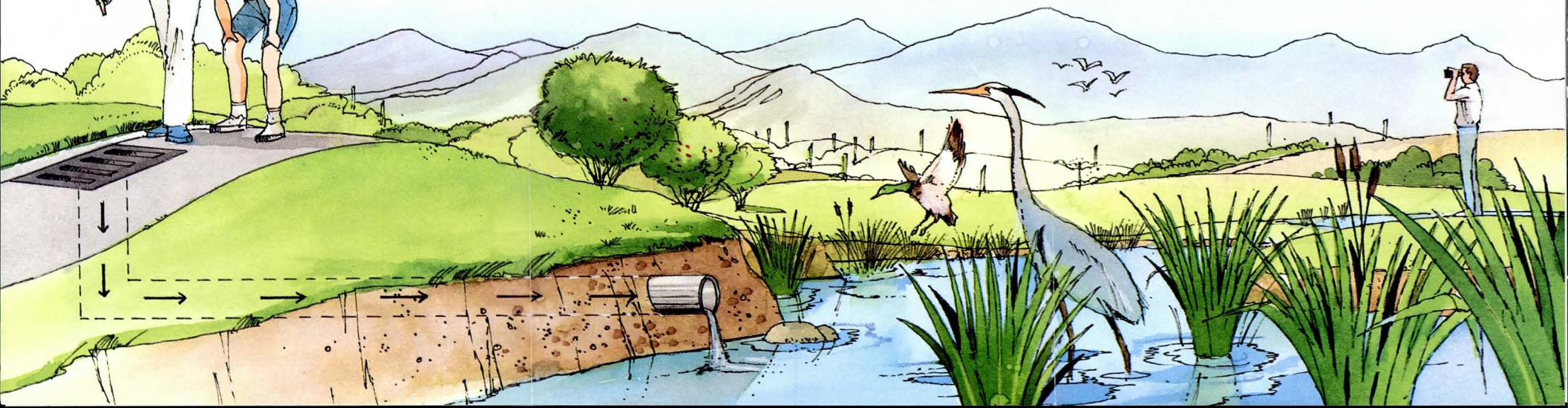
Become a responsible consumer.

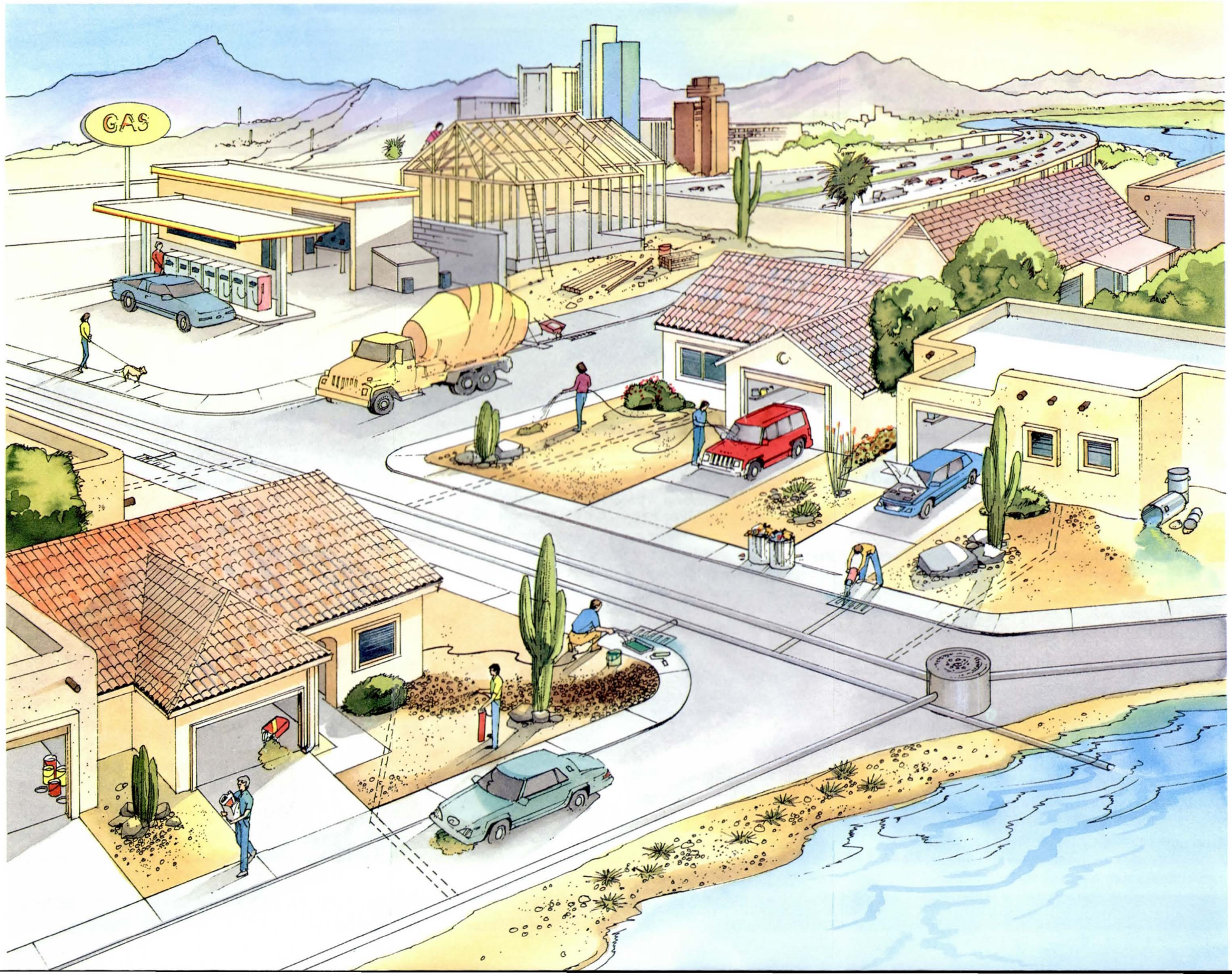
- Avoid buying products that contain metals or other toxic compounds by selecting safe, convenient alternatives. Call your city or town representative listed in this brochure for more information.
- Purchase the right amount of products to avoid having "leftovers."
- Give "leftovers" to a neighbor or 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.




GAS

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.

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

Portions of this brochure were reprinted with the permission of the Santa Clara Valley Nonpoint Source Pollution Control Program

BACKYARD COMPOSTER KITS
OR
YARD CARTS

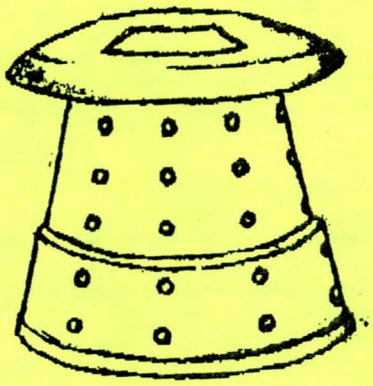
(Made Form Recycled Garbage Containers)

$5.00 Each

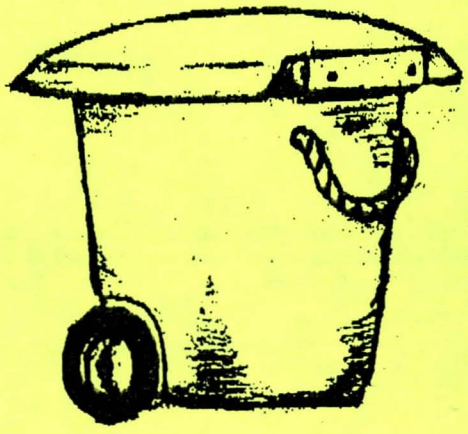
Available at the Following Locations:

27th Avenue Solid Waste Management Facility
3060 S. 27th Avenue, Phoenix
Phone: 262-6598
Hrs: Mon - Fri.: 5:30 A.-5:00 P.
Sat.: 8:00 A.-4:00 P.

Skunk Creek Landfill
3165 W. Happy Valley Road
Phone: 262-7109
Hrs: Mon - Fri.: 5:30 A.-5:00 p.
Sat.&Sun.: 8:00 A.-4:00 P.



Backyard Composter Kits Include: Coposter, a starter supply of mulch, and instructions. Excellent for recycling yard clippings and organic kitchen wastes.



Yard Carts include cart and a detached lid. Excellent for use in gardens as a wheel barrel, As a planter, or as a storage bin for items such as toys and other items.

CITY OF PHOENIX
BACKYARD COMPOSTING PROGRAM

Welcome to The City of Phoenix's Backyard Composting Program!

By choosing to compost, you have taken a large step in *reducing* the solid waste stream, *reusing* valuable organic resources right from home, and *recycling* their rich nutrients by returning them to the soil and thereby enriching your little corner of the earth.

What is Compost?

Compost is the resulting product of the natural decomposition process of organic matter. It is an excellent way to recycle organic matter or dead plant material. What begins as household organic materials becomes compost--a dark, crumbly, sweet-smelling, humus-rich soil enrichment.

What are the Benefits of Compost?

When introduced into gardens and flower beds, your homegrown compost,

* Significantly increases the soil's ability to combat diseases and environmental & seasonal hardships,
* Boosts the nutrients upon which plants depend to survive and flourish,
* Improves the soil structure, allowing oxygen into the soil by loosening clay-like soil, which promotes healthy root growth,
* Helps sandy soil to hold more moisture, permitting plants to take stronger root, and
* Helps prevent soil erosion and improves moisture retention.

All this is accomplished without expensive additives or chemicals.

For More Information....

....about how you can obtain a backyard composter kit and get started on composting, see information on reverse side of this flyer. Composter kits consist of a composter with lid, instructions on how to compost, and a supply of starter mulch--all for only $5 each kit.

PHOENIX RESIDENTS ONLY!

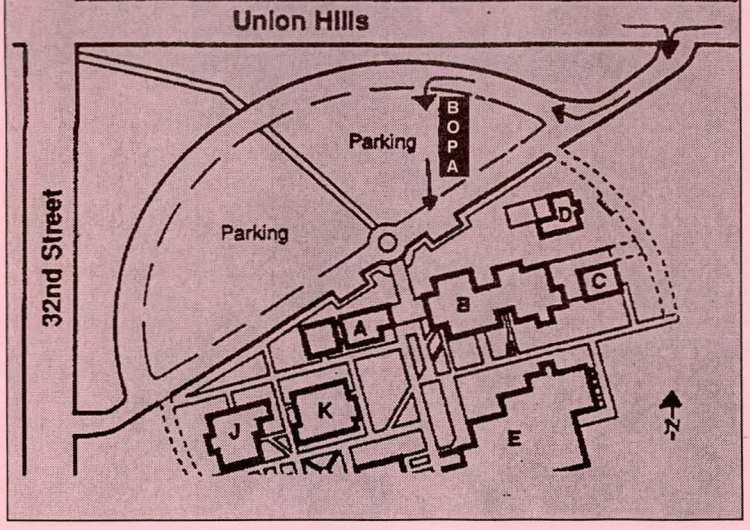
FREE BATTERY, OIL, PAINT & ANTI-FREEZE COLLECTION EVENT

accepting TIRES for a limited time

Batteries Oil Paint Anti-freeze and Tires

•Thursday through Saturday, April 2, 3, 4•
8 a.m. - 2 p.m.

