

Middle Gila River  
Watershed Management Study

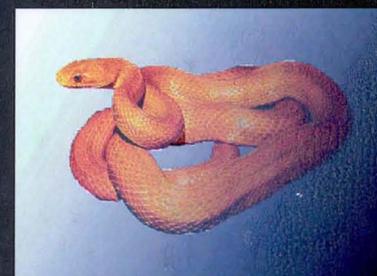
Phase I Assessment Study  
Index No. S-967342/WS9074004-S

July 1998

Prepared for the  
Multi-City Subregional Operating Group  
and the City of Tolleson

By:

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# City of Phoenix

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July 23, 1999

**TO:** Doug Kukino City of Glendale  
 Christine Zielonka City of Mesa  
 Bill Erickson City of Scottsdale  
 Bill Coughlin City of Tempe  
 Marilyn DeRosa Flood Control District of Maricopa County

**FROM:** Lori Sundstrom

**SUBJECT:** MIDDLE GILA RIVER WATERSHED MANAGEMENT STUDY

Enclosed is a copy of the July 1998 report, Middle Gila River Watershed Management Study, Phase I Assessment. This study was completed by the Sub-Regional Operating Group (SROG) at the request of EPA Region 9 to support re-issuance of the NPDES permits for the 23<sup>rd</sup> and 91<sup>st</sup> Avenue Wastewater Treatment Plants. Copies of the study were delivered to wastewater staff in each of the SROG cities some time ago.

You will see that there are numerous mentions of storm water inputs from various sources into the river, and some discussion of storm water control programs and their implementation. I have tentatively arranged for a presentation on the study by Greeley and Hansen, to talk to us about the study's purpose and conclusions on:

August 3, 1999 (Tuesday)  
9:30 am – 10:30 am  
Conference Room 7 West (7<sup>th</sup> Floor)  
Phoenix City Hall  
200 West Washington Street

I will confirm the presentation date as soon as I can. I hope you can attend (and please bring anyone else you want to) since this is information that may affect future storm water NPDES permits.

c: Craig Reece  
Blane Work

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**Phase I Assessment Study  
Index No. WS90140004-S; S-961342**

*Prepared for*  
Multi-City Subregional Operating Group  
and  
City of Tolleson

**July 1998**

**Greeley and Hansen**  
426 North 44th Street, Suite 400  
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*Andrew W. Richardson*

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
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*Middle Gila River Watershed Management Study*  
*Phase I Assessment Study*  
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Phase I Assessment Study  
Index No. WS90140004-S; S-961342*

Greeley and Hansen  
July 1998

**EXECUTIVE SUMMARY**

**The Middle Gila River Watershed Management Study was authorized by the Multi-City Subregional Operating Group and the City of Tolleson at the request of the EPA.**

**INTRODUCTION**

The United States Environmental Protection Agency (EPA) approached the Multi-City Subregional Operating Group (SROG) Cities in the metropolitan Phoenix area and requested that they conduct the Middle Gila River Watershed Assessment Study as a part of the 91st Avenue Wastewater Treatment Plant (WWTP) 1997 National Pollutant Discharge Elimination System (NPDES) Permit renewal. SROG and the City of Tolleson identified advantages in providing reliable data to the EPA for reviewing future NPDES permits on a watershed basis, which will include Total Maximum Daily Load (TMDL) waste load allocations. SROG and the City of Tolleson initiated the Middle Gila River Watershed Management Study (MGRW) to: inventory and assess existing surface and groundwater quality and quantity data, habitat and species information, and identify data gaps for a portion of the Middle Gila River Watershed.

**STUDY AREA**

**The study area includes 70 river miles from Granite Reef Dam on the Salt River downstream to Gillespie Dam on the Gila River.**

The SROG cities, the City of Tolleson and the 91st Avenue WWTP are located within the Middle Gila River watershed. The MGRW study area examined in this study, consists of 70 river miles extending from Granite Reef Dam on the Salt River downstream to Gillespie Dam on the Gila River and includes the land within the 100-year flood plain. In the Arizona Administrative Code, Title 18, Chapter 11 the Arizona Department of Environmental Quality (ADEQ) divided Arizona rivers into

reaches based on their associated uses. The MGRW study area consists of six reaches as defined by ADEQ. They are:

- Reach 1: Granite Reef Dam to 2 km downstream
- Reach 2: 2 km downstream of Granite Reef Dam to I-10 Bridge and the Salt River
- Reach 3: I-10 Bridge and the Salt River to the most upstream outfall from the 23rd Avenue WWTP
- Reach 4: 23rd Avenue WWTP outfall to the confluence of the Salt and Gila Rivers
- Reach 5: Confluence of the Salt and Gila Rivers to Gillespie Dam
- Reach 6: Gillespie Dam to Painted Rock Reservoir

Reach 6 is currently being analyzed by Science Applications International Corporation (SAIC), a consultant of the EPA.

#### **POLLUTANTS OF CONCERN**

**The study focused on 22 pollutants of concern.**

The Water Quality Technical Committee of the Tres Rios River Management Plan (TRRMP) which consists of members from the EPA, ADEQ, Arizona Game and Fish, Bureau of Reclamation and others, assisted in reviewing the list of all contaminants associated with surface water quality standards. The list was reduced to focus on 22 pollutants of concern which represent contaminants that often exceed standards, prompt fish consumption advisory notifications, or were deemed to be important to habitat and wildlife. The MGRW pollutants of concern include inorganic chemicals such as beryllium and copper, all the major trihalomethanes, pesticides such as DDT and lindane and other water quality parameters such as total dissolved solids and dissolved oxygen.

#### **STRESSORS**

**The study identified 11 stressors as potential sources of pollutants of concern.**

Stressors are sources of water quality contaminants that can impact the environment. The stressors identified in the MGRW study area are listed in **Table ES-1**. This table also indicates whether the stressor could be measured and quantified, the amount of data available and the impact the stressor has on surface water quality. Available water quality and quantity

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*Table ES-1*  
*Summary of Stressors in the MGRW Study Area*

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<i>Stressor</i>	<i>Measurable/ Quantifiable?</i>	<i>Data Availability?</i>	<i>Impact on Water Quality?</i>	<i>Comment</i>
Stream Flows (i.e., releases from reservoirs)	Yes	Good	Minimal	Releases typically rare and of short duration
Urban Stormwater Regulated by NPDES	Yes	Good (where measured)	High	Impact high during storms
Unregulated Urban Stormwater	No	None	Unknown, but Potentially High	Not measured; effect cannot be quantified
WWTP Discharges Regulated by NPDES	Yes	Good	High	
Industrial and Gravel Mining NPDES Discharges	Yes	Good	Minimal	Few discharges and overall low flows
Agricultural Stormwater Runoff	No	None	Unknown	Not measured; effect cannot be quantified
Excess Irrigation Water from Agriculture	Yes	Poor	Unknown, but Potentially High	Small percentage of tail water drains are monitored
Agricultural Dewatering Wells	Yes	None	Unknown	Very saline groundwater likely to affect surface water TDS
Concentrated Animal Feedlot Operation (CAFO) Runoff	No	None	Unknown	Locals observe runoff in agricultural drains, although discharge is illegal
Landfill Leachate	No	None	Unknown	Old landfill located in river at 123rd Avenue; no monitoring information
Groundwater Inflow	Yes	Good	High	Gila River becomes gaining stream downstream of 115th Avenue

information for releases from upstream reservoirs, urban stormwater regulated by NPDES, WWTP discharges, industrial and gravel mining NPDES discharges, excess tail water from irrigation and groundwater inflow were inventoried and analyzed to characterize each of the five river reaches in the MGRW study area. Unregulated urban stormwater, agricultural stormwater runoff, agricultural dewatering wells, concentrated animal feedlot operation (CAFO) runoff and landfill leachate were all stressors for which no data was available. These represent water quality data gaps for the MGRW study area. There was little data available regarding excess irrigation water from agriculture. Salt River Project (SRP) provided information on four of their canals that discharge to the Salt or Gila River. However, there are ungaged SRP ditches that drain excess irrigation water to the Salt River at 35th Avenue, 59th Avenue, 67th Avenue, 75th Avenue, 83rd Avenue, 91st Avenue, and 99th Avenue. No quality or quantity information is available for the ungaged SRP drains.

#### ANALYSIS

ADEQ assigned designated uses and surface water quality standards to each of the five river reaches in the MGRW study area. Individual river reaches often had more than one standard for a specific contaminant because different standards applied to each designated use. The most stringent standard for each contaminant in each river reach was used to evaluate exceedances. ADEQ has assigned practical quantitation limits (PQL) to specific contaminants. The PQL is the concentration at which the standard methods of analysis provide an accurate measurement of the concentration of a contaminant. At concentrations less than the PQL, results may be influenced by any one of several external conditions and therefore measured concentrations may not be representative of actual concentrations. The PQL associated with many contaminants was greater than the standard or the detection limit.

**Water quality standards associated with each designated use in each reach were used to identify the most stringent standard for each pollutant of concern.**

**The most stringent standard for each pollutant of concern was compared to reported concentrations to determine if there were exceedances.**

The most stringent standard for each contaminant for each river reach was compared to reported contaminant concentrations to determine if the discharge of the contaminant was in compliance, or if there were exceedances. If there appeared to be exceedances, concentrations were then compared to the PQL to determine if the reported concentrations were "viable". If concentrations were greater than the standard and detection limit, but less than the PQL, they were labeled *potential exceedances*. If concentrations were greater than the standard *and* PQL, they were labeled *verified exceedances* and temporal or spatial trends were then identified if possible. These types of comparisons were the basis for analysis of surface water quality information.

**Data gaps impacting standard analyses were associated with monitoring locations, sampling frequency, and analytical techniques.**

### **DATA GAPS**

An objective of the MGRW study was to identify data gaps. There were three types of data gaps identified: monitoring location, sampling frequency and analytical technique. Monitoring location data gaps were identified where there were specific discharges to the river that were ungaged and unmeasured, and when the distance between sampled locations along the river, was great. Ungaged SRP tail water drains and unsampled storm drains are examples of monitoring location data gaps. Sampling frequency data gaps were identified when a constituent was measured once or a limited number of times at a location and the results indicated possible exceedances. Analytical technique data gaps were identified when concentrations were reported as a "less than value", such as <0.5 ug/l that was greater than the standard, or greater than the standard and PQL. Analytical technique data gaps were also identified when contaminant concentrations were reported as values that exceeded standards, but were less than the PQL. More sensitive analytical techniques are needed to assess contaminant concentrations where analytical technique data gaps exist.

**Analytical technique data gaps considered detection limits, reporting limits and practical quantitation limits.**

**Water quantity is a key factor in evaluating pollutant impacts.**

### **WATER QUANTITY**

The quantity of flow is an important consideration when evaluating potential stressor impacts to the environment. Concentrations and flows are needed to calculate pollutant loadings. A minor exceedance of a

contaminant that occurred during a very infrequent ephemeral flow event may not justify additional investigations or monitoring. Relatively continuous flow sources identified in the MGRW study are those associated with WWTP discharges, irrigation drainage, groundwater and dewatering wells. These were identified as continuous because they are not related to storm runoff and are far more continuous than flood releases from upstream dams. Ephemeral flows identified in the MGRW Study include regulated and unregulated stormwater, CAFO runoff, agricultural storm runoff and flood flows.

**There are five major habitat classes in the study area, each with associated species.**

### **HABITAT AND SPECIES**

The goal of the habitat/species analysis was to first identify the major habitat classes in the MGRW based on existing information sources. Once classes were identified, the major vegetation communities associated with each class were quantified. The next goal was to identify wildlife species commonly associated with habitat communities. The five basic habitat types in the MGRW are: cottonwood-willow, salt cedar, mesquite, marsh and cobble/flood scoured. Key fish, reptiles, amphibians, mammals and birds associated with each habitat type were identified, including any threatened and endangered species. The Arizona Game and Fish Department provided a great amount of species data.

**The principal stressor impact in Reach 1 relates to Granite Reef Dam releases.**

### **SURFACE AND GROUNDWATER CHARACTERIZATION**

#### **Reach 1: Granite Reef Dam to 2 km Downstream**

Reach 1 is primarily dry; flow occurs only during storms or when there are releases from Granite Reef Dam. There are no wells or gaged stormwater drains in this reach. The only water quality information available for this reach, is from the Arizona Canal at Granite Reef Dam. Water in the Arizona Canal is representative of water that is released to the Salt River during flood events. Water in this reach is of high quality, and is used as drinking water. Elevated sediment loading during floods is projected as the only adverse impact Reach 1 will have on downstream reaches.

## **Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge and the Salt River**

**Reach 2 is primarily dry.**

Reach 2 is also primarily dry as flow in this reach occurs only during storm events, when there are releases from upstream reservoirs or when the Mesa Northwest Reclamation plant discharges to the Salt River. There are eight stormwater monitoring locations in this reach between Alma School Road and the Salt River downstream to just east of the I-10 Bridge. Multiple verified exceedances of the dissolved copper standard were observed in stormwater in this reach. Between November 1991 and December 1996 at the 48th Street drain, 7 of the 14 total copper stormwater samples had concentrations greater than 70 ug/l, 5 of those had copper concentrations >100 ug/l. All five samples with concentrations greater than 100, were collected in 1995 and 1996. This indicates that total copper in stormwater at the 48th Street drain, has been increasing in the last few years. Previous studies have identified automobile brake pads as a major source of copper in urban storm water runoff. Sources say brake manufacturers have recently increased their use of copper in brake pads, primarily because copper reduces noise and vibration problems with disc brakes. The recent overall increase of copper in brake pads may have contributed to the increases noted in stormwater.

**There were copper exceedances associated with stormwater inflow and the concentrations have been increasing since 1991.**

**Stormwater contributes cyanide to the river.**

Verified exceedances of the cyanide standard were observed in stormwater at 48th Street, 40th Street and just east of the I-10 Bridge. Results indicate that stormwater in Reach 2 contributes cyanide to the river in levels greater than the standard, but not on a consistent basis.

**Analytical technique data gaps associated with thallium result in potential exceedances of the standard.**

A major analytical technique data gap exists for thallium in stormwater in Reach 2. The minimum thallium standard is 12 ug/l and there is no PQL. Potential exceedances of the thallium standard were observed in 41 percent of the samples, when concentrations were reported as a < value that was greater than the standard. A concentration of <500 ug/l was reported for 23 percent of the thallium samples in stormwater in Reach 2. This represents a major analytical technique data gap as the actual concentration could be 499 ug/l or 10 ug/l. The same type of analytical

technique data gap applies to pesticides in Reach 2. More sensitive analytical techniques are needed to determine actual concentrations.

There was limited groundwater quality information in Reach 2. The majority of available data relates to the investigation of a volatile organic carbon spill in Mesa, where samples were analyzed for nitrate and trihalomethanes.

### **Reach 3: I-10 Bridge and the Salt River to 23rd Avenue WWTP Outfall**

**Stormwater is contributing copper and beryllium to the river in Reach 3.**

Flow in this reach occurs only during storm events or when there are releases from upstream reservoirs. Reach 3 is approximately 7 miles long, however, the only gaged stormwater drain in this reach is at 24th Street Bridge and the Salt River. The 24th Street Bridge was only sampled in August and September 1992 and results indicate that stormwater is contributing copper and beryllium to the river in Reach 3. This data represents monitoring location and sampling frequency data gaps.

Sediment samples from 1985 contained notable amounts of beryllium, selenium and thallium. More sampling is needed to determine if concentrations persist and what the sources may be.

Reach 3 had a minimal amount of groundwater quality information available. No spatial or temporal trends were evident.

### **Reach 4: 23rd Avenue WWTP Outfall to Confluence of Salt and Gila Rivers**

Flow in this reach occurs during storms, following releases from upstream reservoirs and as the result of discharges from WWTPs, industry, gravel mines and agriculture.

**There were verified exceedances of some metals and pesticide standards in Reach 4.**

### **Stormwater**

Verified exceedances of the minimum designated uses standards were noted in stormwater for dissolved beryllium, dissolved copper, total mercury, cyanide, DDE and DDT. There were also many potential exceedances of these contaminants. Potential exceedances represent analytical technique data gaps, because reporting limits are such that it cannot be determined if the standard is being exceeded.

**Copper in stormwater increases in concentration downstream.**

Multiple verified exceedances of the dissolved copper standard were measured in Reach 4 stormwater. These high concentrations may be the result of local stormwater runoff as well as stormwater from upstream. Results indicate that total copper tends to increase downstream during storms. The following table shows the copper concentrations in August and September 1995, from Dorsey and University in Tempe, to the Salt River at 35th Avenue in Phoenix. High copper concentrations in fish tissue were also measured in Reach 4.

<i>Location</i>	<i>Date</i>	<i>Total Copper (ug/l)</i>
Dorsey and University	9/28/95	26
Indian Bend Wash at Curry	9/28/95	25
Fifth Street east of Ash	9/7/95	18
48th Street Drain	8/19/95	120
Salt River at 40th Street	9/28/95	230
500 ft. East of I-10 Bridge	9/27/95	76
Salt River at 35th Avenue	9/28/95	420

Analytical technique data gaps exist for cyanide, selenium and thallium in storm water in Reach 4. Concentrations were reported as < values that were greater than the standard and PQL, or as values that were greater than the standard, but less than the PQL.

**There were verified exceedances of DDT and DDE standards in Reach 4 stormwater.**

There were verified exceedances of DDE and DDT in stormwater at the Salt River and 27th Avenue. It is possible that soil contaminated years ago before the ban on DDT, was the source of DDE and DDT as both contaminants accumulate in soils and are very persistent in the environment.

**There were potential exceedances of the beryllium standard in Reach 4.**

#### **Non-Storm Surface Water**

Water quality information for Reach 4 indicates that beryllium levels potentially exceed the minimum designated uses standard for total beryllium. The 23rd Avenue and 91st Avenue WWTPs reported some beryllium concentrations as a number that was greater than standard but less than the PQL. This represents an analytical technique data gap.

**Boron in the Gila River is diluted by the Salt River inflow.**

Boron samples were collected from the Gila River just upstream of the confluence with the Salt and just downstream of the confluence with the Salt on roughly the same dates in 1990. Results show that in 1990 boron concentrations in the Gila River upstream of the confluence with the Salt River were consistently greater than the standard. In the Gila River downstream of the confluence with the Salt, boron concentrations were less than the standard on the same dates. These results suggest that the Gila River is being diluted by the 91st Avenue WWTP and Tolleson WWTP flows in the Salt River.

**There were verified DDD, DDE, and DDT exceedances of standards and DDE was in fish tissue samples.**

Verified exceedances of the standards for selenium, thallium, chlordane, DDD, DDE, DDT and toxaphene were also noted throughout Reach 4. High concentrations of DDE were also measured in fish tissues samples taken from the Salt River at 59th Avenue between 1994 and 1995.

Effluent from the Tolleson WWTP had some verified exceedances of the standards for copper, selenium, and cyanide.

There were some verified exceedances of the lindane standard in 23rd Avenue and 91st Avenue WWTPs discharges.

Boron and TDS in groundwater were at high concentrations.

No stormwater data was available in Reach 5.

Verified exceedances of the lindane standard were observed in 13 percent of the samples from the 23rd Avenue WWTP, and 2 percent of the samples from the 91st Avenue WWTP. There were also numerous potential exceedances of the lindane standard in these effluents. Potential lindane exceedances may be the result of detection of a compound similar to lindane.

#### **Groundwater**

The majority of wells in Reach 4 were sampled on one day only in the 1980's. Boron concentrations and total dissolved solids (TDS) were high in Reach 4 with 43 percent of the samples having boron concentrations greater than 1,000 ug/l and 43 percent of the samples having TDS greater than 1,500 mg/l. One of the wells had a boron concentration of 10,000 ug/l in 1980.

#### **Reach 5: Confluence of the Salt and Gila Rivers to Gillespie Dam**

No gaged stormwater drains are located in this river reach. Verified exceedances of water quality standards were noted for beryllium, mercury, selenium, and thallium.

There were verified exceedances of the beryllium standard throughout Reach 5. There may be a local source of beryllium, but it may also be washing in from upstream. There was one verified exceedance of the total mercury standard in the Gila River downstream of 115th Avenue in January 1990. The source of this mercury is unknown.

Selenium was observed at levels greater than the standard in 1990 and 1996 in Reach 5. Both verified and potential exceedances of the selenium standard were also measured in the effluent from the Avondale WWTP, City of Goodyear WWTP and Town of Buckeye WWTP.

**Thallium exceeded water quality standards in Reach 5 and there were high concentrations in riverbed sediments.**

There were verified exceedances of the thallium standard at 115th Avenue, El Mirage Road and the Gila River just upstream of Buckeye Canal Discharge. No thallium samples were available for the Gila River above the diversions at Gillespie Dam. Thus, this location represents a monitoring location data gap. In May 1981 a sediment thallium concentration of 23,600 ug/g was measured in the Arlington canal at an unnamed drain and a sediment thallium concentration of 32,500 ug/g thallium was measured at the location of the Buckeye irrigation return flows west of Buckeye.

Only one verified exceedance of the copper standard was noted at the diversions above Gillespie Dam out of hundreds of samples. Thus, it does not appear that copper is a problem at this location.

**High DDT and DDE concentrations were measured in fish tissue samples in Reach 5.**

High concentrations of DDT and DDE were observed in fish tissue in 1985, 1994 and 1995 throughout Reach 5. However, no pesticide samples were collected from surface water in Reach 5 other than in NPDES discharges. This represents a major monitoring location data gap and in-river pesticide sampling should be implemented in Reach 5.

In groundwater in Reach 5, 40 percent of the samples had boron concentrations greater than 1,000 ug/l. Nitrate in one of the Buckeye Irrigation Company wells was 20.2 mg-N/l on both February 8, 1982 and May 7, 1982. Other wells in the area had combined nitrate/nitrite concentrations of 26 mg-N/l in 1983. TDS concentrations were relatively high in Reach 5 with 43 percent of samples showing TDS of 1,500 mg/l or greater and one as high as 3,020 mg/l.

**Copper is increasing in stormwater.**

### **Conclusions**

Stormwater is contributing appreciable amounts of copper to the Salt and Gila Rivers. Copper appears to be increasing downstream during storm events.

**Boron concentrations from the Gila River are being diluted by the Salt River.**

Boron concentrations are greater than the surface water quality standards in the Gila River upstream of the confluence with the Salt River. Downstream of the confluence, the boron concentrations decrease as if diluted by the Salt River.

**High DDE and DDT in fish in Reach 5.**

DDE and DDT concentrations in fish tissue were notable in Reach 4 and Reach 5. Additional surface water sampling of these and the other pesticides should be implemented using sensitive analytical techniques.

Beryllium, thallium and selenium were measured in concentrations greater than the minimum surface water standards in Reaches 2, 3, 4 and 5.

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*Middle Gila River Watershed Management Study*  
*Phase I Assessment Study*  
*Index No. WS90140004-S; S-961342*

Greeley and Hansen  
July 1998

## 1. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) plans to review National Pollution Discharge Elimination System (NPDES) permits on a watershed basis rather than individually and to incorporate Total Maximum Daily Load (TMDL) waste load allocations into future NPDES permits. This will allow the EPA to assess NPDES permits in a comprehensive framework. All NPDES permits within a defined watershed will be evaluated in five-year watershed cycles. The City of Phoenix and its Subregional Operating Group (SROG) partners, Glendale, Mesa, Scottsdale and Tempe, operate the 91st Avenue Wastewater Treatment Plant (WWTP) which discharges highly treated effluent to the Salt River. The SROG Cities and the 91st Avenue WWTP are located within the Middle Gila River Watershed. The EPA requested that SROG complete an assessment of the Middle Gila River Watershed to facilitate issuance of the 1997 NPDES permit for the 91st Avenue WWTP. SROG realized there were short-term benefits of completing this assessment related to the 1997 NPDES permit and long-term benefits by providing reliable data that the EPA could use as the foundation to establish TMDLs. SROG authorized this Phase I Middle Gila River Watershed Assessment Study to compile and characterize the information requested by the EPA. The City of Tolleson also recognized the value of the study and joined with SROG to fund the study.

### 1.1 Background

In the future, EPA will review NPDES permits on a watershed basis revolved around the five-year cycle for NPDES permits. The 91st Avenue WWTP NPDES permit was to be reissued in 1997 and the EPA wanted to conduct the review of the 91st Avenue WWTP and other Phoenix area discharges on a watershed basis. The Arizona Department of Environmental Quality (ADEQ) divided Arizona into ten watersheds. The Middle Gila River Watershed characterization by ADEQ was originally scheduled to begin in 1999. The ADEQ schedule did not meet the needs of the EPA.

When EPA approached SROG to complete an assessment of the Middle Gila River Watershed, SROG recognized there were short-term benefits to completing the assessment. They also recognized a long-term benefit that could be realized by providing reliable data that the EPA could use as the foundation to establish Total Maximum Daily Loads (TMDL) waste load allocations. This accurate data benefit was demonstrated by SROG in a 1996 ultra-clean mercury analysis pilot study. EPA was facing a lawsuit to set a mercury TMDL for the Salt and Gila Rivers based on the supposition of special interest groups that the 91st Avenue WWTP was discharging excessive mercury. The ultra-clean program demonstrated the actual mercury concentration was much less than the enforcement standard and eliminated the need for SROG to construct \$30 million in 91st Avenue WWTP improvements to remove mercury. EPA was given the ultra-clean mercury study data to develop a mercury TMDL based on sound science.

SROG recognized another long-term benefit of the study was that they could use the accurate data generated by this study to develop stormwater pollutant models. These models could then be used to maintain Best Management Procedures (BMPs) rather than require TMDLs that would require treatment of stormwater.

## **1.2 Scope Development**

The Scope of Services for the Middle Gila River Watershed Management Study was developed with input from the Tres Rios River Management Plan (TRRMP) Steering Committee and TRRMP Water Quality Technical Committee. These committees included representatives of EPA, ADEQ, Arizona Game and Fish Department, Bureau of Reclamation, and others. The scope was finalized and presented to SROG for approval. The City of Tolleson joined SROG in funding the Middle Gila River Watershed Study. The TRRMP Water Quality Technical Committee provided oversight to the research and analyses conducted as a part of this study.

## **1.3 Objectives**

The objectives of the Middle Gila River Watershed Study were to:

- Characterize water quantity, water quality and biological/habitat conditions in the study area.
- Identify pollutants of concern and potential sources of contaminants.

- Assess the concentration of pollutants of concern in WWTP discharges, stormwater, and other inflows to the hydraulic system.
- Compile and analyze water quantity, water quality and habitat/species data to assist re-issuance of Phoenix-area NPDES permits in 1997.
- Conduct a thorough assessment of water quantity, water quality and habitat/species conditions to enable the Water Quality Technical Committee of the TRRMP process to evaluate future water quality scenarios/conditions and the Habitat Committee of the TRRMP process to evaluate future habitat conditions.
- Develop a water quantity, water quality and habitat/species database to be augmented in future cycles of watershed assessment (both spatially and temporally) to assist in ongoing characterization of Middle Gila River Watershed conditions.

The MGRW study was intended to inventory available data and not to conduct a new sampling and analysis program. This study focused on quantifiable discharges for which information was available. Those potential contaminant sources that did not have information available were identified as data gaps.

The MGRW study consisted of the following tasks:

- Research and Compile Information
- Prepare Annotated Bibliographies
- Assess Information
- Identify Data Deficiencies
- Prepare Status Reports and Conduct Meetings

## 2. **STUDY PARAMETERS**

The study parameters identified in the Middle Gila River Watershed Study were:

- Study Area
- Stressors
- Pollutants of Concern

- Water Quantity
- Habitat/Species

## 2.1 Study Area

The Middle Gila River Watershed defined by ADEQ contained about 6,000 square miles and included the drainage areas of :

- Salt River downstream from Granite Reef Dam to the Gila River
- Gila River downstream from Coolidge Dam to Painted Rock Dam
- Agua Fria River
- Hassayampa River

This area was larger than was needed by the EPA to facilitate the 91st Avenue WWTP NPDES permit review. The initial study area developed for this Middle Gila River Watershed Study focused on the Salt River extending from Granite Reef Dam downstream to the junction with the Gila River and the Gila River from the Salt River junction downstream to Painted Rock Dam. This area was later modified to eliminate the portion of the Gila River extending from Gillespie Dam to Painted Rock Dam. A consultant of the EPA , Science Applications International Corporation (SAIC), is now conducting a separate characterization study to quantify conditions from Gillespie Dam to Painted Rock Reservoir.

The MGRW study area extended about 70 river miles and included the lands within the 100-year floodplain. Tributary areas of the Agua Fria, Hassayampa, and the Gila River upstream of the junction with the Salt River were not included. It was recognized that these tributaries contribute flow to the study area and could impact water quality. However, limited data was available in these tributaries, and data that was available was for locations substantially upstream of the Salt and Gila Rivers. Overall water quality in these tributaries, near the study area, was inventoried where available.

The study area is shown on **Figure 2-1**. The Middle Gila River Watershed (MGRW) used in this study refers to this study area and not the entire Middle Gila River Watershed defined by ADEQ. The term "Phase I" was added to this study title at the request of ADEQ, because the MGRW study area was only a part of the entire Middle Gila River watershed. Additional phases will be completed by ADEQ as a part of their Middle Gila River characterization.

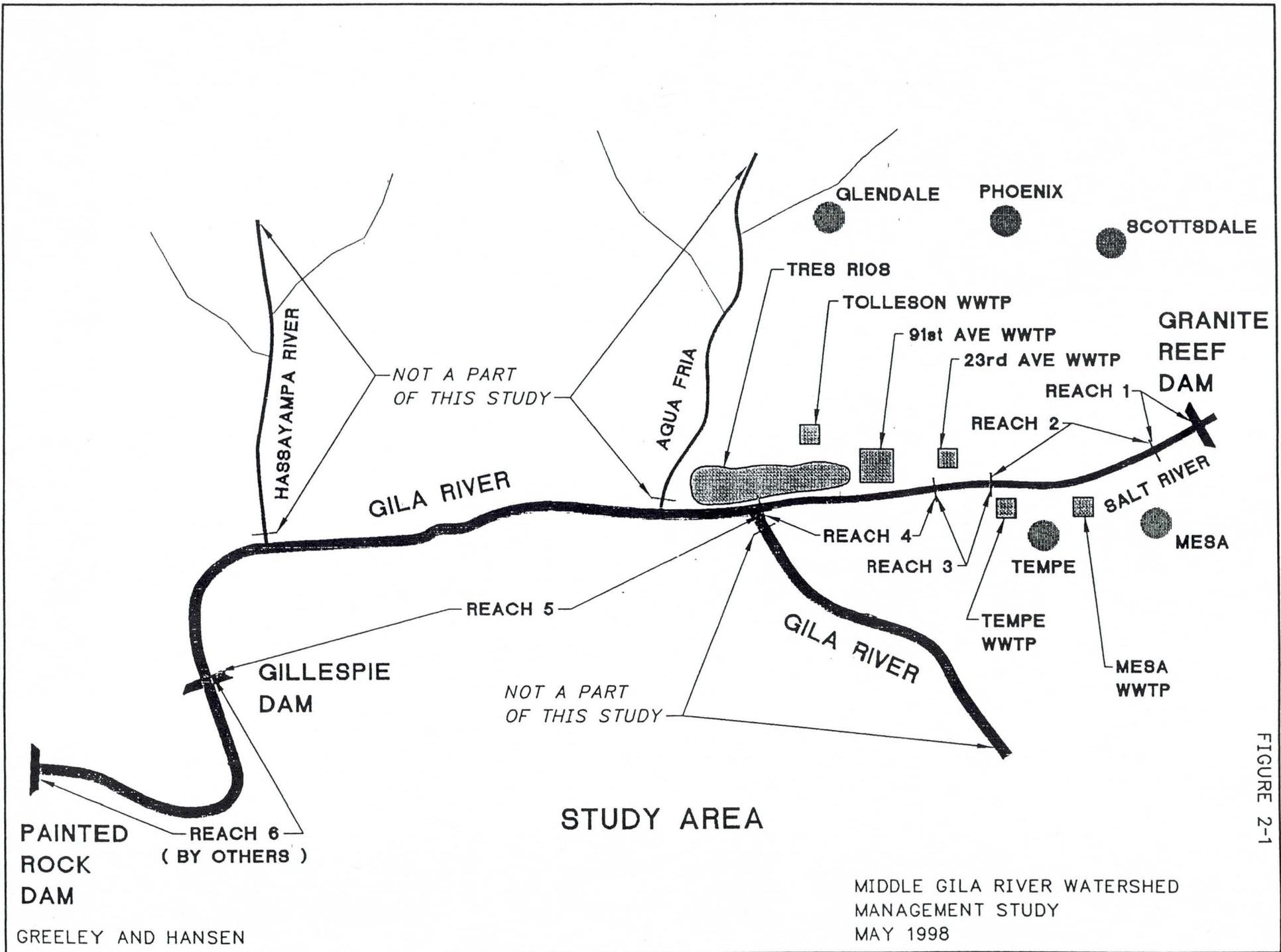


FIGURE 2-1

The initial MGRW area was divided into six reaches (**Figure 2-1**) to conform with designated use standards defined in the Arizona Administrative Code, Title 18, Chapter 11. Reaches 1 through 5 were analyzed in this study. Reach 6 is being studied by SAIC, a consultant to the EPA, and results will be available at a later date. The reaches were defined as follows:

- Reach 1 - Granite Reef Dam to 2 km downstream in the Salt River
- Reach 2 - 2 km downstream of Granite Reef Dam to the Interstate 10 Bridge over the Salt River
- Reach 3 - Interstate 10 Bridge to the most upstream 23rd Avenue WWTP outfall to the Salt River
- Reach 4 - Most upstream 23rd Avenue WWTP outfall to the confluence of the Salt and Gila Rivers
- Reach 5 - Confluence of the Salt and Gila Rivers to Gillespie Dam on the Gila River
- Reach 6 - Gillespie Dam downstream to Painted Rock Reservoir (by EPA)

## **2.2 Stressors**

ADEQ identifies sources of water quality contaminants that can impact the environment as stressors. A list of 12 stressors was developed as a part of the MGRW study and reviewed with the TRRMP Water Quality Technical Committee. These included:

- Stream flows (i.e., releases from upstream reservoirs)
- Stormwater regulated by NPDES
- Stormwater unregulated
- WWTP discharges regulated by NPDES
- Agricultural stormwater runoff
- Agricultural drainage from excess irrigation
- Agricultural dewatering wells
- Concentrated Animal Feeding Operation (CAFO) runoff
- Landfill leachate
- Groundwater
- Sand and gravel mining releases

### **2.2.1 Stream Flows**

The Salt River and Gila Rivers in the MGRW study area include ephemeral reaches that flow in direct response to stormwater runoff or flood flow releases and effluent dependent reaches. Stream flows

were identified as stressors that can transport chemicals or sediment. Effluent dependent reaches exist where flow is maintained by WWTP discharges. Flood flows were defined as releases from upstream dams. Flood flows varied in quantity from minor flows in the channel to 100-year flood flows. The minor flows were the result of controlled releases while the major floods were typically caused by uncontrolled releases.

