

**U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY**

Customer #: 600000834/AZ071
Agreement #: 15WSAZ00300
Project #: ZF009GJ
TIN #: 86-6000247
Fixed Cost Agreement YES

JOINT FUNDING AGREEMENT

FOR
WATER RESOURCES INVESTIGATIONS

THIS AGREEMENT is entered into as of the, 3rd day of September, 2014 by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the CITY OF GLENDALE, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation a program to determine factors that influence the chemical composition of urban stormwater in Glendale, AZ as described in the attached workplan herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of \$0.00

(a) by the party of the first part during the period

Amount	Date	to	Date
\$0.00	October 1, 2014		September 30, 2019

(b) by the party of the second part during the period

Amount	Date	to	Date
\$482,856.00	October 1, 2014		September 30, 2019

Total = \$482,856.00

(c) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.

(d) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.

3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.

4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.

5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.

6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

- 7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.
- 8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
- 9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered quarterly. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983).

**U.S. Geological Survey
United States
Department of the Interior**

**City of Glendale
Water Services Department**


USGS Point of Contact

Customer Point of Contact

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 Email: tkaczmarowski@glendaleaz.com

Signatures and Date

Signature: _____	Date: _____	Signature: _____	Date: _____
			
Name: James M. Leenhouts		Name: _____	
Title: Director		Title: _____	

Signature: _____	Date: _____	Signature: _____	Date: _____
Name: _____		Name: _____	
Title: _____		Title: _____	

Signature: _____	Date: _____	Signature: _____	Date: _____
Name: _____		Name: _____	
Title: _____		Title: _____	

Chemical Composition of Urban Stormwater, Glendale, Arizona



A Workplan Prepared for

City of Glendale

Prepared by

U.S. Geological Survey, Tempe, AZ

Executive Summary

Title: Chemical Composition of Urban Stormwater, Glendale, AZ

Cooperating Agency: City of Glendale, AZ

Project Chief: Kenneth Fossum

Problem: Urban runoff is a known source of pollutants which are carried into receiving waters. Municipalities are required to monitor these pollutant loads and report the results to the Arizona Department of Environmental Quality (ADEQ) in accordance with an Arizona Pollutant Discharge Elimination System (AZPDES) permit. In November, 1990, the Environmental Protection Agency (EPA) recommended U.S. Geological Survey (USGS) involvement in the collection of stormwater information. Since 1991, the USGS, in cooperation with the Flood Control District of Maricopa County (FCDMC), has collected, analyzed, and interpreted urban stormwater information from selected basins throughout the Maricopa County metropolitan area. Water-resource managers and policy makers are expected to use this information to develop and test management strategies designed to mitigate pollutant loads. The basins monitored during the first phase of the investigation are generally categorized by land use type. This approach has aided in determining the effect of land use type on the variability of pollutant loads discharged from basins during storms.

Objective: The objective of this study is to collect rainfall, runoff, and runoff water quality data to characterize stormwater quality from representative urban land uses at five urban monitoring stations in the City of Glendale. This study will be conducted during years 6 through 10 of Glendale's AZPDES permit.

Approach: The USGS will collect stormwater samples during representative storm events at five urban basins located in the metropolitan Glendale area. These samples will be analyzed to determine the basin characteristics and factors that contribute to the variability of urban runoff quality for selected land use types. Two samples will be collected and analyzed annually for each of the urban sites. One sample will be collected during the winter months and one sample will be collected during the summer months. Grab samples as required by Glendale's current permit will be collected at the site by sampling personnel as soon as possible after the beginning of a storm event. Automatic samplers already installed at the sites will be utilized for sample collection of the flow-weighted composite samples. Samples will be analyzed by a City of Glendale contract laboratory to measure concentrations of pollutants discharged from the drainage basins.