PARADISE VALLEY COMMUNITY COLLEGE



DO NOT BRING other types of household hazardous waste to this special **limited** event. Other types of household hazardous waste will be accepted only with prior approval. Call for guidelines. BOPA collection events are held regularly in different city locations. **Commercial loads will NOT be accepted!**

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

PARADISE VALLEY COMMUNITY COLLEGE

City of Phoenix
Public Works Department

MAKING PHOENIX SHINE

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

Batteries, Oil, Paint, Antifreeze and Tires

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

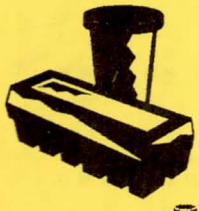
H:\MASTERS\BOPAT.WPD

Recyclables list for city of Phoenix

Recycle these items only!

Plastics

Check bottom of containers for code symbols 1, 2 or 6. These include 2-liter soda bottles, detergent bottles, milk jugs, clear food containers and plastic cups *[**NO PLASTIC BAGS**, pool chemical containers, dinnerware or frozen dinner trays]*



Foam

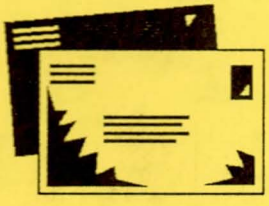
Food containers such as meat trays, cups or egg cartons *[**NO PACKING MATERIAL**]*

Glass

Food and beverage containers only *[Labels are okay]* *[**No** light bulbs, glassware, ceramics or window glass]*

Paper

Such as computer, construction and writing paper; file folders, grocery bags *[**No** facial or toilet tissue, paper towels, napkins, diapers, dog food bags, or thermal fax paper]*

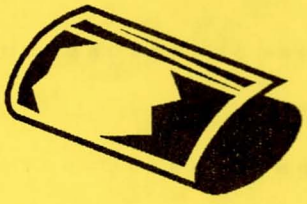


Junk Mail

[No self-sealing or covered-window envelopes]

Magazines

[No paperback or hardbound books]



Newspapers

Include all inserts

Cardboard/chipboard

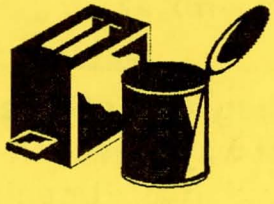
Packing or facial tissue boxes, personal hygiene boxes, dry food boxes such as cereal, cake mix and cracker containers *[remove liners]*, shoe and gift boxes, towel and tissue rolls *[No bar soap or detergent boxes, or beer and soda carriers]*

Milk cartons

Includes juice and creamer cartons and juice boxes

Aluminum

Beverage cans, frozen dinner trays, pie plates, foil, food containers



Metal

Such as food cans, metal lids, small appliances, wire, hub caps, scrap metal, **EMPTY** aerosol cans, screen doors *[**remove** rubber lining]*, lawn chairs *[**remove** webbing]*, wire clothes hangers *[labels are okay]*

- **All material must be clean, dry & empty**
- **No Grass, yard or food waste**
- **Do not bag, box or tie**
- **Remove all caps and lids**

City of Phoenix

Phoenix Recycles

RECYCLING DROP-OFF SITES

Phoenix residents may drop off recyclable material at any blue roll-off bin location.

■Paradise Valley Park	40th Street/Union Hills
■Smith's	19th Avenue/Bell Road
■CRInc Sorting Facility	1919 East University Drive
■Skunk Creek Landfill	3165 West Happy Valley Road
■27th Avenue Landfill	27th Avenue/Lower Buckeye Road

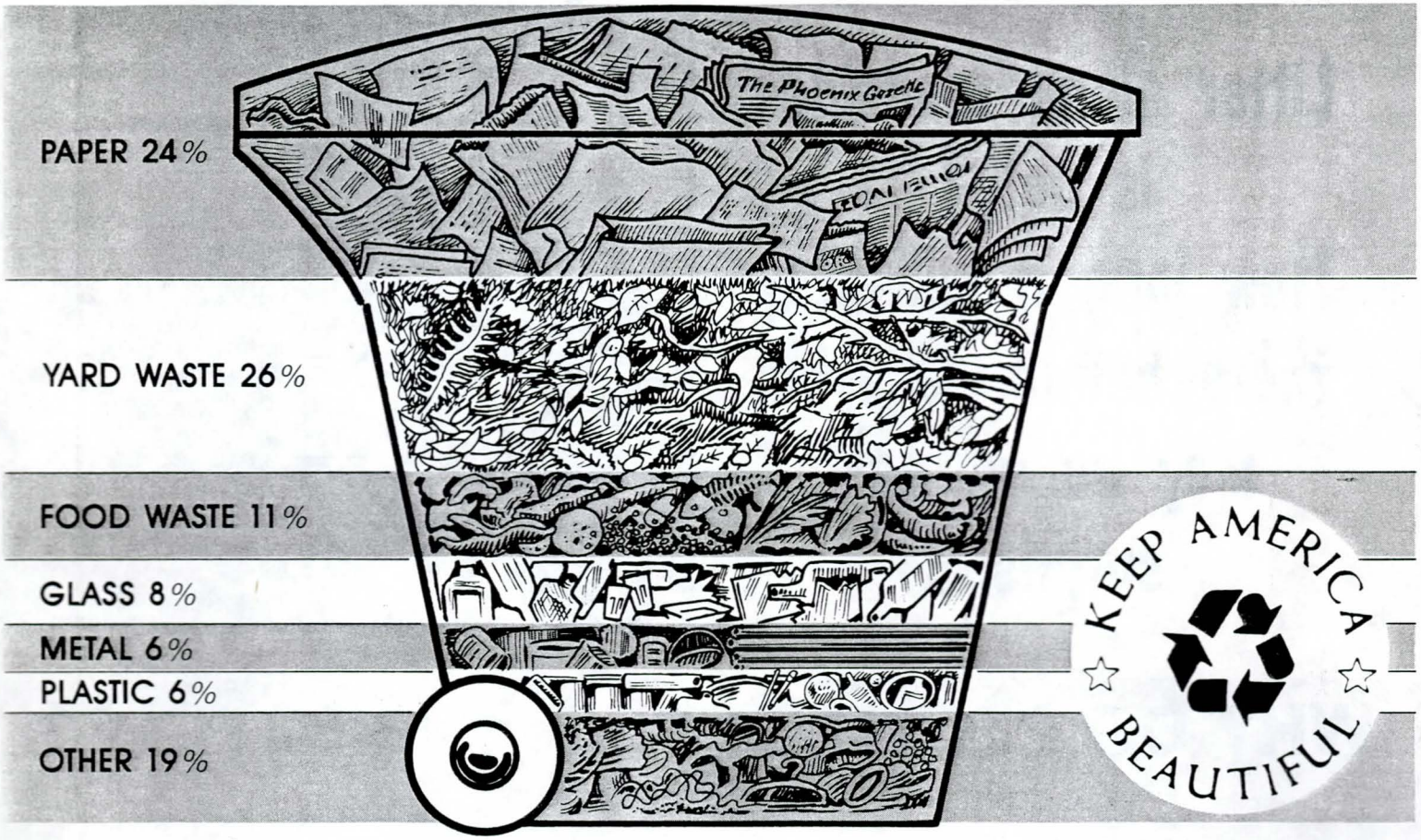
For information

- Call 262-7251 or
- E-mail to ***pwserve@ci.phoenix.az.us.***
- Recycling information is also available at the city's web site, ***www.ci.phoenix.az.us***

The recycling drop off sites are designed to provide a convenient way to recycle until curbside recycling is implemented in all Phoenix neighborhoods.

City of Phoenix

WHAT DO WE THROW AWAY in Phoenix?



UNIVERSITY of ARIZONA REFUSE STUDY

"50.3% by Weight and 63.6% by Volume is Recyclable"