Flood flows transport substantial amounts of sediment. Sediment in tributary flows entering the Salt and Gila Rivers originates upstream and from erosion within the study area. Flood flows erode landfills in or adjacent to the river and transport trash and debris downstream. Much deposition of sediment and landfill materials occurs in the riparian areas downstream of the 91st Avenue WWTP.

Flood flows can contain pollutants of concern derived from tributary stream inflow, erosion of sediments, and landfills. Substantial dilution can result from the relatively large quantities of water present in flood flows.

### **2.2.2 Stormwater Regulated by NPDES**

Stormwater flows enter the Salt and Gila Rivers via storm drains. Some storm drains are regulated as part of the NPDES stormwater permit program. The quality of water from storm drains varies depending on the duration of the storm event, the length of time between storm events, the amount of flow, and the source area of stormwater runoff. Long periods between storm events allow pollutants to accumulate in greater amounts before they are washed away by runoff. In these cases, concentrations of pollutants are greater than when runoff events are more frequent. The amount of flow also impacts concentrations. During high stormwater runoff periods the concentrations of pollutants is diluted by the quantity of flow. Pollutant concentrations change during a single flow event. "First flush" is a term used to describe the initial flow in a runoff event when the concentrations are generally the greatest. First flush data was not used in the MGRW study because it is not representative of the entire flow and not used in the criteria to establish best management practices.

Stormwater runoff often contains significant amounts of sediment. Stormwater runoff also contains chemical contaminants or pollutants. Chemical pollutants in stormwater will vary depending on land uses within a particular drainage area. Runoff from industrial sites should be minimal due to stormwater NPDES requirements. Each industrial site should have a Stormwater Pollution Prevention Plan. Runoff from turf areas has the potential to contain pesticide and fertilizer residuals.

Runoff from paved areas can contain hydrocarbon products, metals, and anything spilled on the pavement.

### **2.2.3 Stormwater, Unregulated**

There were many areas where storm drains were either unregulated or stormwater was not collected in a drainage system and runoff flowed overland or in streets until it drained into the river channels. These were identified as unregulated storm runoff because currently the quality of runoff is not subject to NPDES regulations.

### **2.2.4 WWTP Discharges**

All wastewater treatment plants that discharge to surface waters are required to have NPDES permits that require monitoring the quality of effluent prior to discharge. There are several WWTPs with discharge permits to the Salt and Gila Rivers. These include:

- City of Mesa, Northwest Reclamation Plant
- City of Tempe, Kyrene Reclamation Plant
- City of Phoenix, 23rd Avenue WWTP
- SROG, 91st Avenue WWTP
- City of Tolleson WWTP
- City of Goodyear WWTP
- City of Goodyear, Estrella WWTP
- City of Avondale WWTP
- Town of Buckeye WWTP

Discharge water quality was available for each of these treatment plants.

### **2.2.5 Agricultural Stormwater Runoff**

Most agricultural stormwater runoff originates in fields, but it may also originate from equipment yards. Runoff from concentrated animal feeding operations was identified as a separate stressor. In most cases, agricultural runoff was collected in irrigation drainage canals adjacent to fields and equipment yards. These canals discharged to the river channels. In locations where the farm fields were near river channels, storm runoff flowed from fields directly to the river. Agricultural storm runoff from fields can contain large amounts of sediment. Plowing and cultivation breaks up the soil surface and makes the soil very susceptible to erosion. The field stormwater runoff can contain pollutants of concern associated with agriculture such as nitrates (from fertilizers), pesticides, and

herbicides. The majority of agricultural drains to the rivers were unged and, thus, represent a data gap.

#### **2.2.6 Agricultural Drainage for Excess Irrigation**

Historic irrigation practices often resulted in the application of excess irrigation water which was drained from field into drainage canals and released to the rivers. This excess irrigation water drainage is called tailwater. Recent water conservation rules restricting irrigation water use have resulted in substantial reductions in farm field drainage but have not eliminated all tailwater. This reduction in excess irrigation water was verified by the Holly Acres area residents. Farmland within the Buckeye Irrigation Company (BIC) is exempted from irrigation water use conservation rules because it is in an area of surplus groundwater, adjacent to the Gila River. Tailwater from BIC is released into the Hassayampa River which then joins the Gila River.

#### **2.2.7 Agricultural Dewatering Wells**

Lands near the Gila River in the BIC are situated above a shallow groundwater table. The BIC has 11 wells that pump this shallow groundwater to lower the water table and prevent water logging of farm land. Dewatering wells discharge to canals that discharge to the Gila River downstream of the Tres Rios area.

#### **2.2.8 CAFO Runoff**

Concentrated Animal Feeding Operations (CAFO) produce very poor quality runoff if site drainage is not controlled. Animal wastes can drain from the site into storm drains or irrigation systems, including both water supply laterals and drainage canals. The principal pollutant of concern from CAFOs is nitrate. Uncontrolled CAFO runoff can enter the Salt and Gila Rivers via canals and storm drainage systems. CAFO runoff should be kept on site, by law, however, numerous people say they have witnessed CAFO water in canals that drain into the Salt/Gila Rivers.

#### **2.2.9 Landfill Leachate**

When groundwater or surface water enters a landfill, it will leach contaminants present in the landfill. Water exiting the landfill it is called leachate. Pollutants present in leachate depend on the types of materials buried in the landfill. Active landfills have monitoring programs to detect pollution problems. However, there is an old, inactive landfill at 123rd Avenue in the Gila River and this landfill does not have a monitoring system to assess leachate quality.

### **2.2.10 Groundwater**

The groundwater table beneath the Salt, Hassayampa, Agua Fria and portions of the Gila Rivers is at a depth where flow in these rivers percolates into the ground to recharge the water table. The rivers are classified as losing streams. The groundwater beneath the Gila River starting at about 115th Avenue and downstream rises to the surface and contributes to the surface water flow. In this area the river is a gaining stream because the quantity of surface flow is augmented by groundwater. Therefore, groundwater directly influences surface water quality.

### **2.2.11 Sand and Gravel Mining Releases**

Sand and gravel mining operations use pumped groundwater to process aggregate materials. Water is used to sort and wash aggregates. Mining operations are usually located within the river channels or adjacent to the channel on the river bank. Groundwater used in the mining operations is flowing through similar materials as the aggregate prior to being pumped. Mining operations are required to have Section 404 permits. Some gravel mines are required to prevent processing water from leaving the site. Others discharge to the river and are required to have a NPDES permit. The major potential water quality impact resulting from sand and gravel mining is sediment. Sediment may be contributed to the river when there is an accident and water is released from the site or when the site is inundated during flood events in the river. During a flood, any sediment generated by the sand and gravel mine is overwhelmed by the sediment transported by the flood flow. There were active sand and gravel mining operations near 91st Avenue and the Salt River and there was a proposed mine located in the same area.

### **2.2.12 Stressor Summary**

The MGRW study was intended to inventory available data and not to conduct new sampling and analysis programs. The MGRW study focused on the stressors for which information was available. The stressors that did not have information available were identified as data gaps.

The stressors used as data sources in the MGRW study included:

- Stormwater regulated by NPDES
- WWTP discharges regulated by NPDES
- Industrial discharges regulated by NPDES
- Agricultural drainage
- Groundwater

- Sand and gravel mining NPDES permits
- Stream flow in the Salt River (1 point downstream of Granite Reef Dam)

Stressors for which no data was available, and thus represent data gaps, were:

- Unregulated urban stormwater
- Unregulated agricultural runoff
- Discharge from concentrated animal feeding operations (CAFOs)
- Discharge from ungaged agricultural drains and dewatering wells
- Landfill leachate

### 2.3 Pollutants of Concern

A large list of potential contaminants in the MGRW was prepared using information from the 91st Avenue WWTP NPDES permit and Surface Water Quality Standards. The initial list of pollutants was reviewed by the TRRMP Water Quality Technical Committee and reduced to 22 contaminants. The list included contaminants that often exceed standards, prompt a fish consumption advisory notification, and were felt to be important to habitat and wildlife. The revised list of pollutants of concern was used in the MGRW study and is presented in **Table 2-1**. The pollutants of concern were organized into inorganic contaminants, organic contaminants, pesticides and other water quality parameters as they were categorized in the ADEQ 305B Report. The pollutant of concern chlorodibromomethane was expressed as dibromochloromethane in some cases. Bromodichloromethane and dichlorobromomethane were also used interchangeably in much of the researched information. Chlorodibromomethane and bromodichloromethane were used in the MGRW study because they were the names used most often in the available information.

### 2.4 Water Quantity

An important consideration when evaluating potential stressor impacts on the environment was the quantity of flow. Concentrations and quantity are needed to calculate loading. Periods of flow, continuous or ephemeral, help to evaluate significance of the potential water quality impact. A minor exceedance of a contaminant that occurred during a very infrequent ephemeral flow event may not justify additional investigations or monitoring.

Relatively continuous flows identified in the MGRW study were associated with WWTP discharges, irrigation drainage, groundwater, and dewatering wells. These were identified as continuous because they were not related to storm runoff and were far more continuous than flood releases from

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**Table 2-1**  
**Pollutants of Concern**

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<b>Inorganic Contaminants</b> <ul style="list-style-type: none"><li>• Beryllium</li><li>• Boron</li><li>• Copper</li><li>• Cyanide</li><li>• Mercury</li><li>• Nitrate</li><li>• Selenium</li><li>• Thallium</li></ul>
<b>Organic Contaminants</b> <ul style="list-style-type: none"><li>• Bromodichloromethane</li><li>• Bromoform</li><li>• Chloroform</li><li>• Chlorodibromomethane</li></ul>
<b>Pesticides</b> <ul style="list-style-type: none"><li>• Chlordane</li><li>• DDD</li><li>• DDE</li><li>• DDT</li><li>• Diazinon</li><li>• Dieldrin</li><li>• Lindane</li><li>• Toxaphene</li></ul>
<b>Other Water Quality Parameters</b> <ul style="list-style-type: none"><li>• Dissolved Oxygen</li><li>• Total Dissolved Solids</li></ul>

upstream dams. Continuous flows may be annual or seasonal but once the flow is initiated, it is relatively continuous. Ephemeral flows include water quantity related to stormwater runoff. Ephemeral stressors include regulated and unregulated stormwater, CAFO runoff, agricultural storm runoff, and flood flows.

## **2.5 Habitat/Species**

The goal of the Habitat/Species analysis was to first identify the major habitat classes in the MGRW based on information from existing sources. Once classes were identified, the major vegetation communities associated with each class were quantified.

The next goal was to identify wildlife species commonly associated with habitat communities. The MGRW study did not focus on the location or siting of a particular threatened or endangered species. It was recognized that wildlife moves and analyzing individual sitings would be laborious and of very limited value. Rather, species typically associated with different habitats were researched. Arizona Game & Fish Department provided a great amount of species information.

A concern of the EPA is bioaccumulation of contaminants in fish and wildlife. Fish tissue analyses completed by the U.S. Fish and Wildlife Service, the EPA and others were included in Section 4.5 of this report.

## **3. RESEARCH**

The information required for the MGRW study was very disseminated. Data was obtained from a large number of sources in many different formats. The research phase of this project consisted of two tasks. Task 1 of the MGRW study was to identify data sources and gather the information. Task 2 was to prepare annotated bibliography sheets to document data sources and information obtained. The following documents the information sources and data formats.

### **3.1 Contacts**

A continuously updated list of contacts was maintained during the project. Many references provided a substantial amount of information, while others provided additional contacts. Other contacts had little data or could only provide information previously provided by others. Only a few contacts declined to provide information, these included the Gila River Indian Community, and the Roosevelt Irrigation District (RID). **Table 3-1** presents the agencies and staff contacted, the type of contact (telephone call or meeting) and the information provided.



**Table 3-1**  
**Research Contacts**  
(Continued)

Agency/Contact	Contact Type	Information Provided						Additional Comments	
		Surface Water		Groundwater		Habitat	Species		GIS Reference
		Quality	Quantity	Quality	Quantity				
<b>STATE AGENCIES (Continued)</b>									
<i>Arizona Department of Water Resources</i>									
Dale Mason	C			X	X				
Greg Wallace	C/M								
<i>Arizona Game and Fish</i>									
Mark Dahlberg	C/M	X							
Jeff Howland	C/M						X		
Ronald Engel-Wilson	C/M						X		
Troy Cornan	C/M						X		
Dave Weedman	C/M						X		
Dave Walker	C/M					X			
Barry Spicer	C/M							X	
Bill Werner	C/M							Other Contacts	
<i>Arizona Geological Survey</i>									
Larry Fellows	C							Other Contacts	
Rick Trapp	C					X			
<i>Arizona State Lands Department</i>									
Gary Irish	C							X	
Jim R.	C/M							X	
<b>MUNICIPALITIES</b>									
<i>Town of Buckeye</i>									
Ron Long	C	X	X						
Kit Jackson	C/M								
<i>Town of Gila Bend</i>									
Gene Merritt	C	X	X						
<i>City of Mesa</i>									
Bill Haney	C							No Data	
<i>City of Phoenix</i>									
Paul Kinshella	C/M							Other Contacts	
Gary Ullinskey	C/M							X	
Lori Sundstrom	C/M								
Bob Hollander	C/M	X	X	X		X	X		
<i>City of Tempe</i>									
Barbara Olivieri	C							Other Contacts	
Steve Dalton	C							Other Contacts	
Dena Pierre	C/M	X	X						

**Table 3-1  
Research Contacts  
(Continued)**

<i>Agency/Contact</i>	<i>Contact Type</i>	<i>Information Provided</i>							
		<i>Surface Water</i>		<i>Groundwater</i>		<i>Habitat</i>	<i>Species</i>	<i>GIS Reference</i>	<i>Additional Comments</i>
		<i>Quality</i>	<i>Quantity</i>	<i>Quality</i>	<i>Quantity</i>				
<b>MUNICIPALITIES (Continued)</b>									
<i>City of Tolleson</i> Scott Schroth	C/M	X	X						
<i>Salt River Pima Maricopa Indian Community</i> Gerald Johnson	C		X						
<b>MARICOPA COUNTY</b>									
<i>Maricopa County Flood Control District</i> Eric Feldman	C/M							X	
Dave Gardner	C	X	X						
<b>IRRIGATION DISTRICTS</b>									
<i>Buckeye Irrigation Company</i> Jackie Mack	C								Refused to give information
<i>Salt River Project</i> Gregg Elliott	C/M	X							
<i>St. Johns Irrigation District</i> Adron Reichart	C/M		X						
<b>OTHER</b>									
<i>Earth Info Inc.</i> Scott Edwards	C	X	X	X	X			X	

**Note: C = Called  
C/M = Called/Meeting**

### 3.2 Data Obtained

There was limited consistency in the format of data received from various sources. The data required conversion to a common format for the MGRW study. Some of the data was provided in a paper copy, while others were provided as spreadsheets (Lotus, Excel, Smart, and dBASE formats). Geographic Information System (GIS) files were in Arc Info and Arc View formats in both UTM Zone 12 and State Plane NAD83 coordinates. Some information was provided on CD-Roms including EPA Storet, EPA Basins, USGS Gage Stations and Flood Control District of Maricopa County GIS data.

Information provided by the City of Phoenix regarding effluent water quality for the 91st Avenue WWTP and 23rd Avenue WWTP was very extensive, equivalent to several hundred pages of data. These files required screening to focus on the pollutants of concern.

Time periods covered by the data from different sources also varied from the 1960's to 1996. Surface water quality data analyzed in the MGRW study was from the period 1990 through 1997 (when available). Surface water quality has improved as treatment processes were upgraded and, thus, much of the older data is no longer valid because it is not representative of present discharge conditions. In addition, water quality standards and quantitation standards changed over time as laboratory techniques have improved. Groundwater data from 1980-present was used in the MGRW study because the amount of available information was limited and groundwater quality changes are not as rapid as surface water quality changes.

### 3.3 Annotated Bibliographies

Information used in the MGRW study was documented on annotated bibliography sheets as required by Task 2 in the Scope of Services. **Table 3-2** is an example of an annotated bibliography sheet. **Appendix A** contains all of the annotated bibliographies generated for this project. The information inventoried on each sheet includes:

- Source Code - a code to identify the source of the data and to allow a user of the GIS data to reference the data source. The source code groupings were, 100s for Federal sources, 200s for State, 300s for County, 400s for cities, and 500s for private/other sources.
- Source of data - who the information was obtained from.
- Type of data - quality, quantity, habitat, species.

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**Table 3-2**  
**Annotated Bibliography Sheet**

Greeley and Hansen  
July 1998

Date \_\_\_\_\_

**1. SOURCE OF DATA**

Information Source: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Contact: \_\_\_\_\_  
Title: \_\_\_\_\_  
Phone/Fax: \_\_\_\_\_

**2. TYPE OF DATA**

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity  |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: \_\_\_\_\_  
Data Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- Location - Reach(es) of MGRW that the data applies to.
- Description of data - the time frame covered by the data and a data description.

#### 4. WATER QUALITY ANALYSIS

The objectives of the water quality analysis were to:

- Research and gather available information about surface water discharges, stormwater, and groundwater
- Review existing water quality standards to provide a basis for analysis
- Evaluate the data to assess the quality of available information
- Identify trends such as increasing, stable, or decreasing concentrations for pollutants of concern
- Assess the pollutant of concern data related to exceedances of standards

##### 4.1 Information Quality Analysis

A major effort in the MGRW study was to assess the quality of available information and to determine whether concentrations were potentially in exceedance of the standard or whether they were verified exceedances of the standard. This was essential because the MGRW study information will be provided to the EPA and ADEQ to establish future watershed water quality standards.

Several water quality monitoring terms were used as a part of the water quality analyses and need to be defined. These included:

- ***Standard.*** A concentration of a contaminant set at the maximum allowable limit. Concentrations greater than the standard were identified as exceedances. The standards used in these analyses were from ADEQ and the Arizona Administration Code Title 18, Chapter 11. Standards for certain river reaches were set based on the uses associated with each reach. Thus, the most stringent standard for a reach was often called the "minimum designated uses standard". Many of the standards were given as a numeric value, for either the total concentration or the dissolved fraction. Some contaminants, like dissolved copper, had an equation to calculate the standard, based on hardness. A hardness of 200 mg/l was used to calculate standards. This was a conservative assumption.

- **Method Detection Limit (MDL).** There was an analytical technique required for each pollutant of concern. The lowest concentration of a contaminant that can be detected by this analytical technique was the MDL. When the concentration of a contaminant was less than the MDL of the contaminant, it could not be detected by that analytical technique. In this case, results were presented as either Below Detection Limit (BDL), less than (<) some number corresponding to the MDL, or Non-Detected (ND).
- **Practical Quantitation Limit (PQL).** This was the concentration at which an analytical technique provided an accurate measurement of the concentration of a contaminant. This may also be called the enforcement limit.
- **Reporting Limit.** In many cases, data was reported as less than (<) some "value". Often the "value" was greater than the standard and sometimes the PQL.

The analysis of the quality of data began with the inorganic contaminants on the list of pollutants of concern (**Table 2-1**). The reported concentrations had to be compared to the contaminant standard and PQL to determine if the data was not an exceedance of the standard, was a potential exceedance of the standard, or was a verifiable exceedance of the standard. **Table 4-1** and **Figure 4-1** were prepared to explain the analysis.

**Table 4-1** uses a standard of 0.2 ug/l and a PQL of 0.5 ug/l. At Site A, Samples 1-4 were listed as non-detects, samples 5-9 and 12 concentrations were greater than the standard but less than the PQL, and samples 10-11 were greater than the PQL. The analyses for samples 1-4 were less than the standard and, thus, they are non-exceedances. Samples 10 and 11 were rated as verified exceedances because the concentration was greater than the standard and PQL. Samples 5-9 and 12 were potential exceedances because concentrations were greater than the standard but less than the PQL. The contaminant was detected but could not be quantified, thus the numeric value could not be considered to represent an accurate value. It could represent an actual detection, or it could be a result of laboratory contamination or just "noise" introduced due to the sensitivity of the analytical equipment.

If the data from Site A was used without considering the quality of the data, an observer could report that 8 of the 12 samples represented exceedances. When the quality of the data was included into the data analysis, then there were two documented exceedances (samples 10 and 11) and samples 5-9 and

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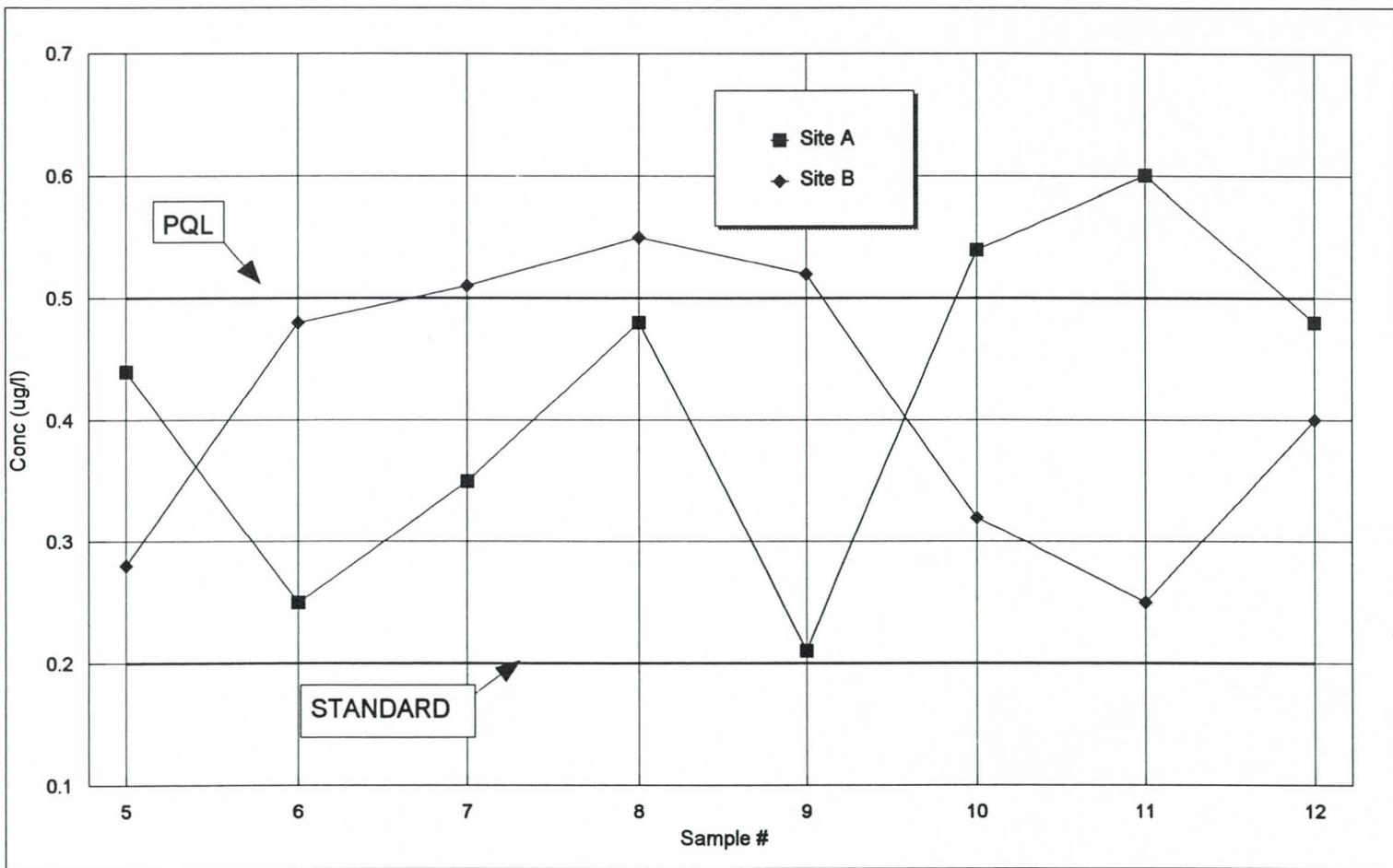
**Table 4-1**  
**Data Quality Analysis**

Greeley and Hansen  
July 1998

<i>Sample Number</i>	<i>Site A</i>	<i>Site B</i>	<i>Site C</i>
1	ND	<0.2	<0.6
2	ND	<0.2	<0.7
3	ND	<0.2	<0.6
4	ND	0.35	<0.5
5	0.44	0.28	<0.4
6	0.25	0.48	<0.4
7	0.35	0.51	<0.3
8	0.48	0.55	<0.3
9	0.21	0.52	<0.6
10	0.54	0.32	<0.5
11	0.60	0.25	<0.4
12	0.48	0.40	<0.3

Site A and B: ND = None Detected  
Method Detection Limit = 0.2 ug/L  
Practical Quantitation Limit = 0.5 ug/L  
Standard = 0.2 ug/L

Site C: Reporting Limit



DATA QUALITY ANALYSIS EXAMPLE

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FIGURE 4-1

12 were potential or possible exceedances. Potential exceedances indicated additional sampling was required and an analysis technique with greater sensitivity, such as clean or ultra-clean sampling, should be used to determine if the standard truly is being exceeded or if the MDL was just too high.

A similar data quality analysis for samples from Site B demonstrated the type of analyses used in this study. Samples 1-3 were reported as <0.2 (less than 0.2 ug/l) and this was a common practice when the concentration was not detected. The laboratory listed the data to represent less than MDL. This represents a verified non-exceedance. Samples 6-8 had concentrations that were detectable, but not quantifiable, because they were less than the PQL. These were potential exceedances.

The Site C example was typical of reported results that presented concerns. All contaminant concentrations were reported as a less than value. The less than value was different than the MDL, PQL or standard associated with that contaminant. There was no way to verify what the reported concentration represented. When the 12 samples from Site C were compared to the standard it appeared that all exceeded the standard but the quantitation of the concentration was not known so the data only represented a possible exceedance.

Pesticides presented a different data quality analysis issue. The most stringent standard was a much lower concentration than the ADEQ PQL and the MDL. These very low standards and higher MDLs meant that any detection of a pesticide was a potential exceedance. However, because the reported concentration was less than the PQL, the reported concentration of the contaminant may not have been accurate. It could represent a range of concentrations from the MDL to just less than the PQL or represent a false detect. Pesticide detection concentrations less than the PQL were identified as potential exceedances.

#### **4.2 Designated Uses**

The focus of the analysis was to compare the concentration of pollutants of concern to specific standards to determine if the stressor was in compliance or if there were exceedances of a standard. The water quality standards used in the MGRW study were the designated use water quality standards for the pollutants of concern. The discharge standards related to NPDES permits were not used as the test to verify exceedances. Each of the five river reaches in the MGRW study (**Figure 2-1**) had specific designated uses defined in the ADEQ 305(b) report. The following are the designated uses identified in Reaches 1 through 5:

A&Wc	= Aquatic & Wildlife Coldwater
A&Ww	= Aquatic & Wildlife Warmwater
A&We	= Aquatic & Wildlife Ephemeral
A&Wedw	= Aquatic & Wildlife Effluent Dependent Water
FBC	= Full Body Contact
PBC	= Partial Body Contact
DWS	= Domestic Water Source
FC	= Fish Consumption
Agl	= Agricultural Irrigation
Agl	= Agricultural Livestock Watering

The designated uses associated with each river reach varied depending on the water sources in the reach and uses associated with that portion of the river system. Not all designated uses applied for each reach. The standard for a specific contaminant often differed between the designated uses in a river reach and between river reaches.

The designated uses and water quality standards used in the MGRW study are presented in **Tables 4-2** and **4-6**. An individual table was prepared for each of the five river reaches. Each table presents the pollutants of concern and the standards associated with each contaminant for each designated use. As stated previously, standards for inorganic contaminants were listed for the total concentration, the dissolved fraction, or a formula was given to calculate the standard. Many of the standard equations were based on the sample hardness. A hardness of 200 mg/l was reasonable but conservative and was used to calculate standards, when applicable. Standards for organic contaminants, pesticides, and other parameters were given for total concentrations. All concentration data was presented in micrograms per liter (ug/l). In some designated uses there was No Numeric Standard (NNS) for a contaminant.

**Tables 4-2** and **4-6** also present the most stringent standard for a contaminant in that specific river reach. This most stringent standard was used in the MGRW study as a basis for analysis. **Tables 4-2** through **4-6** also contain the ADEQ practical quantitation limit for contaminants, where applicable.

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**Table 4-2**  
**Designated Uses**  
**Reach 1: Granite Reef Dam to 2 km Downstream**

Greeley and Hansen  
July 1998

Pollutant of Concern	Aquatic and Wildlife Warmwater	Full Body Contact	Domestic Water Source	Fish Consumption	Agricultural Irrigation	Agricultural Livestock	Summary Most Stringent Standard	ADEQ Practical Quantitation Limit
<b>INORGANIC CONTAMINANTS</b>								
Beryllium	5.3 D	4 T	4 T	0.21 T *	NNS	NNS	0.21 T	0.5
Boron	NNS	12,600	630 *	NNS	1,000 T	NNS	630	
Copper	EQU [34] D *	5,200 D	1,000 D	NNS	5,000 T	500 T	[34] D	
Cyanide	9.7 T *	2,800 T	200 T	210,000 T	NNS	200 T	9.7 T	20
Mercury	0.01 D *	42 T	2 T	0.6 T	NNS	10 T	0.01 D	0.5
Nitrate	NNS	NNS	10,000 *	NNS	NNS	NNS	10,000	
Selenium	2.0 T *	700 T	50 T	9,000 T	20 T	50 T	2 T	5
Thallium	150 D	12 T	2 T *	41 T	NNS	NNS	2 T	
<b>ORGANIC CONTAMINANTS</b>								
Chloroform	900	230	100 *	590	NNS	NNS	100	
Bromoform	10,000	180	100	80 *	NNS	NNS	80	
Bromodichloromethane	NNS	100	100	22 *	NNS	NNS	22	0.5
Dibromochloromethane	NNS	17	100	12 *	NNS	NNS	12	1
<b>PESTICIDES</b>								
Chlordane	0.21	2	2	0.001 *	NNS	NNS	0.001	0.1
DDT	0.001	4.1	0.1	0.0005 *	0.001	0.001	0.0005	0.1
DDE	0.02	4.1	0.1	0.0006 *	0.001	0.001	0.0006	0.1
DDD	0.02	5.8	0.15	0.0009 *	0.001	0.001	0.0009	0.1
Diazinon								
Dieldrin	0.002	0.09	0.002	0.0002 *	k	k	0.0002	0.1
Lindane (Hexachlorocyclohexane gamma)	0.28	1	0.2	0.02 *	NNS	NNS	0.02	0.05
Toxaphene	0.02	3	3	0.0008 *	0.005	0.005	0.0008	2
<b>OTHER PARAMETERS</b>								
Dissolved Oxygen								
TDS								

All values are in ug/l  
\* = Most Stringent Standard  
NNS = No Numeric Standard

T = Total  
D = Dissolved  
EQU = Dissolved Standard =  $e^{(0.9422[\ln(\text{hardness})]-1.464)}$   
[ ] = Standard calculated using assumed hardness of 200 mg/l  
k = 0.003 ug/l aldrin/dieldrin

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*Table 4-3*  
*Designated Uses*  
*Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge*

Greeley and Hansen  
July 1998

Pollutant of Concern	Aquatic and Wildlife Ephemeral	Partial Body Contact	Summary Most Stringent Standard	ADEQ Practical Quantitation Limit
<b>INORGANIC CONTAMINANTS</b>				
Beryllium	NNS	700 T *	700 T	0.5
Boron	NNS	12,600 *	12,600	
Copper	EQU [47] D *	5,200 D *	[47] D	
Cyanide	19 T *	2,800 T	19 T	20
Mercury	2.7 D *	42 T	2.7 D	0.5
Nitrate	NNS	224,000*	224,000	
Selenium	EQU [47] D *	700 T	[47] D	5
Thallium	NNS	12 T *	12 T	
<b>ORGANIC CONTAMINANTS</b>				
Chloroform	NNS	1400 *	1400	
Bromoform	NNS	2800 *	2800	
Bromodichloromethane	NNS	2800 *	2800	0.5
Dibromochloromethane	NNS	2800 *	2800	1
<b>PESTICIDES</b>				
Chlordane	0.45 *	8.4	0.45	0.1
DDT	0.006 *	70	0.006	0.1
DDE	0.03 *	NNS	0.03	0.1
DDD	0.02 *	NNS	0.02	0.1
Diazinon				
Dieldrin	0.9 *	7	0.9	0.1
Lindane (Hexachlorocyclohexane gamma)	0.9 *	42	0.9	0.05
Toxaphene	1.5 *	NNS	1.5	2
<b>OTHER PARAMETERS</b>				
Dissolved Oxygen				
TDS				

All values are in ug/l  
\* = Most Stringent Standard  
NNS = No Numeric Standard

T = Total  
D = Dissolved  
EQU = Dissolved Standard =  $e^{(0.9422[\ln(\text{hardness})]-1.1514)}$   
[ ] = Standard calculated using assumed hardness of 200 mg/l

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**Table 4-4**  
**Designated Uses**  
**Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfall**

Greeley and Hansen  
July 1998

Pollutant of Concern	Aquatic and Wildlife Warmwater	Partial Body Contact	Fish Consumption	Summary Most Stringent Standard	ADEQ Practical Quantitation Limit
<b>INORGANIC CONTAMINANTS</b>					
Beryllium	5.3 D	700 T	0.21 T *	0.21 T	0.5
Boron	NNS	12,600 *	NNS	12,600	
Copper	EQU [34] D *	5,200 D	NNS	[34] D	
Cyanide	9.7 T *	2,800 T	210,000 T	9.7 T	20
Mercury	0.01 D *	42 T	0.6 T	0.01 D	0.5
Nitrate	NNS	224,000*	NNS	224,000	
Selenium	2.0 T *	700 T	9,000 T	2.0 T	5
Thallium	150 D	12 T *	41 T	12 T	
<b>ORGANIC CONTAMINANTS</b>					
Chloroform	900	1400	590 *	590	
Bromoform	10000	2800	80 *	80	
Bromodichloromethane	NNS	2800	22 *	22	0.5
Dibromochloromethane	NNS	2800	12 *	12	1
<b>PESTICIDES</b>					
Chlordane	0.21	8.4	0.001 *	0.001	0.1
DDT	0.001	70	0.0005 *	0.0005	0.1
DDE	0.02	NNS	0.0006 *	0.0006	0.1
DDD	0.02	NNS	0.0009 *	0.0009	0.1
Diazinon					
Dieldrin	0.002	7	0.0002 *	0.0002	0.1
Lindane (Hexachlorocyclohexane gamma)	0.28	42	0.02 *	0.02	0.05
Toxaphene	0.02	NNS	0.0008 *	0.0008	2
<b>OTHER PARAMETERS</b>					
Dissolved Oxygen					
TDS					

All values are in ug/l  
\* = Most Stringent Standard  
NNS = No Numeric Standard