Relevance and Benefits: The collection, compilation, and analysis of urban stormwater information as outlined in this proposal will result in advanced knowledge of the chemistry of urban stormwater runoff in a major metropolitan area of a semiarid region. Because of the many municipal entities involved in the process of characterizing the chemistry of stormwater runoff in Maricopa County, the information gathered and relationships developed by the USGS will provide a substantial database and resource that the communities can use for planning and operation purposes. Finally, because the USGS is collecting similar stormwater chemistry information for major metropolitan areas throughout the United States, this study will contribute information to national databases that can be used to advance the understanding of regional variations in hydrologic conditions.

Chemical Composition of Urban Stormwater, Glendale, Arizona

Introduction

Urban runoff is a known source of pollutants which are carried into receiving waters. Municipalities are required to monitor these pollutant loads and report the results to the Arizona Department of Environmental Quality (ADEQ), in accordance with an Arizona Pollutant Discharge Elimination System (AZPDES) permit. The City of Glendale currently operates under an AZPDES permit (AZS000019-2010) issued in August 2010. The permit and authorization to discharge expires on August 26, 2015, unless the permit is administratively continued or renewed. For the purpose of this proposal, it is assumed that existing permit conditions will remain effective through 2019 (years 6 through 10).

In November, 1990, the Environmental Protection Agency (EPA) recommended U.S. Geological Survey (USGS) involvement in the collection of stormwater information¹. Since 1991, the USGS, in cooperation with the Flood Control District of Maricopa County (FCDMC), has collected, analyzed, and interpreted urban stormwater information from selected basins throughout the Maricopa county metropolitan area (Lopes and others, 1995, and Fossum and Davis, 1996, Fossum and others, 2001). Water-resource managers and policy makers are expected to use this information to develop and test management strategies designed to mitigate pollutant loads. The basins monitored during the first phase of the investigation are generally categorized by land use type. This approach has aided in determining the effect of land use type on the variability of pollutant loads discharged from basins during storms.

Benefits

The collection, compilation, and analysis of urban stormwater information as outlined in this proposal will result in advanced knowledge of the chemistry of urban stormwater runoff in a major metropolitan area of a semiarid region. Because of the many municipal entities involved in the process of characterizing the chemistry of stormwater runoff in Maricopa County, the information gathered and relationships developed by the USGS will provide a substantial database and resource that the communities can use for planning and operation purposes. Finally, because the USGS is collecting similar stormwater chemistry information for major metropolitan areas throughout the United States, this

¹ Federal Register, Volume 55, Number 122, Friday, November 16, 1990, Page 48051, 40CFR Parts 122, 123, 124 - "EPA is working with the USGS to evaluate the availability of USGS technical assistance to municipalities through cooperative funding programs to aid in collecting representative quantitative data of storm water discharges from municipal systems. USGS data collection programs with municipalities typically include storm water discharge samples obtained at various times during a storm hydrograph event. Various USGS field procedures can be used to obtain discharge data for pipes, culverts, etc., typically found in urban areas. Pollutant models can be calibrated

study will contribute information to national databases that can be used to advance the understanding of regional variations in hydrologic conditions.

Objectives

The objective of this study is to collect rainfall, runoff, and runoff water quality data to characterize stormwater quality from representative urban land uses at five urban monitoring stations in the City of Glendale. This study will be conducted during years 6 through 10 of Glendale's AZPDES permit.

Approach

The USGS will collect stormwater samples during representative storm events at five urban monitoring locations located in the metropolitan Glendale area (figure 1). Grab and flow-weighted composite stormwater samples will be collected twice per year per site - one sample during summer season and one sample during winter season. Field analysis of stormwater samples include pH, temperature, specific conductance, and dissolved oxygen. Grab samples as required by the permit will be collected at the site by sampling personnel as soon as possible after the beginning of a storm event. Automatic samplers already installed at the sites will be utilized for sample collection of the composite samples. The flow-weighted composite samples will be analyzed for the parameters listed in the current AZPDES permit by a City of Glendale contract laboratory.