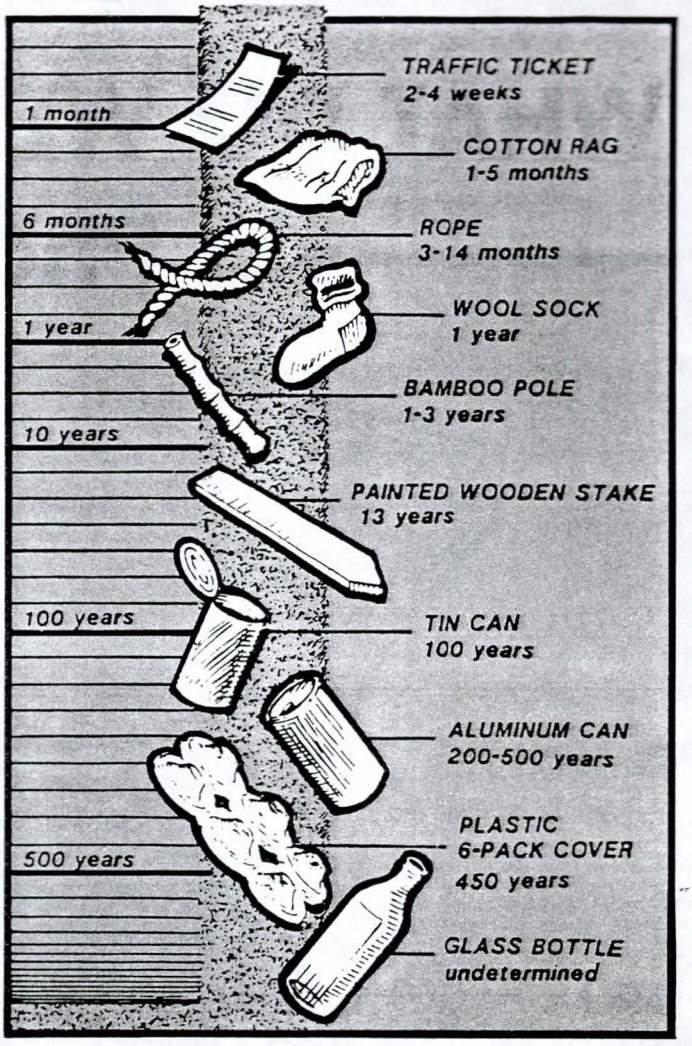
W.L. Rathje, D.C. Wilson, W.W. Hughes

THE GARBAGE PROJECT

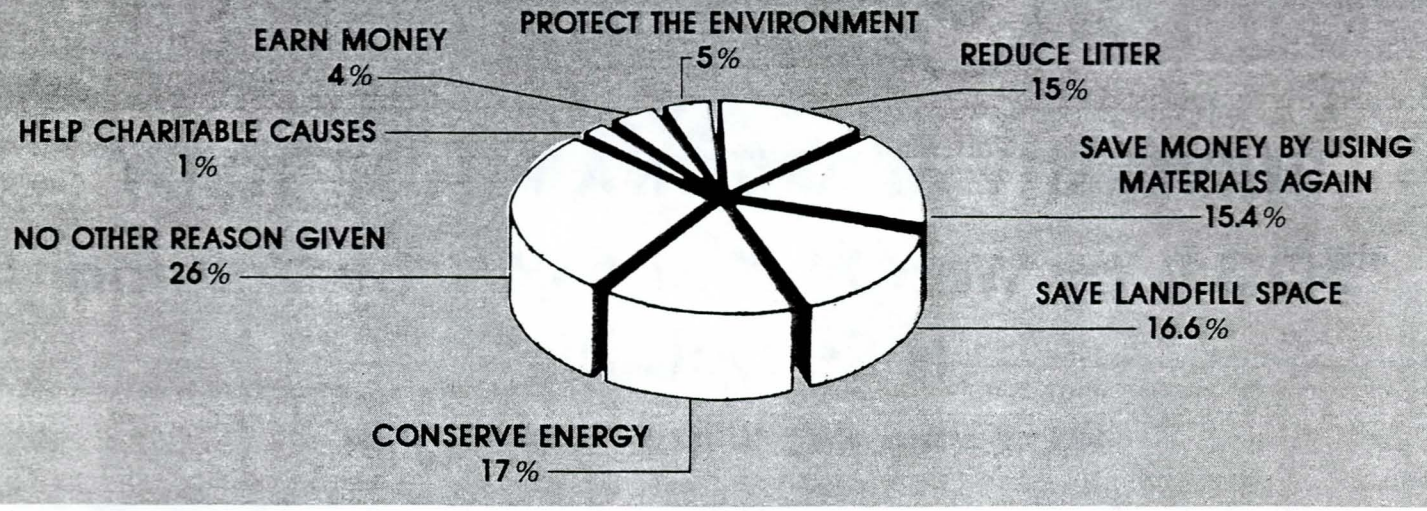
BUREAU of APPLIED RESEARCH in ANTHROPOLOGY
UNIVERSITY OF ARIZONA

ENDURING LITTER

Litter along roadsides is ugly!
How long it will stay there before decaying may be an ugly surprise!



WHY DO PEOPLE in Phoenix RECYCLE?



MAY 1988 GLASS RECYCLING STUDY

Printed on 100% recycled paper

Phoenix Recycles

Phoenix Clean & Beautiful

The organization that helps keep the Phoenix area cleaner and more beautiful grew out of the city's 100th anniversary celebration and interest in the national Keep America Beautiful program. It was launched in the 1982 with the help of Phoenix Mayor Margaret Hance and Phoenix Gazette editor Loyal Meek, two leaders who recognized the value of organized resident involvement in maintaining a better community.

PC&B is a non-profit 501 (c) 3 program. It is supported by the City of Phoenix, businesses, neighborhoods and individuals.

You can help too!

Join Phoenix Clean & Beautiful.
Become a volunteer today!
Complete this form and
mail or fax it to:
Phoenix Clean & Beautiful
101 S. Central - Suite 201
Phoenix, Arizona 85004
Fax # (602) 534-3334
Phone: (602) 262-4820

Name _____

Address _____

_____

City _____ Zip _____

Telephone _____

Keep Environmental Education
Moving and on the Ball

p h o e n i x
CLEAN & BEAUTIFUL
101 S. Central - Suite 201,
Phoenix, Arizona 85004
Address Correction
Requested

p h o e n i x
CLEAN & BEAUTIFUL

A citizens' program to promote positive solid waste practices.

Working for a cleaner, greener community

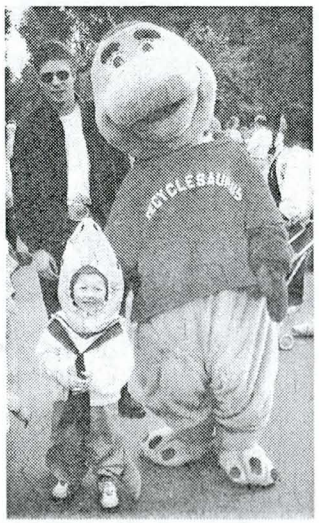
School Programs

Waste in Place
This hands-on educational curriculum from Keep America Beautiful is filled with educational activities for grades K-6.

Waste: A Hidden Resource
This curriculum contains a series of challenging educational projects on solid waste issues for junior and senior high school students.

The Green Shelf Collection
PC&B and local businesses have teamed up to provide a special selection of environmental books for young readers at City of Phoenix libraries.

Recyclesaurus
PC&B's loveable mascot is available to entertain and inform youngsters about solid waste and beautification at school programs and special events.



Call PC&B at 262-4820 for a free demonstration of school curriculums and for information on reserving dates for Recyclesaurus programs.

Business Programs

Waste in the Workplace
Recycling 101 for Small Businesses. This seminar teaches how to recycle waste and reduce operating costs to improve the bottom line.

Build America Beautiful
Endorsed by the National Home Builders Association, this program shows waste haulers and builders how to improve waste handling and disposal of construction debris.

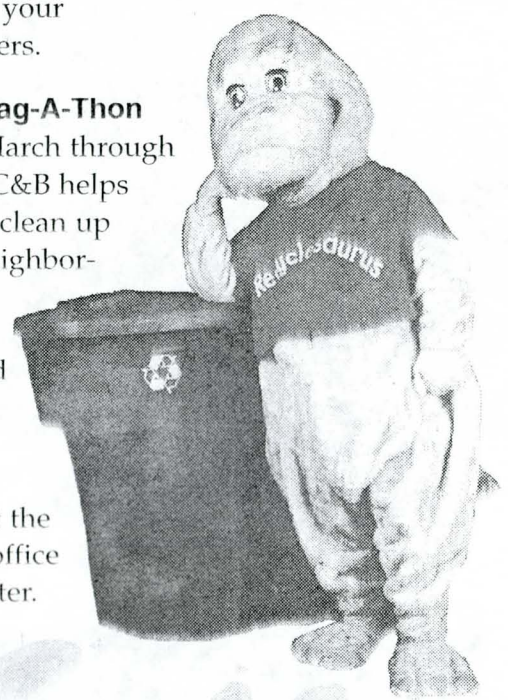
Christmas Tree Recycling
Each January PC&B, in partnership with the City of Phoenix, collects thousands of cut holiday trees to be mulched and used in city landscaping projects. Call in December to learn how you can participate.

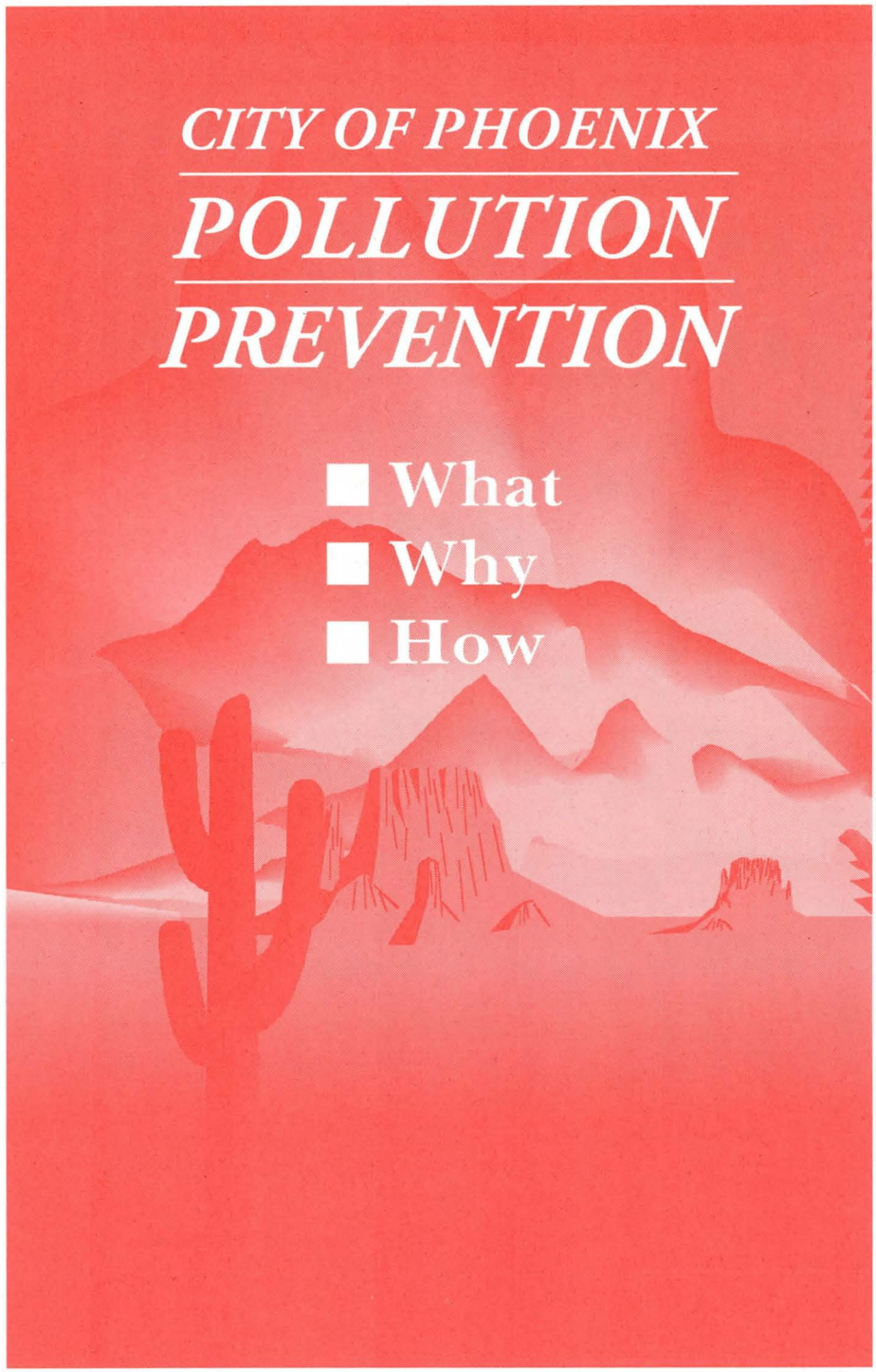
Neighborhood Programs

Cleanup Guides
PC&B offers this special "how to" guide free to neighborhood associations and blockwatch organizations.

Trash Bags and Roll-Off Bins
Free trash bags and caps for neighborhood cleanup programs while supplies last. To reserve yours, call the PC&B office. Litter containers and large roll-off bins are available for special events and community cleanups. Call 3-4 weeks in advance to reserve your containers.

Glad Bag-A-Thon
From March through May, PC&B helps groups clean up their neighborhoods with donated Glad trash bags. Contact the PC&B office to register.