T = Total  
D = Dissolved  
EQU = Dissolved Standard =  $e^{(0.9422[\ln(\text{hardness})]-1.464)}$   
[ ] = Standard calculated using assumed hardness of 200 mg/l

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*Table 4-5*  
*Designated Uses*  
*Reach 4: 23rd Avenue WWTP Outfall to Confluence with Gila River*

Greeley and Hansen  
July 1998

Pollutant of Concern	Aquatic and Wildlife Effluent Dependent Water	Partial Body Contact	Fish Consumption	Agricultural Irrigation	Agricultural Livestock	Summary Most Stringent Standard	ADEQ Practical Quantitation Limit
<b>INORGANIC CONTAMINANTS</b>							
Beryllium	5.3 D	700 T	0.21 T *	NNS	NNS	0.21 T	0.5
Boron	NNS	12600	NNS	1,000 T *	NNS	1,000 T	
Copper	EQU [34] D *	5,200 D	NNS	5,000 T	500 T	[34] D	
Cyanide	9.7 T *	2,800 T	210,000 T	NNS	200 T	9.7 T	20
Mercury	0.2 D *	42 T	0.6 T	NNS	10 T	0.2 D	0.5
Nitrate	NNS	224,000*	NNS	NNS	NNS	224,000	
Selenium	2.0 T *	700 T	9,000 T	20 T	50 T	2.0 T	5
Thallium	150 D	12 T *	41 T	NNS	NNS	12 T	
<b>ORGANIC CONTAMINANTS</b>							
Chloroform	900	1400	590 *	NNS	NNS	590	
Bromoform	10000	2800	80 *	NNS	NNS	80	
Bromodichloromethane	NNS	2800	22 *	NNS	NNS	22	0.5
Dibromochloromethane	NNS	2800	12 *	NNS	NNS	12	1
<b>PESTICIDES</b>							
Chlordane	0.21	8.4	0.001 *	NNS	NNS	0.001	0.1
DDT	0.001	70	0.0005 *	0.001	0.001	0.0005	0.1
DDE	0.02	NNS	0.0006 *	0.001	0.001	0.0006	0.1
DDD	0.02	NNS	0.0009 *	0.001	0.001	0.0009	0.1
Diazinon							
Dieldrin	0.005	7	0.0002 *	k	k	0.0002	0.1
Lindane (Hexachlorocyclohexane gamma)	0.61	42	0.02 *	NNS	NNS	0.02	0.05
Toxaphene	0.02	NNS	0.0008 *	0.005	0.005	0.0008	2
<b>OTHER PARAMETERS</b>							
Dissolved Oxygen							
TDS							

All values are in ug/l  
\* = Most Stringent Standard  
NNS = No Numeric Standard

T = Total  
D = Dissolved  
EQU = Dissolved Standard =  $e^{(0.9422[\ln(\text{hardness})]-1.464)}$   
[ ] = Standard calculated using assumed hardness of 200 mg/l  
k = 0.003 ug/l aldrin/dieldrin

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**Table 4-6**  
**Designated Uses**  
**Reach 5: Confluence of Salt and Gila River to Gillespie Dam**

Greeley and Hansen  
July 1998

Pollutant of Concern	Aquatic and Wildlife Effluent Dependent Water	Partial Body Contact	Fish Consumption	Agricultural Irrigation	Agricultural Livestock	Summary Most Stringent Standard	ADEQ Practical Quantitation Limit
<b>INORGANIC CONTAMINANTS</b>							
Beryllium	5.3 D	700 T	0.21 T *	NNS	NNS	0.21 T	0.5
Boron	NNS	12600	NNS	1,000 T *	NNS	1,000 T	
Copper	EQU [34] D *	5,200 D	NNS	5,000 T	500 T	[34] D	
Cyanide	9.7 T *	2,800 T	210,000 T	NNS	200 T	9.7 T	20
Mercury	0.2 D *	42 T	0.6 T	NNS	10 T	0.2 D	0.5
Nitrate	NNS	224,000*	NNS	NNS	NNS	224,000	
Selenium	2.0 T *	700 T	9,000 T	20 T	50 T	2.0 T	5
Thallium	150 D	12 T *	41 T	NNS	NNS	12 T	
<b>ORGANIC CONTAMINANTS</b>							
Chloroform	900	1400	590 *	NNS	NNS	590	
Bromoform	10000	2800	80 *	NNS	NNS	80	
Bromodichloromethane	NNS	2800	22 *	NNS	NNS	22	0.5
Dibromochloromethane	NNS	2800	12 *	NNS	NNS	12	1
<b>PESTICIDES</b>							
Chlordane	0.21	8.4	0.001 *	NNS	NNS	0.001	0.1
DDT	0.001	70	0.0005 *	0.001	0.001	0.0005	0.1
DDE	0.02	NNS	0.0006 *	0.001	0.001	0.0006	0.1
DDD	0.02	NNS	0.0009 *	0.001	0.001	0.0009	0.1
Diazinon							
Dieldrin	0.005	7	0.0002 *	k	k	0.0002	0.1
Lindane (Hexachlorocyclohexane gamma)	0.61	42	0.02 *	NNS	NNS	0.02	0.05
Toxaphene	0.02	NNS	0.0008 *	0.005	0.005	0.0008	2
<b>OTHER PARAMETERS</b>							
Dissolved Oxygen							
TDS							

All values are in ug/l  
\* = Most Stringent Standard  
NNS = No Numeric Standard

T = Total  
D = Dissolved  
EQU = Dissolved Standard =  $e^{(0.9422[\ln(\text{hardness})]-1.464)}$   
[ ] = Standard calculated using assumed hardness of 200 mg/l  
k = 0.003 ug/l aldrin/dieldrin

### 4.3 Water Quality Data Analysis

A very large amount of water quality data was obtained as a part of the MGRW study. The initial step in the analysis was to sort the water quality records to identify data related to the pollutants of concern which were the focus of this study. This sorting reduced the volume of information to a manageable database. The water quality data analysis consisted of three steps:

- Initial Screening
- Initial Analysis
- Detailed Analysis

#### 4.3.1 Initial Screening

Although the sorting process reduced the size of the water quality database, there was still a very large amount of information to be analyzed. The initial screening process was the first step in the analysis. The initial screening compared the most stringent designated uses standard for a contaminant in each of the five river reaches to the water quality information in the database. Water quality was compared to the minimum designated uses standard for each river reach, rather than a NPDES discharge standard or some other criteria. The initial screening did not consider the PQL or MDL. Contaminants at each site were flagged even if the data was reported as less than X, where X was greater than the standard. It was only a screening process.

The initial screening began with Reach 1 at Granite Reef Dam and progressed downstream. The database for the 23rd Avenue WWTP and 91st Avenue WWTP were extensive, containing several thousand lines of data. The 91st Avenue WWTP data had been reviewed as a part of the 91st Avenue WWTP Reclaimed Water Studies and the data was found to be of good quality. The information from both the 23rd Avenue and 91st Avenue was not processed in the initial screening to allow efforts to focus on the other information in the water quality database.

The results of the initial screening (**Table 4-7**) showed there were a significant number of contaminants that were identified as possible exceedances of the most stringent standard. The information in **Table 4-7** included the sampling location and potential contaminant exceedance starting upstream at Granite Reef Dam and working downstream to Gillespie Dam by reach. The majority of potential exceedances were inorganic contaminants and pesticides.

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*Middle Gila River Watershed Study*  
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*Index No. S-961342*

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**

Greeley and Hansen  
July 1998

**REACH 1: GRANITE REEF DAM TO 2 KM DOWNSTREAM**

No exceedances

**REACH 2: 2 KM DOWNSTREAM OF GRANITE REEF DAM TO I-10 BRIDGE**

*Surface Water*

Salt River at Priest Drive

- DDD
- DDE
- DDT
- Thallium
- Toxaphene

Box Culvert at 48th Street Drain

- Dissolved Copper
- Total Cyanide
- DDD
- DDE
- DDT
- Toxaphene

*Storm Water*

Dorsey and University, Southeast Corner

- Dissolved Copper
- Dissolved Thallium
- Total Thallium
- Lindane

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 2 of 11)

- Chlordane
- P DDD
- P DDE
- P DDT
- Total Dieldrin
- Toxaphene

Fifth Street East of Ash Avenue

- Total Cyanide
- Dissolved Beryllium
- Dissolved Copper
- Total Thallium
- Dissolved Thallium
- Lindane
- Chlordane
- P DDD
- P DDE
- P DDT
- Total Dieldrin
- Total Toxaphene

Downstream side of the Priest Drive Bridge over the Salt River

- P DDE
- P DDT

48th Street Drain at 48th Street - East side of Hohokam Expressway

- Dissolved Copper
- P DDD
- P DDE
- P DDT
- Toxaphene

Salt River at 40th Street - South Bank of River

- Cyanide
- Dissolved Copper
- Total Thallium
- Dissolved Thallium

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 3 of 11)

- Chlordane
- P DDD
- P DDE
- P DDT
- Toxaphene

Salt River approximately 500 feet East of I-10 Bridge over Salt River - North bank

- Total Cyanide
- Dissolved Copper
- Total Thallium
- Dissolved Thallium
- Chlordane
- P DDD
- P DDE
- P DDT
- Toxaphene

**REACH 3: I-10 BRIDGE TO 23RD AVENUE WWTP OUTFALL TO GILA RIVER**

*Surface Water*

Salt River at 19th Avenue

- Total Beryllium
- Chlordane
- Total Dieldrin
- Total Lindane
- P DDD
- P DDE
- P DDT
- Total Selenium
- Total Toxaphene

*Storm Water*

Downstream side of 24th Street Bridge over Salt River

- Cyanide
- Total Beryllium
- Dissolved Beryllium
- Total Thallium

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 4 of 11)

- Lindane
- Chlordane
- P DDD
- P DDE
- P DDT
- Dieldrin
- Toxaphene

**REACH 4: 23RD AVENUE TO CONFLUENCE WITH GILA RIVER**

*Surface Water*

23rd Avenue WWTP Discharge (Based on all data other than that provided by City of Phoenix)

- Total Beryllium
- Total Chlordane
- Total Copper
- Total Dieldrin
- Total Lindane
- Total Toxaphene
- Total Selenium
- P DDT
- P DDE
- P DDD
- Total Mercury

27th Avenue at Salt River

- Dissolved Beryllium
- Total Beryllium
- Chlordane
- Total Cyanide
- Total Dieldrin
- Total Lindane
- P DDD
- P DDE
- P DDT
- Total Thallium
- Total Toxaphene

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 5 of 11)

Salt River above 35th Avenue

- Total Beryllium
- Total Chlordane
- Total Copper
- Total Dieldrin
- O DDD
- O DDT
- P DDD
- P DDE
- P DDT
- Toxaphene

Salt River at 51st Avenue Bridge at Phoenix

- Total Beryllium
- Dissolved Beryllium
- Total Cyanide

67th Avenue Bridge NW

- Dissolved Beryllium
- Total Beryllium

Discharge from Gravel Mine, 0.4 miles East of 83rd Avenue, North Side of River

- Total Beryllium

City of Tolleson Wastewater Utilities

- Cyanide
- Total Mercury
- Total Selenium

Salt River at 91st Avenue Phoenix

- Total Beryllium
- Total Chlordane
- Total Copper
- Total Dieldrin
- Total Mercury

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 6 of 11)

- P DDD
- P DDE
- P DDT
- Total Selenium
- Total Toxaphene

91st Avenue Treatment Plant Discharge (Based on all data other than that provided by City of Phoenix)

- Total Beryllium
- Dissolved Beryllium
- Cyanide
- Total Selenium

Salt River West of 91st Avenue and about one-half mile South of Effluent Discharge; Water Consists of a 3-foot deep Standing Pool of Water

- Beryllium
- Selenium
- Thallium

Salt River at 107th Avenue near Tolleson

- Total Beryllium
- Total Selenium

115th Avenue Crossing, about ½ mile East of the 115th Avenue River Crossing, along the Shoreline

- Beryllium
- Mercury
- Selenium
- Thallium

Gila River above Salt River near 115th Avenue

- Total Beryllium
- Total Boron
- Total Copper
- Total Selenium
- Total Thallium

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 7 of 11)

Salt/Gila River above 115th Avenue Crossing

- Total Beryllium
- Total Chlordane
- Total Dieldrin
- Total Lindane
- Total Mercury
- P DDD
- P DDE
- P DDT
- Total Toxaphene

*Storm Water*

Salt River at 27th Avenue - South Bank of River

- Cyanide
- Total Beryllium
- Dissolved Beryllium
- Total Selenium
- Total Thallium
- Lindane
- Chlordane
- P DDD
- P DDE
- P DDT
- Dieldrin
- Toxaphene

Salt River at 35th Avenue - North Bank of River

- Cyanide
- Total Beryllium
- Dissolved Beryllium
- Dissolved Copper
- Total Mercury
- Dissolved Mercury
- Total Selenium
- Dissolved Selenium
- Total Thallium
- Dissolved Thallium
- Lindane

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 8 of 11)

- Chlordane
- P DDD
- P DDE
- P DDT
- Dieldrin
- Toxaphene

**REACH 5: CONFLUENCE OF GILA AND SALT RIVER TO GILLESPIE DAM**

*Surface Water*

115th Avenue

- Total Beryllium
- Total Chlordane
- Total Dieldrin
- Total Lindane
- Total Mercury
- P DDD
- P DDE
- P DDT
- Total Toxaphene

Gila River below 115th Avenue, near PIR

- Total Beryllium
- Total Mercury
- Total Selenium
- Total Thallium

El Mirage Road North (Salt River Channel)

- Beryllium
- Selenium
- Thallium

El Mirage Road South (Gila River Channel)

- Beryllium
- Selenium
- Thallium

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 9 of 11)

City of Avondale WWTP

- Copper
- Cyanide
- Selenium
- Lindane

Lockheed Martin Tactical Defense Systems Discharge (a.k.a. Loral)

- Total Cyanide
- Total Selenium

3/4 Mile East of 147th Avenue Bridge

- Total Beryllium

Salt River Upstream of Discharge from Buckeye Canal

- Beryllium
- Selenium
- Thallium

Estrella WWTP, City of Goodyear

- Total Selenium
- Bromodichloromethane
- Dibromochloromethane
- Chlordane
- Dieldrin
- Lindane
- Toxaphene

Town of Buckeye WWTP

- Dibromochloromethane
- Lindane
- Selenium
- Toxaphene

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 10 of 11)

Gila River above Highway 85 Bridge

- Total Beryllium
- Total Chlordane
- Total Dieldrin
- Total Lindane
- Total Mercury
- P DDD
- P DDE
- P DDT
- Total Thallium
- Total Toxaphene

Arlington Canal at Unnamed Drain

- Total Beryllium
- Total Chlordane
- Total Dieldrin
- Total Lindane
- O DDD
- O DDT
- P DDD
- P DDE
- P DDT
- Total Toxaphene

Buckeye Canal Irrigation Returns West of Buckeye, Arizona

- Total Chlordane
- Total Dieldrin
- Total Lindane
- O DDD
- O DDT
- P DDD
- P DDE
- P DDT
- Total Toxaphene

**Table 4-7**  
**Initial Data Quality Screening**  
**Possible Exceedances of Most Stringent Designated Uses Standard**  
(Page 11 of 11)

Gila River near Arlington

- Total Beryllium
- Total Chlordane
- Total Dieldrin
- Total Lindane
- Total Mercury
- P DDD
- P DDE
- P DDT
- Total Thallium
- Total Toxaphene

Gila River Above Diversions at Gillespie Dam

- Dissolved Beryllium
- Total Beryllium
- Dissolved Boron
- Total Boron
- Total Chlordane
- Dissolved Copper
- Total Copper
- Total Cyanide
- DDD
- DDE
- Dissolved Lindane
- Total Lindane
- Dissolved Mercury
- Total Mercury
- Dissolved Selenium
- Total Selenium
- Total Thallium
- Total Toxaphene

### 4.3.2 Initial Analysis

The initial analysis was the second step in the water quality data analysis. The initial screening identified the sampling locations and contaminants that represented possible exceedances of the water quality standards. In the initial analysis, the exceedances were compared to the standard and PQL to quantify the number of times a contaminant at a specific location exceeded the standard or both the standard and PQL. This data is presented in **Tables 4-8** through **4-11**, with a separate table for Reaches 2 through 5 of the MGRW study area. The initial screening showed there were no exceedances within Reach 1. The tables also contained the maximum concentration reported for the contaminant at the site and initial comments about the assessment. As with the initial screening the data from 23rd Avenue and 91st Avenue WWTPs was not included in the initial analysis because the data had been reviewed in detail in previous studies.

The initial analysis demonstrated the need for a more detailed analysis. The data presented in **Tables 4-8** through **4-11** shows that many times, concentrations were greater than the standard for a contaminant, but less than the PQL. The initial analysis also showed that in many cases the maximum concentration reported for a contaminant was a less than value and not a quantifiable number.

### 4.3.3 Detailed Analysis

The detailed analysis was the third step in the analysis process. The goal of the detailed analysis was to identify actual exceedances based on verifiable quantities, as opposed to questionable exceedances that were based on reported concentrations influenced by analytical techniques and reporting limits. Detailed analysis information is compiled in **Tables 4-12** through **4-19**. Surface water quality data was separated into stormwater data and all other sources. The surface water quality tables include all NPDES discharges other than the 23rd and 91st Avenue WWTPs. These were analyzed separately because of the large volume of data received.

Stormwater data was analyzed in **Tables 4-12** through **4-14**. There was no stormwater information available for Reach 1 or Reach 5, thus the tables represent storm information for Reach 2 through Reach 4. The format for the data is:

- Location of the sample point given as latitude and longitude
- Description of the sampling location
- Source code indicating the origin of the data
- The date of the sample (in many cases several sample dates are listed for each sampling location)

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Middle Gila River Watershed Study Phase I

*Table 4-8*  
*Initial Analysis*  
*Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge*

Greeley and Hansen  
July 1998

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
Salt River at Priest Drive	DDD	0.02	0.1	3	0	0.1	
	DDE	0.03	0.1	3	3	0.4	
	DDT	0.006	0.1	3	0	0.1	
	Thallium	12T	none	3	N/A	25	
	Toxaphene	1.5	2	3	0	2	
Box Culvert at 48th Street Drain	Dissolved Copper	46	none	2	N/A	100	Standard is Dependent on Hardness
	Total Cyanide	19	20	1	0	20	
	DDD	0.02	0.1	6	0	0.1	
	DDE	0.03	0.1	6	0	0.04	
	DDT	0.006	0.1	6	0	0.1	
	Toxaphene	1.5	2	6	0	2	

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Middle Gila River Watershed Phase I

**Table 4-8**  
**Initial Analysis**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**

Greeley and Hansen  
July 1998

**STORM WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
Dorsey and University, southeast corner	Dissolved Copper	46	none	4	N/A	<50	Standard less than Detection Limit
							Standard Dependent on Hardness
	Total Cyanide	19	20	3	3	<25	Standard less than Detection Limit
	Dissolved Thallium	12	none	4	N/A	<500	Standard less than Detection Limit
	Total Thallium	12	none	7	N/A	<500	Standard less than Detection Limit
	Lindane	0.9	0.05	1	1	<1	Standard less than Detection Limit
	Chlordane	0.45	0.1	15	15	<5	Standard less than Detection Limit
	P DDD	0.02	0.1	19	12	<2	Standard less than Detection Limit
	P DDE	0.03	0.1	18	11	<2	Standard less than Detection Limit
	P DDT	0.006	0.1	19	12	<2	Standard less than Detection Limit
	Total Dieldrin	0.9	0.1	5	5	22	
	Toxaphene	1.5	2	11	11	<20	Standard less than Detection Limit
	Total Cyanide	19	20	1	1	<25	Standard less than Detection Limit
	Dissolved Copper	46	none	3	N/A	50	Standard less than Detection Limit
							Standard Dependent on Hardness
	Total Thallium	12	none	4	N/A	<500	Standard less than Detection Limit
	Dissolved Thallium	12	none	3	N/A	<500	Standard less than Detection Limit
	Lindane	0.9	0.05	1	1	<1	Standard less than Detection Limit
	Chlordane	0.45	0.1	11	11	<10	Standard less than Detection Limit
	P DDD	0.02	0.1	17	6	<2	Standard less than Detection Limit
P DDE	0.03	0.1	16	5	<1	Standard less than Detection Limit	
P DDT	0.006	0.1	18	7	<5	Standard less than Detection Limit	
Total Dieldrin	0.9	0.1	3	3	<2	Standard less than Detection Limit	
Total Toxaphene	1.5	2	6	6	<20	Standard less than Detection Limit	

*Table 4-8 - Initial Analysis*  
*Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge*  
(Continued)

**STORM WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Exceedance (ug/l)	Comment:
				1) Standard	2) PQL		
Downstream side of the Priest Drive Bridge over the Salt River	P DDE	0.03	0.1	3	0	<0.04	Standard less than Detection Limit
	P DDT	0.006	0.1	3	0	<0.1	Standard less than Detection Limit
48th Street Drain at 48th Street - east side of Hohokam Expressway	Dissolved Copper	46	none	1	N/A	70	Standard Dependent on Hardness
	P DDD	0.02	0.1	6	0	<0.1	Standard less than Detection Limit
	P DDE	0.03	0.1	6	0	<0.04	Standard less than Detection Limit
	P DDT	0.006	0.1	6	0	<0.1	Standard less than Detection Limit
	Toxaphene	1.5	2	6	0	<2	Standard less than Detection Limit
Salt River at 40th Street- south bank of river	Cyanide	19	20	6	4	0.03	
	Dissolved Copper	46	none	3	N/A	63	Standard Dependent on Hardness
	Total Thallium	12	none	2	N/A	<50	Standard less than Detection Limit
	Dissolved Thallium	12	none	2	N/A	<50	Standard less than Detection Limit
	Chlordane	0.45	0.1	2	2	<1.5	Standard less than Detection Limit
	P DDD	0.02	0.1	3	1	<0.5	Standard less than Detection Limit
	P DDE	0.03	0.1	3	1	<0.5	Standard less than Detection Limit
	P DDT	0.006	0.1	3	2	<1	Standard less than Detection Limit
	Toxaphene	1.5	2	1	1	<2.5	Standard less than Detection Limit
Salt River approximately 500 feet east of I-10 Bridge over Salt River- north bank	Total Cyanide	19	20	5	2	30	
	Dissolved Copper	46	none	7	N/A	64	Standard Dependent on Hardness
	Total Thallium	12	none	2	N/A	<50	Standard less than Detection Limit
	Dissolved Thallium	12	none	2	N/A	<50	Standard less than Detection Limit
	Chlordane	0.45	0.1	2	2	<1.5	Standard less than Detection Limit
	P DDD	0.02	0.1	4	1	<0.5	Standard less than Detection Limit
	P DDE	0.03	0.1	4	1	<0.5	Standard less than Detection Limit
	P DDT	0.006	0.1	5	2	<1	Standard less than Detection Limit
	Toxaphene	1.5	2	1	1	<2.5	Standard less than Detection Limit

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Middle Gila River Watershed Study Phase I

**Table 4-9**  
**Initial Analysis**  
**Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfall to Gila River**

Greeley and Hansen  
July 1998

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
Salt River at 19th Ave	Total Beryllium	0.21	0.5	1	1	5	
	Chlordane	0.001	0.1	1	1	0.5	
	Total Dieldrin	0.0002	0.1	1	0	0.05	
	Total Lindane	0.02	0.05	1	0	0.05	
	P DDD	0.0009	0.1	1	1	0.15	
	P DDE	0.0006	0.1	1	0	0.05	
	P DDT	0.0005	0.1	1	1	0.15	
	Total Selenium	2	5	1	0	5	
	Total Toxaphene	0.0008	2	1	1	2.5	

**STORM WATER**

Location	Contaminant	Most Stringent Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
Downstream side of 24th Street Bridge over Salt River	Cyanide	9.7	20	2	0	<0.01	Standard less than Detection Limit
	Total Beryllium	0.21	0.5	2	2	<10	Standard less than Detection Limit
	Dissolved Beryllium	0.21	0.5	1	0	<0.5	Standard less than Detection Limit
	Total Thallium	12	none	1	N/A	<20	Standard less than Detection Limit
	Lindane	0.02	0.05	2	0	<0.03	Standard less than Detection Limit
	Chlordane	0.001	0.1	2	0	<0.1	Standard less than Detection Limit
	P DDD	0.0009	0.1	2	0	<0.1	Standard less than Detection Limit
	P DDE	0.0006	0.1	2	0	<0.04	Standard less than Detection Limit
	P DDT	0.0005	0.1	2	0	<0.1	Standard less than Detection Limit
	Dieldrin	0.0002	0.1	2	0	<0.02	Standard less than Detection Limit
	Toxaphene	0.0008	2	2	0	<2	Standard less than Detection Limit

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Middle Gila River Watershed Study Phase I

**Table 4-10**  
**Initial Analysis**  
**Reach 4: 23rd Avenue to Confluence with Gila River**

Greeley and Hansen  
July 1998

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
23rd Avenue WWTP Discharge	Total Beryllium	0.21	0.5	2	2	10	Based on data other than from City of Phoenix
	Total Chlordane	0.001	0.1	4	0	1	Standard less than Detection Limit
	Total Copper	500	none	1	N/A	1740	
	Total Dieldrin	0.0002	0.1	4	2	1	Standard less than Detection Limit
	Total Lindane	0.02	0.05	3	1	1	Standard less than Detection Limit
	Total Toxaphene	0.0008	2	4	0	1	Standard less than Detection Limit
	Total Selenium	2	5	1	1	8	
	P DDT	0.0005	0.1	4	1	1	Standard less than Detection Limit
	P DDE	0.0006	0.1	4	2	1	Standard less than Detection Limit
	P DDD	0.0009	0.1	4	4	1	Standard less than Detection Limit
	Total Mercury	0.6	0.5	1	1	8.3	
	27th Avenue at the Salt River	Dissolved Beryllium	0.21	0.5	12	2	0.6
Total Beryllium		0.21	0.5	15	15	10	
Total Chlordane		0.001	0.1	6	0	0.1	
Total Cyanide		9.7	20	15	0	0.01	
Total Dieldrin		0.0002	0.1	6	0	0.02	
Total Lindane		0.02	0.05	6	0	0.03	
P DDD		0.0009	0.1	6	0	0.1	
P DDE		0.0006	0.1	6	5	1.1	
P DDT		0.0005	0.1	6	0	0.1	
Total Thallium		12	none	6	N/A	500	
Total Toxaphene	0.0008	2	6	0	2		

*Table 4-10 - Initial Analysis*  
 Reach 4: 23rd Avenue to Confluence with Gila River  
 (Continued)

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Exceedance (ug/l)	Comments:
				1) Standard	2) PQL		
Salt River above 35th Avenue	Total Beryllium	0.21	0.5	1	1	10	
	Total Chlordane	0.001	0.1	2	2	1	Standard less than Detection Limit
	Total Dieldrin	0.0002	0.1	2	2	1	Standard less than Detection Limit
	O DDD	0.0009	0.1	2	2	1	Standard less than Detection Limit
	O DDT	0.0005	0.1	2	2	1	Standard less than Detection Limit
	P DDD	0.0009	0.1	2	2	1	Standard less than Detection Limit
	P DDE	0.0006	0.1	2	2	1	Standard less than Detection Limit
	P DDT	0.0005	0.1	2	2	1	Standard less than Detection Limit
	Toxaphene	0.0008	2	6	0	2	
Salt River at 51st Ave Bridge at Phoenix	Total Beryllium	0.21	0.5	6	4	10	
	Dissolved Beryllium	0.21	0.5	3	0	0.3	
	Total Cyanide	9.7	20	3	0	10	
67th Avenue Bridge NW	Total Beryllium	0.21	0.5	5	3	0.8	
Gravel mine discharge 0.4 miles east of 83rd Avenue	Total Beryllium	0.21	0.5	1	1	9.2	
City of Tolleson Wastewater Utilities	Cyanide	9.7	20	32	0	20	
	Total Mercury	0.2	0.5	2	2	1.5	
	Total Selenium	2	5	3	2	50	
Salt River at 91st Avenue Phoenix	Total Beryllium	0.21	0.5	2	2	6	
	Total Chlordane	0.001	0.1	2	0	0.05	
	Total Copper	500	none	1	N/A	21100	Unusually large number (6/15/83)
	Total Dieldrin	0.0002	0.1	2	0	0.005	
	Total Mercury	0.6	0.5	1	1	20	
	P DDD	0.0009	0.1	2	2	0.15	
	P DDE	0.0006	0.1	2	0	0.005	
	P DDT	0.0005	0.1	2	0	0.015	
	Total Selenium	2	5	1	1	33	
Total Toxaphene	0.0008	2	2	0	0.25		
91st Avenue Treatment Plant Discharge	Total Beryllium	0.21	0.5	3	0	0.3	Based on data other than from City of Phoenix
	Dissolved Beryllium	0.21	0.5	3	0	0.3	
	Cyanide	9.7	20	12	0	<20	Standard less than Detection Limit
	Selenium	2	5	12	5	<3	Standard less than Detection Limit
Small pool just South of 91st Discharge	Beryllium	0.21	0.5	1	1	5.4	Total was assumed
	Selenium	2	5	3	0	5	Total was assumed
	Thallium	12	none	2	N/A	60	Total was assumed

**Table 4-10 - Initial Analysis**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Exceedance (ug/l)	Comments:
				1) Standard	2) PQL		
Salt River at 107th Avenue near Tolleson	Total Beryllium	0.21	0.5	3	1	5	
	Total Selenium	2	5	3	0	5	
½ mile east of the 115th Avenue river crossing	Beryllium	0.21	0.5	2	2	5	Total was assumed
	Selenium	2	5	4	0	5	Total was assumed
	Thallium	12	none	2	N/A	60	Total was assumed
Gila River below 115th Avenue, near PIR	Total Beryllium	0.21	0.5	3	2	12	
	Total Mercury	0.6	0.5	1	1	1.8	
	Total Selenium	2	5	13	1	10	
	Total Thallium	12	none	1	N/A		
						50	
Gila River above Salt River near 115th Avenue	Total Beryllium	0.21	0.5	15	2	10	
	Total Boron	1000	none	14	N/A	1940	Consistently above 1000 ug/l
	Total Selenium	2	5	15	2	32	Very high Selenium
	Total Thallium	12	none	2	N/A	50	
Salt/Gila River above 115th Avenue Crossing	Total Beryllium	0.21	0.5	2	2	10	
	Total Chlordane	0.001	0.1	2	2	1	Standard less than Detection Limit
	Total Dieldrin	0.0002	0.1	2	2	1	Standard less than Detection Limit
	Total Lindane	0.02	0.05	2	2	1	Standard less than Detection Limit
	Total Mercury	0.6	0.5	1	1	1	Standard less than Detection Limit
	P DDD	0.0009	0.1	2	2	1	Standard less than Detection Limit
	P DDE	0.0006	0.1	2	2	1	Standard less than Detection Limit
	P DDT	0.0005	0.1	2	2	1	Standard less than Detection Limit
	Total Toxaphene	0.0008	2	2	2	1	Standard less than Detection Limit

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-10**  
**Initial Analysis**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
Greeley and Hansen  
July 1998

**STORM WATER**

Location	Contaminant	Most Stringent Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
Salt River at 27th Avenue - South Bank of River	Cyanide	9.7	20	19	0	10	
	Total Beryllium	0.21	0.5	18	18	<10	Standard less than Detection Limit
	Dissolved Beryllium	0.21	0.5	9	2	0.6	
	Total Selenium	2	5	1	1	<20	Standard less than Detection Limit
	Total Thallium	12	none	1	N/A	<500	Standard less than Detection Limit
	Lindane	0.02	none	6	N/A	<0.03	Standard less than Detection Limit
	Chlordane	0.001	0.1	6	0	<0.1	Standard less than Detection Limit
	P DDD	0.0009	0.1	6	0	<0.1	Standard less than Detection Limit
	P DDE	0.0006	0.1	6	5	1.1	
	P DDT	0.0005	0.1	6	0	0.1	
	Dieldrin	0.0002	0.1	6	0	<0.02	Standard less than Detection Limit
	Toxaphene	0.0008	2	6	0	<0.02	Standard less than Detection Limit
	Salt River at 35th Avenue - North Bank of River	Cyanide	9.7	20	11	0	<0.01
Total Beryllium		0.21	0.5	3	3	<5	Standard less than Detection Limit
Dissolved Beryllium		0.21	0.5	3	3	<4	Standard less than Detection Limit
Dissolved Copper		34	none	9	N/A	100	Standard Dependent on Hardness
Total Mercury		0.6	0.5	13	10	<2	Standard less than Detection Limit
Dissolved Mercury		0.02	0.5	0	0	<0.2	Standard less than Detection Limit
Total Selenium		2	5	3	2	<20	Standard less than Detection Limit
Dissolved Selenium		2	5	3	2	<20	Standard less than Detection Limit
Total Thallium		12	none	1	N/A	<50	Standard less than Detection Limit
Dissolved Thallium		12	none	1	N/A	<20	Standard less than Detection Limit
Lindane		0.02	0.05	6	1	<0.12	Standard less than Detection Limit
Chlordane		0.001	0.1	7	7	<0.35	Standard less than Detection Limit
P DDD		0.0009	0.1	7	6	<0.23	Standard less than Detection Limit
P DDE		0.0006	0.1	7	2	<0.12	Standard less than Detection Limit
P DDT		0.0005	0.1	7	1	<0.23	Standard less than Detection Limit
Dieldrin		0.0002	0.1	7	2	<0.23	Standard less than Detection Limit
Toxaphene		0.0008	2	7	0	<1.2	Standard less than Detection Limit

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Study Phase I

**Table 4-11**  
**Initial Analysis**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**

Greeley and Hansen  
July 1998

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Concentration (ug/l)	Comments:
				1) Standard	2) PQL		
115th Avenue	Total Beryllium	0.21	0.5	4	4	10	
	Total Chlordane	0.001	0.1	3	2	1	Standard less than Detection Limit
	Total Dieldrin	0.0002	0.1	3	2	1	Standard less than Detection Limit
	Total Lindane	0.02	0.05	2	2	1	Standard less than Detection Limit
	Total Mercury	0.6	0.5	3	1	1	Standard less than Detection Limit
	P DDD	0.0009	0.1	3	2	1	Standard less than Detection Limit
	P DDE	0.006	0.1	3	2	1	Standard less than Detection Limit
	P DDT	0.0005	0.1	3	2	1	Standard less than Detection Limit
	Total Toxaphene	0.008	2	3	2	1	Standard less than Detection Limit
El Mirage Road North (Salt River channel)	Beryllium	0.21	0.5	2	2	5	
	Selenium	2	5	4	0	5	
	Thallium	12	none	2	N/A	60	
El Mirage Road South (Gila River channel)	Beryllium	0.21	0.5	2	2	5	
	Selenium	2	5	4	1	5.1	
	Thallium	12	none	2	N/A	60	
City of Avondale WWTP	Copper	500	none	1	N/A	1100	
	Cyanide	9.7	20	2	2	60	
	Selenium	2	5	30	12	15	
	Lindane	0.02	0.05	2	2	<0.5	Standard less than Detection Limit
3/4 mile east of 147th Ave Bridge	Total Beryllium	0.21	0.5	1	0	0.3	
Lockheed Martin Tactical Defense Systems Discharge (a.k.a. Loral)	Cyanide	9.7	20	3	0	10	
	Total Selenium	2	5	6	6	<10	Standard less than Detection Limit
	Total Cyanide	9.7	20	6	1	28	