Quality assurance and quality control for stormwater samples will consist of concurrent replicate samples, equipment blanks, and VOC trip blanks. Concurrent replicate samples will be collected at one site per year. This site will be chosen on a rotating basis. The replicate sample collected will be analyzed for the same constituents as the stormwater samples. Equipment blanks will be collected once per year at one site, also on a rotating basis. The equipment blank will be collected using inorganic free water for the inorganic constituents and organic free water for the VOC's and other organic constituents. Trip blanks will accompany any VOC samples to check for contamination in the sampling process and in shipment to the lab.

All sampling will be conducted in accordance with the most recent versions of the following publications, or any versions that supercede them:

1. Code of Federal Regulations, Title 40, Part 136.
2. U. S. Environmental Protection Agency, NPDES Stormwater Sampling Guidance Document.
3. Flood Control District of Maricopa County, Field Sampling Protocol.
4. Flood Control District of Maricopa County, Stormwater Sampling Management Plan.

with data and long-term rainfall records to simulate the quality of system discharges and compared to other storm water models."

Quality assurance for the laboratory analyses will be accomplished through the Office of Water Quality, SRS Blind Sample Program. All data provided by the contract laboratory will then be entered and stored in the NWIS database. Biannual reports will be produced for the City of Glendale.

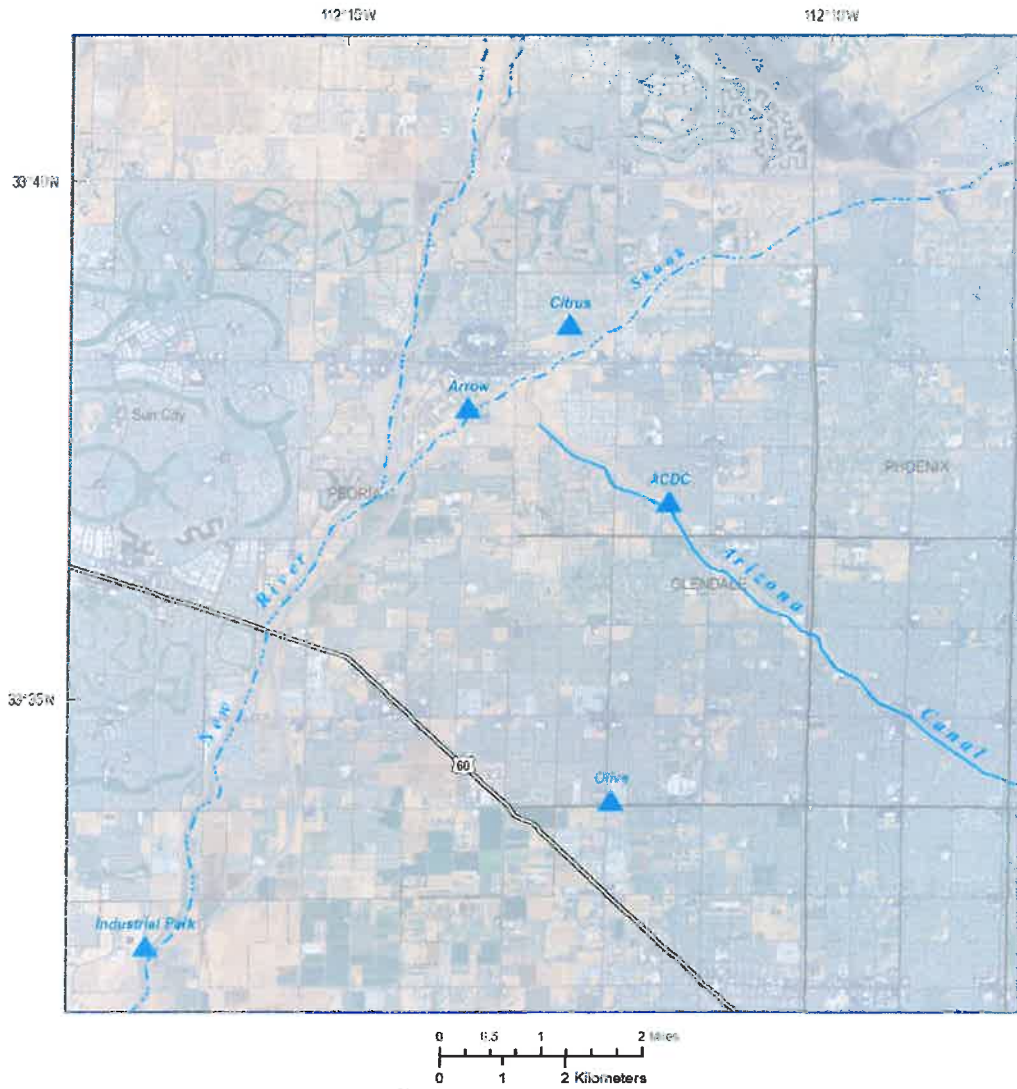


Figure 1. Study area and stormwater-monitoring stations, City of Glendale, Arizona.

Reports

Biannual reports will be provided to the City of Glendale including station status, failure analyses, post-storm activities, chain of custody forms, calibration and maintenance records, and water quality, rainfall, and runoff data and hydrographs. The reports will be provided in October and April of each year. The AWSC will enter the data provided by the contract laboratory into the NWIS database.

Budget