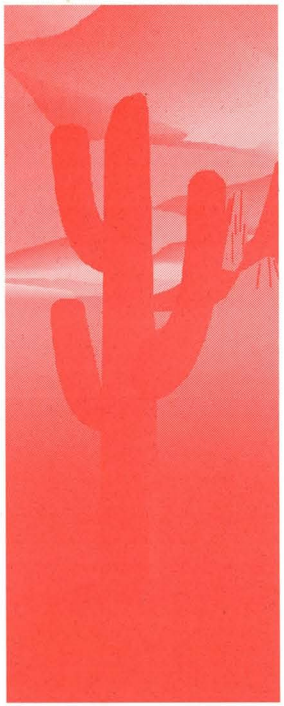



CITY OF PHOENIX
POLLUTION
PREVENTION
What
Why
How

What is Pollution Prevention?

Pollution prevention reduces pollution at the source whenever feasible. Pollution prevention is generally defined as any practice which reduces contaminants entering any waste stream or released into the environment prior to recycling, treatment, or disposal.

Pollution prevention includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.



Why Implement Pollution Prevention?

A Pollution Prevention Program can

- Protect public health and the health and safety of employees
- Reduce liability/legal costs
- Minimize regulatory burden
- Reduce waste disposal/cleanup costs
- Reduce operating costs
- Enhance employee involvement in innovations
- Protect the environment

Preventing Pollution by Managing Your Inventory

Waste is often created by having excess or outdated material.

- Buy only what you know you will use
- Rotate inventory so older material is used first
- Store material to prevent spills and leaks
- Set up an inventory tracking system
- Label all containers with contents and dates
- Don't accept free samples unless you know you will use them

Preventing Pollution From Hazardous Chemicals

The use of improved housekeeping practices can reduce spills, overflows, leaks, and other inefficiencies.

- Inspect and maintain equipment routinely
- Repair leaks quickly
- Use tight-fitting lids to prevent evaporation
- Wipe up spills whenever possible rather than hosing them down
- Use spigots and pumps instead of pouring
- Have a spill prevention program
- Use drip pans
- Train employees in proper management

Preventing Pollution Through Reuse and Recycle

Reuse of waste materials can reduce the amount of waste generated. Consider

- Recycling back into the production process as a raw material
- Filtering and reusing
- Purchasing distillation or recovery units
- Joining a waste exchange
- Sending waste offsite for recycling

Pollution Prevention through Consumer Preference for "Greener" Products

We can all help promote markets for products and services that result in less risk to human and ecological health through our purchasing power.

Environmentally aware purchasing . . . shopping for products that

- because they use less material or are long-lived, *reduce waste*
- because they are durable or repairable, can be *re-used*
- through their design, facilitate reuse and *reduce waste*
- are *recyclable*
- contain *recycled* material
- are *non-toxic* or less toxic than alternatives
- are *energy efficient*

Preventing Air Pollution

Alternative fuels can help improve air quality in the metropolitan Phoenix area.

- Natural gas reduces emissions of carbon monoxide by as much as 90 percent.
- Reduces reactive hydrocarbons by about 85 percent.
- Alternative fuels virtually eliminates particulate emissions. In 1995, over 255 city vehicles were converted to compressed natural gas.
- The city hopes to convert approximately 2,500 to 3,200 vehicles to alternative fuels over the next decade.

City of Phoenix

MAKING PHOENIX SHINE

For additional details on City of Phoenix pollution prevention initiatives, please refer to the "Making Phoenix Shine" brochure or call 256-3447.

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

August 1998

Storm Water

Storm Water Management®

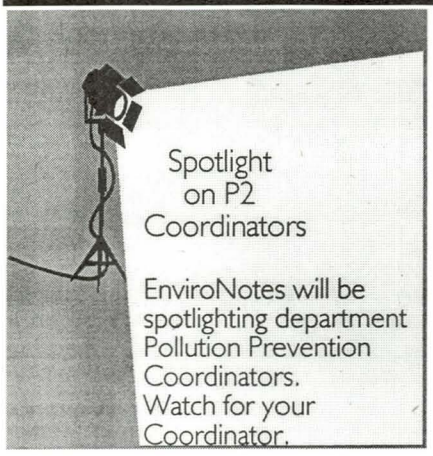
- Rain water carries contaminants from our streets into washes and rivers.
- Storm drains lead to rivers and washes. Because of this, they are intended to carry only rain water.
- 80% of pollutants reaching our rivers and washes come from materials dumped, sprayed or spilled on the ground, then carried through the storm drain system.
- Four quarts of motor oil can pollute a million gallons of water.

If you see anyone dumping anything into the storm drains, or if you would like more information, call the

Storm Water Management Section at 256-3190.

ENVIRONOTES

A Newsletter From The City of Phoenix Office of Environmental Programs • August 1998



Lonnie Thacker, Department Safety Analyst, is the P2 Coordinator for the Street Transportation Department and has provided environmental, health and safety support during his entire 12 years with the City while in this position.

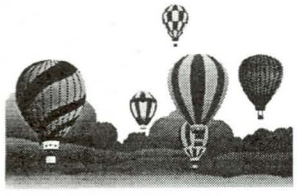
He holds a B.A. in Safety Management from Capital University and an M.S. in Safety and Health Management from West Virginia University. Since 1990, he has completed several classes in the ASU Hazardous Materials and Waste Management Program. Lonnie has been a Registered Environmental Manager since 1995 and last year was awarded status as a Diplomate of the American Board of Forensic Examiners. In addition, he holds certificates with eight environmental professional affiliations.

Lonnie has been involved in pollution prevention issues in the Street Transportation Department since he started in 1986. "Our Sign Shop was the first City facility to receive an EPA identification number for the generation of hazardous waste. We developed a hazardous material strategy for the department which covered OSHA's Hazardous Communication, RCRA Hazardous Waste and EPCRA (Community-Right-to-Know) Laws. We have worked hard to reduce the amount of hazardous waste that we are generating. Although several Street Transportation facilities were a large quantity generator at one time, through pollution prevention, we have been able to reduce our hazardous waste generation by 98 percent and significantly reduce volatile organic compounds (VOCs). Now, all Streets facilities are Conditionally Exempt Small Quantity Generators(CESQG)." These extraordinary successes were recognized by the Arizona Department of Environmental Quality (ADEQ) in 1996 when the Street Transportation Department received the prestigious Arizona Pollution Prevention Leadership Excellence (APPLE) Award.

An integral member of the P2 team since its inception, Lonnie states that P2 starts with his employees. "The key is that the P2 ideas come from the employees. They know their tasks when it comes to P2 and they are enthusiastic in implementing their own ideas. They really believe in the Pollution Prevention Program. Without them, it wouldn't work. It's teamwork at all levels."

Glad to have you on the team, Lonnie!

Clearing the Air



As you look out over the valley haze, do you wonder if it's ever going to get better? The City Council approved nearly $2 million dollars this year for programs to reduce dust (particulate) air pollution. Approximately $6 million will be used to pave all unpaved city streets over the next two years. An additional $6 million has been allocated to stabilize city-owned parking lots and city-owned vacant lots or open areas. The new programs will enhance the on-going regional effort to reduce air pollution.

In This Issue:

P2 Tip

✔ REMEMBER! Refuel after 4:00 p.m. to help reduce the potential effects to the ozone.

Public Works Environmental Workplan 2000 Integrated Contingency Plans (ICPs)

by: Theresa Foster, Environmental Coordinator, Public Works Department, 534-2608

Over the next few years, the Public Works Department will change its emergency response planning process. Currently, when an emergency occurs, staff has to determine which of the required emergency plans to follow. Is it a petroleum, hazardous waste, air quality or chemical emergency? Once the type of emergency is determined , the plan or plans can be dusted off the bookcase and implemented. This is time-consuming and cumbersome, especially when there is an emergency!

Public Works Department Administrative Services Division has developed a long-term environmental strategic plan, known as "Workplan 2000". Integrated Contingency Plans (ICPs) are proposed in the workplan to minimize duplication in the preparation and use of emergency response plans at Public Works' facilities. The ICP combines emergency response information into a comprehensive plan which meets all the various regulatory requirements. With one plan per facility, there will be less confusion when a real emergency does occur. In addition, expenditures for preparing, maintaining, submitting and updating a single plan will be much lower than multiple plans.

The ICP was first proposed by EPA in the June 5, 1996 Federal Register. The Fire Department is planning to adopt an ICP format into the City's Fire Code, possibly as early as October. The Fire Department's ICP will be called a Hazardous Materials Management Plan (HMMP). Generally, City facilities will be required to prepare a plan when on-site chemical quantities exceed quantities listed in the Fire Code. The plan could be made available electronically, which would be useful for: 1) Updating plans when personnel relocate; and 2) Submitting plans to emergency response agencies. For more information on HMMPs, contact Georgia Bramwell, Fire Prevention Specialist, 262-1653.

Hazardous Waste News You Can Use

Are your hazardous waste management procedures up to snuff? The Environmental Research Center has identified the top 10 errors made by hazardous waste generators. Use these as tips to quickly review your facility:

10. Mis-classifying waste as hazardous or non-hazardous
9. Accumulating hazardous waste more than 90 days
8. Accumulating too much waste at a satellite accumulation point
7. Not marking drums as "hazardous waste"
6. Not manifesting precious metals
5. Old or missing contingency plans
4. Using improper containers
3. Not keeping training up-to-date
2. Improperly filling out hazardous waste manifests
1. Not closing drums

Anyone of these can result in a regulatory citation!

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

Check It Out! Pollution Prevention Week September 8-11

Mark your calendars! Various City programs will be showcased during this third annual celebration of National Pollution Prevention Week. Eight City departments representing twelve programs will have displays throughout the week in City Hall, and interactive games with prizes and other giveaways will be the week's highlight from 11:00 am to 1:30 pm on September 10. During September 14-18, these City programs will mobilize to locations outside the downtown area, further raising employee awareness about pollution prevention. Come join the fun! For more information, call Liz Gilman, P2 Coordinator, at 256-5669.

