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Stormwater Sample Management Plan

Version 3.0

July 1, 1999

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Stormwater Sampling Management Plan

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STORMWATER SAMPLING MANAGEMENT PLAN

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JULY 1, 1999

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Purpose:

This Stormwater Sample Management Plan has been written with the objective of providing information about methods and guidelines that the District will use in stormwater sampling and data management. The Field Sampling Protocol will remain a separate document designed for the field technicians' use. However, it is part of the overall Sample Management Plan.

The Stormwater Sample Management Plan will include the following items:

- Sample Plan
- QA/QC Program
- Sampling Protocol/SOPs
- Analyses, detection limits
- Procedures
- QC sampling
- QA/QC Program
- Chain of custody
- Maintenance / calibration logs
- Description of sampling sites
- EPA sampling guidance for grab and composite samples
- Cleaning

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1.0 PURPOSE

The purpose of the Stormwater Sample Management Plan is to provide information about the District's stormwater sampling program and about the methods and procedures used for the collection of samples.

2.0 LOCATIONS AND SITE DESCRIPTIONS

2.1 Site Location

Currently the District monitors seventeen fixed land-based sites in Glendale, Mesa, and Phoenix, with five additional sites in Scottsdale by this summer.

Phoenix SR-03

Originally located approximately 1/4 mile north of the Salt River on 35th Avenue, this site was relocated to the outfall of SR03 at the north bank of the Salt River. The contributing sub basin is approximately 1363 acres, and the outlet is a 75-inch concrete pipe. The drainage basin is mainly industrial.

Phoenix SR-45

Located on the south bank of the Salt River at 40th Street. The contributing sub basin is approximately 870 acres, and the outlet is a 54-inch concrete pipe. The drainage basin is mainly industrial.

Phoenix SR-49

Located on the north bank of the Salt River at 67th Avenue. The contributing sub basin is approximately 5,000 acres, and the outlet is a 96-inch concrete pipe. The drainage basin is mainly undeveloped.

Phoenix IB-08

Located on the north bank of Indian Bend Wash on the east side of 40th Street. The contributing sub basin is approximately 609 acres, and the outlet is a 66-inch concrete pipe. The drainage basin is mainly residential.

Phoenix SR-30

Located on the south bank of the Salt River along the 27th Avenue alignment. The contributing sub-basin is 44.8 acres and the outlet is a 96-inch corrugated pipe. The drainage basin is industrial.

Phoenix ACDC and 43rd Avenue

Located on the north side of the Arizona Canal Diversion Channel, just west of 43rd Avenue. The contributing sub-basin is 3.4 acres and the outlet is a gutter depression that discharges over the top wall and into the ACDC. The drainage basin is commercial. This site will likely be moved in 1999 to a new site near the ACDC and 31st Avenue.

All sites in Phoenix will be monitored by the USGS at least through 2003 when the monitoring agreement expires.

Mesa 1

Located on Horne and Sixth Streets. The contributing sub basin is approximately 193 acres, and the outlet is a 36-inch concrete pipe. The drainage basin is an older residential area with irrigated lots.

Mesa 2

Located on Broadway Road approximately 1/8 mile west of Lindsay Road. The contributing sub basin is approximately 145 acres, and the outlet is a 72-inch concrete pipe. The drainage basin is mainly a mobile home park located north of Broadway Road and east of the Consolidated Canal.

Mesa 3

Located on Fighter Aces Drive, approximately 1/4 mile north of McKellips Road on Falcon Drive, which is located approximately 1/2 mile east of Greenfield Road. The contributing sub basin is approximately 171 acres, and the outlet is a 48-inch concrete pipe. The drainage basin is developed and undeveloped parts of Falcon Field Airport.

Mesa 4

Located on Horne and Grandview Avenue just before discharge into a large retention basin. The contributing drainage area is approximately 66 acres, and the outlet is a 54-inch concrete pipe. The drainage basin is a housing subdivision built after 1980.

Mesa 5

Located on Dobson Road approximately 1/4 mile south of Broadway Road. The contributing drainage area is approximately 63 acres, and the outlet is a 30-inch concrete pipe. The drainage basin is mainly commercial business.

Glendale 1 – OLIVE

Located on 67th Avenue just north of Olive Avenue. The contributing drainage area is approximately 18 acres, with an outlet channel controlled by a weir. The drainage basin is mainly residential.

Glendale 2 – INDUSTRIAL PARK

Located between Glen Harbor Boulevard and New River channel, approximately one-half mile north of Glendale Avenue. Drainage area is approximately 30 acres. The outlet is a 54-inch concrete pipe. The drainage basin is mainly industrial.