*Table 4-11 - Initial Analysis*  
*Reach 5: Confluence of Gila and Salt River to Gillespie Dam*  
(Continued)

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Exceedance (ug/l)	Comments:
				1) Standard	2) PQL		
Estrella WWTP, City of Goodyear	Total Selenium	2	5	1	1	<10	Standard less than Detection Limit
	Bromodichloromethan	22	0.5	1	1	24	
	Dibromochloromethan	12	1	1	1	28	
	Chlordane	0.001	0.1	1	1	<0.15	Standard less than Detection Limit
	Dieldrin	0.0002	0.1	1	0	<0.1	Standard less than Detection Limit
	Lindane	0.02	0.05	1	0	<0.05	Standard less than Detection Limit
	Toxaphene	0.0008	2	1	0	<0.5	Standard less than Detection Limit
Salt River Upstream of Discharge from Buckeye Canal	Beryllium	0.21	0.5	2	2	5	
	Selenium	2	5	4	0	5	
	Thallium	12	none	2	N/A	60	
Town of Buckeye WWTP	Dibromochloromethan	12	1	1	1	17.5	
	Lindane	0.02	0.05	1	1	<1	Standard less than Detection Limit
	Selenium	2	5	9	6	25	
	Toxaphene	0.0008	2	3	2	50	
Gila River above HWY. 85 Bridge	Total Beryllium	0.21	0.5	1	1	10	
	Total Chlordane	0.001	0.1	1	1	1	Standard less than Detection Limit
	Total Dieldrin	0.0002	0.1	1	1	1	Standard less than Detection Limit
	Total Lindane	0.02	0.05	1	1	1	Standard less than Detection Limit
	Total Mercury	0.6	0.5	1	1	0.9	
	P DDD	0.009	0.1	1	1	1	Standard less than Detection Limit
	P DDE	0.0006	0.1	1	1	1	Standard less than Detection Limit
	P DDT	0.0005	0.1	1	1	2.3	
	Total Thallium	12	none	1	N/A	18	
	Total Toxaphene	0.0008	2	1	0	1	Standard less than Detection Limit
Arlington Canal at Unnamed Drain	Total Beryllium	0.21	0.5	1	1	5	
	Total Chlordane	0.001	0.1	1	1	1	Standard less than Detection Limit
	Total Dieldrin	0.0002	0.1	1	1	1	Standard less than Detection Limit
	Total Lindane	0.02	0.05	1	1	1	Standard less than Detection Limit
	P DDD	0.0009	0.1	1	1	1	Standard less than Detection Limit
	P DDE	0.0006	0.1	1	1	1	Standard less than Detection Limit
	P DDT	0.0005	0.1	1	1	1	Standard less than Detection Limit
	Total Toxaphene	0.0008	2	1	0	1	Standard less than Detection Limit

*Table 4-11 - Initial Analysis*  
*Reach 5: Confluence of Gila and Salt River to Gillespie Dam*  
(Continued)

**SURFACE WATER**

Location	Contaminant	Standard (ug/l)	PQL (ug/l)	Number of Exceedances of:		Maximum Exceedance (ug/l)	Comments:
				1) Standard	2) PQL		
Buckeye Canal Irrigation Returns west of Buckeye, Arizona	Total Chlordane	0.001	0.1	1	1	1	Standard less than Detection Limit
	Total Dieldrin	0.0002	0.1	1	1	1	Standard less than Detection Limit
	Total Lindane	0.02	0.05	1	1	1	Standard less than Detection Limit
	P DDD	0.0009	0.1	1	1	1	Standard less than Detection Limit
	P DDE	0.006	0.1	1	1	1	Standard less than Detection Limit
	P DDT	0.0005	0.1	1	1	1	Standard less than Detection Limit
	Total Toxaphene	0.00008	2	1	1	1	Standard less than Detection Limit
Gila River near Arlington	Total Beryllium	0.21	0.5	1	1	10	
	Total Chlordane	0.001	0.1	1	1	10	
	Total Dieldrin	0.0002	0.1	1	1	1	
	Total Lindane	0.02	0.05	1	1	1	
	Total Mercury	0.6	0.5	1	1	0.7	
	P DDD	0.0009	0.1	1	1	1	
	P DDE	0.0006	0.1	1	1	1	
	P DDT	0.0005	0.1	1	1	1	
	Total Thallium	12	none	1	N/A	40	
	Total Toxaphene	0.0008	2	1	1	1	
Gila River Above Diversions at Gillespie Dam	Dissolved Beryllium	0.21	0.5	34	31	10	Consistently 10 ug/l
	Total Beryllium	0.21	0.5	26	26	10	Consistently 10 ug/l
	Dissolved Boron	1000	none	189	N/A	7300	Extremely high Boron consistently
	Total Boron	1000	none	35	N/A	22000	Extremely high Boron consistently
	Total Chlordane	0.001	0.1	3	0	0.1	
	Dissolved Copper	34	none	2	N/A	95	Standard Dependent on Hardness
	Total Copper	500	none	1	N/A	550	
	Total Cyanide	9.7	20	20	2	7000	
	DDD	0.0009	0.1	27	0	0.05	
	DDE	0.0006	0.1	6	0	0.02	
	Dissolved Lindane	0.02	0.05	2	0	0.03	
	Total Lindane	0.02	0.05	5	2	0.07	
	Dissolved Mercury	0.2	0.5	10	2	7	Very high Mercury occurrences
	Total Mercury	0.6	0.5	10	10	3.4	Very high Mercury occurrences
	Dissolved Selenium	2	5	112	29	13	
	Total Selenium	2	5	161	40	20	
	Total Thallium	12	none	6	N/A	400	
Total Toxaphene	0.0008	2	6	0	1.65		

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-12**  
**Detailed Analysis - Storm Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	No PQL Copper Total (ug/l)	No PQL Copper <sup>1</sup> Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	No PQL Thallium Total (ug/l)	No PQL Thallium Dissolved (ug/l)
33.454	-111.86	Alma School Road Bridge Salt River	301	01/07/95	<10	ND	ND	4	ND	<0.01	ND	0.13	<1	ND	ND	ND
				01/30/95	<10	ND	ND	2	ND	<0.01	ND	0.13	<1	ND	ND	ND
				02/16/95	<10	ND	ND	47	ND	<0.01	ND	0.08	<1	ND	ND	ND
33.422	-111.92	Dorsey and University	301	08/25/93	0.4	ND	ND	25	ND	<0.01	ND	1.8 C	76	ND	<1	ND
				11/11/93	<0.2	ND	ND	24	ND	ND	ND	0.81 C	<0.8	ND	<1	ND
				12/15/93	<0.2	<0.2	ND	48	35	ND	<0.2	3.3 C	<0.8	<0.8	<1	<1
				01/25/94	<0.2	<0.2	ND	41	30	ND	<0.2	2.8 C	<0.8	<0.8	<1	<1
				02/07/94	<0.2	<0.2	ND	11	7	ND	<0.2	0.31 C	<0.8	<0.8	<1	<1
				03/19/94	<0.2	ND	ND	19	ND	ND	ND	0.74 C	<0.8	ND	<1	ND
				03/19/94	<0.2	ND	ND	33	ND	ND	ND	1.4 C	<0.8	ND	<1	ND
				03/25/94	<0.2	<0.2	ND	8	8	ND	<0.2	0.18 C	<0.8	<0.8	<1	<1
				09/02/94	<0.2	<0.2	ND	16	14	ND	<0.2	2.2 C	<0.8	<0.8	<1	<1
				12/05/94	<10	<10	ND	<50	<50	ND	<0.2	0.38	<10	<10	<500	<500
				01/12/95	<10	<10	ND	<50	<50	ND	<0.2	0.68	<10	<10	<500	<500
				01/25/95	<10	<10	ND	<50	<50	ND	<0.2	0.47 C	<10	<10	<500	<500
				02/21/95	<10	<10	ND	<50	<50	ND	<0.2	1.34 C	<10	<10	<500	<500
				08/14/95	<0.2	<0.2	ND	17	12	<0.01	<0.2	2.5 C	<0.8	<0.8	<1	<1
				08/19/95	<0.2	<0.2	ND	16	9	<0.01	<0.2	1.1 C	<0.8	<0.8	<1	<1
09/28/95	0.2	<0.2	ND	26	29	<0.01	<0.2	1 C	<0.8	<0.8	<1	<1				
02/01/96	<0.2	<0.2	ND	11	10	<0.01	<0.2	0.5 C	<0.8	<0.8	<1	<1				
02/26/96	<0.2	<0.2	ND	12	<10	<0.01	<0.2	0.5 C	<0.8	<0.8	<1	<1				
03/13/96	<0.2	<0.2	ND	11	10	<0.01	<0.2	<0.3 C	<0.8	<0.8	<1	<1				
33.44	-111.91	Indian Bend Wash at Curry Road	301	02/08/94	<10	<0.5	ND	19	<10	<0.01	ND	3.46	<1	ND	ND	ND
				10/15/94	<10	ND	ND	12	ND	<0.01	ND	0.01	<1	ND	ND	ND
				12/06/94	<10	ND	ND	130	ND	<0.01	ND	0.04	<1	ND	ND	ND
				12/06/94	<10	ND	ND	5	ND	<0.01	ND	0.03	<1	ND	ND	ND
				01/05/95	<10	ND	ND	7	ND	<0.01	ND	0.03	<1	ND	ND	ND
				01/06/95	<10	ND	ND	5	ND	<0.01	ND	0.03	<1	ND	ND	ND
				08/20/95	<10	ND	ND	8	ND	ND	ND	1.04	<1	ND	ND	ND
09/28/95	<10	ND	ND	25	ND	<0.01	ND	0.33	<1	ND	ND	ND				

**Outline** = Data Reporting Limit greater than Standard  
**Outline and Shade** = Data Reporting Limit greater than Std. and PQL  
 ND = No Data  
 C = Nitrite and Nitrate Combined

**Shade and Outline** = Reported Concentration greater than Std., but less than PQL  
**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

**Table 4-12**  
**Detailed Analysis - Storm Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	No Std.			Dissolved Oxygen (mg/l)	TDS (mg/l)	
													Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)			Toxaphene Total (ug/l)
		Alma School Road Bridge Salt River	301	01/07/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.7	402	
				01/30/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.4	319	
				02/16/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.9	252	
		Dorsey and University	301	08/25/93	<5	<25	<5	<5	<5	<1	<1	<1	ND	<1	<0.5	<10	ND	260
				11/11/93	ND	ND	ND	ND	<10	<2	<2	<2	ND	<2	<1	<20	ND	110
				12/15/93	ND	ND	ND	ND	<5	<1	<1	<1	ND	<1	<0.5	<10	ND	320
				01/25/94	ND	ND	ND	ND	<5	<1	<1	<1	ND	<1	<0.5	<10	ND	230
				02/07/94	ND	ND	ND	ND	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	42
				03/19/94	ND	ND	ND	ND	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	120
				03/19/94	ND	ND	ND	ND	<5	<1	<1	<1	ND	<1	<0.5	<10	ND	190
				03/25/94	ND	ND	ND	ND	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	38
				09/02/94	ND	ND	ND	ND	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	110
				12/05/94	ND	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	35
				01/12/95	ND	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	35
				01/25/95	ND	ND	ND	ND	<0.17	<0.11	<0.055	<0.11	ND	<0.11	<0.055	<0.55	ND	110
				02/21/95	ND	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	260
				08/14/95	<5	<5	<5	<5	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	70
				08/19/95	<50	<50	<50	<50	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	100
				09/28/95	<50	<50	<50	<50	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	130
				02/01/96	<5	<5	<5	<5	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	70
				02/26/96	<5	<5	<5	<5	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	30
				03/13/96	<5	<5	<5	<5	<0.5	<0.1	<0.1	<0.1	ND	<0.05	<0.05	<1	ND	70
		Indian Bend Wash at Curry Road		02/08/94	ND	ND	ND	ND	ND	ND	ND	ND	0.12	ND	ND	ND	ND	94
				10/15/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.9	483
				12/06/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.8	192
				12/06/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.9	419
				01/05/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.2	199
				01/06/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.1	125
				08/20/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.1	320
				09/28/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.3	211

**Outline** = Data Reporting Limit greater than Standard  
**Outline and Shade** = Data Reporting Limit greater than Std. and PQL  
ND = No Data  
C = Nitrite and Nitrate Combined

**Shade and Outline** = Reported Concentration greater than Std., but less than PQL  
**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance  
<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

**Table 4-12**  
**Detailed Analysis - Storm Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	No PQL Copper Total (ug/l)	No PQL Copper <sup>1</sup> Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	No PQL Thallium Total (ug/l)	No PQL Thallium Dissolved (ug/l)	
33.44	111.9148	Indian Bend Wash at Curry Road (Continued)		02/26/96	<10	ND	ND	2	ND	<0.01	ND	3.03	<1	ND	ND	ND	
				07/26/96	<10	ND	ND	4	ND	<0.01	ND	1.21	<1	ND	ND	ND	ND
				08/19/96	<10	ND	ND	3	ND	<0.01	ND	0.71	<1	ND	ND	ND	ND
				09/02/96	ND	ND	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND
33.425	-111.94	Fifth Street east of Ash Avenue		08/25/93	<0.2	ND	ND	83	ND	<0.01	ND	0.91 C	<0.8	ND	<1	ND	
				09/13/93	<0.2	ND	ND	105	ND	ND	ND	1.8 C	<0.8	ND	<1	ND	
				11/12/93	<0.2	ND	ND	35	ND	ND	ND	1 C	<0.8	ND	<1	ND	
				03/07/94	<0.2	<0.2	ND	45	21	ND	ND	<0.2	1.29 C	<0.8	<0.8	<1	<1
				03/25/94	<0.2	<0.2	ND	19	7	ND	ND	<0.2	0.58 C	<0.8	<0.8	<1	<1
				04/26/94	<0.2	<0.2	ND	22	12	ND	ND	<0.2	0.67 C	<0.8	<0.8	<1	<1
				05/25/94	<0.2	<0.2	ND	40	36	ND	ND	<0.2	1.83 C	<0.8	<0.8	<1	<1
				08/08/94	0.4	<0.2	ND	58	10	ND	ND	<0.2	2.3 C	<2	<0.8	<1	<1
				12/05/94	<10	ND	ND	<50	ND	<0.025	ND	0.95	<10	ND	<500	ND	
				01/12/95	<10	<10	ND	<50	<50	ND	<0.2	0.78	<10	<10	<500	<500	
				01/25/95	<10	<10	ND	<50	<50	ND	<0.2	0.48	<10	<10	<500	<500	
				02/21/95	<10	<10	ND	60	<50	ND	<0.2	2.06 C	<10	<10	<50	<50	
				08/14/95	0.3	<0.2	ND	35	12	<0.01	<0.2	1.3 C	<0.8	<0.8	<1	<1	
				08/19/95	0.5	0.2	ND	37	11	<0.01	<0.2	1.7 C	<0.8	<0.8	<1	<1	
				09/07/95	<0.2	<0.2	ND	18	9	<0.01	<0.2	0.6 C	<0.8	<0.8	<1	<1	
02/01/96	0.3	<0.2	ND	37	18	<0.01	<0.2	1.1 C	<0.8	<0.8	<1	<1					
02/25/96	<0.2	<0.2	ND	21	12	0.01	<0.2	0.8 C	<0.8	<0.8	<1	<1					
33.432	-111.96	Priest Drive Bridge over Salt River		12/31/92	ND	<0.5	ND	3	<10	ND	ND	ND	<2	ND	ND	ND	
				01/04/93	ND	<0.5	ND	6	<10	<0.01	ND	ND	<2	ND	ND	ND	
				01/12/93	ND	<0.5	ND	25	<10	<0.01	ND	<0.5	<2	ND	ND	ND	
				02/11/93	ND	<0.5	ND	13	<10	<0.01	ND	<0.5	<2	ND	ND	ND	
				01/06/95	<10	ND	ND	27	ND	<0.01	ND	0.22	<1	ND	ND	ND	
				01/12/95	<10	ND	ND	2	ND	<0.01	ND	0.14	<1	ND	ND	ND	
				02/15/95	<10	ND	ND	58	ND	<0.01	ND	0.11	<1	ND	ND	ND	
33.415	-111.98	48th Street Drain at 48th Street		11/10/91	<10	1	ND	30	10	<0.01	ND	0.72	<1	ND	<10	ND	
				12/18/91	<10	<5	ND	ND	<10	<0.01	ND	0.61	<2	ND	<10	ND	
				03/08/92	<10	<5	ND	10	<10	<0.01	ND	1.54	<2	ND	<10	ND	
				03/27/92	<10	<5	ND	72	10	<0.01	ND	0.38	<2	ND	<5	ND	
				05/20/92	<10	0.7	ND	50	20	<0.01	ND	0.87	<2	ND	<10	ND	
				08/05/92	<10	<0.5	ND	55	<10	<0.01	ND	0.77	1	ND	<5	ND	
				02/28/93	ND	<0.5	ND	ND	<10	ND	ND	ND	ND	ND	ND	ND	
				03/26/93	ND	<0.5	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	
				08/25/93	ND	<0.5	ND	ND	70	ND	ND	ND	ND	ND	ND	ND	
03/25/94	<10	ND	ND	90	ND	<0.01	ND	0.6	<1	ND	ND	ND					

**Outline** = Data Reporting Limit greater than Standard

**Outline and Shade** = Data Reporting Limit greater than Std. and PQL

**Shade and Outline** = Reported Concentration greater than Std., but less than PQL

**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data

C = Nitrite and Nitrate Combined

<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

**Table 4-12**  
**Detailed Analysis - Storm Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo-methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	No Std.			Dissolved Oxygen (mg/l)	TDS (mg/l)	
													Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)			Toxaphene Total (ug/l)
		Indian Bend Wash at Curry Road (Continued)		02/26/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	648	
				07/26/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	678	
				08/19/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	576	
				09/02/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		Fifth Street east of Ash Avenue		08/25/93	<5	<25	<5	<5	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	260
				09/13/93	ND	ND	ND	ND	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	280
				11/12/93	ND	ND	ND	ND	<5	<1	<1	<1	ND	<1	<0.5	<10	ND	760
				03/07/94	ND	ND	ND	ND	<5	<1	<1	<1	ND	<1	<0.5	<10	ND	180
				03/25/94	ND	ND	ND	ND	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	96
				04/26/94	ND	ND	ND	ND	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	120
				05/25/94	ND	ND	ND	ND	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	280
				08/08/94	ND	ND	ND	ND	<10	<2	<2	<2	ND	<2	<1	<20	ND	310
				12/05/94	<2	<2	<2	<2	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	140
				01/12/95	ND	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	170
				01/25/95	ND	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	65
				02/21/95	ND	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	440
				08/14/95	<50	<50	<50	<50	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	150
				08/19/95	<5	<5	<5	<5	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	100
				09/07/95	<50	<50	<50	<50	<0.5	<0.1	<0.1	<0.1	ND	<0.1	<0.05	<1	ND	80
				02/01/96	<50	<50	<50	<50	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	100
				02/25/96	<50	<50	<50	<50	<2.5	<0.5	<0.5	<0.5	ND	<0.5	<0.25	<5	ND	70
		Priest Drive Bridge over Salt River		12/31/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	491
				01/04/93	ND	ND	ND	ND	ND	ND	<0.04	<0.1	ND	<0.02	ND	ND	10.2	347
				01/12/93	ND	ND	ND	ND	ND	ND	<0.04	<0.1	ND	<0.02	ND	ND	8.1	292
				02/11/93	ND	ND	ND	ND	ND	ND	<0.04	<0.1	ND	<0.02	ND	ND	8.7	180
				01/06/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.8	230
				01/12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.6	440
				02/15/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.4	349
		48th Street Drain at 48th Street		11/10/91	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	8.2	57
				12/18/91	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	8.3	92
				03/08/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	8.9	89
				03/27/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	7.9	44
				05/20/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	6.9	116
				08/05/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	7.2	63
				02/28/93	ND	ND	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND	8.4	ND
				03/26/93	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	3.8	ND
				08/25/93	ND	ND	ND	ND	ND	ND	ND	ND	0.08	ND	ND	ND	ND	ND
				03/25/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	55

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C = Nitrite and Nitrate Combined

<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

**Table 4-12**  
**Detailed Analysis - Storm Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	No PQL Copper Total (ug/l)	No PQL Copper <sup>1</sup> Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	No PQL Thallium Total (ug/l)	No PQL Thallium Dissolved (ug/l)			
33.4153	-111.98	48th Street Drain at 48th Street (Continued)		05/24/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				10/15/94	<10	ND	ND	55	ND	<0.01	ND	1.32	<1	ND	ND	ND	ND	ND	ND
				11/12/94	<10	ND	ND	23	ND	<0.01	ND	1.17	<1	ND	ND	ND	ND	ND	ND
				01/04/95	<10	ND	ND	20	ND	<0.01	ND	0.55	<1	ND	ND	ND	ND	ND	ND
				08/14/95	<10	ND	ND	140	ND	0.02	ND	2.24	<1	ND	ND	ND	ND	ND	ND
				08/19/95	<10	ND	ND	120	ND	ND	ND	1.86	<1	ND	ND	ND	ND	ND	ND
				11/01/95	<10	ND	ND	140	ND	0.01	ND	1.48	<1	ND	ND	ND	ND	ND	ND
				02/01/96	<10	ND	ND	130	ND	<0.01	ND	0.59	<1	ND	ND	ND	ND	ND	ND
				07/25/96	<10	ND	ND	110	ND	0.01	ND	1.8	<1	ND	ND	ND	ND	ND	ND
				09/02/96	ND	ND	ND	ND	ND	ND	ND	ND	1.67	ND	ND	ND	ND	ND	ND
33.428	-111.99	Salt River at 40th Street		01/03/92	<0.2	ND	ND	ND	57	<0.01	ND	ND	<0.8	ND	<1	ND	ND		
				02/06/92	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	
				03/26/92	0.3	ND	ND	ND	63	ND	ND	ND	ND	<0.8	ND	<1	ND	ND	
				08/14/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/19/95	ND	ND	ND	80	<50	<0.01	ND	2	ND	ND	ND	ND	ND	ND	ND
				09/28/95	ND	ND	ND	230	20	<0.01	ND	1.3	ND	ND	ND	ND	ND	ND	ND
				11/01/95	ND	ND	ND	120	<50	<0.01	ND	1.4	ND	ND	ND	ND	ND	ND	ND
				02/01/96	ND	ND	ND	ND	ND	<0.025	ND	0.79	ND	ND	ND	ND	ND	ND	ND
				02/26/96	<5	<5	ND	85	<50	<0.025	<0.2	1.4	<20	<20	<20	<20	<20	<20	<20
				03/13/96	<5	<4	ND	69	<50	<0.025	<0.2	1.2	<20	<20	<20	<20	<50	<50	
07/09/96	<2	ND	ND	370	ND	<0.02	ND	ND	<5	ND	<5	ND	<1	ND					
09/04/96	<2	<2	ND	89	50	<0.02	<0.2	0.7	<5	<5	<5	<1	<1						
33.423	-112.02	500 feet east of I-10 Bridge over Salt		01/03/92	<0.2	ND	ND	ND	26	<0.01	ND	ND	<0.8	ND	<1	ND	ND		
				02/06/92	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND	ND	
				03/26/92	<0.2	ND	ND	ND	31	<0.01	ND	ND	<0.8	ND	<1	ND	ND		
				08/05/92	<0.2	ND	ND	ND	64	ND	ND	ND	<0.8	ND	<1	ND	ND		
				01/04/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				01/25/95	ND	ND	ND	<50	<50	<0.01	ND	2.1 C	ND	ND	ND	ND	ND	ND	
				08/19/95	ND	ND	ND	110	<50	0.03	ND	2.9	ND	ND	ND	ND	ND	ND	
				09/27/95	ND	ND	ND	76	25	0.02	ND	1.2	ND	ND	ND	ND	ND	ND	
				11/01/95	ND	ND	ND	65	<50	<0.01	ND	3.1	ND	ND	ND	ND	ND	ND	
				02/01/96	ND	ND	ND	ND	ND	ND	ND	0.97	ND	ND	ND	ND	ND	ND	
				02/26/96	<5	<5	ND	<50	<50	ND	<0.2	2.6	<20	<20	<20	<20	<20	<20	
				03/13/96	<5	<4	ND	<50	<50	<0.025	<0.2	1.1	<20	<20	<20	<50	<50		
				07/25/96	<2	<2	ND	<15	54	<0.02	<0.2	2	<5	<5	<5	<1	<1		
09/02/96	<2	<2	ND	36	36	ND	<0.2	1.9	<5	<5	<5	<1	<1						
09/11/96	<2	<2	ND	44	40	<0.02	<0.2	0.49	<5	<5	<5	<1	<1						

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**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

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<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

C = Nitrite and Nitrate Combined

**Table 4-12**  
**Detailed Analysis - Storm Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	No Std.			Dissolved Oxygen (mg/l)	TDS (mg/l)
													Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)		
		48th Street Drain at 48th Street (Continued)		05/24/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/15/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.1	153
				11/12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.8	76
				01/04/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.3	52
				08/14/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.6	335
				08/19/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.3	140
				11/01/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.6	152
				02/01/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	111
				07/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	424
				09/02/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		Salt River at 40th Street		01/03/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	90
				02/06/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				03/26/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	70
				08/14/95	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/19/95	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	150
				09/28/95	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	120
				11/01/95	<2	<5	<2	<2	<1.5	<0.1	<0.1	<1	ND	<0.5	<0.5	<2.5	ND
				02/01/96	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	5
				02/26/96	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	8.4	140
				03/13/96	<2	<5	<2	<2	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	1.2
				07/09/96	<2	<2	<2	<2	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<0.5	2.69
				09/04/96	<2	<2	<2	<2	ND	ND	ND	ND	ND	ND	ND	7.3	178
		500 feet east of I-10 Bridge over Salt		01/03/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	40
				02/06/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				03/26/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/05/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100
				01/04/95	<0.5	<0.5	<0.5	<0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
				01/25/95	<2	<2	<1	<2	<0.02	<0.01	<0.01	<0.01	ND	<0.01	<0.01	<0.02	ND
				08/19/95	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	170
				09/27/95	<2	<5	<2	<2	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND
				11/01/95	<2	<5	<2	<2	<1.5	<0.1	<0.1	<1	ND	<0.5	<0.5	<2.5	ND
				02/01/96	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	8.6	ND
				02/26/96	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	9.1	170
				03/13/96	<2	<5	<2	<2	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	9.4
				07/25/96	<2	<2	<2	<2	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<0.5	8.1
				09/02/96	<2	<2	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	336
				09/11/96	<2	<2	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	100

**Outline** = Data Reporting Limit greater than Standard  
**Outline and Shade** = Data Reporting Limit greater than Std. and PQL

**Shade and Outline** = Reported Concentration greater than Std., but less than PQL  
**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data  
C = Nitrite and Nitrate Combined

<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

**Table 4-13**  
**Detailed Analysis - Storm Water Quality**  
**Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfall to Salt River**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	No PQL Copper Total (ug/l)	No PQL Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	No PQL Thallium Total (ug/l)	No PQL Thallium Dissolved (ug/l)
33.417	-111.03	24th St. Bridge over Salt River	301	08/24/92	<10	ND	ND	300	ND	<0.01	<0.1	ND	0.13	<2	ND	<20	ND
				09/02/92	<10	<0.5	ND	2	<10.0	<0.01	<0.1	ND	<0.05 C	<2	ND	<10	ND

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo-methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	No Std. Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)
33.417	-111.03	24th St. Bridge over Salt River	301	08/24/92	ND	ND	ND	ND	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	5.6	225
				09/02/92	ND	ND	ND	ND	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	5.9	445

**Outline** = Data Reporting Limit greater than Standard

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**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data

C = Nitrite and Nitrate Combined

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-14**  
**Detailed Analysis - Storm Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	No PQL Copper Total (ug/l)	No PQL Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	No PQL Thallium Total (ug/l)	No PQL Thallium Dissolved (ug/l)
33.409	-112.12	Salt River at 27th Avenue	301	12/10/91	<10	ND	ND	ND	ND	<0.01	<0.1	ND	1.5	<2	ND	ND	ND
				12/18/91	<10	<0.5	ND	ND	10	<0.01	<0.1	ND	1.92	<2	ND	<10	ND
				03/02/92	<10	<0.5	ND	200	20	<0.01	<0.1	ND	4.63	<2	ND	<500	ND
				03/08/92	<10	0.4	ND	200	10	<0.01	<0.1	ND	1.59	<2	ND	<10	ND
				07/11/92	<10	<0.5	ND	50	20	<0.01	<0.1	ND	2.55	<2	ND	<10	ND
				08/22/92	<10	<0.5	ND	160	20	<0.01	0.2	ND	2.06	<1	ND	<10	ND
				12/08/92	ND	<0.5	ND	100	<10	<0.01	<0.1	ND	1.68	<2	ND	ND	ND
				11/13/93	ND	<0.5	ND	ND	10	ND	<0.1	ND	ND	ND	ND	ND	ND
				02/07/94	<10	0.4	ND	37	20	<0.01	<0.1	ND	0.43	<1	ND	ND	ND
				03/25/94	<10	<0.5	ND	72	20	<0.01	0.1	ND	1.92	<1	ND	ND	ND
				10/15/94	<10	ND	ND	22	ND	<0.01	0.1	ND	1.81	<1	ND	ND	ND
				12/05/94	<10	ND	ND	2	ND	<0.01	<0.1	ND	3.92	<1	ND	ND	ND
				01/04/95	<10	ND	ND	130	ND	0.01	0.1	ND	3.33	<1	ND	ND	ND
				11/01/95	<10	ND	ND	120	ND	0.01	<0.1	ND	2.52	<1	ND	ND	ND
				02/01/96	<10	ND	ND	230	ND	<0.01	<0.1	ND	2.31	<1	ND	ND	ND
				02/25/96	<10	ND	ND	91	ND	<0.01	<0.1	ND	3.54	<1	ND	ND	ND
				03/14/96	<10	ND	ND	110	ND	<0.01	<0.1	ND	3.17	<20	ND	ND	ND
				07/06/96	<10	ND	ND	220	ND	<0.01	<0.1	ND	3.55	<1	ND	ND	ND
				07/09/96	<10	ND	ND	140	ND	<0.01	<0.1	ND	2.02	<1	ND	ND	ND
				07/25/96	<10	ND	ND	94	ND	<0.01	<0.1	ND	2.04	<1	ND	ND	ND

**Outline** = Data Reporting Limit greater than Standard

**Shade and Outline** = Reported Concentration greater than Std., but less than PQL

**Outline and Shade** = Data Reporting Limit greater than Std. and PQL

**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data

C = Nitrite and Nitrate Combined

**Table 4-14**  
**Detailed Analysis - Storm Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo-methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	No Std. Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)
		Salt River at 27th Avenue	301	12/10/91	<0.2	<0.2	<0.2	<0.2	ND	ND	ND	ND	ND	ND	ND	ND	7.3	110
				12/18/91	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	0.14	<0.1	ND	<0.02	<0.03	<2	9	122
				03/02/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	0.67	0.1	ND	<0.02	<0.03	<2	8.5	158
				03/08/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	1.1	<0.1	ND	<0.02	<0.03	<2	7.6	112
				07/11/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	0.35	<0.1	ND	<0.02	<0.03	<2	7.1	138
				08/22/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.04	<0.1	ND	<0.02	<0.03	<2	5.9	121
				12/08/92	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	1.4	1.1	ND	<0.02	<0.03	<2	10.2	70
				11/13/93	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND
				02/07/94	ND	ND	ND	ND	ND	ND	ND	ND	0.48	ND	ND	ND	ND	143
				03/25/94	ND	ND	ND	ND	ND	ND	ND	ND	<0.2	ND	ND	ND	ND	124
				10/15/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.6	128
				12/05/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.8	464
				01/04/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.6	143
				11/01/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5	155
				02/01/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	174
				02/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	161
				03/14/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	137
				07/06/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	235
				07/09/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2	122
				07/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	131

Outline = Data Reporting Limit greater than Standard  
Outline and Shade = Data Reporting Limit greater than Std. and PQL  
Shade and Outline = Reported Concentration greater than Std., but less than PQL  
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance  
ND = No Data  
C = Nitrite and Nitrate Combined

**Detailed Analysis - Storm Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	No PQL Copper Total (ug/l)	No PQL Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	No PQL Thallium Total (ug/l)	No PQL Thallium Dissolved (ug/l)			
33.416	-112.14	Salt River at 35th Avenue		01/03/92	<0.2	ND	ND	ND	230	<0.01	<2	ND	ND	<0.8	ND	<1	ND			
				02/06/92	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				03/26/92	ND	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/22/92	<0.2	ND	ND	ND	100	<0.01	<2	ND	ND	<0.8	ND	<1	ND	ND	ND	
				12/05/94	ND	ND	ND	<50	<50	0.01	<1	ND	0.99 C	ND	ND	ND	ND	ND	ND	
				01/04/95	ND	ND	ND	<50	<50	<0.01	<1	ND	0.57 C	ND	ND	ND	ND	ND	ND	
				03/11/95	ND	ND	ND	<50	<50	<0.01	<1	ND	1.7 C	ND	ND	ND	ND	ND	ND	
				08/14/95	ND	ND	ND	130	<50	ND	<1	ND	ND	ND	ND	ND	ND	ND	ND	
				08/19/95	ND	ND	ND	80	<50	<0.01	<1	ND	1.2	ND	ND	ND	ND	ND	ND	
				09/07/95	ND	ND	ND	52	15	<0.01	<1	ND	<0.05	ND	ND	ND	ND	ND	ND	
				09/28/95	ND	ND	ND	420	4	<0.01	1	ND	0.55	ND	ND	ND	ND	ND	ND	
				11/01/95	ND	ND	ND	170	<50	<0.01	<1	ND	0.74	ND	ND	ND	ND	ND	ND	
				02/01/96	<5	<4	ND	120	<50	ND	<0.2	<0.2	0.66	<20	<20	<2	<2	ND	ND	
				03/13/96	<5	<4	ND	<50	40	ND	<0.2	<0.2	0.36	<20	<20	<50	<20	ND	ND	
				07/07/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				07/15/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
07/25/96	<2	<2	ND	137	24	ND	<0.2	<0.2	1.35	<5	<5	<1	<1	ND	ND					
09/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
33.406	-112.17	51st Avenue Bridge over Salt River		01/07/95	<10	ND	ND	15	ND	<0.01	0.1	ND	0.84	<1	ND	ND	ND			
				01/30/95	<10	ND	ND	3	ND	<0.01	<0.1	ND	1.45	<1	ND	ND	ND	ND		
				02/17/95	<10	ND	ND	23	ND	<0.01	<0.1	ND	<0.02 C	<1	ND	ND	ND	ND		