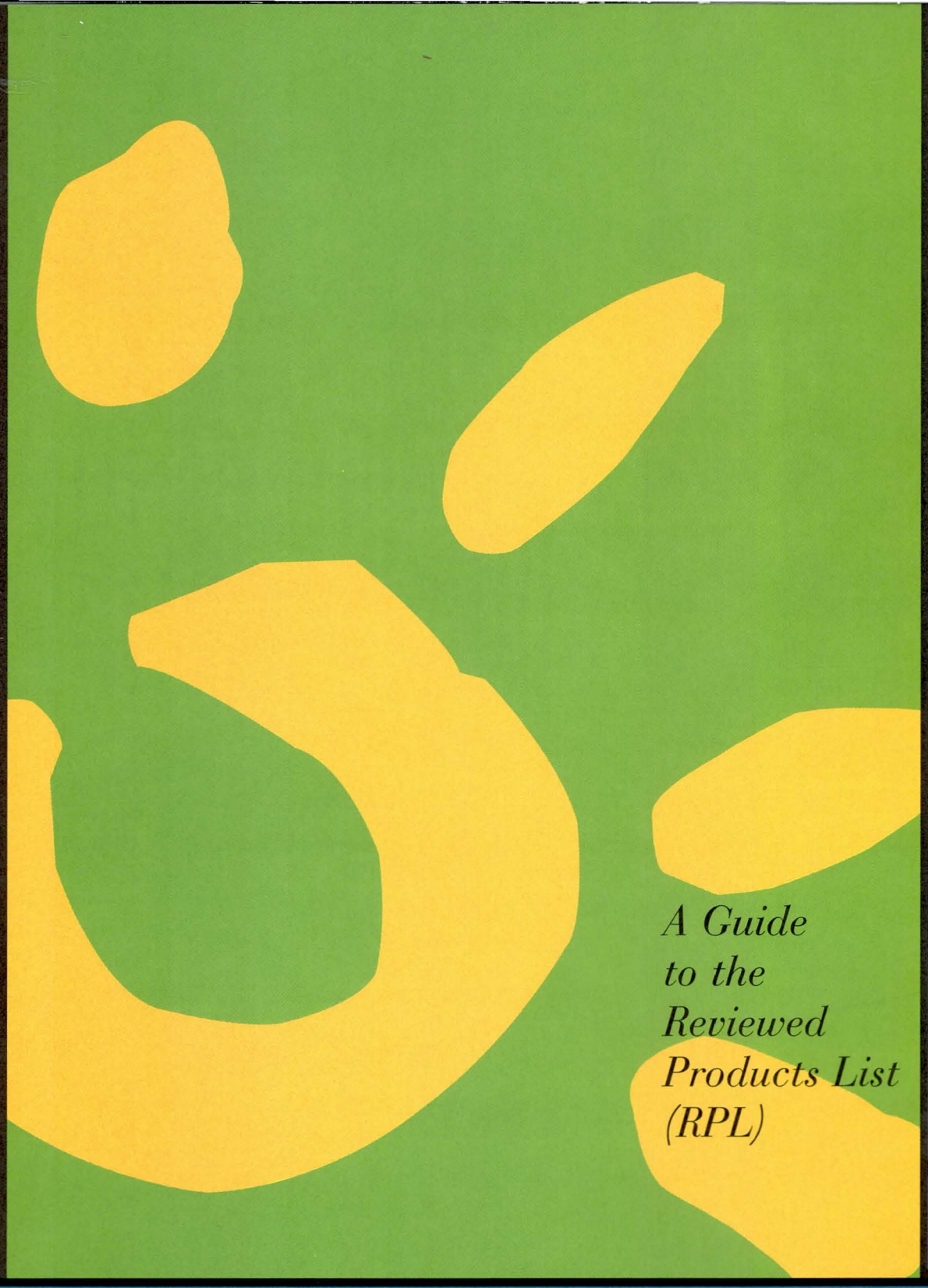
MAKING PHOENIX SHINE

Pollution Prevention Awareness

How are you saving money and helping the environment? Fax your success stories to OEP at 534-0795!

Printed on recycled paper.

SPHALT BATTERIES
HESIVES COMPRESSED
LABORATORY CHEMI-
FFICE SUPPLIES PAINTS
APHIC & PHOTOCOPIER
CTIVE MATERIALS
G SUPPLIES WELDING
WATER & WASTEWATER
EOUS ACIDS ASBESTOS
CAULKS SEALANTS
SED GASES EPOXIES
EMICALS OILS, GREAS
PAINTS PESTICIDES
TOCOPIER CHEMICALS
RIALS JANITORIAL &
WELDING MATERIALS
ASTEWATER CHEMICALS
ASBESTOS ASPHALT
EALANTS ADHESIVES
S EPOXIES FUELS
ALS OILS GREASES
AINTS PESTICIDES
OCOPIER CHEMICALS
RIALS JANITORIAL &
WELDING MATERIALS



A Guide to the Reviewed Products List (RPL)

THE CITY OF PHOENIX OFFICE OF ENVIRONMENTAL PROGRAMS POLLUTION PREVENTION (P2) PROGRAM

P2
POLLUTION PREVENTION

MAKE PHOENIX SHINE WITH ENVIRONMENTAL FRIENDLY PRODUCTS

MAKING PHOENIX SHINE

The city of Phoenix is committed to enhancing our community by reduction of pollution and hazardous materials. As employees and vendors of the city, you can make a difference! A new initiative, called the Reviewed Products List (RPL), provides a practical and easy way to reduce pollution by promoting the use of environmentally preferred materials. Products listed on the RPL have been reviewed for their potential impacts to the environment and to employee safety and health. Here are answers to some questions you may have about RPL.

WHAT ARE THE ADVANTAGES OF THE RPL FOR EMPLOYEES?

- **Safety** - RPL products are environmentally preferred products that have been reviewed to ensure safety for employees who use the products.

- **Time Savings** - Environmentally preferred materials can be easily identified without extensive research.

- **A Better Phoenix** - Many of the environmentally safer products on the RPL are used every day by city employees. Safer products mean a safer environment for our city and our families.

WHAT ARE THE ADVANTAGES OF THE RPL FOR VENDORS?

- **Increased Sales** - Suppliers of environmentally preferred materials may have an advantage over those providing more hazardous products. Products on the RPL may be recommended, even if these products aren't the least expensive in their category. Although still important, cost will not be the sole consideration as we strive to build a cleaner Phoenix.

FOR MORE INFORMATION (602) 256-5669

WHAT TYPES OF MATERIALS ARE INCLUDED ON THE RPL?

The products on the RPL are broken down into 21 different categories. Some of these categories include: janitorial and cleaning supplies, paints, pesticides, caulks, sealants, adhesives, compressed gases, epoxies, fuels, oils and greases.

HOW WAS THE RPL DEVELOPED?

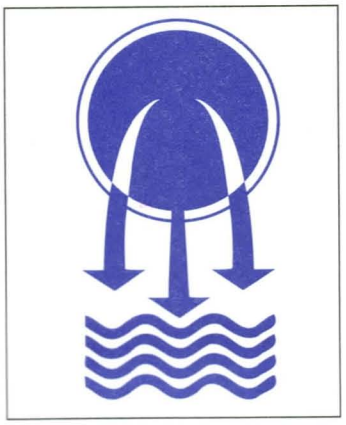
The city of Phoenix Interim Purchase Policy for Hazardous Materials focuses upon the city's goal to reduce the use of hazardous products in the workplace and served as the catalyst for the RPL. Using this policy, two city departments developed lists of materials after reviewing each product for compliance with the policy. After further review by the Office of Environmental Programs (OEP) and Personnel Safety, these lists were merged to create the RPL.

HOW CAN THE RPL BE EXPANDED?

Any department, employee or vendor can suggest new products for inclusion in the RPL. Based upon review by OEP and Personnel Safety, the material may be added to the RPL with the appropriate rating. This list will be updated and distributed to participating departments regularly.

HOW CAN I GET MORE INFORMATION ON RPL?

For more information or to add a product to the RPL, contact Liz Gilman or Paul Boothe at the Office of Environmental Programs at 256-5669.



Rivers, washes, ditches, pipes, catch basins, and retention ponds are all part of the storm drain system.

If you see anyone dumping anything into the storm drains or if you would like more information;

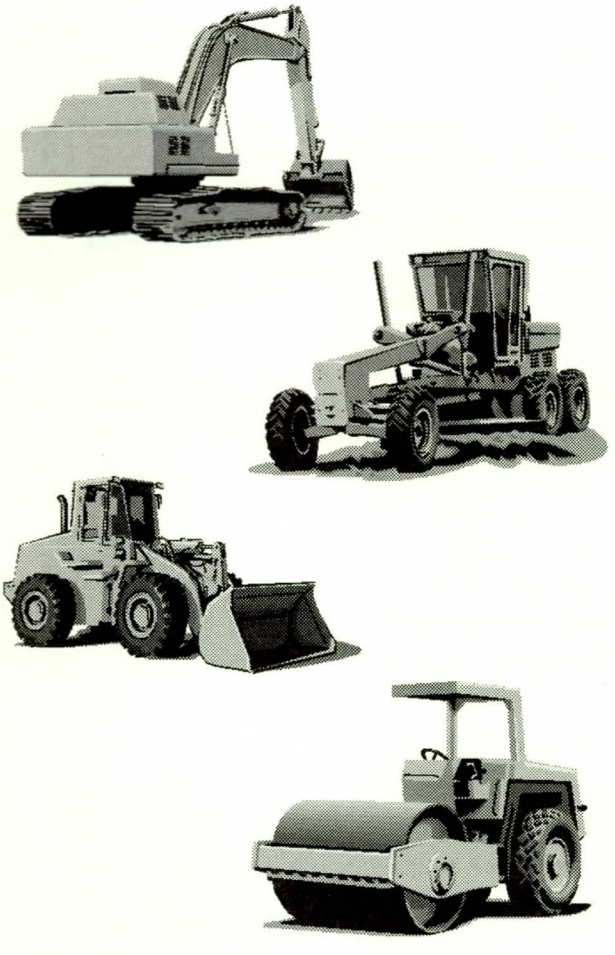
Call the City of Phoenix, Storm Water Management section at **256-3190.**

Storm Drains Lead
To The River.

City of Phoenix
STREET TRANSPORTATION
DEPARTMENT

3

Storm Water Management for Construction Activities



"Keeping Our City Clean"

Definitions

ADEQ (Arizona Department of Environmental Quality) - The state department responsible for record keeping under the National Pollutant Discharge Elimination System permit

BMPs (Best Management Practices) - Methods that have been determined to be an effective, practical means of preventing or reducing pollution

City of Phoenix - The local authority responsible for all activity under the National Pollutant Discharge Elimination System permit

DCM (Design and Construction Management) - The City of Phoenix division of Street Transportation responsible for all construction activities in the right of way

DSD (Development Services Department) - The City of Phoenix department responsible for all construction activity on privately owned land

EPA (Environmental Protection Agency) - The federal authority that regulates construction activity under the National Pollutant Discharge Elimination System permit

General Contractor - The company hired by the owner to do a job and is responsible for all construction activities on the site

NOI (Notice of Intent) - Application for construction site permit through the EPA

NOT (Notice of Termination) - Application for reporting to the EPA that construction is complete and permit is closed

NPDES - National Pollutant Discharge Elimination System (Storm Water)

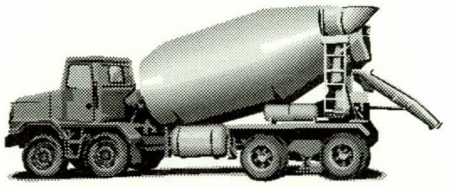
Owner - The property owner of the construction site

Sub-contractor - A company hired by the general contractor to assist in the construction activities

SWPPP or SWP3 (Storm Water Pollution Prevention Plan) - A written plan created for each specific site, implemented by the general contractor to prevent pollution from leaving the construction site

General Permit Checklist

- Bring a copy of the NOI, certification statements and the SWPPP to the pre-construction meeting with City of Phoenix inspector.
- At least 48 hours prior to the beginning of construction a Notice of Intent (NOI) must be mailed to the Environmental Protection Agency, postmark must reflect this time frame.
- Send a copy of the NOI to Arizona Department of Environmental Quality.
- Post appropriate permit documents on the job site or at an area of public accessibility per EPA rules.(e.g. confirmation of permit coverage, SWPPP).
- Inspect and report on BMP or SWPPP if any of the following occur: (including but not limited to) inspections within 24 hours of a qualifying rain event; weekly or at least monthly inspection reports; an incident takes place; changes in the sub-contractor(s) with a new certification statement(s) from the new sub-contractor(s); or changes in the SWPPP or BMP to remain in compliance with the construction general permit requirements.
- Within 27 days after final site stabilization you must send a copy of the NOT to the City of Phoenix DCM division.
- Within 30 days after final stabilization of the project you must submit a NOT to the EPA.
- Send a copy of the NOT to ADEQ.