Glendale 3 – BUTLER

Located on 56th Drive south of Olive Avenue. The drainage area is approximately 30 acres. The outlet is a small channel. The drainage basin is mainly residential.

Glendale 4 – ARROW

Located on the north bank of Skunk Creek near 79th Avenue alignment. The drainage area is approximately 120 acres. The outlet is a 54-inch concrete pipe. The drainage basin is mainly commercial.

Glendale 5 – CITRUS

Located on the east bank of the 71st Avenue Drainage Channel at the Grovers Avenue alignment. The drainage area is approximately 60 acres. The outlet is a 42-inch corrugated pipe. The drainage basin is mainly residential.

South Mountain

Located on Central Avenue in South Mountain Park past the park offices. The drainage area is approximately 1120 acres of mainly undeveloped parkland. The monitoring location is in a 72-inch corrugated metal pipe under a side road in the park.

Five additional sites in Scottsdale will be added during 1999. All of the sites are located along the Indian Bend Wash, with four of the five south of Thomas Road.

2.2 Site Specific Information

Site	Drainage Area (acres)	Pipe Diameter (inch)	Pipe Slope (ft/ft)	Roughness Coefficient
Phoenix SR-03	1363	75	0.0009 [1]	0.013
Phoenix SR-49	5000	90	0.0024 [1]	0.013
Phoenix SR-45	794	54	0.0023 [1]	0.013
Phoenix IB-08	609	66	0.0032 [1]	0.013
Phoenix ACDC/43rd Ave	3.4	N/A	N/A	N/A
Phoenix SR-30	42	96	N/A	N/A
Mesa SIXTH	193	36	0.0029 [2]	0.013
Mesa LINDSAY	145	72	0.0011 [2]	0.013
Mesa FALCON	171	48	0.0014 [2]	0.013
Mesa GRANDVIEW	66	54	0.0040 [2]	0.013
Mesa DOBSON	62	30	0.0014 [2]	0.013
Glendale OLIVE	27	N/A	N/A	0.013
Glendale ARROW	120	54	N/A	0.013
Glendale BUTLER	30	N/A	N/A	N/A
Glendale CITRUS	60	96	N/A	0.013
Glendale INDPK	30	42	N/A	0.013
South Mountain	1120	72	0.040	0.014

[1] City of Phoenix Stormdrain As-Builts
[2]City of Mesa

2.3 Field Equipment

NPDES Water Quality Sites

The NPDES sites maintained by the District use Sigma automatic sampling equipment. Equipment in Mesa is the Sigma 800SL Sampler with integral flowmeter. A dialout alarm and modem are exclusive from the sampler unit. Equipment in Glendale is the Sigma 900 MAX Sampler with integral flowmeter, modem, and dialout alarm. In Phoenix, the USGS uses a combination Isco sampler and Campbell Scientific data logger for recording rainfall and converting flow data.

The five sites in Mesa have electric power supplied by Salt River Project and telephone service provided by US West. The sites in Glendale, Phoenix, and Scottsdale do not have commercial power, but are powered by batteries charged by solar panels. Most sites have telephone service provided by US West or cellular communications.

3.0 SAMPLING PROGRAM

3.1 Sampling

A sampling event occurs when rainfall and flow are detected at a sample site. The parameters for sampler initiation are essentially identical throughout all sampling locations. All sites are triggered when 0.05 inch of precipitation falls within 60 minutes and when one-half inch of water is present at the level sensor.

Three types of samples may be taken at a sampling location. The first two are storm related and are the grab and composite samples. The third sample is a quality control sample and it is taken occasionally to check the adequacy of equipment cleaning. Each is described in more detail below.

Each municipality has its own separate requirements with respect to its sampling program. Each will be discussed individually.

3.1.1 Glendale NPDES

3.1.1.1 Grab Samples

Grab sampling is a technique used to collect samples that are not amenable to collection through the composite sample. Glendale's pollutant list includes oil and grease, volatile organic compounds, fecal coliform, fecal streptococci, and BOD. Grab samples are collected directly from discharge at the point of compliance.

Grab samples are collected using an apparatus designed to place sample collection bottles directly into the flow. PVC pipe is used for holding the bottles in place. Smaller diameter PVC pipe is used as extension poles to reach down into pipes and channels from above. A small amount of liquid is poured from the non-preserved plastic bottle into a small glass jar where temperature and pH are measured.

3.1.1.2 Composite Samples

A flow-weighted composite sample is also collected at each site. The flow-weighted sample is collected via the automatic sampling equipment in jars two through eight, with the first jar collecting a small first flush sample.

Four individual samples are collected in each jar, for a total of 28 aliquots. Each aliquot is collected based on a pre-set amount of flow passing across the flow sensor.