The costs associated with collecting two samples annually at five urban sites, costs associated with maintenance of the monitoring stations, supplies, vehicles, and utilities (phone charges), are contained in the tables below (Tables 1 and 2). The City of Glendale will be billed quarterly for operation and maintenance and sampling costs. The City of Glendale will also be billed for any equipment repair or replacement costs. Costs for sample analysis are not included in this proposal; the City of Glendale is responsible for direct payment to the contract laboratory.

References Cited

- Fossum, K.D., and Davis, R.G., 1996, Physical, chemical, biological, and toxicity data from the study of urban stormwater and ephemeral streams, Maricopa County, Arizona, Water Years 1992-95: U.S. Geological Survey Open-File Report 96-394, 71 p.
- Lopes, T.J., Fossum, K.D., Phillips, J.V., and Monical, J.E., 1995, Statistical summary of selected physical, chemical, and microbial characteristics, and estimates of constituent loads in urban stormwater, Maricopa County, Arizona: U.S. Geological Survey Water-Resources Investigations Report 94-4240, 62 p.
- Fossum, K. D., O' Day, C. M., Wilson, B. J., and Monical, J. E., 2001, Statistical summary of selected physical, chemical, and toxicity characteristics and estimates of annual constituent loads in urban stormwater, Maricopa County, Arizona: U.S. Geological Survey Water-Resources Investigations Report 01-4088, 33 p.

Table 1. Itemized costs of urban sampling at City of Glendale sites for a sampling term from October 1, 2014 to September 30, 2019 (Costs are held constant for FY2015 and FY2016, and then are adjusted by a 3% inflation rate for each year after FY2016). Amounts in black are fixed costs and amounts in red are to be added as needed for equipment repair and replacement.

Cost Item	FY2015	FY2016	FY2017	FY2018	FY2019
Labor – O and M (Table 3)	50,215	50,215	51,721	53,273	54,871
Supplies-Equipment: Tubing, Water Quality meters, Miscellaneous Supplies	7,000	7,000	7,210	7,426	7,649
Utilities: Phones	5,000	5,000	5,150	5,304	5,463
Vehicles (1 Vehicle)	7,000	7,000	7,210	7,426	7,649
Sampling Labor – (8 hours/sample) (2 people/sample) (12 samples) (\$83.00 hourly rate)	15,936	15,936	16,414	16,906	17,413
(2 samples/site) (5 sites) + 2 QA samples = 12 total samples					
Subtotal	85,151	85,151	87,705	90,335	93,045
Contingency costs (to be used as needed):					
• Equipment repair and replacement	8,000	8,000	8,240	8,487	8,742
Project Total	\$93,151	\$93,151	\$95,945	\$98,822	\$101,787

Table 2. – Itemized Operation and Maintenance Labor Costs (for the first year; FY2015).