Permit History

In 1987 Congressional Amendments to the Clean Water Act required the EPA to control pollution from storm water discharges. Phase I storm water regulations were finalized by the EPA in 1990, and the general permits for construction sites disturbing five or (any part of a 5 acre project) more acres were first issued in September 1992. The general permits provide the EPA with an effective mechanism to regulate the discharge from thousands of construction sites, thus protecting and improving the surface and ground water quality across the nation. The permit was revised effective February 17, 1998. Revisions to the technical aspects of the permit involve improvements in clarity and certain new requirements. The most significant changes include:

- conditions regarding the protection of listed endangered and threatened species and critical habitats;
- a requirement to post the confirmation of permit coverage and a brief description of the project;
- applicable terms when in transition from previous Baseline Construction General Permit;
- the requirement to submit a Notice of Termination when construction is completed;
- automatic coverage for a permittee with ongoing projects after the permit expiration date if a replacement permit has not yet been issued;
- capability to use this permit to acquire coverage for other construction related industrial activities (e.g. onsite asphalt and concrete batch plants);
- storm water pollution prevention plan performance objectives; and
- periodic inspection by the contractor for on site BMP's and monitoring by owner that inspections are occurring.

The Endangered Species Act is designed to prohibit EPA or any other authority from authorizing discharges that would adversely affect endangered or threatened species and critical habitats. The current endangered species and critical habitat requirements are updated versions of those contained in the 1995 NPDES Storm Water Multi-Sector General Permit for industrial activities.

References

Phoenix City Code, Chapter 32C, Storm Water Quality Protection, available from the City of Phoenix Storm Water Management Section, (602) 256-3190, free.

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Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA-832-R005, available from National Technical Information Service (NTIS) (703) 487-4650, order # PB 92-235951, $35.00.

.....

A summary of Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, available from EPA Resource Center, (202) 260-7786, order #833-R-92-001, free.

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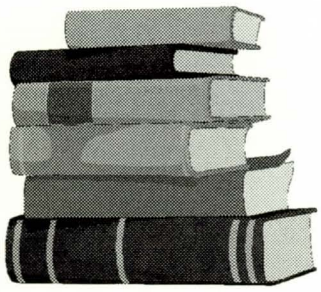
For detailed information on properly filling out NOI, NOT and SWPPP forms:

Drainage Design Manual for Erosion Control, Volume III, available from Flood Control District of Maricopa County, (602) 506-1501, $27.00.



Administrative Connections

The following is a list of City, State and Federal authorities that require NOI and NOT:

(NOI, NOT, SWPPP)
City of Phoenix
Street Transportation Department
Design and Construction Management (DCM)
1034 East Madison Street
Phoenix, Arizona 85034
(602) 495-2050

(NOI, NOT)
City of Phoenix
Development Services Department
Project Engineering
200 West Washington Street, 3rd Floor
Phoenix, Arizona 85003
(602) 495-0460

(NOI, NOT)
Storm Water Coordinator
Arizona Department of Environmental Quality
3033 North Central Avenue, 4th Floor
Phoenix, Arizona 85012
(602) 207-4574

(NOI)
Storm Water Notice of Intent (4203)
U.S. Department of Environmental Protection
401 M. Street, SW
Washington, District of Columbia 20460
(703) 931-3230
Do not send Storm Water Pollution Prevention Plans (SWPPP) to the U.S.E.P.A.

(NOT)
Storm Water Notice of Termination (4203)
U.S. Department of Environmental Protection
401 M. Street, SW
Washington, District of Columbia 20460
(703) 931-3230

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Are You Environmentally Correct?

Positive ways to protect the environment at home

"Keeping Our City Clean"

Keeping your home maintained and in good condition are very important to our community, but how you do it is crucial to our environment and our future.

General

- Buy household products labeled "non-toxic" or "non-hazardous".
- Buy and use only the amount you need.
- Take unwanted household products to a household hazardous waste collection event.
- Reduce automotive emissions by regular vehicle maintenance, car pooling and using public transportation.
- Direct rain gutters to the lawn, flower bed or shrubbery.
- Pick up animal waste twice a week or more if necessary and dispose of in a sealed plastic bag.
- Place only clean, dry, empty, uncrushed recyclable material in your recycle bin.
- Use the blue recycle bin for recyclable material and the green/black trash bin for garbage.
- Always store all products in the original containers or label new containers properly and keep instructive information available.
- Buy recycled or recyclable products to "close the loop" and fully support the recycling effort.
- Keep your barbeque grill clean and free of grease build-up.

Home Maintenance

(continued)

Pest Control

- Apply the correct dosage of pesticides, herbicides and fertilizer. Follow label directions.
- Never apply chemicals or fertilizers when rain or wind are in the weather forecast.
- Store pesticides, herbicides, plant foods and fertilizers in a dry, cool, covered location.
- If you should spill any chemical, Use dry clean-up methods, absorb, sweep and dispose.

Lawn and Garden

- Collect tree, shrub and grass clippings and start a compost pile or put in garbage bags and tie shut before disposal.
- Surround plants and lawn with a small berm to prevent run-off and water wastage.
- After applying fertilizer, hose lightly to stimulate soil absorption.
- Sweep the driveway and walkways after performing lawn chores.
- Bag and Tie your garbage and grass.
- Plant a Tree! Call Phoenix Urban Forestry for information about matching cost program.

Vehicle Maintenance

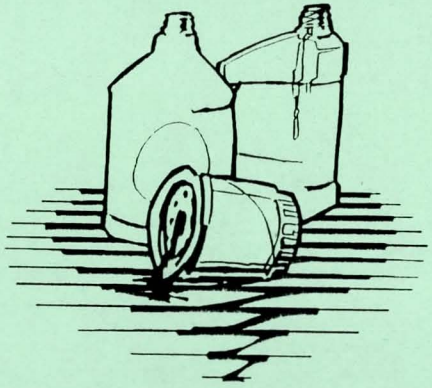
Have you ever poured oil on your grass? Or poured old chemicals down the sink? If you answered yes, then you have contributed to the contamination of our water source.

Automobile Washing

- Sweep area prior to vehicle washing.
- Use a bucket and phosphate free, biodegradable detergent for vehicle washing.
- Do not a use degreaser while washing or rinsing a vehicle. Use a dry clean-up method to remove excess grease.
- Do not clean or degrease your engine at home, use a self-service car wash for degreasing engines or other equipment.

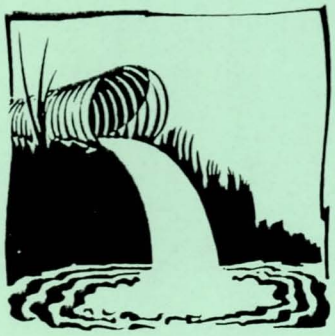
Automobile Repairs

- Dispose of used automobile fluids at your local garage, automotive store or at a household hazardous waste collection event.
- Inspect and maintain your vehicle regularly to reduce leakage.
- Perform all maintenance on a old blanket or have absorbent nearby to absorb any leaks or spills.
- Use drip pans to catch leaks and spills.



Did you know.....

- One quart of oil can contaminate 250,000 gallons of drinking water.
- Phoenix has two separate collection systems, one for sanitary waste and one for storm water run-off.
- 80% of pollutants reaching our rivers and washes come from chemicals that are dumped, sprayed or spilled on the ground and carried to them through the storm drain system.
- Storm drains, rivers, washes, retention basins, ditches, streets, gutters and catch basins are all a part of the storm drain system.
- Phoenix' annual storm water run-off could fill Sun Devil Stadium over 200 times and it would cost over a billion dollars to clean-up.
- Pumping pool water into the street is illegal, it must be put into a sanitary sewer drain or contained on the property.
- To absorb antifreeze or oil spills you should use sand or cat litter as an absorbent.
- You can take your used motor oil to be disposed of at your local automotive store, garage or at a household hazardous waste collection event.
- Rain water carries contaminants from our streets into washes and rivers.
- If you see anyone dumping anything into the street or catch basin, you should call:
  The Storm Water Hotline at 256-3190.



Pollution Prevention Connections

Environment

Office of Environmental Programs	256-5669
Storm Water Management	256-3190
Neighborhood Maintenance and Zoning Enforcement	262-7844
Pollution Control/Prevention	262-1859
Environmental Services	534-2524
Water Conservation	261-8367

Education

Phoenix Clean and Beautiful	262-4820
Water Services Department	261-8366
Transit	261-8253
Landfills	534-3333
Solid Waste/Recycling	262-7251
Recreational Programs	262-6861

Discharge and Disposal Concerns

Sanitary Sewer	262-1859
Storm Drains	256-3190
Hazardous Waste	262-7251
Spills and Emergencies	911

General Information

City Operator	262-6011
Sewer Roaches	262-6691
Dead animals(under 75 lbs.) in Phx.	262-6791
Water Emergencies	262-6251
Phoenix Urban Forestry	495-3763
Neighborhood Clean-up	262-7844
Street Flooding	262-6441
Block Watch	534-2424
Phoenix Recycles Bicycles	261-8806
Graffiti Hotline	262-7327
Street Light Repair	495-5125
Abandoned Vehicles	262-7844
Adopt-A-Street	256-4334
Traffic Signal Concerns	262-6021
Phoenix Job-line	252-5627
Public Transit-Valley Metro	253-5000
Pothole Repair	262-6441

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City of Phoenix

PHOENIX CITY CODE

Chapter 32C
Storm Water Quality Protection

Distributed by
City of Phoenix
Street Transportation Department

February 28, 1993

CHAPTER 32C

Storm Water Quality Protection

Sec. 32C-100. General Powers and Purpose.

(a) The City Manager or his designee may regulate the use, grading, paving, maintenance, and operation of public rights-of-way and public storm drain systems so as to reduce, to the maximum extent practicable, the addition of pollutants to storm water in quantities or concentrations that could reasonably be expected to cause or contribute to either a violation of an applicable water quality standard or any condition of a storm water NPDES permit issued to the City; or any other act that causes or contributes to damage to a public storm drain system. The City Manager or his designee 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.