Each of the 28 aliquots from the seven jars is placed in a large glass vessel for compositing. Once the individual aliquots are together, individual pre preserved bottles are filled. This procedure is often done at the contract laboratory, but is sometimes done by the sampling technicians at the Instrumentation Lab.

3.1.1.3 Quality Control Samples

Quality control (QC) samples are taken to measure contamination of samples and equipment that may have been introduced by sampling techniques, and to check the accuracy of the contract laboratory. Three types of QC samples are taken: travel blanks, field duplicates, and equipment blanks.

Travel blanks assess contamination during transport of the volatile organic samples to the laboratory. One travel blank is provided in each cooler that contains VOC samples.

Field duplicates or splits assess the accuracy of the laboratory analyses. These are taken once per season.

Equipment blanks measure the effectiveness of cleaning of the sampling equipment. These are taken once per season.

3.1.2 Mesa NPDES

3.1.2.1 Grab Samples

Grab sampling is a technique used to collect samples that are not amenable to collection through the composite sample. Mesa requires pollutants such as oil and grease, volatile organic compounds, fecal coliform, fecal streptococci, and BOD to be analyzed from grab samples. Grab samples are collected directly from the discharge at or near to the sampler intake tubing location.

In three of the Mesa locations the sample collection points are in manholes in or near busy streets, making grab sample collection difficult and dangerous to collect directly.

Grab samples are collected using an apparatus designed to place sample collection bottles directly into the flow. PVC pipe is used for holding the bottles in place. Smaller diameter PVC pipe is used as extension poles to reach down into pipes and channels from above. A small amount of liquid is poured from the non-preserved plastic bottle into a small glass jar where temperature and pH are measured.

3.1.2.2 Composite Samples

A flow-weighted composite sample is also collected for each site. The flow-weighted sample is collected via the automatic sampling equipment. In the Sigma 800 model sampling equipment, the composite sample is collected in all eight jars.

Four individual samples are collected in each jar, for a total of 32 aliquots collected. Each aliquot is collected based on a pre-set amount of flow passing across the flow sensor.

Each of the 32 aliquots from the eight jars is placed in a large glass vessel for compositing. Once the individual aliquots are combined, individual pre preserved bottles are filled. This procedure is often done at the contract laboratory, but is

sometimes done by the sampling technicians at the Instrumentation Lab.

3.1.2.3 Quality Control Samples

Quality control (QC) samples are taken to measure contamination of samples and equipment that may have been introduced by sampling techniques, and to check the accuracy of the contract laboratory. Three types of QC samples are taken: travel blanks, field duplicates, and equipment blanks.

Travel blanks assess contamination during transport of the volatile organic samples to the laboratory. Travel blanks are transported in each cooler containing VOC samples.

Field duplicates assess the accuracy of the laboratory analyses. These samples are taken once per season.

Equipment blanks measure the effectiveness of cleaning of the sampling equipment. Equipment blanks are taken once per season.

3.1.3 Phoenix NPDES

3.1.3.1 Grab Samples

Grab sampling is a technique used to collect samples that are not amenable to collection through the composite sample or via an automatic sampler. Phoenix's required grab samples include oil and grease, total petroleum hydrocarbons, volatile organic compounds, organochlorine pesticides, semivolatile organics, fecal coliform, and fecal streptococci. Grab samples are collected directly from the discharge. The USGS is currently maintaining these sites and doing the sample collection.

Grab samples are collected using an apparatus designed to place sample collection bottles directly into the flow. PVC pipe is used for holding the bottles in place. Smaller diameter PVC pipe is used as extension poles to reach down into pipes and channels from above. The field parameters of temperature,

dissolved oxygen, and pH are also measured at the discharge point.

3.1.3.2 Composite Samples

A flow-weighted composite sample is also collected for each site. The flow-weighted sample is collected via the automatic sampling equipment. At five of the six sites, the USGS has installed an Isco sampler with a five-gallon glass jar, a bubbler level measuring device, and a data recorder. The sixth site at IBW and 40th Street will continue to use the American Sigma 900 MAX sampler. The Sigma sampler will be modified with an area velocity meter later this year. The flows at this site sometimes run at full pipe.

Individual aliquots are collected in the five-gallon container based on a large flow interval. Approximately 1.4 liters of sample is pulled for each aliquot. A minimum of five aliquots will be pulled for a storm, and to have enough sample to run all required analyses.

3.1.3.3 Quality Control Samples

Quality control (QC) samples are taken to measure contamination of samples and equipment that may have been introduced by sampling activities, and to check the accuracy of the contract laboratory. Three types of QC samples are taken: travel blanks, field duplicates, and equipment blanks.