Labor	hours	Visits per Year	Number of Stations	Hourly Rate	Approximate Costs
Semi-annual routine maintenance	5	2	5	\$83.00	\$4,150
Administrative work related to station O&M	25	N/A	5	83.00	10,375
Downloading data after storm event	2	4	5	83.00	3,320
Cleaning and resetting samplers	3	4	5	83.00	4,980
Other O&M repair activities	20	N/A	5	83.00	8,300
Database management and biannual report compilation	230	N/A	N/A	83.00	19,090
Labor Total					\$50,215

JOB HAZARDS ANALYSIS

Job Hazard Analysis For New Projects

- Check the numbered box(s) for all significant safety concerns this project should address. Significant safety concerns are commonly those that require training, purchase of safety equipment, or specialized preparation to address potentially hazardous conditions.
- Identify any unlisted safety concerns at bottom of the page.
- Provide details on the back of this page.

Proposal Number AZ05E

Project Title (Short): Urban Runoff Chemistry, Glendale, AZ

Project Chief or Proposal Author: Kenneth Fossum

√	Safety Concerns
1. √	Wading, bridge, boat, or cableway measurements or sampling
2.	Working on ice covered rivers or lakes
3. √	Measuring or sampling during floods
4.	Well drilling; borehole logging
5.	Electrical hazards in the work area
6.	Construction
7.	Working in remote areas, communication, office call in procedures
8.	Ergonomics, carpal tunnel syndrome
9. √	Field Vehicles appropriate for task?- Safety screens, equipment restraints.
10.	All terrain vehicles, snowmobiles
11.	Helicopter or fixed wing aircraft usage
12. √	Site access
13. √	Hypothermia or heat stroke
14.	Hantavirus, Lyme Disease, Histoplasmosis, Pfiesteria, Others?
15. √	Contaminated water with sanitary, biological, or chemical concerns
16. √	Immunizations
17. √	Laboratory or mobile laboratory. Chemical hygiene plan.
18.	Hazardous waste disposal
19.	Hazardous waste site operations
20.	Confined space
21.	Radioactivity
22.	Respiratory protection
23.	Scuba Diving
24.	Electrofishing
25.	Explosives

Site Safety Plan and Job Hazard Analysis for Work Sites:		Urban Runoff Chemistry, Glendale, AZ
Safety items required by site personnel and visitors as appropriate:	Eye and foot protection, and personal floatation devices. Rubber gloves when appropriate.	
Site specific needs:	NONE	
Nearest Hospital:	911	
Emergency Numbers (Police, Fire, Ambulance)	911	911
	911	
Cooperator Contacts:	City of Glendale Environmental Resources : 623-930-4133	
Job Steps and Procedures	Potential Accidents and Hazards	Recommended Safe Job Practices
Loading and unloading equipment	Pinching fingers, crushing toes, back strain.	Wear gloves, use proper lifting techniques (use legs not back), and get assistance if necessary.
Transporting equipment to site	Unsecured equipment hitting vehicle occupants in accident.	Secure equipment/load. Vehicle has safety screen installed.
Walking around site	Loose rocks, steep slopes, muddy slopes.	Discuss ground hazards (rocks, muddy and steep slopes) Create safe passage to all gage equipment.
Wading in swift or deep water	Slipping on slick or slippery banks or river beds.	Use hip boots or chest waders. Wear personal floatation devices for all deep or swift streams.
Working in the heat of summer	Sunburn, heat exhaustion, heat stroke.	Always use sunscreen and carry ample amounts of water and electrolytes.
Water sample collection and sample preservation.	Stormwater contamination and possible acid burns from sample preservation.	Have all required immunizations. Always wear rubber gloves for sample collection and preservation. Dispose of acid ampules in an approved container.