(b) Nothing in this Chapter shall be construed as an assumption by the City of Phoenix of any other person's duties or responsibilities arising under any applicable law, including the common law. Any activities of the City Manager authorized by this Chapter are permissive rather than mandatory.

(c) The City Manager or his designee will provide implementation guidance to assist the public in complying with this Chapter. This guidance may consist of fact sheets, policy and procedure manuals, and other pertinent information relating to the development and implementation of best management practices. (Ord. No. G-3589, § 1.)

Sec. 32C-101. Definitions.

As used in this Chapter, the following terms shall have the designated meanings.

(a) *Applicable Water Quality Standard* means a numeric or narrative r quality criterion that limits the quantity or concentrations of tants that may be present in navigable waters defined in 33 United s Code Section 1362(7).

(b) *Nonresidential Property* means any real property that is actually or ded to be used for commercial, industrial, agricultural or recreational oses, including but not limited to the immediate vicinity of five or more ected residential dwelling units, and residential subdivisions or lings that have not been occupied by a bona fide purchaser or tenant.

(c) *NPDES Permit* means an authorization to discharge pollutants d pursuant to 33 United States Code Section 1342.

(d) *Pollutant* means solid, liquid, gaseous or other substances that can the chemical or physical properties of water, including but not limited uids, solid wastes, pesticides, herbicides, fertilizers, solvents, sludge, oleum and petroleum products, biological materials, radioactive rials, sand, dirt, animal wastes, acids and bases.

(e) *Pollution* means the presence of pollutants on land or in storm r.

(f) *Public Storm Drain System* means all or any part of the publicly- d storm drains, basins, ditches, pipes, graded areas and gutters located n easements, rights-of-way, parks, streets, roads or highways, or in non areas of real property leased from the City of Phoenix that are used ollecting, retaining or conveying storm water.

(g) *Release* means any spilling, leaking, pumping, pouring, emitting, ying, discharging, injecting, placing, leaching, dumping or disposing or on any land in a manner that significant materials, pollutants or storm r may come to be located in a public storm drain system.

(h) *Significant Materials* means any solid, liquid or gaseous substance than storm water that can release pollutants, including but not limited aw materials; fuels; solvents; detergents; finished materials; hazardous tances designated under Section 101(14) of the Comprehensive ronmental Response, Compensation and Liability Act, 42 United States e Section 9601(14); any chemical for which a report must be filed uant to Section 313 of Title III of the Superfund Amendments and thorization Act of 1986, 42 United States Code Section 11023; izers; pesticides; herbicides; and waste materials, including garbage, , ashes, slag, yard waste, animal waste and sludge.

(i) *Storm Water* means rainfall runoff. (Ord. No. G-3589, § 1.)

Sec. 32C-102. Declaration of nuisance.

It is hereby declared to be a public nuisance for any person to directly or indirectly release significant materials, pollutants or storm water without proper authorization in quantities, velocities or concentrations that may reasonably be expected to cause or contribute to: damage to a public right-of-way or public storm drain system; a violation of an applicable water quality standard; or a violation of any condition of a storm water NPDES permit. As used in this section, proper authorization exists if an activity affecting storm water is specifically authorized in (i) this Chapter, (ii) an administrative rule, permit, plan approval or other authorization issued in compliance with this Chapter, or (iii) a storm water NPDES permit. (Ord. No. G-3589, § 1.)

Sec. 32C-103. Prohibited practices.

(a) It shall be unlawful for any person to use, store, treat or dispose of storm water, pollutants or significant materials in a manner that creates a public nuisance as defined in Section 32C-102 of this Chapter.

(b) It shall be unlawful for any person to release to a publicly-owned right-of-way or public storm drain system any substance that is not composed entirely of storm water except (i) releases pursuant to a NPDES permit, (ii) releases resulting from fire fighting and street maintenance activities, and (iii) releases of materials as provided in paragraphs (d) or (e) of this section.

(c) It shall be unlawful for any person to, without good cause, interfere with or prohibit any City employee from conducting any activities in furtherance of the requirements of this Chapter, including conducting inspections and taking samples.

(d) This section does not prohibit releases of storm water from storm water retention or detention basins if a permit or approval is first obtained from the City Manager or his designee. A person seeking such a permit or approval shall demonstrate that the release is not reasonably expected to cause or contribute to a public nuisance as defined in Section 32C-102 of this Chapter.

(e) This section does not prohibit releases from: fire hydrant flushing;

able water systems, including water line flushing; foundation or footing ns that are not contaminated by pollutants; naturally occurring seeps, ngs, wetlands or riparian areas; non-agricultural irrigation water; vehicle hing for no charge in residential areas, or for not-for-profit fundraisers for cation or public service groups; residential evaporative coolers; air ditioner condensate; and dust control watering. (Ord. No. G-3589, § 1.)

. 32C-104. Storm Water Management Plans Prepared by Permit plicants.

(a) Any person applying pursuant to any Chapter of the Phoenix City de for authorization, permission, or a permit to construct improvements or duct activities on non-residential property that have the reasonable ential to affect storm water shall prepare a detailed written storm water nagement plan for the management of the volume, velocity and quality of rm water that has the reasonable potential to be released off site. Storm ter management plans shall apply to all contiguous land under common nership or control, and shall specifically state the address of each parcel of perty subject to the plan. The plan shall include a description of the types all significant materials that will be on the property; the land use and terials management practices that could lead to the pollution of storm ter during all phases of existing and proposed land use; the manner in ich significant materials will be used, stored, treated or disposed of; the thods to minimize, to the maximum extent practicable, the pollution of rm water; and any additional information concerning storm water nagement and pollution prevention efforts that are or will be prepared to mply with any rules or NPDES permits promulgated pursuant to the tions of 40 Code of Federal Regulations Part 122, that relate to discharges storm water. The storm water management plan shall be provided to the y Manager or his designee.

(b) A storm water management plan may cover more than one parcel of perty so long as the activities on the property are sufficiently similar that plan is appropriate. Storm water management plans need not be ubmitted where the new permits relate to activities that will not affect the plicability of a previously submitted plan.

(c) Permits, approvals or other authorizations that require storm water nagement plans as provided in this section shall not be issued until the y Manager or his designee has received the applicable storm water

management plan. It shall be cause for modification or revocation of the permit, approval or other authorization if significant materials are not at all times managed in substantial compliance with the applicable storm water management plan, or if the authorized activity causes or contributes to violations of this Chapter. There shall be an enforceable commitment that the persons described in section 32C-106(b) of this Chapter will update the storm water management plan as necessary if activities at the affected property are modified in a manner that may cause a material detrimental change in the volume, velocity, or quality of storm water released off site.

(d) Storm water management plans shall include, to the extent applicable, practicable measures for: managing litter; the use, storage, treatment and disposal of significant materials; the use and disposal of pesticides and herbicides; reducing the velocity of releases to a public storm drain system; the use of landscape features to reduce the quantity and velocity of storm water that may be released off site; maintenance of retention basins and other storm water management devices; maintenance and cleaning of parking lots and buildings; and ensuring that significant materials are not exposed to direct contact with storm water. Storm water pollution prevention plans that comply with a storm water NPDES permit and applicable requirements of 40 Code of Federal Regulations Part 122 may be used as part of all of the storm water management plan required by this section. (Ord. No. G-3589, § 1.)

Sec. 32C-105. Inspections.

(a) The City Manager or his designee is authorized to inspect real property, structures and buildings as necessary to assess compliance with this Chapter or a storm water NPDES permit. These inspections shall be conducted in accordance with applicable constitutional or statutory requirements.

(b) Inspections conducted pursuant to this Chapter may be expanded to include items covered by other Chapters of the Phoenix City Code that relate to the quality or management of storm water.

(c) The City Manager or his designee may collect and analyze samples of storm water and significant materials, install and require the installation of storm water sampling and measurement devices, and examine records concerning significant materials and storm water. (Ord. No. G-3589, § 1.)

Sec. 32C-106. Violations and penalties.

(a) The remedies specified herein are cumulative and City Manager or his designee, or the City Attorney, may proceed under these or any other remedies authorized by law. In addition to any other authorized remedies, a person who violates any provisions of this Chapter shall be guilty of a misdemeanor. Each day of violation shall be a separate offense.

(b) Any person having control over an activity or any real property, or who causes, authorizes, facilitates, aids or abets any violation of any provision of this Chapter, or who fails to abate any nuisance or prohibited practice for which the person is responsible, is guilty of a Class One misdemeanor.

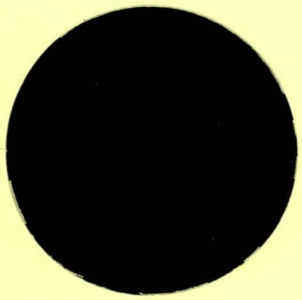
(c) The City Manager or his designee may issue a Notice of Violation to any person who has violated or is in violation of this Chapter. Failure to perform any act required in the Notice of Violation shall be a separate violation for each day beyond the tenth calendar day following the issuance of the Notice of Violation.

(d) The transfer of ownership, possession or control of real property to another person does not relieve the transferor of responsibility for violations of this Chapter, as provided in paragraph (b) of this section, that occurred before the transfer unless transferee accepts responsibility for the violations.

(e) A person who violates this Chapter is subject to a civil action in any court of competent jurisdiction to collect a civil sanction of not less fifty dollars ($50) nor more than two thousand five hundred dollars ($2,500) for each violation. Each day of each violation shall constitute a separate civil offense.

(f) The owner of record of the property upon which a violation of this Chapter occurs shall be presumed to be a person having lawful control over an activity or real property, unless it is demonstrated that another person has knowingly and in good faith accepted responsibility for the activity or property at issue. If more than one person is identified as the owner of record, such persons shall be presumed to be jointly and severally in lawful possession and control of the activity or land. (Ord. No. G-3589 § 1.)

City of Phoenix
SOLID WASTE INSPECTIONS DIVISION



ANIMAL WASTE NOTICE

NAME _____ DATE _____

ADDRESS _____ TIME _____

A problem exists regarding the _____ waste

in the _____ of:

☐ your property, OR

☐ property at _____.

You must clean up and dispose of the waste by _____ to be in compliance with the City Code.

Phoenix City Code Chapter 27, Section 27-8 requires all animal owners and custodians shall immediately clean up and properly dispose of wastes left by their animals on any public street, gutter, sidewalk, right-of-way, park, or private property. All animal wastes shall be removed from pens, stables, yards, cages and other enclosures and disposed of as often as necessary to prevent occurrence of a public nuisance or health hazard. All wastes shall be placed in a plastic bag, securely tied and placed in the solid waste container.

If you fail to comply, a criminal complaint may be filed. Phoenix City Code Chapter 27, Section 27-45 states that any person violating any of the provisions of this chapter of the City Code is guilty of a Class 1 misdemeanor.