Travel blanks assess contamination during transport of the volatile organic samples to the laboratory. Travel blanks are collected for each cooler that contains VOC samples.

Field duplicates assess the accuracy of the laboratory analyses. These samples are taken once per season.

Equipment blanks measure the effectiveness of cleaning of the sampling equipment. These samples are taken once per season.

3.1.4 Scottsdale NPDES

3.1.4.1 Grab Samples

Scottsdale's sites are not yet installed. However, the sampling techniques will be very similar to that used in the other cities.

3.1.4.2 Composite Samples

Composite samples will be taken from automatic samplers that will be installed at each location.

3.1.4.3 Quality Control Samples

Scottsdale's requirements have not yet been set. However, it is likely that the types and frequencies will be similar if not identical.

3.2 Representative Storm Events

The municipalities have selected ranges of rainfall and duration, which will serve as a benchmark for determining valid storm events that will be reported to EPA in satisfaction of their NPDES permit. This document attempts to further qualify the definition of a representative storm event.

A representative event is defined in each city's permit in the following manner:

MESA	RAINFALL	DURATION
SUMMER	0.24 – 0.72 INCH	2.4 – 7.2 HOURS
WINTER	0.22 – 0.66 INCH	5.9 – 17.7 HOURS

In addition, no rainfall greater than 0.10 inches within the past 72 hours. Summer months are July through September and winter months are October through March. Rainfall in April, May, and June is not considered representative.

GLENDALE	RAINFALL	DURATION
SUMMER (Apr – Sept)	0.2 – 0.8 INCH	2.2 – 6.5 HOURS
WINTER (Oct – Mar)	0.2 – 0.7 INCH	5.2 – 15.6 HOURS

and no rainfall greater than 0.10 inches within the past 72 hours.

PHOENIX	RAINFALL	DURATION
SUMMER (Apr – Sept)	0.2 – 0.7 INCH	2.2 – 6.5 HOURS
WINTER (Oct – Mar)	0.2 – 0.7 INCH	5.2 – 15.6 HOURS

and no rainfall greater than 0.10 inches within the past 72 hours.

The storm duration is defined as the period when sustained rainfall begins and ending when the rainfall stops. Sustained rainfall is defined as rainfall that continues without a lapse of greater than 150 consecutive minutes. If a lapse greater than 150 consecutive minutes occurs, then the rainfall is considered to be from a separate storm event.

All storm events will be monitored. If rainfall accumulation is nearing 0.12 – 0.15 inches, a storm will require a response to collect grab samples. Grab samples with short hold times will be submitted to the laboratory for analysis. If the storm is representative, composite samples will be submitted to the laboratory for analysis. If the storm does not become representative, any samples already submitted to the laboratory will have the requested analyses cancelled.

3.3 Analyses of Samples

Since the sampling program began in 1993, the District has sampled for the same general set of constituents, with analyses being updated as necessary. Each sample was analyzed for approximately 160 analytes or compounds. Now, each municipality has slightly different requirements. Separate tables are in the Appendix that lists their required compounds.

3.4 Detection Limits

The detection limits are based on 40 CFR 136 and in the individual municipal permits.

4.0 QUALITY ASSURANCE / QUALITY CONTROL

The Quality Assurance / Quality Control (QAQC) program for the District's sampling is designed to ensure that the samples collected are of high quality and that the laboratory analyzing the samples is producing quality results. The program consists of sampling procedures, quality control samples, data review and validation, and equipment maintenance.

4.1 Lab QA/QC Procedures

The contract laboratory has a full set of Quality Assurance procedures that cover all aspects of operations from building maintenance, sample log in, sample tracking, and sample analysis. A copy of the document is available at the District.

4.2 Sample QA/QC Procedures

The sample QAQC procedures include aspects of preparedness and sampling.

4.2.1 Preparedness

Sample equipment, bottles, and forms are all set up at each sampling site prior to a storm event. This helps to ensure that the proper laboratory bottles and sampler jars are at each site before a storm event occurs. By preparing for an event ahead of time, the possibility of filling incorrect bottles or mislabeled bottles can be avoided. All equipment is readied within 72 hours after the previous storm event.

Readying a site includes:

- Placing clean, labeled sample jars in the sampling unit.
- Placing clean, labeled grab sample bottles at each site.
- Setting the sampler program in a ready position for the next event.
- Cleaning the intake tubing.
- Checking for hardware problems.
- Correcting hardware problems that surfaced during a previous event.

4.2.2 Field QAQC Samples

Three types of QAQC samples are taken: Travel Blanks, Field Duplicates, and Equipment Blanks.