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C = Nitrite and Nitrate Combined

**Shade and Outline** = Reported Concentration greater than Std., but less than PQL  
**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

**Detailed Analysis - Storm Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	No Std. Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)	
		Salt River at 35th Avenue		01/03/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	
				02/06/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				03/26/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/22/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	660
				12/05/94	ND	ND	ND	ND	<0.35	<0.23	<0.12	<0.23	ND	<0.23	<0.12	<1.2	ND	150	
				01/04/95	<0.5	<0.5	<0.5	<0.5	<0.15	<0.15	<0.1	<0.1	ND	<0.1	<0.05	<0.5	ND	480	
				03/11/95	<2	<2	<2	<2	<0.17	<0.17	<0.11	<0.055	ND	<0.11	<0.005	<0.55	ND	270	
				08/14/95	<2	<5	<2	<2	<0.15	<0.15	<0.1	<0.1	ND	<0.1	<0.05	<0.5	ND	ND	
				08/19/95	<2	<5	<2	<2	<0.15	<0.15	<0.1	<0.1	ND	<0.1	<0.05	<0.5	ND	360	
				09/07/95	<2	<5	<2	<2	<0.15	<0.15	<0.1	<0.1	ND	<0.1	<0.05	<0.5	ND	220	
				09/28/95	<2	<5	<2	<2	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	270	
				11/01/95	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	130
				02/01/96	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.3	90
				03/13/96	<2	<5	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.3	260
				07/07/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.87	ND
				07/15/96	<2	<2	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.15	ND
			07/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.1	290	
			09/11/96	<2	<2	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.85	ND	
		51st Avenue Bridge over Salt River		01/07/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.9	347	
				01/30/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2	513	
				02/17/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.2	233	

Outline = Data Reporting Limit greater than Standard  
Outline and Shade = Data Reporting Limit greater than Std. and PQL  
Shade and Outline = Reported Concentration greater than Std., but less than PQL  
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance  
ND = No Data  
C = Nitrite and Nitrate Combined

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

**Table 4-15**  
**Detailed Analysis - Surface Water Quality**  
**Reach 1: Granite Reef Dam to 2 km Downstream**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium (ug/l)	Boron Total (ug/l)	Boron Dissolved (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	Thallium (ug/l)	
33:30.6:44.6	111:41.4:6.6	Arizona Canal at Granite Reef Dam	508	2/18/92	ND	150	ND	20.7	ND	ND	0.2	ND	BDL	BDL	ND	ND	
				3/24/92	ND	140	ND	40	ND	ND	0.3	ND	BDL	BDL	ND	ND	
				4/21/92	ND	150	ND	BDL	ND	ND	0.2	ND	1.03	BDL	ND	ND	
				5/19/92	ND	90	ND	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				6/24/92	ND	ND	60	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				7/23/92	ND	ND	40	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				8/18/92	ND	ND	50	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				9/23/92	ND	ND	60	ND	BDL	ND	ND	<b>0.2</b>	BDL	BDL	ND	BDL	ND
				10/21/92	ND	ND	60	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				11/24/92	ND	ND	90	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				12/17/92	ND	ND	60	ND	BDL	ND	ND	BDL	BDL	ND	BDL	ND	
				33:30.6:44.6	111:41.4:6.6	Arizona Canal at Granite Reef Dam	501	1/24/96	ND	ND	ND	ND	ND	ND	ND	ND	ND
2/13/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
3/14/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
4/17/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
5/14/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
6/12/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
7/10/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
8/28/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
9/24/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
10/23/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
11/11/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
12/17/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
1/21/97	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	
2/25/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					

ND = No Data  
BDL = Below Detection Limit  
C = Nitrite and Nitrate Combined  
= Data Reporting Limit greater than Standard

**Shade and Outline**

= Reported Concentration greater than Std., but less than PQL

**Shade**

= Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exc

**Outline**

**Outline and Shade** = Data Reporting Limit greater than Std. and PQL

**Table 4-15**  
**Detailed Analysis - Surface Water Quality**  
**Reach 1: Granite Reef Dam to 2 km Downstream**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)		
33:30.6:44.6	111:41.4:6.6	Arizona Canal at Granite Reef Dam	508	2/18/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	341		
				3/24/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	368	
				4/21/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	287	
				5/19/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	465	
				6/24/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	388	
				7/23/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	360	
				8/18/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	406	
				9/23/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	389	
				10/21/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	202	
				11/24/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	242	
				12/17/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	394	
				33:30.6:44.6	111:41.4:6.6	Arizona Canal at Granite Reef Dam	501	1/24/96	BDL	BDL	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND
2/13/96	BDL	BDL	BDL					BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
3/14/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
4/17/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
5/14/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
6/12/96	ND	ND	0.6					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7/10/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
8/28/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9/24/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10/23/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11/11/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12/17/96	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1/21/97	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2/25/97	ND	ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = No Data

BDL = Below Detection Limit

C = Nitrite and Nitrate Combined

= Data Reporting Limit greater than Standard

Outline

Outline and Shade = Data Reporting Limit greater than Std. and PQL

Shade and Outline = Reported Concentration greater than Std., but less than PQL

Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-16**  
**Detailed Analysis - Surface Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
Greeley and Hansen  
July 1998

Longitude	Latitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Thallium Total (ug/l)		
33:27:11	111:51:25	Salt River near Alma School Road	503	1/7/95	10	ND	ND	4	ND	ND	0.1	ND	0.14 C	1	ND		
				1/30/95	10	ND	ND	2	ND	ND	0.1	ND	0.13 C	1	ND		
				2/16/95	10	ND	ND	47	ND	ND	0.1	ND	0.09 C	1	ND		
33:26:37	111:54:53	Indian Bend Wash at Curry Road	503	2/8/94	10	0.5	ND	19	10	0.01	0.1	ND	3.6 C	1	ND		
				10/15/94	10	ND	ND	12	ND	0.01	0.1	ND	0.35 C	1	ND		
				12/6/94	10	ND	ND	130	ND	0.01	0.1	ND	1.8 C	1	ND		
				12/6/94	10	ND	ND	5	ND	ND	0.1	ND	1.3 C	1	ND		
				1/5/95	10	ND	ND	7	ND	0.01	0.1	ND	0.67 C	1	ND		
				1/6/95	10	ND	ND	5	ND	0.01	0.1	ND	0.41 C	1	ND		
				8/20/95	10	ND	ND	8	ND	ND	0.1	ND	1.1 C	1	ND		
				9/28/95	10	ND	ND	25	ND	0.01	0.1	ND	0.38 C	1	ND		
33:26:38	111:56:04	Papago Water Treatment Plant Discharge	408	4/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				10/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:21:44.6	111:46:36.2	Kyrene Reclamation Plant	408	5/92	ND	ND	270	<10	ND	<0.01	<0.2	ND	ND	<5	ND		
				6/92	ND	ND	360	11	ND	<0.01	<2	ND	ND	<5	ND		
				7/92	ND	ND	360	11	ND	<0.01	<0.2	ND	ND	<5	ND		
				8/92	ND	ND	260	<10	ND	<0.01	<0.2	ND	ND	<5	ND		
				10/94	ND	ND	510	<50	ND	<0.02	<0.2	ND	ND	<10	ND		
				11/94	ND	ND	380	<10	ND	<0.01	<0.2	ND	ND	<5	ND		
				12/94	ND	ND	440	<10	ND	<0.01	<0.2	ND	ND	<5	ND		
				1/95	ND	ND	350	<10	ND	<0.01	<2	ND	ND	<5	ND		

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**Table 4-16**  
**Detailed Analysis - Surface Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Longitude	Latitude	Sampling Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)		
33:27:11	111:51:25	Salt River near Alma School Road	503	1/7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.7	ND		
				1/30/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.4	ND	
				2/16/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.9	ND	
33:26:37	111:54:53	Indian Bend Wash at Curry Road	503	2/8/94	ND	ND	ND	ND	ND	ND	ND	ND	0.12	ND	ND	ND	ND	ND		
				10/15/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.9	ND	
				12/6/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.8	ND	
				12/6/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.9	ND	
				1/5/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.2	ND
				1/6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.1	ND
				8/20/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.1	ND
				9/28/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.3	ND
33:26:38	111:56:04	Papago Water Treatment Plant Discharge	408	4/93	ND	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/95	<0.5	0.7	<0.5	<0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				10/95	<0.5	<0.5	<0.5	<0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				1/96	2	0.5	6.3	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/96	<0.5	<0.5	<0.5	<0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:21:44.6	111:46:36.2	Kyrene Reclamation Plant	408	5/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				6/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				7/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				8/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				10/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				11/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		

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**Table 4-16**  
**Detailed Analysis - Surface Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Longitude	Latitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Thallium Total (ug/l)
33:21:44.6	111:46:36.2	Kyrene Reclamation Plant (Continued)	408	2/95	ND	ND	320	<10	ND	<0.01	<2	ND	ND	<5	ND
				3/95	ND	ND	280	<10	ND	<0.01	<2	ND	ND	<5	ND
				4/95	ND	ND	350	<10	ND	<0.01	<2	ND	ND	<5	ND
				5/95	ND	ND	340	<10	ND	<0.01	<2	ND	ND	<5	ND
				6/95	ND	ND	300	<10	ND	<0.00	<2	ND	ND	<5	ND
				7/95	ND	ND	330	<10	ND	<0.01	<2	ND	ND	<5	ND
				8/95	ND	ND	40	<10	ND	<0.01	<2	ND	ND	<5	ND
				9/95	ND	ND	390	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				10/95	ND	ND	380	<5	ND	<0.01	<2	ND	ND	<5	ND
				11/95	ND	ND	400	<10	ND	<0.01	<2	ND	ND	<5	ND
				12/95	ND	ND	540	<10	ND	<0.01	<2	ND	ND	<5	ND
				1/96	ND	ND	500	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				2/96	ND	ND	300	<15	ND	<0.01	<0.2	ND	ND	<5	ND
				3/96	ND	ND	300	<15	ND	<0.01	<0.2	ND	ND	<5	ND
				4/96	ND	ND	300	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				5/96	ND	ND	300	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				6/96	ND	ND	400	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				7/96	ND	ND	400	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				8/96	ND	ND	400	<10	ND	<0.01	<0.2	ND	ND	<5	ND
				9/96	ND	ND	340	<20	ND	<0.01	<0.2	ND	ND	<5	ND
10/96	ND	ND	400	<10	ND	<0.01	<0.2	ND	ND	<5	ND				
11/96	ND	ND	500	<10	ND	<0.01	<0.2	ND	ND	<5	ND				
1/97	ND	ND	300	<10	ND	<0.01	<0.2	ND	ND	<5	ND				
2/97	ND	ND	400	<10	ND	<0.01	<0.2	ND	ND	<5	ND				
4/97	ND	ND	400	<10	ND	<0.01	<0.2	ND	ND	<5	ND				
33:26:01	111:57:37	Salt River at Priest Drive	503	12/31/92	10	0.5	ND	3	10	ND	0.1	ND	ND	2	ND
				1/4/93	10	0.5	ND	6	10	0.010	0.1	ND	0.1 C	2	10
				1/12/93	10	0.5	ND	25	10	0.010	0.1	ND	0.2 C	2	10
				2/11/93	10	0.5	ND	13	10	0.010	0.1	ND	0.3 C	2	10
				1/6/95	10	ND	ND	27	ND	0.010	0.4	ND	0.24 C	1	ND
				1/12/95	10	ND	ND	2	ND	0.010	0.1	ND	0.15 C	1	ND
				2/15/95	10	ND	ND	58	ND	0.010	0.2	ND	0.12 C	1	ND

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**Table 4-16**  
**Detailed Analysis - Surface Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Longitude	Latitude	Sampling Location	Source Code	Date	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Dibromodichloro-methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)			
33:21:44.6	111:46:36.2	Kyrene Reclamation Plant (Continued)	408	2/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
				3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
33:26:01	111:57:37	Salt River at Priest Drive	503	12/31/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
				1/4/93	ND	ND	ND	ND	0.1	0.1	0.04	0.1	0.01	0.02	0.03	2	10.2	ND			
				1/12/93	ND	ND	ND	ND	0.1	0.1	0.04	0.1	0.01	0.02	0.03	2	8.1	ND			
				2/11/93	ND	ND	ND	ND	0.1	0.1	0.04	0.1	0.01	0.02	0.03	2	8.7	ND			
				1/6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.8	ND		
				1/12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.6	ND		
				2/15/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.4	ND		

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**Table 4-16**  
**Detailed Analysis - Surface Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Longitude	Latitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Thallium Total (ug/l)	
33:17:10.794	111:57:54.247	Gila Drain near 48th St. and Pecos	502	1/24/96	BDL	ND	271	11	ND	ND	BDL	ND	10.2	ND	ND	
				2/13/96	BDL	ND	237	BDL	ND	BDL	ND	BDL	ND	5.55	ND	ND
				3/15/96	ND	ND	144	ND	ND	ND	ND	ND	ND	2.28	ND	ND
				4/17/96	ND	ND	149	15	ND	ND	ND	ND	ND	0.65	ND	ND
				5/14/96	ND	ND	208	ND	ND	ND	ND	ND	ND	1.24	ND	ND
				6/12/96	ND	ND	97	ND	ND	ND	ND	ND	ND	0.58	ND	ND
				7/10/96	ND	ND	137	ND	ND	ND	ND	ND	ND	0.65	ND	ND
				8/28/96	ND	ND	170	ND	ND	ND	ND	ND	ND	2	ND	ND
				9/24/96	ND	ND	276	ND	ND	ND	ND	ND	ND	4.88	ND	ND
				10/13/96	ND	ND	291	ND	ND	ND	ND	ND	ND	4.52	ND	ND
				11/11/96	ND	ND	669	ND	ND	ND	ND	ND	ND	7.68	ND	ND
				12/17/96	ND	ND	198	ND	ND	ND	ND	ND	ND	2.71	ND	ND
				1/21/97	ND	ND	1170	ND	ND	ND	ND	ND	ND	1.61	ND	ND
				2/25/97	ND	ND	163	ND	ND	ND	ND	ND	ND	0.8	ND	ND
				3/26/97	ND	ND	277	ND	ND	ND	ND	ND	ND	2.33	ND	ND
				4/29/97	ND	ND	130	13	ND	ND	ND	ND	ND	0.19	ND	ND
				5/15/97	ND	ND	307	10	ND	ND	ND	ND	ND	2.66	ND	ND
6/24/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.81	ND	ND				

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Outline and Shade = Data Reporting Limit greater than Std. and PQL     
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C = Nitrite and Nitrate Combined  
BDL = Below Detection Limit

**Table 4-16**  
**Detailed Analysis - Surface Water Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Longitude	Latitude	Sampling Location	Source Code	Date	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Dibromodichloro-methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)
33:17:10.794	111:57:54.247	Gila Drain near 48th St. and Pecos	502	1/24/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/13/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/15/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/14/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/28/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				9/24/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/13/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/21/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/25/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/26/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/29/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/15/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/24/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

**Outline**

= Data Reporting Limit greater than Standard

**Shade and Outline**

= Reported Concentration greater than Std., but less than PQL

**Outline and Shade**

= Data Reporting Limit greater than Std. and PQL

**Shade**

= Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data  
C = Nitrite and Nitrate Combined  
BDL = Below Detection Limit

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

**Table 4-17**  
**Detailed Analysis - Surface Water Quality**  
**Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfall to Salt River**  
Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide (mg/l)	Mercury Total (ug/l)	Nitrite/Nitrate (mg-N/l)	Selenium Total (ug/l)	Thallium Total (ug/l)	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)			
33:24:56	112:01:45	Salt River at 24th Street, Phoenix	503	8/24/92	10	ND	ND	300	ND	0.01	0.1	0.15	2	20	ND	ND			
				9/2/92	10	0.5	ND	2	10	0.01	0.1	0.05	2	10	ND	ND			
33:30:30	112:04:00	One Camelback, Inc. (NPDES Permit)	204	8/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				5/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:20:49	112:05:03	Salt River Tributary at South Mntn. Park	503	1/12/92	10	0.5	ND	27	10	0.01	0.1	1.4	2	5	0.2	0.2			
				2/7/92	10	ND	ND	210	ND	ND	0.1	0.59	2	ND	ND	ND	ND		
33:24:52	112:05:06	Union Rock and Materials	204	3/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL		
				4/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				6/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				12/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				1-6/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				7/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				11/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				2/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
				5/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	
6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL					

Outline

= Data Reporting Limit greater than Standard

Shade and Outline

= Reported Concentration greater than Std., but less than PQL

Outline and Shade

= Data Reporting Limit greater than Std. and PQL

Shade

= Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

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**Table 4-17**  
**Detailed Analysis - Surface Water Quality**  
**Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfall to Salt River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Chloroform	Chlorodibromo-	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Lindane	Toxaphene	Dissolved Oxygen	TDS	
					Total (ug/l)	methane (ug/l)						Total (ug/l)		Total (ug/l)			
33:24:56	112:01:45	Salt River at 24th Street, Phoenix	503	8/24/92	ND	ND	0.1	0.1	0.04	0.1	ND	0.02	0.03	2	5.6	ND	
				9/2/92	ND	ND	0.1	0.1	0.04	0.1	ND	0.02	0.03	2	5.9	ND	
33:30:30	112:04:00	One Camelback, Inc. (NPDES Permit)	204	8/96	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				4/97	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				5/97	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/97	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:20:49	112:05:03	Salt River Tributary at South Mtn. Park	503	1/12/92	0.2	0.2	0.1	0.1	0.04	0.1	ND	0.02	0.03	2	7.3	ND	
				2/7/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:24:52	112:05:06	Union Rock and Materials	204	3/91	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				4/91	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				6/91	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				12/91	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1-6/92	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				7/93	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				11/94	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				12/94	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1/95	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				2/95	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
4/95	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
5/95	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
6/95	BDL	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					

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MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Thallium Total (ug/l)	Thallium Dissolved (ug/l)	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)		
33:24:31	112:06:56	27th Avenue at Salt River	503	12/10/91	10	ND	ND	ND	ND	0.01	0.1	1.7 C	2	ND	ND	0.2	0.2		
				12/18/91	10	0.5	ND	ND	10	0.01	0.1	2.0 C	2	10	ND	0.2	0.2		
				12/19/91	ND	ND	ND	ND	ND	ND	ND	2.0 C	ND	ND	ND	ND	ND	ND	
				2/7/92	10	ND	ND	320	ND	0.01	0.1	ND	2	ND	ND	0.2	0.2		
				3/2/92	10	0.5	ND	200	20	0.01	0.1	4.7 C	2	500	ND	0.2	0.2		
				3/8/92	10	0.5	ND	200	10	0.01	0.1	1.7 C	2	10	ND	0.2	0.2		
				3/27/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				7/11/92	10	0.5	ND	50	20	0.01	0.1	2.6 C	2	10	ND	0.2	0.2		
				8/22/92	10	0.5	ND	160	20	0.01	0.2	2.1 C	1	10	ND	0.2	0.2		
				12/8/92	10	0.5	ND	100	10	ND	0.1	1.8 C	2	10	ND	0.2	0.2		
				12/18/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/13/93	ND	0.5	ND	ND	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/7/94	10	0.6	ND	37	30	0.01	0.1	0.48 C	1	ND	ND	ND	ND		
				3/25/94	10	0.5	ND	72	20	0.01	0.1	2.0 C	1	ND	ND	ND	ND		
				10/15/94	10	ND	ND	22	ND	0.01	0.1	1.9 C	1	ND	ND	ND	ND		
12/5/94	10	ND	ND	2	ND	0.01	0.1	4.2 C	1	ND	ND	ND	ND						
1/4/95	10	ND	ND	130	ND	0.01	0.1	3.5 C	1	ND	ND	ND	ND						
11/1/95	10	ND	ND	120	ND	0.01	0.1	2.6 C	1	ND	ND	ND	ND						
33:24.6:33.6	112:7.8:48	35th Avenue Bridge NE	402	Ave. 7/92-6/93	0	<0.3	ND	6.6	<3	ND	ND	ND	0	<2	ND	ND			
33:24:27	112:10:06	Salt River at 51st Avenue Bridge at Phoenix	503	1/7/95	10	ND	ND	15	ND	0.010	0.1	0.87 C	1	ND	ND	ND	ND		
				1/30/95	10	ND	ND	3	ND	0.010	0.1	1.5 C	1	ND	ND	ND	ND		
				2/17/95	10	ND	ND	23	ND	0.010	0.1	0.02 C	1	ND	ND	ND	ND		
33:24:33.6	112:9.6:51	51st Avenue Bridge NW	402	Ave. 7/92-6/93	0	<0.3	ND	8	<3	ND	ND	ND	0	<2	ND	ND			
33:23.4:56.4	112:12:25.2	67th Avenue Bridge NW	402	Ave. 7/92-6/93	0.1	<0.3	ND	9	<3	ND	ND	ND	0	<2	ND	ND			

**Outline** = Data Reporting Limit greater than Standard  
**Outline and Shade** = Data Reporting Limit greater than Std. and PQL

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ND = No Data  
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**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**

(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Chloroform	Chlorodibromo-	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS		
					Total (ug/l)	methane Total (ug/l)					Total (ug/l)	Total (ug/l)	Total (ug/l)	Lindane (ug/l)		Total (ug/l)	Oxygen (mg/l)
33:24:31	112:06:56	27th Avenue at Salt River	503	12/10/91	0.2	0.2	ND	ND	ND	ND	ND	ND	ND	7.3	ND		
				12/18/91	0.2	0.2	0.1	0.1	0.14	0.1	ND	0.02	0.03	1	9	ND	
				12/19/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/7/92	0.2	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/2/92	0.2	0.2	0.1	0.1	0.67	0.1	ND	0.02	0.03	1	8.5	ND	
				3/8/92	0.2	0.2	0.1	0.1	1.1	0.1	ND	0.02	0.03	1	7.6	ND	
				3/27/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5	ND
				7/11/92	0.2	0.2	0.1	0.1	0.35	0.1	ND	0.02	0.03	2	7.1	ND	
				8/22/92	0.2	0.2	0.1	0.1	0.04	0.1	ND	0.02	0.03	1	5.9	ND	
				12/8/92	0.2	0.2	0.1	0.1	0.4	0.1	ND	0.02	0.03	1	10.2	ND	
				12/18/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/13/93	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND
				2/7/94	ND	ND	ND	ND	ND	ND	0.48	ND	ND	ND	ND	ND	ND
				3/25/94	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	ND	ND	ND
				10/15/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.6	ND
				12/5/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.8	ND
1/4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.6	ND				
11/1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5	ND				
35th Avenue Bridge NE			401	Ave. 7/92-6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
33:24:27	112:10:06	Salt River at 51st Avenue Bridge at Phoenix	503	1/7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				1/30/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				2/17/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
51st Avenue Bridge NW			401	Ave. 7/92-6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
67th Avenue Bridge NW			401	Ave. 7/92-6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			

Outline = Data Reporting Limit greater than Standard  
Outline and Shade = Data Reporting Limit greater than Std. and PQL  
Shade and Outline = Reported Concentration greater than Std., but less than PQL  
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance  
 ND = No Data  
 C = Nitrite and Nitrate Combined

**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium	Beryllium	Boron	Copper	Copper	Cyanide	Mercury	Nitrate	Selenium	Thallium	Thallium	Bromodichloro- methane Total	Bromoform	
					Total	Dissolved		Total	Dissolved				Total	Dissolved	Total			
					(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(ug/l)	(mg-N/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	
33:20:55.146	112:12:5.219	Laveen Drain at Deadhorse Ditch	502	1/24/96	BDL	ND	257	13	ND	ND	BDL	0.46	ND	ND	ND	ND	ND	
				2/13/96	BDL	ND	296	BDL	ND	BDL	2.07	ND	ND	ND	ND	ND	ND	ND
				3/15/96	ND	ND	326	ND	ND	ND	2.66	ND	ND	ND	ND	ND	ND	ND
				4/17/96	ND	ND	322	ND	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND
				5/14/96	ND	ND	296	ND	ND	ND	1.75	ND	ND	ND	ND	ND	ND	ND
				6/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/11/96	ND	ND	256	ND	ND	ND	1.62	ND	ND	ND	ND	ND	ND	ND
				8/27/96	ND	ND	226	ND	ND	ND	1.56	ND	ND	ND	ND	ND	ND	ND
				9/25/96	ND	ND	349	ND	ND	ND	2.3	ND	ND	ND	ND	ND	ND	ND
				10/22/96	ND	ND	321	ND	ND	ND	3	ND	ND	ND	ND	ND	ND	ND
				11/11/96	ND	ND	630	ND	ND	ND	5.53	ND	ND	ND	ND	ND	ND	ND
				1/21/96	ND	ND	526	ND	ND	ND	7.16	ND	ND	ND	ND	ND	ND	ND
				2/26/97	ND	ND	355	ND	ND	ND	2.46	ND	ND	ND	ND	ND	ND	ND
				3/25/97	ND	ND	271	11	ND	ND	2.11	ND	ND	ND	ND	ND	ND	ND
				4/28/97	ND	ND	497	ND	ND	ND	5.58	ND	ND	ND	ND	ND	ND	ND
				5/14/97	ND	ND	374	ND	ND	ND	4.25	ND	ND	ND	ND	ND	ND	ND
6/24/97	ND	ND	ND	ND	ND	ND	2.2	ND	ND	ND	ND	ND	ND	ND				
33:22:2:46.2	112:13:2:22.8	SRP Canal enters Salt River 0.6 miles west of 75th Avenue	401	2/24/93	0	ND	150	0	ND	ND	0	ND	0	ND	ND	ND	ND	
33:22:49.005	112:13:31.356	Maricopa Drain at Lateral 14 on Western Canal	502	1/24/96	ND	ND	633	14	ND	ND	BDL	5.96	ND	ND	ND	ND	ND	
				2/13/96	BDL	ND	1040	BDL	ND	BDL	10.7	ND	ND	ND	ND	ND	ND	
				3/15/96	BDL	ND	573	ND	ND	ND	8.11	ND	ND	ND	ND	ND		
				4/17/96	ND	ND	307	ND	ND	ND	2.28	ND	ND	ND	ND	ND		
				6/11/96	ND	ND	354	ND	ND	ND	0.84	ND	ND	ND	ND	ND		
				7/11/96	ND	ND	285	ND	ND	ND	10.5	ND	ND	ND	ND	ND		
				8/27/96	ND	ND	398	10	ND	ND	1.33	ND	ND	ND	ND	ND		
				10/22/96	ND	ND	575	ND	ND	ND	5.98	ND	ND	ND	ND	ND		
				11/11/96	ND	ND	679	ND	ND	ND	6.12	ND	ND	ND	ND	ND		
				12/17/96	ND	ND	489	22	ND	ND	2.39	ND	ND	ND	ND	ND		
				1/21/97	ND	ND	470	ND	ND	ND	2.94	ND	ND	ND	ND	ND		
				3/25/97	ND	ND	798	11	ND	ND	7.45	ND	ND	ND	ND	ND		
				4/28/97	ND	ND	242	ND	ND	ND	2.03	ND	ND	ND	ND	ND		
5/14/97	ND	ND	ND	ND	ND	ND	3.16	ND	ND	ND	ND	ND						
6/24/97	ND	ND	ND	ND	ND	ND	4.92	ND	ND	ND	ND	ND						
33:20:4:3.6	112:13:2:57.6	Gravel Mine Discharge, 0.4 miles east of 83rd Ave and Salt River	401	2/23/94	ND	ND	920	288	ND	ND	0.5	ND	0	ND	ND	ND	ND	

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**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS			
					Total (ug/l)	methane Total (ug/l)					Total (ug/l)	Total (ug/l)	Total (ug/l)	Lindane (ug/l)		Oxygen (mg/l)		
33:20:55.146	112:12:5.219	Laveen Drain at Deadhorse Ditch	502	1/24/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
				2/13/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				3/15/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/14/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/27/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				9/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/22/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/21/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/26/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/25/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/28/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/14/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/24/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
33:22.2:46.2	112:13.2:22.8	SRP Canal enters Salt River 0.6 miles west of 75th Avenue	401	2/24/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.4	ND			
33:22:49.005	112:13:31.356	Maricopa Drain at Lateral 14 on Western Canal	502	1/24/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
				2/13/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				3/15/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/27/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/22/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/21/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/25/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/28/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/14/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/24/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				33:20.4:3.6	112:13.2:57.6	Gravel Mine Discharge, 0.4 miles east of 83rd Ave and Salt River	401	2/23/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	15

Outline = Data Reporting Limit greater than Standard  
Outline and Shade = Data Reporting Limit greater than Std. and PQL  
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Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance  
ND = No Data  
C = Nitrite and Nitrate Combined

**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium	Beryllium	Boron	Copper	Copper	Cyanide	Mercury	Nitrate	Selenium	Thallium	Thallium	Bromodichloro- methane Total	Bromoform
					Total	Dissolved		Total	Dissolved				Total	Total			
					(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(ug/l)	(mg-N/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
33:22.8:25.2	112:15:24	Salt River 1/2 mile south of 91st Discharge	401	4/96	4	ND	ND	25	ND	ND	0.2	0.05 C	4	60	ND	ND	ND
				6/96	4	ND	ND	10	ND	ND	0.2	0.05 C	4	24	ND	ND	ND
				10/96	ND	ND	DN	2.9	ND	ND	0.2	0.2 C	4	ND	ND	ND	ND
				12/96	ND	ND	ND	10	ND	ND	0.2	0.6 C	5	ND	ND	ND	ND
33:25:45	112:14:54	City of Tolleson Wastewater Utilities	406	3/90	ND	ND	ND	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				4/90	ND	ND	ND	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				6/90	ND	ND	ND	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				7/90	ND	ND	ND	ND	<50	0.015	1.5	ND	<5	ND	ND	ND	ND
				8/90	ND	ND	ND	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				4/91	ND	ND	ND	ND	<50	<0.01	0.0	ND	<5	ND	ND	ND	ND
				5/91	ND	ND	210	ND	<50	<0.01	0.1	ND	<5	ND	ND	ND	ND
				6/91	ND	ND	300	ND	<50	0.014	0.2	ND	<5	ND	ND	ND	ND
				10/91	ND	ND	345	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				11/91	ND	ND	350	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				12/91	<10	ND	340	ND	<50	<0.01	0.2	ND	<5	<10	ND	ND	ND
				1/92	ND	ND	335	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				2/92	ND	ND	355	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				3/92	ND	ND	335	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				4/92	ND	ND	350	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				6/92	ND	ND	320	ND	14.5	<0.01	0.2	ND	<5	ND	ND	ND	ND
				11/92	ND	ND	355	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				1/93	ND	ND	370	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
				2/24/93	0	ND	420	14	ND	ND	0	ND	0	ND	ND	ND	ND
				3/93	ND	ND	200	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND
4/93	ND	ND	285	ND	<50	<0.01	0.5	ND	<5	ND	ND	ND	ND				
6/93	ND	ND	320	ND	<50	ND	0.2	ND	1.5	ND	ND	ND	ND				
7/93	ND	ND	275	ND	<50	<0.01	0.2	ND	<5	ND	ND	ND	ND				
9/93	ND	ND	430	ND	<50	<0.01	0.2	ND	2.0	ND	ND	ND	ND				
10/93	ND	ND	464	ND	241	<0.01	0.2	ND	<5	ND	ND	ND	ND				
12/93	ND	ND	378	ND	22.5	<0.01	0.2	ND	<5	ND	ND	ND	ND				

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ND = No Data  
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BDL = Below Detection Limits

**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Chloroform	Chlorodibromo		P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon	Dieldrin	Toxaphene		Dissolved	TDS (mg/l)	
					Total (ug/l)	methane (ug/l)	Chlordane (ug/l)				Total (ug/l)	Total (ug/l)	Lindane (ug/l)	Total (ug/l)	Oxygen (mg/l)		
		Salt River 1/2 mile south of 91st Discharge	401	4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:45	112:14:54	City of Tolleson Wastewater Utilities	406	3/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	875	
				4/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	884	
				6/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	998	
				7/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	936	
				8/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	1050	
				4/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	
				5/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	1015	
				6/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	938	
				10/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	
				11/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.1	ND	
				12/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	
				1/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2	ND	
				2/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.9	ND	
				3/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.9	ND	
				4/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	
				6/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	
				11/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	
				1/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	
				2/24/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1	ND	
				3/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	
				4/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	
				6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	ND	
				7/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				9/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	
				10/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND	
				12/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

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**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

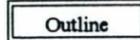
Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Thallium Total (ug/l)	Thallium Dissolved (ug/l)	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)
33:25:45	112:14:54	City of Tolleson Wastewater Utilities	406	1/94	<10	ND	383	ND	35	<0.01	0.2	ND	<5	<500	ND	ND	ND
		(Continued)		2/94	ND	ND	405	ND	20	<0.01	0.2	ND	<5	ND	ND	ND	ND
				3/94	ND	ND	400	ND	25.5	<0.01	0.2	ND	6.8	ND	ND	ND	ND
				8/94	ND	ND	340	ND	<50	0.02	1	ND	<50	ND	ND	ND	ND
				9/94	ND	ND	340	ND	<50	<0.01	0.2	ND	<50	ND	ND	ND	ND
				11/94	ND	ND	375	ND	<50	<0.01	0.2	ND	<50	ND	ND	ND	ND
				12/94	ND	ND	395	ND	<50	<0.01	0.2	ND	<50	ND	ND	ND	ND
				1/95	<50	ND	400	ND	<50	<0.01	0.2	ND	<50	<100	ND	ND	ND
				4/95	ND	ND	330	ND	10	<0.01	1	9.49	<5	ND	ND	ND	ND
				5/95	<50	ND	265	ND	10	<0.01	1	15.1	<5	<100	ND	ND	ND
				6/95	ND	ND	395	ND	30	<0.01	14.4	15.9	17.5	ND	ND	ND	ND
				6/6/95	ND	ND	400	<50	ND	0.03	<0.2	ND	<10	ND	ND	<0.5	<0.5
				7/95	ND	ND	ND	ND	ND	7.5	ND	ND	ND	ND	ND	ND	ND
				8/95	ND	ND	350	ND	<50	<0.01	<0.2	ND	<60	ND	ND	ND	ND
				9/95	<2	ND	360	ND	<50	<0.01	<0.2	ND	<50	<2	ND	ND	ND
				11/95	ND	ND	452	ND	<50	<0.01	0.2	ND	<50	ND	ND	ND	ND
				12/95	ND	ND	375	ND	<50	<0.01	0.2	ND	<50	ND	ND	ND	ND
				12/11/95	ND	ND	510	<50	ND	ND	ND	ND	<50	ND	ND	ND	ND
				3/96	<50	ND	390	ND	<50	<0.01	0.2	11.25	<50	<50	ND	ND	ND
				4/96	ND	ND	624	ND	26.7	0.1013	0.2	ND	14	ND	ND	ND	ND
				5/96	<50	ND	390	ND	10	<0.01	0.2	ND	<5	<60	ND	ND	ND
				10/96	<10	ND	ND	ND	ND	ND	ND	9.42	ND	<50	ND	ND	ND
				11/96	ND	ND	ND	ND	ND	ND	ND	2.7	ND	ND	ND	ND	ND
				12/96	ND	ND	ND	ND	ND	ND	ND	0.9	ND	ND	ND	ND	ND
				1/97	<10	ND	ND	ND	ND	ND	ND	1.625	ND	<50	ND	ND	ND
				4/97	ND	ND	ND	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND
				5/97	<10	ND	ND	ND	ND	ND	ND	0.55	ND	<50	ND	ND	ND