Pictures taken: _____ YES _____ NO

If you have any questions, call your Solid Waste Management District, Monday through Friday, 7 a.m. to 5 p.m. at

261- _____

Inspector _____ No. _____

131-94D New 12/94

PREVENT STORM WATER CONTAMINATION
Best Management Practices for
Carpet, Building and Food-related Mobile Cleaning

General Information:

1) **Commercial/Industrial wash water is prohibited from entering the storm drain system, street or any other outside area.** Before discharging any water to the storm drain, call Storm Water Management at 256-3190 for more information and permission to discharge.
2) All washing activities that use soap, solvents, degreasers or any other chemicals must be hauled to a landfill or discharged into the sanitary sewer through a sand/oil interceptor or approved pretreatment device. For more information about pretreatment devices and procedures, contact the Office of Pollution Control at 262-1859.
3) Non-Hazardous Liquid Waste Haulers and can be found in the Phoenix Yellow Pages under Septic Tank Cleaning.

Carpet and drapery cleaning

- Wash water is not allowed in the storm drain, street or any other outside area.
- Wash water must be discharged to the sanitary sewer or landfill.
- Ask your customer if you can discharge the wash water into the sanitary sewer (a toilet, sink or clean out) on the job site.
- Use a lint trap or filter when discharging to the sanitary sewer, dispose of the lint or fibers in the trash.
- If wash water is collected and transported from the wash site, it may be discharged into the first stage of a sand/oil interceptor at your place (contractor's) of business.
- Untreated wash water may kill plants. Do not use it for landscape irrigation.

Building surface cleaning
Exterior walls with soap

- Wash water can not be discharged to the storm drain or street.
- Collect and discharge all wash water to the sanitary sewer or a landfill.
- Untreated wash water may kill plants. Do not use wash water for landscape irrigation.
- Seal the storm drains with an impervious material before washing begins.
- If wastewater is contained on-site for later removal, it must be picked up by an authorized Non-Hazardous Liquid Waste Hauler.

Glass and Steel buildings
Exterior walls, with water only

- Direct wash water to landscaped areas or sanitary sewer.
- Seal storm drains with a fabric filter to collect dirt and debris.
- Before washing begins, sweep, shovel and dispose of debris in the trash.

Masonry efflorescence (acid washing)

- Wash water is prohibited from entering the storm drain, street or any other outside area.
- Seal the storm drains using an impervious material before washing begins.
- Collect all wash water. Vacuum or pump the wash water to a holding tank for analyses and disposal.
- Adjust the wastewater to a pH between 5.0 and 10.5 before discharging to the sanitary sewer. Dilution is not an acceptable pretreatment. Call 262-1859 for more information.
- Filter out sand, dirt and debris before discharge, if necessary.

Buildings painted after 1978, with paint in good condition - without soap

- Direct wash water to landscaped areas or sanitary sewer.
- Seal all storm drains with a fabric filter to collect paint chips, dirt and debris.

Buildings painted with lead-based or mercury-based paint - with or without soap

- Wash water is not allowed in the storm drain, street or any other outside area.
- Seal the storm drains with an impervious material before washing begins.
- Collect all wash water. Vacuum or pump the wash water to a holding tank for laboratory analyses and disposal.
- Water and sludge may be a hazardous waste; laboratory testing may be required to determine the proper method of disposal.

Sidewalks and plazas - without soap

- Direct wash water to landscaped areas or sanitary sewer.
- Before washing begins, sweep, shovel and dispose of debris in the trash.
- Seal storm drains with a fabric filter to collect dirt and debris.

Best Management Practices for
Food Processors
CONTINUED

Dairy products
Packaged dairy products (spoiled and broken product containers)

- Store aged/spoiled dairy products in enclosed area.
- Train employees on proper disposal methods for all aged/spoiled dairy products.
- Ensure that all aged/spoiled product (e.g. bottles, cartons, plastic containers) are disposed of in a proper manner (bagged, covered).

Canned frozen and preserved fruits, vegetables and frozen specialities
Fruit and vegetable storage and disposal

- Store all fruits and vegetables in appropriate containers (e.g. bins, bushels, baskets, buckets) and in enclosed/covered areas.
- Store empty fruit and vegetable containers in an enclosed/covered area.
- Train employees on proper handling/disposal methods for fresh/rotten fruits and vegetables.

Grain mills
Grain handling, storage and mixing

- Store all grain in appropriate containers (e.g. silos, hoppers) in an enclosed/covered area.
- Train employees on grain handling procedures.
- Consider a vacuum control system in all grain mixing areas.

Bakery products
Ingredient storage and mixing

- Store all ingredients (e.g. corn sweeteners, flour, shortening, syrup, vegetable oils) in appropriate containers (e.g. tanks, drums, bags) in an enclosed/covered area.

Sugar and confectionery
Sugar handling

- Consider a vacuum control system in all granular and powdered processing areas.

Fats and oils
Fat and oil storage and mixing

- Store all fats and oils, (e.g. butcher shop materials, hair, hide, tallow, bone meal and offal) in enclosed areas.
- Ensure all fats and oils are physically contained.

Beverages
Material storage and handling

- Ensure grain is stored in enclosed/covered area.
- Consider an air emission control system for all grain handling and brewing processes.
- Protect reusable beverage containers that are stored outdoors from storm water contact.

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

Best Management Practices for

Carpet, Building and Food-related Mobile Cleaning

CONTINUED

Sidewalks and plazas - with soap

- Wash water is not allowed in the storm drain or street.
- Before washing begins, sweep, shovel and dispose of debris in the trash.
- Seal storm drains with an impervious material, before the washing process begins.
- Collect all wash water. Vacuum or pump the wash water to a holding tank for analyses and disposal.
- Contained wash water may be discharged to the sanitary sewer or landfill.
- If collected wastewater is transported from the wash site, it may be discharged into a sand/oil interceptor at your place of business. Call 262-1859 for more information.

Restaurant alleys, grocery dumpster areas with or without soap

- Wash water is not allowed to enter the storm drain or street.
- Dry clean; use rags, absorbents and sweep up debris.
- Seal storm drains with an impervious material, before the washing process begins.
- Collect all wash water. Vacuum or pump the water to a holding tank for analyses and disposal.
- Pretreatment of all wastewater through a sand/oil interceptor may be required before discharge to sanitary sewer. Call the Office of Pollution Control for more information.
- Filter the wash water and dispose of the debris as trash.

Mobile Caterers with or without soap

- Wash water is not allowed in the storm drain or street.
- Seal storm drains with an impervious material, before the washing process begins.
- Use dry cleaning methods. Collect solid debris in plastic bags and dispose of it in the trash.
- Sweep and shovel dirt and place it in the trash.
- Wash water must be discharged to the sanitary sewer through a City approved sand/oil interceptor.
- Uncontaminated ice water may be discharged to landscaped areas.

Truck trailer, interior cleaning (food related) with or without soap

- Wash water is not allowed in the storm drain or street.
- Seal storm drains with an impervious material, before the washing process begins.
- Pretreatment of all wash water through a sand/oil interceptor is required before discharge to the sanitary sewer.
- Use dry cleaning methods. Sweep, shovel and dispose of debris as trash.
- Use a wash rack to capture wash water.

Grocery carts - without soap

- Direct wash water to landscaped areas or sanitary sewer.
- Seal storm drains with a fabric filter to remove dirt, trash and other debris.
- Before washing begins, sweep, shovel and dispose of debris in the trash.

Grocery carts - with soap

- Wash water is not allowed in the storm drain or street.
- Seal storm drains with an impervious material, before the washing process begins.
- Collect all wash water. Vacuum or pump the water to a holding tank for analyses and disposal.
- Contained wash water may be discharged to the sanitary sewer or landfill.
- If wastewater is contained on-site for later removal, it must be picked up by an authorized Non-Hazardous Liquid Waste Hauler.

Training

- Train personnel on the safety, use, and waste practices of cleaning chemicals and materials.
- Develop and implement a Storm Water Management Plan.

If a spill occurs:

- Stop the source of the spill immediately.
- Contain the liquid until cleanup is complete.
- Deploy containment booms, if the spill may reach a storm drain, wash or the street.
- Cover a liquid spill with an absorbent material.
- Keep the area well ventilated.
- Dispose of clean-up materials properly.
- Do not use emulsifiers or dispersing agents.

Storm Drains Are For Rain Water, Pure And Simple.

City of Phoenix

STREET TRANSPORTATION DEPARTMENT
STORM WATER MANAGEMENT SECTION

(602) 256-3190

2/97 New

PREVENT STORM WATER CONTAMINATION

Best Management Practices for

Food Processors

Shipping and receiving

- Close storm drains during loading/unloading activities in surrounding area.
- Inspect all containers prior to unloading/loading of any raw or spent materials.
- Use drip pans when loading/unloading liquid product.
- Situate loading/unloading areas indoors or in a covered area.
- Drain hoses back into truck, railcar, etc. after loading/unloading materials.
- Install high level alarm on tanks to prevent overfilling.
- Ensure that berms and dikes are built around the unloading/loading areas, if applicable.
- If outside or in covered areas, minimize run-on of storm water into the unloading/loading areas by grading the areas to insure that storm water runs off.
- Use dry clean-up methods for unloading/loading areas rather than washing the areas down.
- Train employees on proper unloading/loading techniques.

Storage containers/ *Liquid storage*

- Inspect the external condition (corrosion, leaks) of the containers.
- Ensure that berms and dikes are built around the containers.
- Cover and/or enclose.
- Ensure that all containers are closed (e.g. valves shut, lids and manways sealed, caps closed).
- If outside or in a covered area, minimize run-on of storm water into a storage area by grading area to ensure that storm water runs "off" and not "on".
- Train employees on proper storage techniques (e.g. filling and transferring contents).
- Maintain an inventory control of all raw and spent materials.
- Employ measures to protect against spillage from the overflows (e.g. high level sensors, alarms).

Solid storage *(silos, holding bins, fiber drums, etc.)*

- Consider vacuum emission control systems for airborne dust and particulate matter.

Solid waste *(paper, wood pallets, scrap metals, refuse, etc.)*

- Store waste so that it is physically contained (dumpsters, drums, bags).
- If outside or in a covered area, minimize exposure to storm water by grading the area to ensure that storm water runs "off" and not "on".
- Ensure that hazardous waste disposal practices are performed in accordance with Federal, State and local requirements.
- Route trash compactor leakage to treatment system or sanitary sewer.

Pest control

- Follow manufacturers directions for application of pest control materials to site.
- Time application for dry weather conditions.
- Apply insecticides during breeding months.
- Protect rat bait houses from storm water.

Meat products *Animal holding pens (beef and chicken)*

- Enclose/cover fowl hanging area.
- Enclose/cover the animal holding pens.
- Grade the areas around the animal holding pens to ensure storm water "run off" and not "on" to the holding pen.
- Train employees on proper material (i.e. hide, hair, feathers, animal parts) clean-up procedures.
- Store animal manure and other materials from clean-up activities in appropriate containers in an enclosed/covered area.
- Area for trailers holding empty bird cages should have storm water run-on/runoff controls in place.
- Use mechanical sweepers around site to clean up fugitive feathers, dust and manure.