Travel Blanks are samples that accompany volatile organic samples analyzed for EPA method 624. One set of travel blanks is placed in each cooler that contains VOC samples. The lab supplies the travel blanks and they are not opened during the sampling process. Travel blanks measure contamination that may occur during transportation to the lab.

The frequency for this sample will be one travel blank for each cooler containing other VOC samples.

Duplicates or Splits are samples taken as a single sample by the automatic sampler and split into two separate, but identical samples. The two samples' results are compared to measure errors introduced by the laboratory.

The frequency of this sample will be one per season per municipality.

Equipment Blanks are samples taken after the equipment has been cleaned. The Equipment Blanks will be taken from the sample intake tubing and the glass sampler jars used in the automatic sampler equipment. Deionized water is used as the medium. Deionized water is poured into the glassware or pumped through the intake tubing directly into laboratory sample containers. Samples will be analyzed for all NPDES pollutants.

The frequency of this sample will be once per season per municipality.

4.3 Analytical Quality Control Requirements

Each municipality may have different QC requirements. Because the city of Phoenix's QC requirements are very stringent with respect to detection limits, and quality control samples that its model will be applied to all municipalities.

The following table lists the required quality control data.

QC Parameters

TYPE	FREQUENCY	PRECISION
Lab Duplicate	10% of instrument batch	
Sample Duplicate Precision	NA	see below
Method Blank	once per day	
Matrix Spike	5% of instrument batch	
Matrix Spike Duplicate	5% of instrument batch	
MS/MSD Precision	NA	<25 % RPD
Blind Samples	quarterly	

Sample Duplicate Precision

Precision

PARAMETER	PRECISION
pH	<15 % RPD
Temperature	<15 % RPD
DO	<15 % RPD
Hardness	<15 % RPD
TDS	<15 % RPD
TSS	<15 % RPD
BOD	<30 % RPD
COD	<30 % RPD
All metals	<35 % RPD
Cyanide	<35 % RPD
TPH	<50 % RPD
Oil and Grease	<50 % RPD
Total Phenolics	<35 % RPD
EPA 624	<35 % RPD
EPA 625	<35 % RPD
EPA 608	<35 % RPD
Fecal Coliform	<30 % RPD
Fecal Strep	<30 % RPD
Nutrients	<15 % RPD

4.4 Cleanliness

The cleanliness of the equipment is vital to ensuring that contamination is not introduced from a controllable factor. Both the intake tubing and the sample jars are cleaned to minimize or eliminate sample contamination.

Equipment cleaning consists of the following steps:

1. Disconnect distributor tubing on sampling unit
2. Pump tap water through the tubing, (1/2-gallon).
3. Pump Liquinox® mixed with tap water through the line (1/2 gal.).
4. Pump copious amounts of tap water through line (1+ gallon).
5. Pump nitric acid through line, (1/4 gallon).
6. Pump deionized water through line, (1-2 gallons).

NOTE: See the Field Sampling Protocol for the necessary volumes. Glassware cleaning consists of the following steps:

1. Wash the container with Liquinox® solution using a stiff brush to clean sides and bottom.
2. Thoroughly rinse containers with tap water.
3. Rinse the container with nitric acid.
4. Rinse the container with deionized water.

NOTE: See the Field Sampling Protocol for the necessary volumes.

4.5 Equipment Service and Calibrations

Equipment will be serviced a minimum of twice per year, usually before the next rainy season. Calibrations are conducted during both twice-yearly services. Calibrations of the flow measuring devices (pressure transducers) and pumped sample volume are conducted a minimum of twice annually.

For reference, a log of the service is kept. The information kept in the log should include at least the following:

Date and time of the service
Person(s) doing calibration
Depth of water to which PT probe is submerged

Volume of water pumped to calibrate sampler delivery volume
Service information on raingauges, batteries, etc.

A log sheet is in the Field Sampling Protocol manual for recording maintenance and calibration information. One sheet is completed for each site, each time it is visited.

4.6 Sample Collection

During actual storm sample collection events, a number of procedures are done to ensure that sample collection is done in a careful and consistent manor. A *Field Sampling Protocol* has been developed for the field sampling personnel to use. This document provides all information needed for an individual to setup, maintain, and collect samples from stormwater quality sampling stations. The document is updated several times during the year as needed.

Some of the procedures followed during storm events include using latex gloves while handling samples and equipment, using chain of custody forms to record sample numbers and collection information. All individuals who have physical possession of the samples will sign and date the form. Furthermore, no sample ever leaves the possession of any District employee. The District does not use a third party to collect, prepare, or deliver samples. Sampling personnel use ice in the transport coolers and in the sampler bases. All samples are given a unique identification number that includes the site, type of sample, and the date of sample. Custody seals are used on each cooler. They may, at the sampler's discretion, be used on each individual container.