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**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS			
					Total (ug/l)	methane Total (ug/l)					Total (ug/l)	Total (ug/l)	Lindane (ug/l)	Total (ug/l)		Oxygen (mg/l)		
33:25:45	112:14:54	City of Tolleson Wastewater Utilities (Continued)	406	1/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND			
				2/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND		
				3/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND	
				8/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	
				9/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	
				11/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	
				12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND
				5/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND
				6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND
				6/6/95	ND	ND	ND	<0.15	<0.1	<0.05	<0.1	ND	<0.1	<0.05	<0.5	ND	ND	ND
				7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND
				9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND
				11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND
				12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND
				12/11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND
				4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				

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**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium	Beryllium	Boron	Copper	Copper	Cyanide	Mercury	Nitrate	Selenium	Thallium	Thallium	Bromodichloro- methane Total	Bromoform Total
					Total	Dissolved		Total	Dissolved				Total	Total	Dissolved		
					(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(ug/l)	(mg-N/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
33:32:12	112:16:52	New River near Glendale, Arizona	503	3/7/94	10	0.5	ND	18	10	0.01	0.1	0.98	1	5	ND	0.2	0.2
				3/25/94	10	0.5	ND	17	10	0.01	0.1	1.2	1	10	ND	0.2	0.2
				9/13/94	10	0.5	ND	16	10	0.01	0.1	0.67	1	5	ND	0.2	0.2
				9/13/94	10	0.5	ND	16	10	0.01	0.1	0.67	1	5	ND	0.2	0.2
				10/15/94	10	ND	ND	28	ND	0.01	0.1	1.3	1	ND	ND	ND	ND
				12/29/94	10	ND	ND	31	ND	0.01	0.1	2.2	1	ND	ND	ND	ND
				1/4/95	10	ND	ND	5	ND	0.01	0.1	0.57	1	ND	ND	ND	ND
				8/11/95	10	ND	ND	50	ND	0.01	0.1	0.99	1	ND	ND	ND	ND
				8/19/95	10	ND	ND	16	ND	0.01	0.1	1.7	1	ND	ND	ND	ND
				11/1/95	10	ND	ND	30	ND	0.01	0.1	1.2	1	ND	ND	ND	ND
				1/31/96	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:22:50	112:17:28	Salt River at 107th Avenue near Tolleson	503	10/29/90	0.5	ND	540	29	ND	ND	0.5	2.12 C	5	5	ND	ND	ND
				11/26/90	5	ND	540	20	ND	ND	0.2	1.62 C	5	5	ND	ND	ND
				12/19/90	0.5	ND	630	10	ND	ND	0.5	3.6 C	5	5	ND	ND	ND
33:22:50	112:17:28	1/2 mile east of 115th Avenue river crossing	401	4/96	5	ND	ND	25	ND	ND	0.2	1.98 C	5	60	ND	ND	ND
				6/96	5	ND	ND	57.3	ND	ND	0.2	4.99 C	5	44	ND	ND	ND
				10/96	ND	ND	ND	11.4	ND	ND	0.2	1 C	5	ND	ND	ND	ND
				12/96	ND	ND	ND	10	ND	ND	0.2	4.1 C	5	ND	ND	ND	ND
33:23.4:10.8	112:13.2:57.6	Salt River: Upstream of Confluence with Gila	402	Ave. 7/92-6/93	ND	ND	ND	4	<3	ND	ND	ND	0	<2	ND	ND	
33:22:30	112:13.2:8.4	Gila River: Upstream of Confluence with Salt	402	Ave. 7/92-6/93	ND	ND	ND	8	<3	ND	ND	ND	0.1	<2	ND	ND	

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**Shade** = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

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BDL = Below Detection Limits

**Table 4-18**  
**Detailed Analysis - Surface Water Quality**  
**Reach 4: 23rd Avenue to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Chloroform	Chlorodibromo		P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene		Dissolved Oxygen	TDS		
					Total (ug/l)	methane	Total (ug/l)					Chlordane (ug/l)	P,P' DDD (ug/l)			Total (ug/l)	Total (ug/l)
33:32:12	112:16:52	New River near Glendale, Arizona	503	3/7/94	0.2	0.2	0.1	0.1	0.04	0.1	ND	0.02	ND	2	ND	ND	
				3/25/94	0.2	0.2	0.1	0.1	0.04	0.1	ND	0.02	ND	2	ND	ND	
				9/13/94	0.2	0.2	0.1	0.1	0.04	0.1	ND	0.02	0.03	2	6.3	ND	
				9/13/94	0.2	0.2	0.1	0.1	0.04	0.1	ND	0.02	0.03	2	6.3	ND	
				10/15/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.3	ND
				12/29/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2	ND
				1/4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.9	ND
				8/11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/19/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	ND
				11/1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.1	ND
				1/31/96	ND	ND	ND	ND	ND	ND	ND	ND	7.3	ND			
		Salt River at 107th Ave near Tolleson	503	10/29/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1	ND		
				11/26/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.2	ND		
				12/19/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6	ND		
33:22:50	112:17:28	1/2 mile east of 115th Ave river crossing	401	4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
		Salt River: Upstream of Confluence with Gila	401	Ave. 7/92-6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
		Gila River: Upstream of Confluence with Salt	401	Ave. 7/92-6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		

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MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Source Code	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron Total (ug/l)	Boron Dissolved (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	Thallium Total (ug/l)	Thallium Dissolved (ug/l)	
33:22:59	112:18:13	Gila River above Salt River near 115th Avenue	503	1/18/90	0.5	ND	1410	ND	18	ND	ND	0.5	ND	2.3 C	5	ND	5	ND	
				2/22/90	0.5	ND	ND	ND	10	ND	ND	0.5	ND	1.55 C	5	ND	5	ND	
				3/22/90	0.5	ND	680	ND	10	ND	ND	0.5	ND	1.6 C	5	ND	5	ND	
				5/1/90	0.5	ND	690	ND	10	ND	ND	0.5	ND	1.83 C	5	ND	5	ND	
				5/30/90	0.5	ND	790	ND	70	ND	ND	0.5	ND	2.3 C	5	ND	5	ND	
				6/28/90	0.5	ND	840	ND	20	ND	ND	0.5	ND	2.46 C	5	ND	5	ND	
				7/31/90	0.5	ND	1460	ND	28	ND	ND	0.5	ND	1.44 C	5	ND	5	ND	
				8/27/90	10	ND	765	ND	30	ND	ND	0.2	ND	2.02 C	14	ND	27	ND	
				10/29/90	0.5	ND	770	ND	17	ND	ND	0.5	ND	2.12 C	5	ND	5	ND	
				11/27/90	0.5	ND	770	ND	13	ND	ND	0.5	ND	2.07 C	5	ND	5	ND	
				12/20/90	0.5	ND	840	ND	50	ND	ND	0.5	ND	2 C	5	ND	40	ND	
33:22:42	112:18:32	115th Avenue Bridge NE	402	Ave. 7/92-6/93	0	<0.3	ND	ND	7	3	ND	ND	ND	ND	ND	0	<2		
33:22:42	112:18:32	Salt River at 115th Avenue	401	11/18/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				11/23/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/3/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/22/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/4/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/19/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/2/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/17/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/2/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/22/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)		
33:22:59	112:18:13	Gila River above Salt River near 115th Avenue	503	1/18/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.8	ND		
				2/22/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.6	ND	
				3/22/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.2	ND	
				5/1/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.6	ND	
				5/30/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.6	ND	
				6/28/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	
				7/31/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2	ND	
				8/27/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/29/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND
				11/27/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.6	ND
				12/20/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:42	112:18:32	115th Avenue Bridge NE	401	Ave. 7/92-6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33:22:42	112:18:32	Salt River at 115th Avenue	401	11/18/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2	ND		
				11/23/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.7	ND		
				12/3/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.1	ND		
				12/22/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.7	ND		
				1/4/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND		
				1/19/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.9	ND		
				2/2/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2	ND		
				2/17/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.1	ND		
				3/2/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	ND		
3/22/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.1	ND						

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate (mg-N/l)	Selenium	Selenium	Thallium	Thallium			
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (mg/l)	Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)			
33:22:42	112:18:32	Salt River at 115th Avenue (Continued)	401	4/5/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/20/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				5/4/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/25/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/3/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/15/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:42	112:18:32	Gila River below 115th Avenue, near PIR	503	1/18/90	0.5	ND	740	ND	21	ND	ND	1.3	ND	1.28 C	5	ND	5	ND		
				2/22/90	0.5	ND	ND	ND	10	ND	ND	0.5	ND	1.34 C	5	ND	5	ND		
				3/22/90	0.5	ND	570	ND	10	ND	ND	0.5	ND	0.97 C	5	ND	5	ND		
				5/1/90	0.5	ND	350	ND	10	ND	ND	0.5	ND	1.45 C	5	ND	5	ND		
				5/30/90	0.5	ND	535	ND	10	ND	ND	0.5	ND	0.75 C	5	ND	5	ND		
				6/28/90	0.5	ND	460	ND	14	ND	ND	0.5	ND	0.47 C	5	ND	5	ND		
				7/13/90	0.5	ND	600	ND	100	ND	ND	0.5	ND	2.56 C	5	ND	5	ND		
				9/24/90	5	ND	690	ND	20	ND	ND	0.2	ND	2.2 C	10	ND	5	ND		
				10/29/90	0.5	ND	730	ND	35	ND	ND	0.5	ND	2.03 C	5	ND	40	ND		
				11/27/90	0.5	ND	170	ND	24	ND	ND	0.5	ND	1.81 C	5	ND	5	ND		
				12/20/90	0.5	ND	750	ND	10	ND	ND	0.5	ND	2.09 C	5	ND	5	ND		
33:22.8:29.4	112:19.2:13.8	El Mirage Road North - (Salt River Channel)	401	4/96	5	ND	ND	ND	25	ND	ND	0.2	ND	2.27 C	5	ND	60	ND		
				6/96	4	ND	ND	ND	10.6	ND	ND	0.2	ND	4.38 C	5	ND	25	ND		
				10/96	ND	ND	ND	ND	11.2	ND	ND	0.2	ND	1.5 C	5	ND	ND	ND		
				12/96	ND	ND	ND	ND	10	ND	ND	0.2	ND	4 C	5	ND	ND	ND		
33:22.2:33.6	112:19.2:13.8	El Mirage Road South - (Gila River Channel)	401	4/96	5	ND	ND	ND	25	ND	ND	0.2	ND	2.03 C	5	ND	60	ND		
				6/96	4	ND	ND	ND	10	ND	ND	0.2	ND	6.04 C	5	ND	25	ND		
				10/96	ND	ND	ND	ND	15.6	ND	ND	0.2	ND	1.7 C	5	ND	ND	ND		
				12/96	ND	ND	ND	ND	10	ND	ND	0.2	ND	4.3 C	5	ND	ND	ND		
33:22.8:52.2	112:19.8:59.4	Drainage Ditch 0.1 mile west of El Mirage	401	2/24/93	0	ND	590	ND	33	ND	ND	0	ND	0	ND	ND	ND			
33:23:56	112:21:07	City of Avondale WWTP	204	1/94	ND	ND	332	ND	41	ND	<0.01	<0.2	ND	ND	<5	ND	ND	ND		
				1-3/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				8/94	ND	ND	<380	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<8	ND	ND	ND	

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS
				methane Total	Total	Total	methane Total					Total	Total	Total	Oxygen	
				(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(mg/l)
Salt River at 115th Avenue			401	4/5/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.8	ND
(Continued)				4/20/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.5	ND
				5/4/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.5	ND
				5/25/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.8	ND
				6/3/93	ND	ND*	ND	ND	ND	ND	ND	ND	ND	ND	4.5	ND
				6/15/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.8	ND
33:22:42	112:18:32	Gila River below 115th Avenue, near PIR	503	1/18/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6	ND
				2/22/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.2	ND
				3/22/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.6	ND
				5/1/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.7	ND
				5/30/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.7	ND
				6/28/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND
				7/13/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6	ND
				9/24/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND
				10/29/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.3	ND
				11/27/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND
				12/20/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
El Mirage Road North - (Salt River Channel)			401	4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
El Mirage Road South - (Gila River Channel)			401	4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Drainage Ditch 0.1 mile west of El Mirage			401	2/24/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.1	ND
33:23:56	112:21:07	City of Avondale WWTP	204	1/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1-3/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.2	<2	ND
				8/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium Total (ug/l)	Beryllium Dissolved (ug/l)	Boron Total (ug/l)	Boron Dissolved (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide Total (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	Thallium Total (ug/l)	Thallium Dissolved (ug/l)			
33:23:56	112:21:07	City of Avondale WWTP (Continued)	204	9/94	ND	ND	<460	ND	<50	ND	<0.02	<0.2	ND	ND	<8	ND	ND	ND		
			7-9/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10/94	ND	ND	320	ND	<50	ND	<0.01	0.3	ND	ND	ND	<8	ND	ND	ND	ND	
			12/94	ND	ND	370	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<8	ND	ND	ND	ND	
			10-12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			1-3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1/95	ND	ND	370	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<8	ND	ND	ND	ND	
			2/95	ND	ND	370	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<8	ND	ND	ND	ND	
			3/95	ND	ND	<340	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<8	ND	ND	ND	ND	
			4/95	ND	ND	400	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<8	ND	ND	ND	ND	
			5/95	ND	ND	430	ND	<50	ND	<0.01	<0.2	ND	ND	ND	<10	ND	ND	ND	ND	
			4-6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			6/95	ND	ND	425	ND	<50	ND	<0.01	<0.1	ND	ND	ND	18	ND	ND	ND	ND	
			7/95	ND	ND	560	ND	5	ND	<0.01	<0.2	ND	ND	ND	13	ND	ND	ND	ND	
			8/95	ND	ND	590	ND	6	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND	ND	
			9/95	ND	ND	280	ND	<10	ND	<0.02	<0.2	ND	ND	ND	<5.9	ND	ND	ND	ND	
			7-9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/95	ND	ND	280	ND	10	ND	<0.005	<0.2	ND	ND	ND	<5	ND	ND	ND	ND	
			11/95	ND	ND	310	ND	<10	ND	<0.01	0.2	ND	ND	ND	<5	ND	ND	ND	ND	
			12/95	ND	ND	300	ND	<10	ND	0.06	<0.2	ND	ND	ND	<5	ND	ND	ND	ND	
			10-12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1-12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1-3/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/96	ND	ND	290	ND	<15	ND	0.03	<0.2	ND	ND	ND	<5	ND	ND	ND	ND				
4-6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
9/96	ND	ND	310	ND	<15	ND	<0.02	<0.2	ND	ND	ND	<5	ND	ND	ND	ND				
7-9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
10/96	ND	ND	310	ND	<15	ND	<0.0002	<0.2	ND	ND	ND	<5	ND	ND	ND	ND				
11/96	ND	ND	360	ND	20	ND	0.02	0.2	ND	ND	ND	5	ND	ND	ND	ND				

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ND = No Data  
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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Lindane	Toxaphene	Dissolved	TDS			
				methane Total	Total	Total	methane Total					Total	Total		Oxygen					
				(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(mg/l)			
33:23:56	112:21:07	City of Avondale WWTP (Continued)	204	9/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
			7-9/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			10/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10-12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			1-3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			2/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			5/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			4-6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			8/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			7-9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10-12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			1-12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.1	<0.5	ND	ND
			1-3/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4-6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			7-9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of GIs and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate (mg-N/l)	Selenium	Selenium	Thallium	Thallium			
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (mg/l)	Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)			
33:23:56	112:21:07	City of Avondale WWTP (Continued)	204	12/96	ND	ND	330	ND	20	ND	<0.02	0.2	ND	ND	<0.1	ND	ND	ND		
				1-12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1-3/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/97	ND	ND	350	ND	<20	ND	<0.02	<0.2	ND	ND	<5	ND	ND	ND	ND	
				2/97	ND	ND	291	ND	<20	ND	<0.02	<0.2	ND	ND	<5	ND	ND	ND	ND	
				3/97	ND	ND	348	ND	<10	ND	<0.02	<0.2	ND	ND	<5	ND	ND	ND	ND	
				4/97	ND	ND	344	ND	19	ND	<0.02	0.2	ND	ND	<5	ND	ND	ND	ND	
				1/18/96	ND	ND	277	ND	ND	ND	ND	ND	ND	ND	8.29	ND	ND	ND	ND	
33:23:30.321	112:21:8.025	Buckeye Feeder and Lennox Drain at Head	502	1/24/96	BDL	ND	204	ND	BDL	ND	ND	BDL	ND	5.53	ND	ND	ND	ND		
				1/29/96	ND	ND	141	ND	ND	ND	ND	ND	ND	ND	4.88	ND	ND	ND	ND	
				2/5/96	ND	ND	126	ND	ND	ND	ND	ND	ND	ND	3.93	ND	ND	ND	ND	
				2/13/96	BDL	ND	175	ND	BDL	ND	ND	BDL	ND	ND	7.77	ND	ND	ND	ND	
				2/19/96	ND	ND	501	ND	ND	ND	ND	ND	ND	ND	10.8	ND	ND	ND	ND	
				2/26/96	ND	ND	160	ND	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND	ND	
				3/4/96	ND	ND	280	ND	ND	ND	ND	ND	ND	ND	6.59	ND	ND	ND	ND	
				3/15/96	ND	ND	243	ND	ND	ND	ND	ND	ND	ND	2.66	ND	ND	ND	ND	
				3/18/96	ND	ND	325	ND	ND	ND	ND	ND	ND	ND	3.66	ND	ND	ND	ND	
				3/25/96	ND	ND	589	ND	ND	ND	ND	ND	ND	ND	9.89	ND	ND	ND	ND	
				4/17/96	ND	ND	310	ND	ND	ND	ND	ND	ND	ND	5.8	ND	ND	ND	ND	
				5/14/96	ND	ND	259	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	
				6/11/96	ND	ND	289	ND	13	ND	ND	ND	ND	ND	4.74	ND	ND	ND	ND	
				7/11/96	ND	ND	234	ND	ND	ND	ND	ND	ND	ND	2.3	ND	ND	ND	ND	
				8/27/96	ND	ND	261	ND	ND	ND	ND	ND	ND	ND	4.45	ND	ND	ND	ND	
				9/25/96	ND	ND	411	ND	ND	ND	ND	ND	ND	ND	8.72	ND	ND	ND	ND	
				10/22/96	ND	ND	545	ND	ND	ND	ND	ND	ND	ND	9.53	ND	ND	ND	ND	
				11/11/96	ND	ND	532	ND	15	ND	ND	ND	ND	ND	7.34	ND	ND	ND	ND	
				12/17/96	ND	ND	448	ND	ND	ND	ND	ND	ND	ND	9.03	ND	ND	ND	ND	
				1/21/97	ND	ND	582	ND	ND	ND	ND	ND	ND	ND	0.47	ND	ND	ND	ND	
	2/26/97	ND	ND	373	ND	ND	ND	ND	ND	ND	ND	9.48	ND	ND	ND	ND				
	3/25/97	ND	ND	463	ND	13	ND	ND	ND	ND	ND	11.2	ND	ND	ND	ND				
	4/28/97	ND	ND	282	ND	ND	ND	ND	ND	ND	ND	5.67	ND	ND	ND	ND				
	5/14/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.47	ND	ND	ND	ND				
	6/24/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.16	ND	ND	ND	ND				

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Lindane	Toxaphene	Dissolved	TDS		
				methane Total	Total	Total	methane Total					Total	Total	Total	Oxygen				
				(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(mg/l)		
33:23:56	112:21:07	City of Avondale WWTP (Continued)	204	12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				1-12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1-3/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:23:30.321	112:21:8.025	Buckeye Feeder and Lennox Drain at Head	502	1/18/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				1/24/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1/29/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/5/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/13/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/19/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/26/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/15/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/18/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				3/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				4/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/14/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/27/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				9/25/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/22/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/17/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/21/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	2/26/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	3/25/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	4/28/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	5/14/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	6/24/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate (mg-N/l)	Selenium	Selenium	Thallium	Thallium
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)		Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	
33:25:54	112:21:40	Discharge from Lockheed Martin (aka Loral): Discharge 001	204	1/95	ND	ND	ND	ND	ND								
			4/95	ND	ND	ND	ND	ND	ND								
			7/95	ND	ND	ND	ND	ND	ND								
			10/95	ND	ND	ND	ND	ND	ND								
			1/96	ND	ND	ND	ND	ND	ND								
			4/96	ND	ND	174	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			7/96	ND	ND	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/96	ND	ND	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1/97	ND	ND	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/97	ND	ND	95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:35	112:21:38	Discharge from Lockheed Martin (aka Loral): Discharge 002	204	1/95	ND	ND	ND	ND	ND								
			2/95	ND	ND	ND	ND	ND									
			3/95	ND	ND	ND	ND	ND									
			4/95	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	
			5/95	ND	ND	ND	ND	ND									
			6/95	ND	ND	ND	ND	ND									
			7/95	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	
			8/95	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	
			9/95	ND	ND	ND	ND	ND									
			10/95	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	
11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS
				methane Total (ug/l)	Total (ug/l)	Total (ug/l)	methane Total (ug/l)					Total (ug/l)	Total (ug/l)	Lindane (ug/l)	Total (ug/l)	
33:25:54	112:21:40	Discharge from Lockheed Martin (aka Loral): Discharge 001	204	1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			7/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:35	112:21:38	Discharge from Lockheed Martin (aka Loral): Discharge 002	204	1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			2/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			5/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			8/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			11/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

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Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate (mg-N/l)	Selenium	Selenium	Thallium	Thallium				
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (mg/l)	Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)				
33:25:35	112:21:38	Discharge from Lockheed Martin (aka Loral): Discharge 002 (Continued)	204	12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
				1/96	ND	ND	ND	ND	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				2/96	ND	ND	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				3/96	ND	ND	ND	ND	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				4/96	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				5/96	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				7/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				8/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/96	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/96	ND	ND	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/97	ND	ND	ND	ND	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	4/97	ND	ND	ND	ND	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	5/97	ND	ND	ND	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
33:25:34	112:21:39	Discharge from Lockheed Martin (aka Loral): Discharge 003	204	1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
				2/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				1/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				7/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
112:21:21.6	33:22:8.50.4	Discharge from St. John's Canal	401	2/24/93	0	ND	340	ND	22	ND	ND	0	ND	ND	0	ND	ND	ND			
33:23:51	112:23:14	City of Goodyear WWTP	204	Ave. 1-3/94	ND	ND	290	ND	<50	ND	<0.02	<0.2	ND	ND	<10	ND	ND	ND			
				Ave. 4-6/94	ND	ND	530	ND	<50	ND	<0.02	<0.2	ND	ND	<10	ND	ND	ND			
				6/9/94	ND	ND	230	ND	66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				Ave. 7-9/94	ND	ND	420	ND	<50	ND	<0.02	<0.2	ND	ND	<10	ND	ND	ND			

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ND = No Data  
C = Nitrite and Nitrate Combined  
BDL = Below Detection Limits

**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon		Dieldrin		Toxaphene		Dissolved				
												Total (ug/l)	Total (ug/l)	Total (ug/l)	Total (ug/l)	Oxygen (mg/l)	TDS (mg/l)					
33:25:35	112:21:38	Discharge from Lockheed Martin (aka Loral): Discharge 002 (Continued)	204	12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			1/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			2/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			3/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			5/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			7/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			8/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			11/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
33:25:34	112:21:39	Discharge from Lockheed Martin (aka Loral): Discharge 003	204	1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			2/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			7/96	ND	31.1	ND	27.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
		Discharge from St. John's Canal	401	2/24/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND			
33:23:51	112:23:14	City of Goodyear WWTP	204	Ave. 1-3/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			Ave. 4-6/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			6/9/94	0.89	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			Ave. 7-9/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate (mg-N/l)	Selenium	Selenium	Thallium	Thallium	
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (mg/l)	Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	
33:23:51	112:23:14	City of Goodyear WWTP (Continued)	204	Ave. 10-12/94	ND	ND	240	ND	<50	ND	<0.02	<0.2	ND	<10	ND	ND	ND	
				Ave. 1-3/95	ND	ND	260	ND	<50	ND	<0.02	<0.2	ND	<10	ND	ND	ND	
				Ave. 7-9/95	ND	ND	330	ND	<5	ND	0.028	<0.2	ND	<10	ND	ND	ND	
33:23:4:6.6	112:21:6:11.4	3/4 mile east of 147th Avenue Bridge	402	Ave. 7/92- 6/93	0	<0.3	ND	ND	10	<3	ND	ND	ND	ND	0	<2		
33:23:4:30	112:24:46.5	Salt-Gila Upstream of Buckeye Canal Discharge	401	4/96	5	ND	ND	ND	25	ND	ND	0.2	ND	1.51 C	5	ND	60	ND
				6/96	4	ND	ND	ND	10	ND	ND	0.2	ND	3.02 C	4	ND	35	ND
				10/96	ND	ND	ND	ND	6.5	ND	ND	0.2	ND	1.7 C	5	ND	ND	ND
				12/96	ND	ND	ND	ND	10	ND	ND	0.2	ND	3.8 C	4	ND	ND	ND
33:21:04	112:27:02	Estrella WWTP: City of Goodyear	204	5/17/95	ND	ND	490	ND	<50	ND	ND	<0.2	ND	ND	ND	ND		
33:21:00	112:34:55	Town of Buckeye WWTP	407	12/27/94	ND	ND	ND	ND	ND	ND	ND	<0.2	ND	ND	ND	ND	ND	
				1/95	ND	ND	ND	ND	<50	ND	<0.01	<0.2	ND	ND	<5	ND	ND	
				6/95	ND	ND	ND	ND	<50	ND	<0.01	<0.2	ND	ND	<5	ND	ND	
				6/21/95	ND	ND	ND	ND	ND	ND	ND	<0.2	ND	ND	ND	ND	ND	
				9/95	ND	ND	ND	ND	<50	ND	<0.02	0.2	ND	ND	<10	ND	ND	
				10/95	ND	ND	ND	ND	<10	ND	0.0004	<0.2	ND	ND	<5	ND	ND	
				12/95	ND	ND	ND	ND	<10	ND	0.0004	<0.2	ND	ND	<5	ND	ND	
				3/96	ND	ND	ND	ND	<20	ND	<0.02	<0.2	ND	ND	<5	ND	ND	
				3/27/96	ND	ND	ND	ND	ND	ND	ND	<0.2	ND	ND	ND	ND	ND	
				4/96	ND	ND	<20	ND	<20	ND	ND	<0.79	ND	ND	<5	ND	ND	
				9/96	ND	ND	<20	ND	<20	ND	ND	<0.2	ND	ND	<5	ND	ND	
				12/96	ND	ND	ND	ND	<20	ND	<0.02	<2	ND	ND	<10	ND	ND	
				3/97	ND	ND	ND	ND	<25	ND	<0.02	0.2	ND	ND	5	ND	ND	
	6/97	ND	ND	ND	ND	<10	ND	<0.028	<0.02	ND	ND	<25	ND	ND				
33:20:50	112:43:30	Hassayampa River near Arlington, AZ	503	2/6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33:13:45	112:46:00	Gila River above Diversions at Gillespie Dam	503	01/17/90	10	10	ND	ND	7	1	ND	0.1	ND	8.7C	3	3	ND	
				02/14/90	ND	ND	ND	ND	9	1	ND	0.1	6.2	7.4 C	3	3	ND	
				03/20/90	ND	ND	ND	ND	10	3	ND	0.1	ND	8.8 C	3	3	ND	
				04/17/90	10	10	ND	ND	12	3	ND	0.1	6.2	9.2 C	4	1	ND	
				05/15/90	ND	ND	ND	ND	1	3	ND	0.1	ND	8.6 C	4	4	ND	
				06/12/90	10	ND	ND	ND	11	7	ND	0.1	ND	ND	5	4	ND	

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon Total (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)		
																		204	401
33:23:51	112:23:14	City of Goodyear WWTP (Continued)	Ave. 10-12/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			Ave. 1-3/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			Ave. 7-9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:23.4:6.6	112:21.6:11.4	3/4 mile east of 147th Avenue Bridge Salt-Gila Upstream of Buckeye Canal Discharge	Ave. 7/92- 6/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:21:04	112:27:02	Estrella WWTP: City of Goodyear	5/17/95	24	2.3	19	ND	<0.15	ND	ND	ND	ND	<0.10	<0.05	<0.5	ND	ND		
			12/27/94	13	<1	12	ND	ND	ND	ND	ND	ND	ND	ND	<1	<1	ND	ND	
33:21:00	112:34:55	Town of Buckeye WWTP	1/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			6/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			6/21/95	11.5	<0.5	18	ND	ND	ND	ND	ND	ND	ND	ND	<10	<2.5	ND	ND	
			9/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			10/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			12/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			3/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			3/27/96	8.9	<0.5	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	<10	<50	ND	ND
			4/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			9/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
			12/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:20:50	112:43:30	Hassayampa River near Arlington, AZ	2/6/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.9	ND		
			3/97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33:13:45	112:46:00	Gila River above Diversions at Gillespie Dam	01/17/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			02/14/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			03/20/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			04/17/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			05/15/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
			06/12/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		

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**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate (mg-N/l)	Selenium	Selenium	Thallium	Thallium	
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (mg/l)	Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	
33:13:45	112:46:00	Gila River above Diversions at Gillespie Dam (Continued)	503	07/31/90	ND	ND	ND	ND	17	7	ND	0.1	ND	8.8 C	4	4	ND	ND
				08/16/90	13	34	ND	400	88	5	ND	0.1	0.1	3.8 C	1	1	ND	ND
				09/18/90	ND	ND	ND	1000	27	4	ND	0.1	ND	5.9 C	2	2	ND	ND
				10/16/90	ND	10	ND	ND	14	4	ND	0.1	0.1	8.7 C	3	2	ND	ND
				11/16/90	ND	ND	ND	ND	11	3	ND	0.1	ND	8.7 C	1	3	ND	ND
				12/11/90	ND	ND	ND	ND	17	5	ND	0.1	ND	7.7 C	2	3	ND	ND
				01/16/91	ND	ND	ND	ND	8	ND	ND	0.1	ND	9.6 C	2	2	ND	ND
				02/27/91	ND	10	ND	ND	6	2	ND	0.1	0.1	8.8 C	2	1	ND	ND
				03/20/91	ND	ND	ND	ND	13	2	ND	0.1	ND	6.4 C	3	3	ND	ND
				04/17/91	ND	10	ND	ND	12	2	ND	0.1	0.1	7.5 C	3	3	ND	ND
				05/14/91	ND	ND	ND	ND	19	2	ND	0.1	ND	9.6 C	4	4	ND	ND
				06/19/91	ND	ND	ND	ND	16	4	ND	0.1	ND	9.7 C	6	7	ND	ND
				07/16/91	ND	ND	ND	ND	13	5	ND	0.1	ND	9.6 C	7	3	ND	ND
				08/28/91	ND	10	ND	ND	23	5	ND	0.1	0.1	7.3 C	3	4	ND	ND
				09/17/91	ND	ND	ND	ND	12	1	ND	0.1	ND	10 C	4	5	ND	ND
				10/22/91	ND	ND	ND	ND	12	2	ND	0.1	0.1	9.0 C	3	4	ND	ND
				11/19/91	ND	ND	ND	ND	7	2	ND	0.1	ND	8.6 C	4	3	ND	ND
				12/03/91	ND	ND	ND	ND	ND	3	ND	0.1	ND	7.9 C	3	3	ND	ND
				01/17/92	ND	ND	ND	320	80	1	ND	0.1	ND	1.7 C	1	1	ND	ND
				02/19/92	ND	ND	ND	190	89	2	ND	0.1	0.1	0.81 C	1	1	ND	ND
				03/25/92	ND	ND	ND	310	22	3	ND	0.1	ND	2.5 C	1	1	ND	ND
				04/21/92	ND	ND	ND	400	23	4	ND	0.1	0.1	2.7 C	1	1	ND	ND
				05/20/92	ND	ND	ND	810	9	4	ND	0.1	ND	5.5 C	2	1	ND	ND
				06/24/92	ND	ND	ND	ND	10	4	ND	0.1	ND	7.0 C	4	5	ND	ND
				07/30/92	ND	ND	ND	ND	10	2	ND	0.1	ND	8.6 C	4	4	ND	ND
				08/25/92	ND	ND	ND	ND	18	3	ND	0.1	0.1	7.4 C	4	1	ND	ND
				09/30/92	ND	ND	ND	ND	7	3	ND	0.1	ND	6.9 C	2	3	ND	ND
				10/28/92	ND	ND	ND	ND	10	3	ND	0.1	0.1	7.0 C	3	1	ND	ND
				11/23/92	ND	ND	ND	ND	5	2	ND	0.1	ND	7.0 C	3	2	ND	ND
				12/21/92	ND	ND	ND	ND	3	2	ND	0.1	ND	6.7 C	3	3	ND	ND
				01/12/93	ND	ND	ND	130	150	7	ND	0.1	ND	ND	1	1	ND	ND

Outline = Data Reporting Limit greater than Standard  
Outline and Shade = Data Reporting Limit greater than Std. and PQL  
Shade and Outline = Reported Concentration greater than Std., but less than PQL  
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance  
ND = No Data  
C = Nitrite and Nitrate Combined  
BDL = Below Detection Limits

**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS
				methane Total	Total	Total	methane Total					Total	Total	Total	Oxygen	
				(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(mg/l)
33:13:45	112:46:00	Gila River above Diversions at Gillespie Dam	503	07/31/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				(Continued)	08/16/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				09/18/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/16/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/16/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/11/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				01/16/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				02/27/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				03/20/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				04/17/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				05/14/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				06/19/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				07/16/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/28/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				09/17/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/22/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/19/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/03/91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				01/17/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				02/19/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				03/25/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				04/21/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				05/20/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				06/24/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				07/30/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/25/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				09/30/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/28/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/23/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/21/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				01/12/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Shade and Outline = Reported Concentration greater than Std., but less than PQL

Outline and Shade = Data Reporting Limit greater than Std. and PQL
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data  
C = Nitrite and Nitrate Combined  
BDL = Below Detection Limits

**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Beryllium	Beryllium	Boron	Boron	Copper	Copper <sup>1</sup>	Cyanide	Mercury	Mercury	Nitrate	Selenium	Selenium	Thallium	Thallium	
				Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	Total (mg/l)	Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)	Total (ug/l)	Dissolved (ug/l)	
33:13:45	112:46:00	Gila River above Diversions at Gillespie Dam (Continued)	503	03/03/93	ND	ND	ND	110	400	8	ND	0.1	0.1	ND	1	1	ND	ND
			03/30/93	ND	ND	ND	160	250	8	ND	0.1	ND	ND	1	1	ND	ND	
			05/07/93	ND	ND	ND	410	21	6	ND	0.1	0.1	ND	1	1	ND	ND	
			05/27/93	ND	ND	ND	180	17	2	ND	0.1	ND	ND	1	1	ND	ND	
			06/30/93	ND	ND	ND	ND	13	3	ND	0.1	ND	ND	2	2	ND	ND	
			07/30/93	ND	ND	ND	ND	3	2	ND	0.1	ND	ND	2	2	ND	ND	
			08/27/93	ND	ND	ND	ND	4	1	ND	0.1	0.1	ND	2	2	ND	ND	
			09/23/93	ND	ND	ND	ND	12	2	ND	0.1	ND	ND	2	2	ND	ND	
			10/28/93	ND	ND	ND	ND	6	2	ND	0.1	0.1	7.8 C	2	2	ND	ND	
			11/19/93	10	ND	ND	750	16	1	ND	0.1	ND	5.3 C	2	2	ND	ND	
			12/22/93	10	ND	ND	ND	5	1	ND	0.1	ND	7.4 C	2	2	ND	ND	
			01/27/94	10	ND	ND	ND	5	2	ND	0.1	ND	7.4 C	2	2	ND	ND	
			02/17/94	ND	ND	ND	ND	5	2	ND	0.1	0.1	7.2 C	2	2	ND	ND	
			03/24/94	10	ND	ND	ND	4	1	ND	0.1	ND	7.0 C	2	2	ND	ND	
			04/27/94	ND	ND	ND	ND	8	1	ND	0.1	0.1	7.5 C	2	2	ND	ND	
			06/01/94	10	ND	ND	ND	10	2	ND	0.1	ND	6.7 C	2	2	ND	ND	
			06/23/94	ND	ND	ND	ND	4	2	ND	0.1	ND	10 C	2	2	ND	ND	
			07/28/94	10	ND	ND	ND	6	1	ND	0.1	ND	9.0 C	2	2	ND	ND	
			08/25/94	ND	ND	ND	ND	4	1	ND	0.1	0.1	8.3 C	2	2	ND	ND	
			09/14/94	10	ND	ND	ND	3	1	ND	0.1	ND	9.0 C	2	2	ND	ND	
			11/30/94	10	ND	ND	ND	5	30	ND	0.1	0.1	7.1 C	2	2	ND	ND	
			01/26/95	10	ND	140	ND	9	30	ND	0.1	0.2	7.7 C	2	2	ND	ND	
			02/17/95	10	ND	100	ND	60	10	ND	0.1	0.1	0.26 C	1	1	ND	ND	
			05/23/95	10	ND	ND	ND	6	30	ND	0.1	0.2	5.6 C	2	2	ND	ND	
			07/26/95	10	ND	ND	ND	2	10	ND	0.1	0.1	9 C	2	2	ND	ND	
			09/27/95	10	10	ND	ND	3	1	ND	0.1	0.1	7.6 C	2	2	ND	ND	
11/28/95	10	10	ND	ND	2	2	ND	0.1	0.4	8 C	2	2	ND	ND				

Outline = Data Reporting Limit greater than Standard  
Outline and Shade = Data Reporting Limit greater than Std. and PQL  
Shade and Outline = Reported Concentration greater than Std., but less than PQL  
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data  
C = Nitrite and Nitrate Combined  
BDL = Below Detection Limits

<sup>1</sup> Standard calculated using estimated hardness of 200 mg/l

**Table 4-19**  
**Detailed Analysis - Surface Water Quality**  
**Reach 5: Confluence of Gila and Salt River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampling Location	Date	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene		Dissolved	TDS
				methane Total	Total	Total	methane Total					Total	Total	Lindane	Total	Oxygen	
				(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(mg/l)
33:13:45	112:46:00	Gila River above Diversions at Gillespie Dam	503	03/03/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		(Continued)		03/30/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				05/07/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				05/27/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				06/30/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				07/30/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/27/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				09/23/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/28/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/19/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/22/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				01/27/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				02/17/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				03/24/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				04/27/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				06/01/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				06/23/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				07/28/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				08/25/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				09/14/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/30/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				01/26/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				02/17/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				05/23/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				07/26/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				09/27/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				11/28/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Outline = Data Reporting Limit greater than Standard
Shade and Outline = Reported Concentration greater than Std., but less than PQL

Outline and Shade = Data Reporting Limit greater than Std. and PQL
Shade = Reported Concentration greater than Std. and greater than or equal to PQL (when applicable) equals Exceedance

ND = No Data  
C = Nitrite and Nitrate Combined  
BDL = Below Detection Limits

- Contaminant concentration as reported. ND was used if no data for the contaminant was reported. If data was available for both the dissolved and total concentrations of a contaminant, they were both included in the tables. If data was reported as less than a concentration, it is listed the same way in the Detailed Analysis Tables.