4.7 Field Records

A field notebook is kept to record all activities at each site. Information such as sampling events times and dates, calibration activities, and maintenance activities are recorded in the book.

4.8 Data Review and Validation

Data review and validation uses all of the sampling data received for an event. Checks of the holding times, proper chain of custody procedures, preservation, sample data, QC sample data, and lab QC data are made to determine the validity of the data.

A Data Validation Sheet is completed and attached to each data set. For stormwater sampling, a data set would include first flush grab and composite samples at one site.

Any circumstances in which the data does not meet the criteria on the review sheet or data that seems questionable is reported to the laboratory for resolution.

4.9 Data Retrieval and Storage

There are two primary types of data collected in the stormwater monitoring program: Water Quality and Discharge/Ambient Conditions.

4.9.1 Water Quality Data

The water quality data is a direct result of the samples collected during a storm from grab and composite samples. The samples are analyzed for the pollutants listed previously in section 3.3. Data is reported from the contract laboratory as hard copy and electronic file on disk.

All reports from the contract laboratory are reviewed when received as described in Section 4.8 above.

The numerical data is currently entered into a Microsoft Excel spreadsheet. Electronic data is provided on disk in the Excel format. The hard copies of the laboratory reports are forwarded to the cities for their records. The laboratory also provides a quality control report, which will also be forwarded to the cities. Copies of all hard copy data as well as quality control reports are kept at the District's offices.

4.9.2 Discharge/Ambient Data

Along with the water quality data, a number of parameters are collected and retained as part of the overall storm data. Data collected in this category includes:

Rainfall
Maximum 5-minute rainfall intensity
Runoff quantity sampled
Total storm runoff

Peak discharge
Days since last measurable rain
Storm Duration
Land use characteristics
Basin size
Flow and rainfall data is downloaded by telephone line or direct connection with field equipment. Data is checked to ensure integrity.

4.10 Preventative Maintenance

As mentioned in Section 4.5 maintenance of the equipment will be on a scheduled, periodic basis. A regular six-month and annual maintenance will be done.

The six-month maintenance is done in June of each year and will consist of:

1. Calibrate the depth sensor.
2. Calibrate the pumped sample volume.
3. Check and clean raingages of debris.
4. Inspect sample intake line, connections, cables, pump tubing, batteries, solar panels, and battery charging system.

The annual maintenance is done in October of each year and will include the six month maintenance, and:

1. Replace sample intake tubing.
2. Replace sampler pump and distributor tubing.
3. Rinse new intake tubing with deionized water.

Since equipment failures tend to increase with time, maintenance that is more frequent may be required. Any repairs and replacements will be made as necessary. In addition, an Equipment Blank sample may indicate the need for tubing replacement before scheduled replacement.

4.11 Record Keeping

All records are kept at the District offices, except for the field notebook kept at each site. Sample logs, maintenance sheets, equipment cleaning sheets, laboratory data, and historic reports are the types of items kept at the District offices.

4.12 Equipment Replacement

As mentioned previously, equipment failures increase with age. It is the District's policy to replace equipment that is no longer functional and cannot be repaired, and equipment that has been serviced many times without satisfactory resolution of the problems. All equipment is first repaired for reuse. If a problem persists, the equipment will be replaced.

References

Environmental Sampling and Analysis for Technicians, Csuros, Maria, Lewis Publishers, 1994

NPDES Storm Water Sampling Guidance Document, U.S. Environmental Protection Agency, Document number EPA 833-B-92-001, July 1992.

City of Phoenix Part II NPDES Permit Application, Woodward Clyde Consultants, 1992.

City of Mesa Part II NPDES Permit Application.

City of Glendale Part II NPDES Permit Application, Camp Dresser and McKee, 1998.

Storm Water NPDES Monitoring Program Review, Technical Memorandum, Prepared for the city of Phoenix by Narasimhan Consulting Services, February 16, 1999.

APPENDIX

WATER QUALITY SAMPLER MAINTENANCE LOG SHEET

SITE				DATE	
ARRIVAL TIME		DEPARTURE TIME		SERVICED BY	
SAMPLER MODEL NUMBER				SAMPLER SERIAL/ ASSET NUMBER	
PT SERIAL NUMBER/ ASSET NUMBER				RAINGAGE SERIAL/ ASSET NUMBER	

	CHECKED / SERVICED / CALIBRATED	CONDITION	REPLACED?	NEEDS REPLACING?	NOTES
BATTERY VOLTAGE	YES NO	GOOD FAIR POOR	YES NO	YES NO	volts
SOLAR PANEL	YES NO N/A	GOOD FAIR POOR	YES NO	YES NO	
CONNECTION CABLES	YES NO	GOOD FAIR POOR	YES NO	YES NO	
RAINGAGE	YES NO	GOOD FAIR POOR	YES NO	YES NO	
SAMPLE INTAKE TUBING	YES NO	GOOD FAIR POOR	YES NO	YES NO	length (feet)
SAMPLER PUMP TUBING	YES NO	GOOD FAIR POOR	YES NO	YES NO	
SAMPLER DISTRIBUTOR TUBING	YES NO	GOOD FAIR POOR	YES NO	YES NO	
DEPTH SENSOR	YES NO	GOOD FAIR POOR	YES NO	YES NO	depth (inch)
CALIBRATE DEPTH SENSOR	YES NO	GOOD FAIR POOR	N/A	N/A	
CALIBRATE SAMPLE VOLUME	YES NO	GOOD FAIR POOR	N/A	N/A	mL
CLEANED SAMPLE INTAKE TUBING	YES NO	GOOD FAIR POOR	N/A	N/A	

NOTES / ACTIONS

STORM EVENT LOG SHEET

SITE:	

DATE:		TIME:	

DID EQUIPMENT OPERATE PROPERLY DURING EVENT: YES NO

IF NO, WHAT WERE PROBLEM(S):

_____

_____

_____

_____

FIELD PARAMETERS:

Sampler Start Time	
Effluent pH	
Effluent Temperature	

GRAB SAMPLES: Take grab samples from discharge only!

Grab Samples Taken?	YES	NO
Preservatives added to bottles?	YES	NO

EQUIPMENT CLEANING CHECKLIST

Site			
Date		Time	
Serviced By:			

☐ Data Downloaded to DTU?

1. Halt program
2. Connect extension tubing to the distributor tubing on the underside of the sampler.
3. Press the Purge Key on 800 models or the Manual key on 900 models.
4. On 900 models, press the Pump Operation key and then the select Purge.
5. Follow the steps below and check each as it is done.

☐ Pump approximately 1/2 gallon tap water through tubing.

☐ Pump approximately 1/2 gallon of Liquinox through tubing.

☐ Pump a large quantity of tap water through tubing.

☐ Pump a small amount of Nitric Acid (pH 3 - 4) through tubing.

☐ Pump approximately 1/2 - 1 gallon deionized water through tubing.

6. Disconnect the extension tubing and make sure the distributor tubing is seated properly.
7. Replace the base and clean bottles.
8. If the data has been downloaded to the DTU, START the program from the beginning.
9. If the data has not been downloaded, RESUME the program.

GLENDALE NPDES STORMWATER ANALYSIS FORM

SITE _____ DATE _____

GRAB SAMPLE

			Bottle(s) Required
X	BOD5	405.1	1- 1 liter plastic, unpreserved
X	Fecal Coliform	9222C	1- bacterial bottle, tablet preserved
X	Fecal Streptococci	9230C	1- bacterial bottle, tablet preserved
X	Oil and Grease	413.1	1- 1 liter glass, unpreserved
X	Purgeables	EPA 624	4- 40 mL glass vials, unpreserved

COMPOSITE SAMPLE

Inorganic Chemistry - Non-Metals

X	Cyanide	335.3	X	Nitrogen, Kjeldahl	351.3
X	COD	410.1	X	Phosphorous, Total	365.2
X	Chloride	300.0	X	Phosphorous, Dissolved	365.3
X	Total Dissolved Solids	160.1	X	Phosphorous, Ortho	365.2
X	Total Suspended Solids	160.1	X	Phenolics	420.1
X	Nitrogen, Ammonia	350.3	X	Organic Carbon, Total	415.1
X	Nitrogen, Nitrate	353.2	X	Alkalinity, Total	310.1
X	Nitrogen, Nitrite	353.2	X	Hardness	130.2
X	Nitrogen, NO2+NO3	353.2	X	Sulfate, Dissovled	375.3
X	Nitrogen, Organic	351.4			

Inorganic Chemistry - Metals, Total and Dissolved

X	Antimony, Total	200.7	X	Lead, Total	239.2
X	Antimony, dissolved	200.7	X	Lead, dissolved	239.2
X	Arsenic, Total	200.7	X	Mercury, Total	245.1
X	Arsenic, dissolved	200.7	X	Mercury, dissolved	245.1
X	Beryllium, Total	200.7	X	Nickel, Total	249.2
X	Beryllium, dissolved	200.7	X	Nickel, dissolved	249.2
X	Cadmium, Total	213.2	X	Selenium, Total	200.7
X	Cadmium, dissolved	213.2	X	Selenium, dissolved	200.7
X	Chromium, Total	218.2	X	Silver, Total	200.7
X	Chromium, dissolved	218.2	X	Silver, dissolved	200.7
X	Copper, Total	220.2	X	Thallium, Total	200.7
X	Copper, dissolved	220.2	X	Thallium, dissolved	200.7
			X	Zinc, Total	289.2
			X	Zinc, dissolved	289.2