The stormwater quality information was compared to the standards and PQL. For stormwater, the following provides the appropriate tables references:

<i>Reach</i>	<i>Standards and PQLs</i>	<i>Stormwater Data</i>
2	Table 4-3	Table 4-12
3	Table 4-4	Table 4-13
4	Table 4-5	Table 4-14

As a part of the detailed analysis stormwater quality data was classified into six (6) categories:

- Concentration values (a number) and data reporting limits [less than (<) values] that were at concentrations less than the standard. These were rated as non-exceedances.
- Data reporting limit [less than (<) values] greater than the contaminant standard. These were identified as potential exceedances, not verified exceedances.
- Data reporting limit [less than (<) values] greater than the standard and the ADEQ PQL value. These were identified as potential exceedances, not verified exceedances.
- Contaminant concentrations (a number) greater than the standard but less than the PQL. These were identified as potential exceedances, not verified exceedances.
- Contaminant concentrations (a number) exceeding the standard and PQL. These were identified as verified exceedances.
- No data available.

The stormwater data for Reach 2 identified potential exceedances in the inorganic contaminants cyanide, dissolved copper, and total thallium, and the organic contaminants. The analysis showed the number of total potential exceedances, questionable exceedances, and verified exceedances.

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
Copper, dissolved	22	16	6
Cyanide	13	9	4
Thallium, total	12	12	0
Chlordane	32	32	0
DDD	49	49	0
DDE	52	52	0
DDT	53	53	0
Dieldrin	8	8	0
Lindane	2	2	0
Toxaphene	25	25	0

The above table demonstrates that of all the potential exceedances in Reach 2, almost all were based on questionable data. The monitoring program for these constituents should be revised to better quantify concentrations as they relate to the WQ standard.

The stormwater data for Reach 3 was very limited, two samples at one location. These data show potential exceedances of beryllium (total and dissolved), cyanide, total mercury, total thallium, and all the pesticides except diazinon (which has no WQ standard). All of these potential exceedances were questionable as none were verifiable.

Stormwater data for Reach 4 was similar to the data for Reaches 2 and 3. There were a number of potential exceedances but very few verifiable exceedances. The following table shows the analysis of possible exceedances for Reach 4.

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
Beryllium, dissolved	12	10	2
Beryllium, total	24	24	0
Copper, dissolved	10	7	3
Cyanide	33	33	0
Mercury, total	10	9	1
Selenium, total	4	4	0
Thallium, total	2	2	0
Chlordane	13	13	0
DDD	13	13	0
DDE	13	8	5
DDT	13	11	2
Dieldrin	13	13	0
Lindane	13	13	0
Toxaphene	13	13	0

The surface water quality data from NPDES permits and other monitoring points are presented in **Tables 4-15 through 4-19**. As mentioned previously, water quality data from the 23rd Avenue WWTP and 91st Avenue WWTP were analyzed separately. The other surface water quality information was analyzed the same way the stormwater data was analyzed. The surface water quality data was compared to the designated uses standards and ADEQ PQL. The following provides the appropriate table references for surface water:

<i>River Reach</i>	<i>Designated Use Standards and PQLs</i>	<i>Surface Water Data</i>
1	Table 4-2	Table 4-15
2	Table 4-3	Table 4-16
3	Table 4-4	Table 4-17
4	Table 4-5	Table 4-18
5	Table 4-6	Table 4-19

The data for Reach 1 was from the Arizona Canal at Granite Reef Dam. This site was included as a base to show the quality of water that could flow down the Salt River during flood releases. The data shows only one potential exceedance of mercury because one concentration was greater than the standard, but less than the PQL.

Water quality data for Reach 2 showed there were 15 potential exceedances, but only two for total thallium were verified. The remaining 13 exceedances were only potential exceedances.

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
Cyanide	1	1	0
Thallium, total	2	0	2
DDD	3	3	0
DDE	3	3	0
DDT	3	3	0
Toxaphene	3	3	0

Reach 3 data showed 35 potential exceedances of inorganic and pesticide pollutants of concern. The data that follows shows of these 35 potential exceedances, only four related to dissolved beryllium and one for total thallium were verified exceedances, while the others were questionable exceedances.

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
Beryllium, dissolved	2	2	0
Beryllium, total	4	0	4
Cyanide	3	3	0
Mercury, total	4	4	0
Thallium, total	1	0	1
Chlordane	3	3	0
DDD	3	3	0

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
DDE	3	3	0
DDT	3	3	0
Dieldrin	3	3	0
Lindane	3	3	0
Toxaphene	3	3	0

The data for Reach 4 showed numerous potential exceedances for inorganic and pesticide pollutants of concern. The following table shows that 207 of the 294 potential exceedances were verified exceedances. It should be noted in **Table 4-18** the dissolved beryllium was shown as an exceedance in some cases when the dissolved standard (5.3 ug/l) was greater than the concentration. This was because the total beryllium concentration most stringent standard was 0.12 ug/l and the dissolved concentration exceeded the total standard, therefore, it was a total beryllium exceedance.

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
Beryllium, total	46	10	36
Beryllium, dissolved	16	3	13
Boron	1	0	1
Copper, dissolved	35	32	3
Cyanide	69	66	3
Mercury, total	7	0	7
Selenium, total	63	48	15
Thallium, total	13	8	5
Chlordane	11	5	6
DDD	11	5	6
DDE	11	6	5
DDT	11	5	6
Dieldrin	11	11	0
Lindane	9	9	0
Toxaphene	11	5	6

Reach 5 data shown in **Table 4-19** shows a large number of potential exceedances of the standards. There were 325 potential exceedances and 81 were verified exceedances. The majority of the exceedances were due to beryllium, boron and selenium. The trihalomethane bromodichloromethane also had one exceedance. The following data summarized the exceedances:

<i>Contaminant</i>	<i>Total Potential Exceedances</i>	<i>Questionable Exceedances</i>	<i>Verified Exceedances</i>
Beryllium, dissolved	11	2	9
Beryllium, total	46	0	46
Boron, dissolved	1	0	1
Boron, total	10	0	10
Copper, total	1	0	1
Cyanide, total	40	36	4
Mercury, dissolved	5	5	0
Mercury, total	3	1	2
Selenium, dissolved	48	38	10
Selenium, total	129	84	45
Thallium, total	9	2	7
Bromodichloromethane	1	0	1
Chlordane	1	1	0
Dieldrin	1	1	0
Lindane	7	7	0
Toxaphene	7	7	0

Implications of these results and discussion regarding data gaps are presented in Sections 8 and 9.

#### **4.4 91st Avenue and 23rd Avenue WWTPs Analysis**

The City of Phoenix provided an extensive amount of water quality information for the 91st Avenue WWTP and 23rd Avenue WWTP. The database consisted of hundreds and, in some cases, thousands

of analyses for a single contaminant. This data was reviewed as a part of the detailed analysis process and is summarized in **Table 4-20** and **Table 4-21**.

The water quality data for the 91st Avenue WWTP is presented in **Table 4-20** and follows the same format used for the other surface water quality data. Contaminant concentrations were compared to the minimum designated uses standard and practical quantitation limits. The data in **Table 4-20** shows there were 3,079 total potential exceedances when the reported "less than" data was greater than the standard. At the 91st Avenue WWTP, there were 455 potential exceedances when the reported concentration was greater than the standard for the contaminant. When the reported concentrations were compared to the standard and PQL, however, there were only 47 total exceedances and of this 33 were related to lindane.

The water quality data for the 23rd Avenue WWTP shown in **Table 4-21** is similar to the 91st Avenue WWTP data. There were a total of 3,316 potential exceedances where the reported "less than" value was greater than the standard. There were 760 potential exceedances where the reported concentration (a number) exceeded the standard, but was less than the PQL. There were 215 exceedances where the reported concentration exceeded both the standard and PQL. Of these, 187 were for lindane.

#### **4.5 Fish Tissue Analysis**

As part of the MGRW study, concentrations of pollutants of concern in fish tissue were also examined. Fish tissue samples from 1980 to the present were inventoried. The majority of fish tissue information came from EPA storet and from Kirk King's report "Environmental Contaminants in Fish and Wildlife of the Lower Gila River, Arizona". **Table 4-22** lists the concentrations of pollutants of concern in fish tissue samples. In 1989 the U.S. Environmental Protection Agency released a guidance manual entitled "Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish" (USEPA, 1989). This manual outlined concentration criteria for numerous contaminants in fish tissue for the protection of human health. The following table summarizes the contaminant criteria available for the pollutants of concern:

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

*Table 4-20*  
*91st Avenue WWTP Detailed Analysis*

Greeley and Hansen  
July 1998

Parameter	Standard <sup>1*</sup>	PQL <sup>2</sup>	Number Analyses	Between Dates	Reported MDL <sup>3</sup> > Standard	Reported Conc. > Standard	Reported Conc. > Standard and PQL	Maximum Concentration
<b>INORGANIC CHEMICALS</b>								
Beryllium	0.21	0.5	40	4/90-10/94	24	0	0	<10
Boron	1000	No PQL	42	5/91-10/94	0	0	N/A	440
Copper	34	No PQL	204	12/92-3/97	0	0	N/A	31
Cyanide	9.7	20	448	5/92-3/97	280	8	4	30
Mercury	0.2	0.5	486	4/90-4/97	0	24	3	0.5
Nitrate	224 mg/l	No PQL	34	1/93-1/98	0	0	N/A	7.3 mg/l
Selenium	2	5	69	4/90-10/94	39	0	0	1
Thallium	12	No PQL	52	4/90-10/94	12	0	N/A	<20
<b>ORGANIC CHEMICALS</b>								
Chloroform	590	No PQL	38	12/91-1/97	0	0	N/A	54.9
Bromoform	80	No PQL	56	12/91-1/97	0	0	N/A	<5
Bromodichloromethane	22	0.5	38	12/91-1/97	0	2	2	24.6
Chlorodibromomethane	12	1	38	12/91-1/97	0	0	0	8.24
<b>PESTICIDES</b>								
Chlordane	0.001	0.1	252	3/92-4/97	252	0	0	<25
DDT	0.0005	0.1	648	4/90-4/97	648	0	0	<1.0
DDE	0.0006	0.1	484	4/90-4/97	444	8	4	0.128
DDD	0.0009	0.1	690	4/90-4/97	684	6	0	0.043
Diazinon	No. Std.	No PQL	36	1/95-2/96	0	0	N/A	0.22
Dieldrin	0.0002	0.1	122	4/90-4/97	118	4	1	0.102
Lindane (Hexachlorocyclohexane gamma)	0.02	0.05	1397	4/90-4/97	429	407	33	0.074
Toxaphene	0.0008	2	150	3/92-4/97	149	0	0	<50
<b>OTHER</b>								
TDS	No Std.	No PQL	132	7/92-6/93	N/A	N/A	N/A	786 mg/l

<sup>1</sup> Most Stringent Designated Uses Standard from Arizona Administrative Code, Title 18, Chapter 11, September 30, 1996

<sup>2</sup> Practical Quantitation Limits

<sup>3</sup> Method Detection Limit

\* All Concentrations ug/l unless noted

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

**Table 4-21**  
**23rd Avenue WWTP Detailed Analysis**

Greeley and Hansen  
July 1998

Parameter	Standard <sup>1*</sup>	PQL <sup>2</sup>	Number Analyses	Between Dates	Reported MDL <sup>3</sup> > Standard	Reported Conc. > Standard	Reported Conc.> Standard and PQL	Maximum Concentration
<b>INORGANIC CHEMICALS</b>								
Beryllium	0.21	0.5	100	3/90-4-95	76	0	0	<10
Boron	1000	No PQL	60	5/91-4/95	0	0	N/A	48
Copper	34	No PQL	198	12/92-3/97	0	0	N/A	17
Cyanide	9.7	20	584	3/92-3/97	316	28	4	26
Mercury	0.2	0.5	555	3/90-3/97	0	33	9	0.5
Nitrate	224 mg/l	No PQL	65	11/92-1/98	0	0	N/A	12.3 mg/l
Selenium	2	5	150	3/90-4/95	63	3	3	11
Thallium	12	No PQL	102	3/90-4/95	12	0	N/A	<20
<b>ORGANIC CHEMICALS</b>								
Chloroform	590	No PQL	100	6/92-3/97	0	0	N/A	53
Bromoform	80	No PQL	150	6/92-3/97	0	0	N/A	1.3
Bromodichloromethane	22	0.5	100	6/92-3/97	0	6	6	39.6
Chlorodibromomethane	12	1	98	6/92-3/97	0	6	6	18.2
<b>PESTICIDES</b>								
Chlordane	0.001	0.1	258	3/92-3/97	256	0	0	<25
DDT	0.0005	0.1	684	3/90-3/97	678	6	0	0.055
DDE	0.0006	0.1	484	3/90-3/97	480	4	0	0.076
DDD	0.0009	0.1	720	3/90-3/97	720	0	0	<1
Diazinon	No. Std.	No PQL	76	1/95-3/97	N/A	N/A	N/A	0.258
Dieldrin	0.0002	0.1	130	3/90-5/97	127	3	0	0.055
Lindane (Hexachlorocyclohexane gamma)	0.02	0.05	1474	3/90-3/97	440	671	187	0.118
Toxaphene	0.0008	2	149	3/92-3/97	148	0	0	<50
<b>OTHER</b>								
TDS	No Std.	No PQL	164	7/92-12/95	N/A	N/A	N/A	558 mg/l

<sup>1</sup> Most Stringent Designated Uses Standard from Arizona Administrative Code, Title 18, Chapter 11, September 30, 1996

<sup>2</sup> Practical Quantitation Limits

<sup>3</sup> Method Detection Limit

\* All Concentrations ug/l unless noted

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-22**  
**Fish Tissue**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampling Location	Fish Type	Source Code	Date	Beryllium	Boron	Copper	Cyanide	Mercury	Selenium	Thallium	Bromodichloromethane	Bromoform	Chlorodibromomethane	Chloroform	Chlordane	DDD	DDE	DDT	Dieldrin	Lindane	Toxaphene					
33.4517	-111.907	Indian Bend Wash near McKellips & Mill	Unknown	503	9/84	ND	ND	1.19	ND	ND	ND	0.30	0.002	0.005	ND	0.001	ND	0.03	0.75	0.02	ND	ND	ND					
33.4075	-112.092	Salt River at 19th Avenue	Unknown	503	4/85	ND	ND	12	ND	0.10	4.5*	5*	ND	ND	ND	ND	0.02	0.69	0.002 o/p	0.00 o/p	0.03	0	0.04					
33.2542	-112.160	Gila River near Laveen, AZ	Unknown	503	6/83	0.04	ND	ND	ND	0.18	0.50	0.01	0.001	0.001	0.001	0.001	0.05	0.05 o/p	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.05	0.01				
					6/83	0.04	ND	ND	ND	0.50	0.10	0.001	0.001	0.001	0.001	0.05	0.05 o/p	0.05 o/p	0.05 o/p	0.05	ND	0.10						
					6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	0.1 p/p	0.05 p/p	ND	ND	ND			
33.4075	-112.169	Salt River below 51st Avenue Bridge	Unknown	503	6/82	0.1	ND	0.94	ND	0.39	0.33	1.50	0.003	0.003	0.003	0.058	0.05	0.05	0.05 o/p	0.05 o/p	0.05	0.05	0.05	ND				
					6/82	0.1	ND	1.6	ND	0.93	0.45	1.50	0.002	0.002	0.002	1.50	0.029	0.05	0.017	0.19 o/p	0.05 o/p	0.05	0.33	ND				
					6/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	ND	ND	ND	ND				
					6/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	ND	ND	ND	ND				
					6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05	0.05 o/p	0.05 o/p	0.05	0.05	0.05	ND		
33.4005	-112.186	Salt River at 59th Avenue	Carp	101	85	ND	ND	1.3	ND	0.09	0.32	ND	ND	ND	ND	ND	ND	ND	0.77 p/p	0.17 p/p	0.01	ND	ND					
					85	ND	ND	1.9	ND	0.08	0.28	ND	ND	ND	ND	ND	ND	ND	0.7 p/p	0.18 p/p	0.01	ND	ND					
					85	ND	ND	1.4	ND	0.09	0.22	ND	ND	ND	ND	ND	ND	ND	0.5 p/p	0.26 p/p	ND	ND	ND					
					94-95	ND	0.47	5.62	ND	0.07	0.40	ND	ND	ND	ND	ND	0.01	ND	0.21 p/p	<0.01 p/p	0.02	ND	<0.05					
					94-95	ND	0.4	1.43	ND	0.06	0.37	ND	ND	ND	ND	ND	0.03	ND	0.18 p/p	<0.01 p/p	0.01	ND	<0.05					
			Catfish Bass	101	94-95	ND	1.28	1.27	ND	0.16	0.57	ND	ND	ND	ND	ND	ND	<0.01	ND	0.63 p/p	<0.01 p/p	<0.01	ND	<0.06				
					94-95	ND	<0.39	1.39	ND	0.28	<0.20	ND	ND	ND	ND	ND	<0.01	ND	0.38 p/p	<0.01 p/p	<0.01	ND	<0.09					
					94-95	ND	<0.39	1.33	ND	0.24	<0.20	ND	ND	ND	ND	ND	<0.01	ND	0.16 p/p	<0.01 p/p	<0.01	ND	<0.05					
					94-95	ND	0.6	0.36	ND	0.03	<0.20	ND	ND	ND	ND	ND	0.02	ND	0.47 p/p	<0.01 p/p	0.01	ND	<0.05					
					94-95	ND	0.41	0.93	ND	0.07	0.31	ND	ND	ND	ND	ND	0.04	ND	0.26 p/p	<0.01 p/p	0.05	ND	<0.26					
					94-95	ND	0.66	0.35	ND	0.08	0.26	ND	ND	ND	ND	ND	0.07	ND	0.37 p/p	<0.01 p/p	0.09	ND	<0.34					
33.3842	-112.254	Salt River at 91st Avenue	Carp	401	4/94	0.07	ND	ND	ND	0.09	0.58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23	ND					
					5/82	0.1	ND	1.4	ND	0.90	0.81	1.50	0.004	0.025	ND	0.039	ND	0.5 p/p	0.5 p/p	0.05 p/p	0.19	0.5	ND					
					5/82	ND	ND	ND	ND	0.66	0.55	0.15	ND	0.025	ND	0.082	ND	0.19 o/p	0.2 o/p	0.06 o/p	0.17	0.5	ND					
					6/82	0.1	ND	1	ND	ND	ND	ND	0.003	ND	ND	0.039	ND	0.5 p/p	0.5 p/p	0.05 p/p	ND	ND	ND					
					6/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.082	ND	0.17 o/p	0.29 o/p	0.08 o/p	ND	ND	ND					
					6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.009	ND	0.05 o/p	ND	ND	ND	ND					
					6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15 p/p	ND	ND	ND	ND					
					33.3765	-112.302	Gila River at 115th Avenue	Unknown	503	5/82	ND	ND	1.4	ND	0.90	0.81	1.50	0.004	0.025	ND	ND	ND	0.5 p/p	0.5 p/p	0.05 p/p	0.19	0.5	ND
										5/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19 o/p	0.2 o/p	0.06 o/p	ND	ND	ND
										6/82	ND	ND	1	ND	0.66	0.55	0.15	0.003	ND	ND	ND	ND	0.5 p/p	0.5 p/p	0.05 p/p	0.17	0.5	ND
										6/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.17 o/p	0.29 o/p	0.08 o/p	ND	ND	ND
6/83	ND	ND	5.3	ND						ND	ND	0.02	0.003	0.001	ND	ND	ND	0.05 p/p	0.15 p/p	0.05 p/p	0.05	0.5	ND					
33.3900	-112.372	Buckeye Canal at Bullard Avenue	Unknown	101	6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.05	ND						
					6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	5.3 p/p	0.05 p/p	ND	ND	ND						
33.3900	-112.372	Buckeye Canal at Lichfield	Unknown	101	5/80	0.06	ND	3.6	ND	0.10	ND	2.70	0.005	0.005	0.005	0.005	2.5	2.5	2.5 p/p	2.50	2.5	ND						
33.3902	-112.375	Salt River at Estrella Park	Carp	101	85	ND	ND	1.4	ND	0.15	0.47	ND	ND	ND	ND	ND	0.09	ND	7.6 p/p	0.14 p/p	0.06	ND	8.4					
					85	ND	ND	1.3	ND	0.14	0.40	ND	ND	ND	ND	0.02	ND	0.63 p/p	0.23 p/p	0.03	ND	0.28						
					85	ND	ND	1.9	ND	0.14	0.38	ND	ND	ND	ND	ND	ND	2.1 p/p	0.14 p/p	0.02	ND	ND						
					94-95	ND	0.44	1.51	ND	0.23	0.33	ND	ND	ND	ND	0.01	ND	1.5 p/p	<0.01 p/p	<0.01	ND	<0.05						
					94-95	ND	0.5	1.8	ND	0.11	0.39	ND	ND	ND	ND	0.03	ND	2.0 p/p	<0.01 p/p	<0.01	ND	<0.40						
					94-95	ND	0.54	6.73	ND	0.09	0.65	ND	ND	ND	ND	ND	<0.01	ND	0.44 p/p	<0.01 p/p	<0.01	ND	<0.05					
					94-95	ND	0.6	3.45	ND	0.10	0.29	ND	ND	ND	ND	ND	<0.01	ND	0.89 p/p	<0.01 p/p	<0.01	ND	<0.05					
94-95	ND	0.89	1.68	ND	0.09	0.43	ND	ND	ND	ND	ND	<0.01	ND	0.3 p/p	<0.01 p/p	<0.01	ND	<0.05										

units (ug/g wet weight)  
\* units (ug/g)

ND = No Data  
o/p = Chlorine is in ortho position  
p/p = Chlorine is in para position

Table 4-22  
Fish Tissue  
(Continued)

Latitude	Longitude	Sampling Location	Fish Type	Source Code	Date	Beryllium	Boron	Copper	Cyanide	Mercury	Selenium	Thallium	Dichlorobromo	Bromoform	Chlorodibromo	Chloroform	Chlordane	DDD	DDE	DDT	Dieldrin	Lindane	Toxaphene							
						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33.3902	-112.375	Salt River at Allenville	Carp	101	85	ND	ND	1.2	ND	0.13	0.35	ND	ND	ND	ND	ND	ND	ND	ND	3.4 p/p	ND	0.06	ND	2.00						
					85	ND	ND	1.4	ND	0.14	0.39	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.8 p/p	ND	0.02	ND	2.00				
					85	ND	ND	1.3	ND	0.16	0.42	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.5 p/p	ND	ND	ND	1.40				
					94-95	ND	0.50	6.02	ND	0.13	1.47	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	1.1 p/p	0.02 p/p	<0.01	ND	<0.08				
					94-95	ND	0.57	2.11	ND	0.14	0.84	ND	ND	ND	ND	ND	ND	ND	ND	<0.01	ND	1.1 p/p	<0.01 p/p	<0.01	ND	<0.09				
			Catfish	101	94-95	ND	0.84	1.69	ND	0.41	0.60	ND	ND	ND	ND	ND	ND	ND	<0.01	ND	6.1 p/p	<0.01 p/p	<0.01	ND	<0.05					
					85	ND	ND	0.57	ND	0.08	0.31	ND	ND	ND	ND	ND	ND	ND	0.16	ND	6.1 p/p	ND	0.02	ND	5.30					
					85	ND	ND	0.35	ND	0.09	0.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.3 p/p	ND	0.05	ND	5.00					
					85	ND	ND	0.41	ND	0.10	0.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.9 p/p	ND	ND	ND	5.50					
					94-95	ND	0.77	2.43	ND	0.11	0.66	ND	ND	ND	ND	ND	ND	ND	0.16	ND	7.9 p/p	0.15 p/p	0.04	ND	<4.00					
33.3900	-112.375	Buckeye Canal	Carp	101	85	ND	ND	0.96	ND	0.20	0.45	ND	ND	ND	ND	ND	ND	ND	ND	20 p/p	0.3 p/p	0.02	ND	5.90						
					85	ND	ND	1.5	ND	0.13	0.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	15 p/p	0.28 p/p	0.05	ND	8.10					
					85	ND	ND	1.2	ND	0.09	0.41	ND	ND	ND	ND	ND	ND	ND	ND	ND	23 p/p	0.44 p/p	0.04	ND	14.00					
					94-95	ND	0.61	1.3	ND	0.04	0.87	ND	ND	ND	ND	ND	ND	ND	0.05	ND	9.4 p/p	0.08 p/p	0.02	ND	<0.40					
					94-95	ND	0.50	1.1	ND	0.05	0.25	ND	ND	ND	ND	ND	ND	ND	0.05	ND	14 p/p	0.04 p/p	<0.01	ND	<0.40					
					94-95	ND	0.48	1.15	ND	0.25	0.43	ND	ND	ND	ND	ND	ND	ND	0.08	ND	21 p/p	0.15 p/p	<0.01	ND	<0.40					
					94-95	ND	0.65	1.37	ND	0.05	0.33	ND	ND	ND	ND	ND	ND	ND	0.09	ND	14 p/p	0.13 p/p	<0.01	ND	<0.40					
			Carp/Filletts	101	94-95	ND	1.11	1.54	ND	0.04	0.38	ND	ND	ND	ND	ND	ND	<0.01	ND	4.5 p/p	<0.01 p/p	<0.01	ND	<0.40						
					94-95	ND	0.70	1.07	ND	0.13	0.37	ND	ND	ND	ND	ND	ND	ND	ND	1.9 p/p	ND	0.01	ND	0.81						
					94-95	ND	0.58	2.28	ND	0.18	0.44	ND	ND	ND	ND	ND	ND	ND	ND	4.5 p/p	ND	<0.01	ND	0.74						
					94-95	ND	0.84	0.8	ND	0.11	0.44	ND	ND	ND	ND	ND	ND	ND	ND	1.3 p/p	ND	<0.01	ND	0.31						
					Catfish	101	94-95	ND	2.69	2.86	ND	0.07	0.24	ND	ND	ND	ND	ND	ND	0.05	ND	9.8 p/p	0.02 p/p	<0.03	ND	2.60				
							94-95	ND	1.96	0.71	ND	0.11	<0.02	ND	ND	ND	ND	ND	ND	0.14	ND	20 p/p	0.04 p/p	<0.06	ND	5.40				
							33.3340	-112.609	Gila River above Hwy. 85 Bridge	Unknown	503	6/82	0.1	ND	3.2	ND	0.26	ND	1.50	0.002	0.002	0.002	0.002	ND	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.05	ND
												6/82	0.1	ND	1.3	ND	0.37	ND	0.15	0.002	0.002	0.002	0.002	ND	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.19	ND
6/82	ND	ND	ND	ND	ND	ND						ND	ND	ND	ND	ND	ND	ND	0.09 p/p	0.5 p/p	0.05 p/p	ND	ND	ND						
6/82	ND	ND	ND	ND	ND	ND						ND	ND	ND	ND	ND	ND	ND	0.12 p/p	0.50 p/p	0.12 p/p	ND	ND	ND						
33.3340	-112.651	Arlington Canal at Unnamed Drain	Unknown	503	5/81	0.08						ND	2.8	ND	0.10	ND	0.04	ND	ND	ND	ND	ND	0.05	0.05 o/p	0.05 o/p	0.05 o/p	ND	0.05	ND	
					5/81	ND						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	5.0 p/p	ND	ND	ND	ND	
					6/83	ND						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05 o/p	0.05 o/p	0.05 p/p	ND	0.05	ND
					6/83	ND						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	5.0 p/p	ND	ND	ND	ND	
33.3340	-112.668	Gila River adjacent to Robbins Butte	Unknown	503	8/83	0.13						ND	1.2	ND	0.09	ND	0.01	0.005	0.005	0.002	0.003	0.003	0.0 p/p	0.4 p/p	0.0 p/p	0.00	0	ND		
					7/81	0.05						ND	1.14	ND	0.33	ND	10.00	0.005	0.005	0.005	0.005	ND	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.05	ND		
33.3547	-112.723	Buckeye Canal Irrigation Returns	Unknown	503	7/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	0.2 p/p	8.5 p/p	0.05 p/p	ND	ND	ND							
					6/83	0.45	ND	13	ND	0.35	ND	0.05	0.001	0.001	0.001	0.05	ND	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.05	ND							
					6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	14.0 p/p	0.05 p/p	ND	ND	ND						
					2/82	0.1	ND	1.7	ND	0.10	ND	0.18	0.025	0.025	ND	ND	ND	ND	0.05 o/p	0.05 o/p	0.05 o/p	0.05	0.05	ND						
33.2700	-112.770	Gila River near Arlington	Unknown	503	2/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05 p/p	0.05 p/p	0.05 p/p	ND	ND	ND							
					85	ND	ND	9.52	ND	0.08	0.62	ND	ND	ND	ND	ND	ND	ND	ND	5 p/p	ND	0.02	ND	14.00						
33.2390	-112.770	Gillespie Dam	Carp	101	85	ND	ND	1.1	ND	0.11	0.43	ND	ND	ND	ND	ND	ND	ND	ND	4.9 p/p	ND	0.02	ND	2.10						
					85	ND	ND	1.1	ND	0.08	0.43	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.0 p/p	ND	0.02	ND	1.90					
					94-95	ND	1.05	1.82	ND	0.08	0.83	ND	ND	ND	ND	ND	ND	0.01	ND	1.3 p/p	0.02 p/p	0.01	ND	<0.25						
					94-95	ND	1.17	1.29	ND	0.07	0.56	ND	ND	ND	ND	ND	ND	<0.01	ND	0.67 p/p	0.02 p/p	<0.01	ND	<0.25						
					94-95	ND	0.91	5.44	ND	0.08	0.58	ND	ND	ND	ND	ND	ND	<0.01	ND	1.00 p/p	0.02 p/p	<0.01	ND	<0.25						
					94-95	ND	1.4	1.3	ND	0.05	0.66	ND	ND	ND	ND	ND	ND	<0.01	ND	0.73 p/p	<0.01 p/p	<0.01	ND	<0.25						
					33.2390	-112.770	Gillespie Dam	Catfish	101	94-95	ND	2.84	0.5	ND	0.06	0.23	ND	ND	ND	ND	ND	0.01	ND	7.9 p/p	0.09 p/p	<0.01	ND	<0.80		
										94-95	ND	0.81	5.99	ND	0.09	0.41	ND	ND	ND	ND	ND	ND	0.01	ND	4.6 p/p	0.11 p/p	<0.01	ND	<0.80	
										94-95	ND	1.09	1.57	ND	0.08	0.39	ND	ND	ND	ND	ND	ND	0.01	ND	4.2 p/p	0.08 p/p	<0.01	ND	<0.80	
										94-95	ND	0.9	0.53	ND	0.06	0.27	ND	ND	ND	ND	ND	ND	0.02	ND	8.4 p/p	0.07 p/p	<0.01	ND	<0.80	
94-95	ND	0.52	5.49	ND						0.07	0.48	ND	ND	ND	ND	ND	ND	0.03	ND	1.3 p/p	0.02 p/p	<0.01	ND	<0.05						
94-95	ND	ND	ND	ND						ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	0.96 p/p	<0.01 p/p	<0.01	ND	<0.05						
94-95	ND	ND	ND	ND						ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	0.35 p/p	<0.01 p/p	<0.01	ND	<0.05						
94-95	ND	ND	ND	ND						ND	ND	ND	ND	ND	ND	ND	ND	<0.01	ND	0.84 p/p	<0.01 p/p	<0.01	ND	<0.05						
94-95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.01	ND	3.5 p/p	<0.01 p/p	<0.04	ND	1.80											

units (ug/g wet weight)  
\* units (ug/g)

ND = No Data  
o/p = Chlorine is in ortho position  
p/p = Chlorine is in para position

<i>Contaminant</i>	<i>Criteria</i>
Dieldrin	300 ug/g
Chlordane	300 ug/g
Copper	100,000 ug/g
DDD	5000 ug/g
DDE	5000 ug/g
DDT, sum	5000 ug/g
Lindane	100 ug/g
Mercury	1000 ug/g
Selenium	100/200 ug/g
Toxaphene	5000 ug/g

All fish tissue concentrations reviewed in the MGRW study area were far less than any of the criteria values listed above. Other sources have established fish tissue criteria for the protection of wildlife (Newell et al., 1987; Australia Water Resources Council, 1974; BCMOELP, 1994). These are listed in the following table:

<i>Contaminant</i>	<i>Criteria</i>	<i>Source</i>
Dieldrin	0.022 ug/g	Newell, et al., 1987
Chlordane	0.37 ug/g	Newell, et al., 1987
DDTs	0.20 ug/g	Newell, et al., 1987
Mercury	0.50 ug/g	Australia Water Resources Council, 1974
Selenium	3.00 ug/g	BCMOELP, 1994

The above values should not be interpreted as standards not to be exceeded. Rather they were guidelines that provide a basis for quantifying possible fish tissue contamination. Of the criteria listed above for the protection of wildlife, pesticides (DDTs) were the most commonly exceeded pollutants of concern in the MGRW area. In this case, DDTs include DDT, DDE and DDD. Concentrations of DDE in fish from the Buckeye canal were far greater than concentrations in fish upstream of the canal. Concentrations of DDE in carp from the Buckeye Canal, were as much as 23 ug/g in 1985 and

21 ug/g in 1994-95. Upstream of the Buckeye Canal, the highest concentration of DDE measured in fish was 1.28 ug/g in 1985 at the Salt River and 19th Avenue. Since 1985, the highest measured concentration of DDE upstream of the Buckeye Canal was 0.63 ug/g which occurred in 1994-95 at the Salt River at 59th Avenue.