Organic Compounds

X	Chlorinated Pesticides	608	X	Base/Neutral/Acid Extractable	625

MESA NPDES STORMWATER ANALYSIS FORM

SITE _____ DATE _____

GRAB SAMPLE

			Bottle(s) Required
X	BOD5	405.1	1- 1 liter plastic, unpreserved
X	Fecal Coliform	9222C	1- bacterial bottle, tablet preserved
X	Fecal Streptococci	9230C	1- bacterial bottle, tablet preserved
X	Oil and Grease	413.1	1- 1 liter amber glass, unpreserved
X	Methylene Chloride	EPA 624	4- 40 mL glass vials, unpreserved
X	Toluene	EPA 624	from above

COMPOSITE SAMPLE

Inorganic Chemistry - Non Metals

			X	Nitrogen, Organic	351.4
X	COD	410.1	X	Nitrogen, Kjeldahl	351.3
X	Total Dissolved Solids	160.1	X	Phosphorous, Total	365.2
X	Total Suspended Solids	160.1	X	Phosphorous, Dissolved	365.3
X	Nitrogen, Ammonia	350.3	X	Hardness	130.2
X	Nitrogen, Nitrate	353.2			

Inorganic Chemistry - Metals, Total and Dissolved

X	Cadmium, Total	213.2	X	Lead, Total	239.2
X	Cadmium, dissolved	213.2	X	Lead, dissolved	239.2
X	Chromium, Total	218.2	X	Mercury, Total	245.1
X	Chromium, dissolved	218.2	X	Mercury, dissolved	245.1
X	Copper, Total	220.2	X	Zinc, Total	289.2
X	Copper, dissolved	220.2	X	Zinc, dissolved	289.2

Organic Compounds

X	DDE	608	X	Fluroanthene	625
X	Benzo(a) Anthracene	625	X	Indeno (1,2,3-cd) Pyrene	625
X	Chrysene	625	X	Pyrene	625

PHOENIX NPDES STORMWATER ANALYSIS FORM

SITE _____ DATE _____

GRAB SAMPLE

			Bottle(s) Required
X	Total Petroleum Hydrocarbon	418.1	1- 1 liter glass, unpreserved
X	Fecal Coliform	9222C	1- bacterial bottle, tablet preserved
X	Fecal Streptococci	9230C	1- bacterial bottle, tablet preserved
X	Oil and Grease	413.1	1- 1 liter glass, unpreserved
X	Purgeables (Acetone)	EPA 624	4- 40 mL glass vials, unpreserved
X	DDE	EPA 608	1- 1 liter glass, unpreserved
X	Chrysene	EPA 625	1- 1 liter glass, unpreserved
X	Benzoic Acid	EPA 625	1- 1 liter glass, unpreserved
X	Phenol	EPA 625	1- 1 liter glass, unpreserved

COMPOSITE SAMPLE

Inorganic Chemistry - Non-Metals

X	BOD	405.1	X	Nitrogen, Kjeldahl	351.3
X	COD	410.1	X	Phosphorous, Total	365.2
X	Cyanide	353.3	X	Hardness	130.2
X	Total Dissolved Solids	160.1	X	Phosphorous, Ortho	365.2
X	Total Suspended Solids	160.1	X	Phenolics	420.1
X	Nitrogen, Ammonia	350.3			
X	Nitrogen, Nitrate	Computation			
X	Nitrogen, Nitrite	353.2			
X	Nitrogen, NO2+NO3	353.2			

Inorganic Chemistry - Metals, Total and Dissolved

X	Arsenic, Total	200.7	X	Lead, Total	239.2
X	Arsenic, dissolved	200.7	X	Lead, dissolved	239.2
X	Beryllium, Total	200.7	X	Nickel, Total	249.2
X	Beryllium, dissolved	200.7	X	Nickel, dissolved	249.2
X	Cadmium, Total	213.2	X	Silver, Total	200.7
X	Cadmium, dissolved	213.2	X	Silver, dissolved	200.7
X	Chromium, Total	218.2	X	Zinc, Total	289.2
X	Chromium, dissolved	218.2	X	Zinc, dissolved	289.2
X	Copper, Total	220.2			
X	Copper, dissolved	220.2			