The mercury criteria for the protection of wildlife was exceeded four times in 1982. The dieldrin criteria was exceeded 30 times. The practical quantitation limit for analyzing these contaminants in fish tissue samples was not listed. Thus, some of the apparent exceedances may be due to noise and/or high method detection limits

No criteria for the protection of wildlife was found for lindane. However at the Salt River at 91st Avenue in April, 1994 a carp was sampled that had a lindane concentration of 23 ug/g. This is far higher than any of the other lindane concentrations measured.

Copper was found to have the consistently highest concentrations of all the metals in fish. Thallium and beryllium fish tissue samples were only available for the 1980's. Concentrations of thallium in fish were as high as 10 ug/g in Buckeye irrigation return flows in 1981. Beryllium and selenium concentrations have stayed relatively constant.

All trihalomethanes were at very low concentrations in fish. The highest concentrations measured were for chloroform (highest 0.082 ug/g in 1982 at 115th Avenue and the Gila River).

#### 4.6 Sediment Data

**Table 4-23** contains all of the sediment concentrations collected in this study for the pollutants of concern. Sediment concentrations can be indicators of past water quality if the contaminant was deposited in the sediment from the water. It is also recognized that sediment can be a source of contamination.

Sediment contaminant concentrations for pesticides were much higher in the 1980's samples than in the 1990's. However, most of the available sediment information was from the 1980's. Concentrations of DDD reached as much as 820 ug/g in the Arlington Canal, in 1981.

Of the metals, the highest sediment contaminant concentrations occurred for thallium. Concentrations were as high as 32,500 ug/g in Buckeye Canal irrigation returns and as high as 23,600 ug/g in the Arlington Canal. Both of these high concentrations were measured in 1981.

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Table 4-23  
Sediment  
Greeley and Hansen  
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Latitude	Longitude	Location	Source Code	Date	Beryllium	Copper	Mercury	Selenium	Thallium	Bromoform	Chloroform	Chlorodibromo -								
												methane	Chlordane	DDD	DDE	DDT	Diazinon	Dieldrin	Lindane	Toxaphene
33.4240	-111.893	1st Street and Smith Road, Tempe	503	3/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6 *	35 *	2.4 *	ND	8.5	0.3	ND
33.4395	-111.909	Indian Bend Wash at Curry Rd.	503	6/93	ND	21	0	ND	ND	ND	ND	ND	1	0.4 *	20 *	1.6 *	0.2 *	0.1	0.1	10
33.4335	-111.956	Salt River at Priest Drive	503	6/93	ND	37	100	ND	ND	ND	ND	ND	3	0.3 *	7.6 *	0.7 *	0.4 *	0.8	0.2	20
33.4185	-111.956	University and Priest, Tempe	503	11/94	ND	30	0	ND	ND	ND	ND	ND	8	0.7 *	5.2 *	0.3 *	ND	ND	0.1	10
33.4188	-111.971	48th St. above gage under lot	503	6/93	ND	40	0	ND	ND	ND	ND	ND	ND	8.6 *	30 *	9.5*	0.2 *	ND	0.1	ND
33.4182	-111.973	48th St. above gage near freeway	503	6/93	ND	41	0	ND	ND	ND	ND	ND	15	1.2 *	30 *	4.2 *	0.1 *	1.5	0.1	ND
33.4423	-111.991	Washington at 40th Street, Phoenix	503	3/94	ND	50	100	ND	ND	ND	ND	ND	ND	3.4 *	30 *	6.5 *	0.2 *	4.4	0.3	20
33.4093	-112.036	Salt River at 24th Street at Phoenix	503	6/93	ND	42	100	ND	ND	ND	ND	ND	30	ND	8.6 *	ND	ND	7.6	0.1	ND
33.4210	112.036	Stream at 20th St. & University	503	12/94	ND	110	0	ND	ND	ND	ND	ND	9	1.2 *	6.9 *	2.2 *	ND	0.8	0.1	20
33.3415	-112.084	Salt River tributary at South Mountain Park	503	9/92	ND	26	0	ND	ND	ND	ND	ND	8	0.2 *	51 *	4.9 *	0.1 *	0.7	0.2	ND
33.4075	-112.092	Salt River at 19th Ave	503	4/85	3200	12	100	3200	6500	6.4	6.4	ND	25	5.2 o'p	2.6 o'p *	5.2 o'p	ND	5.2	2.6	52
				4/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2 p'p	5.2 p'p *	ND	ND	ND	ND	ND
33.4042	-112.104	5th Catchbasin from 27th Ave	503	9/92	ND	26	0	ND	ND	ND	ND	ND	13	0.2 *	91 *	11 *	0.8 *	0.3	0.2	ND
33.4042	-112.107	2nd Catchbasin from 27th Ave	503	9/92	ND	35	0	ND	ND	ND	ND	ND	7	0.5 *	39 *	5 *	0.2 *	0.8	0.2	ND
33.4042	-112.109	1st Catchbasin from 27th Ave	503	9/92	ND	62	10	ND	ND	ND	ND	ND	10	0.2 *	97 *	ND	0.3 *	0.2	0.2	ND
				6/93	ND	40	0	ND	ND	ND	ND	ND	ND	8.2 *	130 *	ND	0.4 *	3.9	0.5	ND
33.4073	-112.134	Salt River at 35th Ave	503	6/93	2700	39	100	ND	ND	ND	ND	ND	16	2.4 *	102 o'p *	9.5 *	0.2 *	3.9	0.1	ND
33.4092	-112.134	Salt River above 35th Ave	503	4/82	ND	287	200	200	410	5.1	ND	ND	102	102 o'p	102 p'p *	102 o'p	ND	102	102	102
				4/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	102 p'p	ND	102 p'p	ND	ND	ND	ND
33.2542	-112.160	Gila River near Laveen, AZ	503	6/83	1200	9.3	200	ND	ND	3.8	ND	ND	30	15 p'p	151 o'p *	151 o'p	ND	30	30	ND
				6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30 p'p *	30 p'p	ND	ND	ND	ND
33.4045	-112.169	Salt River below 51st Ave Bridge	503	2/82	1800	ND	ND	300	2300	3.7	ND	ND	75	75 o'p	75 o'p *	75 o'p	ND	75	75	75
				2/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	75 p'p	75 p'p *	75 p'p	ND	ND	ND	ND
				6/83	600	17	200	30	50	3.2	3.2	3.2	26	129 o'p	129 o'p *	129 o'p	ND	26	26	129
				6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	26 p'p	26 p'p *	26 p'p	ND	ND	ND	ND
33.3765	-112.302	Salt/Gila River above 115th Ave Crossing	503	2/82	2000	132	300	300	3200	4.9	4.9	4.9	98	98 o'p	98 o'p *	98 o'p	ND	98	98	98
				2/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	98 p'p	98 p'p *	98 p'p	ND	ND	ND	ND
				6/83	ND	ND	ND	30	ND	ND	ND	3.2	ND	ND	ND	ND	ND	ND	ND	ND
33.3765	-112.302	Gila River at 115th Ave, Phoenix	503	2/82	2000	132	300	800	3200	4.9	4.9	ND	98	98 o'p	98 o'p *	98 o'p	ND	98	98	98
				2/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	98 p'p	98 p'p *	98 p'p	ND	ND	ND	ND
				6/83	600	10	200	30	50	2.5	2.5	ND	28	141 o'p	141 o'p *	141 o'p	ND	28	28	141
				6/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	28 p'p	28 p'p *	28 p'p	ND	ND	ND	ND
33.3343	-112.609	Gila River above HWY 85 Bridge	503	2/82	4600	64.5	100	920	4100	41.5	11.5	11.5	230	230 o'p	230 o'p *	507 o'p	ND	230	230	230
				2/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	230 p'p	230 p'p *	230 o'p	ND	ND	ND	ND
33.3340	-112.651	Arlington Canal @ Unnamed Drain	503	5/81	1200	52.6	200	160	23600	8.2	13.6	13.6	82	820 o'p	82 o'p *	82 o'p	ND	82	82	82
				5/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	82 p'p	82 p'p *	ND	ND	ND	ND	ND
33.3546	-112.723	Buckeye Canal irrigation returns west of Buckeye AZ	503	5/81	1600	46.6	300	300	32500	13.6	ND	ND	136	136 o'p	136 o'p *	136 o'p	ND	136	136	136
				5/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	136 p'p	136 p'p *	ND	ND	ND	ND	ND
33.2242	-112.767	Gila River above diversions at Gillespie	503	10/81	ND	ND	ND	ND	ND	ND	ND	4	ND	3.9 *	47 *	0.1 *	ND	0.4	0.1	10
				4/82	ND	ND	ND	ND	ND	ND	ND	5	ND	0.1 *	22 *	0.1 *	ND	0.2	0.1	10
33.2700	-112.770	Gila River near Arlington	503	2/82	1900	84.5	100	580	6700	4.8	4.8	ND	96	96 o'p	96 p'p *	96 o'p	ND	96	96	96
				2/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	96 p'p	ND	96 p'p	ND	ND	ND	ND

units (ug/g wet weight)  
\* units (ug/g)

ND = No Data  
o'p = Chlorine is in ortho position  
p'p = Chlorine is in para position

Beryllium concentrations were as high as 4,600 ug/g at Highway 85 bridge and the Gila River in 1982. The only sediment beryllium sample in the 1990's was taken in 1993 at 35th Avenue and the Salt River and showed a concentration of 2700 ug/g. All sediment samples analyzed for mercury were between 100 and 300 ug/g. Copper concentrations ranged from 9.3 ug/g to 287 ug/g.

#### 4.7 Groundwater Analysis

Groundwater was analyzed in **Tables 4-24** through **4-27** for river Reaches 2 through 5, respectively. There were no wells located in Reach 1. For river Reaches 2 through 5, there were many wells sampled only one time for a specific contaminant. Thus, it was difficult to identify any trends either spatially or temporally. As mentioned, groundwater data was inventoried from 1980 through 1997. Older data was used because of data availability and groundwater quality does not change as rapidly as surface or stormwater.

In Reach 2 (**Table 4-24**), many of the well samples were those collected during the investigation of a volatile organic carbon spill in Mesa. Of the pollutants of concern, these samples were analyzed primarily for nitrate and the trihalomethanes.

**Table 4-25** shows the results for Reach 3 which extends from I-10 bridge and the Salt River to the 23rd Avenue WWTP outfall. Reach 3 had 5 wells in the MGRW area. All of these samples were from the 1980's.

**Table 4-26** shows results from Reach 4 which extends from the 23rd Avenue WWTP outfalls to the confluence of the Salt and Gila rivers. As **Table 4-26** shows, most of the wells were sampled on one day only in the 1980's. Boron concentrations and total dissolved solids (TDS) were high in Reach 4 with 43 percent of the samples having boron concentrations higher than 1000 ug/l and 43 percent of the samples having TDS greater than 1500 mg/l. One of the wells had a boron concentration of 10,000 ug/l in 1980.

**Table 4-27** shows the results for Reach 5 from the confluence of the Salt and Gila River to Gillespie Dam. The highest boron concentration sampled was 3,900 mg/l in 1984 and 40 percent of the samples in Reach 5 had boron concentrations greater than 1000 ug/l. Nitrate in one of the Buckeye Irrigation Company wells was 20.2 mg-N/l on both February 8, 1982 and May 7, 1982. Other wells in the area had combined nitrate/nitrite concentrations of 26 mg-N/l in 1983. TDS concentrations were relatively high in Reach 5 with 43 percent of samples showing TDS of 1500 mg/l or greater and one as high as 3,020 mg/l.

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**Table 4-24**  
**Detailed Analysis - Groundwater Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**

Greeley and Hansen  
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Latitude	Longitude	Sampled Location	Source Code	Date	Beryllium	Beryllium	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate	Nitrate/Nitrite	Selenium	Thallium	Bromodichloro-	Bromoform
					Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)		Total (ug/l)	Dissolved (ug/l)		(mg-N/l)	Dissolved (mg-N/l)	Total (ug/l)	Total (ug/l)	methane Total (ug/l)
33:29:20	111:43:46	MAG 205J/VOC & DBCP in GW in Mesa	503	6/21/85	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	ND	ND	0.5	0.5
33:29:10	111:44:02	Well at A-02-06 27CBC	503	1/15/81	ND	ND	0	ND	ND	ND	ND	ND	ND	2.0	ND	ND	ND	ND
				1/15/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:29:06	111:44:05	Well at A-02-06 27CBC	503	6/3/80	ND	ND	140	ND	ND	ND	ND	0	ND	1.4	0	ND	ND	ND
33:29:12	111:44:04	MAG 205J/VOC & DBCP in GW in Mesa	503	6/20/85	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	0.5	0.5
33:29:05	111:44:20	MAG 205J/VOC & DBCP in GW in Mesa	503	6/19/85	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND	ND	ND	0.5	0.5
33:28:51	111:44:55	MAG 205J/VOC & DBCP in GW in Mesa	503	6/17/85	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	0.5	0.5
33:28:29	111:45:28	MAG 205J/VOC & DBCP in GW in Mesa	503	7/9/85	ND	ND	ND	ND	ND	ND	ND	ND	5.4	ND	ND	ND	0.5	0.5
33:28:57	111:45:35	MAG 205J/VOC & DBCP in GW in Mesa	503	5/8/85	ND	ND	ND	ND	ND	ND	ND	ND	2.2	ND	ND	ND	0.5	0.5
33:28:59	111:45:53	MAG 205J/VOC & DBCP in GW in Mesa	503	5/8/85	ND	ND	ND	ND	ND	ND	ND	ND	1.8	ND	ND	ND	0.5	0.5
33:28:38	111:45:56	MAG 205J/VOC & DBCP in GW in Mesa	503	5/8/85	ND	ND	ND	ND	ND	ND	ND	ND	0.9	ND	ND	ND	0.5	0.5
33:28:32	111:46:22	MAG 205J/VOC & DBCP in GW in Mesa	503	5/8/85	ND	ND	ND	ND	ND	ND	ND	ND	1.3	ND	ND	ND	0.5	0.5
33:28:06	111:46:37	MAG 205J/VOC & DBCP in GW in Mesa	503	6/27/85	ND	ND	ND	ND	ND	ND	ND	ND	8.6	ND	ND	ND	0.5	0.5
33:27:51	111:47:07	MAG 205J/VOC & DBCP in GW in Mesa	503	6/25/85	ND	ND	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND	0.5	0.5
33:27:33	111:47:21	MAG 205J/VOC & DBCP in GW in Mesa	503	7/9/85	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	0.5	0.5
33:27:43	111:47:45	MAG 205J/VOC & DBCP in GW in Mesa	530	6/26/85	ND	ND	ND	ND	ND	ND	ND	ND	3.0	ND	ND	ND	0.5	0.5
33:27:58	111:48:18	MAG 205J/VOC & DBCP in GW in Mesa	530	6/20/85	ND	ND	ND	ND	ND	ND	ND	ND	6.4	ND	ND	ND	0.5	0.5
33:27:30	111:48:42	MAG 205J/VOC & DBCP in GW in Mesa	530	6/21/85	ND	ND	ND	ND	ND	ND	ND	ND	3.9	ND	ND	ND	0.5	0.5
33:27:58	111:49:17	MAG 205J/VOC & DBCP in GW in Mesa	530	6/27/85	ND	ND	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND	0.5	0.5
33:27:30	111:49:17	MAG 205J/VOC & DBCP in GW in Mesa	530	6/28/85	ND	ND	ND	ND	ND	ND	ND	ND	3.8	ND	ND	ND	0.5	0.5
33:27:06	111:49:28	MAG 205J/VOC & DBCP in GW in Mesa	530	6/26/85	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	0.5	0.5
33:28:35	111:49:33	MAG 205J/VOC & DBCP in GW in Mesa	530	10/11/85	ND	ND	ND	ND	ND	ND	0.2	ND	5.8	ND	ND	ND	1	1
33:28:28	111:49:42	MAG 205J/VOC & DBCP in GW in Mesa	530	10/11/85	ND	ND	ND	ND	ND	ND	0.2	ND	32.8	ND	5	ND	0.5	0.5
33:27:34	111:49:45	MAG 205J/VOC & DBCP in GW in Mesa	530	5/7/85	ND	ND	ND	ND	ND	ND	ND	ND	15.1	ND	ND	ND	0.5	0.5
				10/17/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0.5
				10/21/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5

ND = No Data

**Table 4-24**  
**Detailed Analysis - Groundwater Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampled Location	Source Code	Date	Chloroform	Chlorodibromo-	Chlordane	O, P' DDD	P,P' DDD	O, P' DDE	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS
					Total (ug/l)	methane Total (ug/l)								Total (ug/l)	Oxygen (mg/l)		
33:29:20	111:43:46	MAG 205J/VOC &DBCP in GW in Mesa	503	6/21/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:29:10	111:44:02	Well at A-02-06 27CBC	503	1/15/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				1/15/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	641
33:29:06	111:44:05	Well at A-02-06 27CBC	503	6/3/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	583
33:29:12	111:44:04	MAG 205J/VOC &DBCP in GW in Mesa	503	6/20/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:29:05	111:44:20	MAG 205J/VOC &DBCP in GW in Mesa	503	6/19/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:51	111:44:55	MAG 205J/VOC &DBCP in GW in Mesa	503	6/17/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:29	111:45:28	MAG 205J/VOC &DBCP in GW in Mesa	503	7/9/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:57	111:45:35	MAG 205J/VOC &DBCP in GW in Mesa	503	5/8/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:59	111:45:53	MAG 205J/VOC &DBCP in GW in Mesa	503	5/8/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:38	111:45:56	MAG 205J/VOC &DBCP in GW in Mesa	503	5/8/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:32	111:46:22	MAG 205J/VOC &DBCP in GW in Mesa	503	5/8/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:06	111:46:37	MAG 205J/VOC &DBCP in GW in Mesa	503	6/27/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:51	111:47:07	MAG 205J/VOC &DBCP in GW in Mesa	503	6/25/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:33	111:47:21	MAG 205J/VOC &DBCP in GW in Mesa	503	7/9/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:43	111:47:45	MAG 205J/VOC &DBCP in GW in Mesa	530	6/26/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:58	111:48:18	MAG 205J/VOC &DBCP in GW in Mesa	530	6/20/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:30	111:48:42	MAG 205J/VOC &DBCP in GW in Mesa	530	6/21/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:58	111:49:17	MAG 205J/VOC &DBCP in GW in Mesa	530	6/27/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:30	111:49:17	MAG 205J/VOC &DBCP in GW in Mesa	530	6/28/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:06	111:49:28	MAG 205J/VOC &DBCP in GW in Mesa	530	6/26/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:35	111:49:33	MAG 205J/VOC &DBCP in GW in Mesa	530	10/11/85	0.5	0.5	100	ND	10	ND	10	10	ND	10	ND	500	ND
33:28:28	111:49:42	MAG 205J/VOC &DBCP in GW in Mesa	530	10/11/85	0.5	0.5	100	ND	10	ND	10	10	ND	10	ND	ND	ND
33:27:34	111:49:45	MAG 205J/VOC &DBCP in GW in Mesa	530	5/7/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/17/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				10/21/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

ND = No Data

**Table 4-24**  
**Detailed Analysis - Groundwater Quality**  
**Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge**  
(Continued)

Latitude	Longitude	Sampled Location	Source Code	Date	Beryllium	Beryllium	Boron	Copper	Copper	Cyanide	Mercury	Mercury	Nitrate	Nitrate/Nitrite	Selenium	Thallium	Bromodichloro-	Bromoform
					Total	Dissolved		Total	Dissolved		Total	Dissolved		Dissolved	Total	Total	methane Total	Total
					(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(ug/l)	(ug/l)	(mg-N/l)	(mg-N/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
33:26:14	111:50:14	MAG 205J/VOC & DBCP in GW in Mesa	530	6/26/85	ND	ND	ND	ND	ND	ND	ND	ND	2.9	ND	ND	ND	0.5	0.5
33:25:17	111:50:17	City of Mesa- Well No. 11	530	10/12/83	ND	ND	ND	50	ND	ND	1	ND	2.2	ND	5	ND	ND	ND
33:27:33	111:50:23	MAG 205J/VOC & DBCP in GW in Mesa	530	5/7/85	ND	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	ND	0.5	0.5
				10/21/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5
33:27:07	111:50:23	MAG 205J/VOC & DBCP in GW in Mesa	530	6/25/85	ND	ND	ND	ND	ND	ND	ND	ND	2.4	ND	ND	ND	0.5	0.5
33:27:23	111:50:23	MAG 205J/VOC & DBCP in GW in Mesa	530	5/7/85	ND	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	ND	0.5	0.5
				10/21/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5
33:26:37	111:50:48	MAG 205J/VOC & DBCP in GW in Mesa	530	6/27/85	ND	ND	ND	ND	ND	ND	ND	ND	2.3	ND	ND	ND	0.5	0.5
33:28:09	111:50:14	MAG 205J/VOC & DBCP in GW in Mesa	530	5/21/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0.5
				10/11/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	
				10/18/85	ND	ND	ND	ND	ND	ND	ND	ND	22.2	ND	ND	ND	0.5	0.5
33:25:23	111:51:15	MAG 205J/VOC & DBCP in GW in Mesa	530	6/19/85	ND	ND	ND	ND	ND	ND	ND	2.2	ND	ND	ND	0.5	0.5	
33:25:23	111:53:09	Salt River Project Well No 7 Mesa	530	3/12/82	ND	ND	ND	50	ND	ND	0.5	ND	13.3	ND	5	ND	ND	ND
33:24:57	111:53:18	City of Tempe- Well No. 8	530	4/30/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/15/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:06	111:53:54	City of Tempe- Well No. 11- SRP Exchange	530	12/2/81	ND	ND	ND	50	ND	ND	0.5	ND	4.1	ND	5	ND	ND	ND
33:25:09	111:53:57	City of Tempe- Well No. 7	530	7/9/81	ND	ND	ND	50	ND	ND	0.5	ND	13	ND	5	ND	ND	ND
				10/1/84	ND	ND	ND	50	ND	ND	1	ND	10	ND	5	ND	ND	ND
				4/30/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:09	111:53:57	Tempe Municipal Well No. 7	530	6/22/81	5	ND	ND	8	ND	ND	0.2	ND	ND	2	18	10	10	
33:27:02	111:54:53	Well at A-01-04 11 ABA	530	8/12/83	ND	0.5	200	ND	10	ND	ND	ND	ND	3.5	ND	ND	ND	ND
33:26:59	111:55:03	City of Tempe- Well No 6- Backup for Irrigation	530	5/14/81	ND	ND	ND	50	ND	ND	0.5	ND	5.8	ND	5	ND	ND	ND
				7/10/81	ND	ND	ND	50	ND	ND	0.5	ND	7.3	ND	5	ND	ND	ND
				12/2/81	ND	ND	ND	50	ND	ND	0.5	ND	4	ND	5	ND	ND	ND
				4/13/82	ND	ND	ND	50	ND	ND	0.5	ND	4.1	ND	5	ND	ND	ND
				8/12/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	0.6		
33:25:24	111:56:01	Well at A-01-04 15DCC	530	8/12/83	ND	0.5	260	ND	10	ND	ND	ND	5.9	ND	ND	ND	ND	
33:25:20	111:56:04	City of Tempe- Well No. 3	530	12/2/81	ND	ND	ND	50	ND	ND	0.5	ND	7.3	ND	5	ND	ND	ND
				8/12/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.7	0.6
				4/30/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/15/85	ND	ND	ND	ND	ND	ND	5.7	ND	ND	ND	ND	ND	ND	ND
33:25:32	111:58:40	Well at A-01-04 18 DAD	530	4/28/82	ND	ND	240	ND	ND	ND	ND	ND	4.4	ND	ND	ND	ND	
33:25:32	111:59:04	Well at A-01-04 18CAC	530	5/17/82	ND	ND	950	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	
33:25:30	111:59:35	Well at A-01-04 18CCB	530	6/13/80	ND	1	1400	ND	10	ND	0.1	ND	0.1	ND	ND	ND	ND	
33:25:28	111:59:46	Well at A-01-03 13DDA	530	6/17/80	ND	1	220	ND	10	ND	ND	0	ND	4.9	ND	ND	ND	

ND = No Data

Table 4-24  
Detailed Analysis - Groundwater Quality  
Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge  
(Continued)

Latitude	Longitude	Sampled Location	Source Code	Date	Chloroform	Chlorodibromo-	Chlordane	O, P' DDD	P,P' DDD	O, P' DDE	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Toxaphene	Dissolved	TDS
					Total (ug/l)	methane Total (ug/l)								Total (ug/l)	Lindane (ug/l)	Total (ug/l)	
33:26:14	111:50:14	MAG 205J/VOC & DBCP in GW in Mesa	530	6/26/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:17	111:50:17	City of Mesa- Well No. 11	530	10/12/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:33	111:50:23	MAG 205J/VOC & DBCP in GW in Mesa	530	5/7/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/21/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:07	111:50:23	MAG 205J/VOC & DBCP in GW in Mesa	530	6/25/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:27:23	111:50:23	MAG 205J/VOC & DBCP in GW in Mesa	530	5/7/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/21/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:26:37	111:50:48	MAG 205J/VOC & DBCP in GW in Mesa	530	6/27/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:28:09	111:650:14	MAG 205J/VOC & DBCP in GW in Mesa	530	5/21/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/11/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
				10/18/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:25:23	111:51:15	MAG 205J/VOC & DBCP in GW in Mesa	530	6/19/85	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:23	111:53:09	Salt River Project Well No 7 Mesa	530	3/12/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:24:57	111:53:18	City of Tempe- Well No. 8	530	4/30/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				2/15/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
33:27:06	111:53:54	City of Tempe- Well No. 11- SRP Exchange	530	12/2/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:09	111:53:57	City of Tempe- Well No. 7	530	7/9/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				10/1/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/30/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33:25:09	111:53:57	Tempe Municipal Well No. 7	530	6/22/81	10	10	1	1	1	1	1	ND	1	1	1	ND	ND
33:27:02	111:54:53	Well at A-01-04 11 ABA	530	8/12/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:26:59	111:55:03	City of Tempe- Well No 6- Backup for Irrigation	530	5/14/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/10/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				12/2/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/13/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				8/12/83	5	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33:25:24	111:56:01	Well at A-01-04 15DCC	530	8/12/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:20	111:56:04	City of Tempe- Well No. 3	530	12/2/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				8/12/83	5	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				4/30/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
				2/15/85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
33:25:32	111:58:40	Well at A-01-04 18 DAD	530	4/28/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	616	
33:25:32	111:59:04	Well at A-01-04 18CAC	530	5/17/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1530	
33:25:30	111:59:35	Well at A-01-04 18CCB	530	6/13/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1220	
33:25:28	111:59:46	Well at A-01-03 13DDA	530	6/17/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1110	

ND = No Data

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON

Middle Gila River Watershed Phase I

**Table 4-25**  
**Detailed Analysis - Groundwater Quality**  
**Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfall**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampled Location	Source Code	Date	Beryllium	Boron	Copper	Cyanide	Mercury	Nitrate/Nitrite	Selenium	Thallium	Bromodichloro-	Bromoform	Chloroform	Chlorodibromo-
					Dissolved		Dissolved		Dissolved	Diss	Total		methane			methane
					(ug/l)	(ug/l)	(ug/l)	(mg/l)	(ug/l)	(mg-N/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
33:25:15	112:02:41	Well at A-01-03 22BBB	503	7/26/84	ND	220	ND	ND	0.1	1.1	1	ND	ND	ND	ND	ND
33:25:11	112:04:23	Well at A-01-03 20BAD	503	6/16/80	1	300	10	ND	0	3.1	1	ND	ND	ND	ND	ND
33:26:01	112:05:53	Well at A-01-03 18BBC	503	7/2/80	1	350	10	ND	0	3	0	ND	ND	ND	ND	ND
33:25:36	112:05:59	Well at A-01-02 13DAD	503	8/20/80	1	410	10	ND	0	3.5	0	ND	ND	ND	ND	ND
33:25:20	112:06:38	Well at A-01-02 13CCC	503	8/20/80	1	610	10	ND	0	2.9	0	ND	ND	ND	ND	ND

Latitude	Longitude	Sampled Location	Source Code	Date	Chlordane	P,P' DDD	P,P' DDE	P,P' DDT	Diazinon	Dieldrin	Lindane	Toxaphene	Dissolved	TDS
										Total		Total	Oxygen	
					(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(mg/l)	(mg/l)	
33:25:15	112:02:41	Well at A-01-03 22BBB	503	7/26/84	0.1	0.01	0.01	0.01	ND	0.01	0.01	1	ND	ND
33:25:11	112:04:23	Well at A-01-03 20BAD	503	6/16/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	935
33:26:01	112:05:53	Well at A-01-03 18BBC	503	7/2/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	871
33:25:36	112:05:59	Well at A-01-02 13DAD	503	8/20/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	914
33:25:20	112:06:38	Well at A-01-02 13CCC	503	8/20/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	1080

ND = No Data

MULTI-CITY SUBREGIONAL OPERATING GROUP  
and  
CITY OF TOLLESON  
Middle Gila River Watershed Phase I

**Table 4-26**  
**Detailed Analysis - Groundwater Quality**  
**Reach 4: 23rd Avenue WWTP Outfall to Confluence with Gila River**  
Greeley and Hansen  
July 1998

Latitude	Longitude	Sampled Location	Source Code	Date	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Nitrate/Nitrite Diss (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	Thallium (ug/l)
33:25:23	112:06:55	Stream at 20th St. and University	503	6/17/80	ND	640	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:18	112:06:56	Well at A-01-02 24BBB2	503	8/20/80	1	540	ND	10	ND	ND	0	ND	4.2	ND	1	ND
33:26:00	112:07:00	Well at A-01-02 14AAD	503	6/17/80	ND	450	ND	ND	ND	ND	ND	ND	5.3	ND	ND	ND
33:24:23	112:07:42	Well at A-01-02 26BAB	503	6/20/80	ND	1400	ND	ND	ND	ND	ND	ND	7.9	ND	ND	ND
33:25:05	112:08:19	Well at A-01-02 22ACA	503	6/26/80	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND
				7/1/80	ND	470	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:24:13	112:08:44	Well at A-01-02 27BAC	503	6/30/80	ND	1000	ND	ND	ND	ND	ND	ND	12	ND	ND	ND
33:25:01	112:09:03	Stream at A-01-02 22BCC	503	8/26/80	ND	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:23:54	112:09:34	Well at A-01-02 28CAD	503	6/30/80	ND	1400	ND	ND	ND	ND	ND	ND	11	ND	ND	ND
33:25:20	112:09:50	Well at A-01-02 21BAB	503	6/18/80	ND	670	ND	ND	ND	ND	ND	ND	6.8	ND	ND	ND
33:24:07	112:10:02	Well at A-01-02 28BCC	503	6/20/80	ND	1000	ND	ND	ND	ND	ND	ND	5.5	ND	ND	ND
33:23:30	112:10:04	Well at A-01-02 32AAA2	503	6/23/80	ND	1600	ND	ND	ND	ND	0.2	ND	13	ND	5	ND
33:24:38	112:10:32	Well at A-01-02 20DCB	503	7/2/80	ND	580	ND	ND	ND	ND	ND	ND	1.9	ND	ND	ND
33:23:32	112:10:34	Well at A-01-02 32BAA	503	6/28/80	ND	1900	ND	ND	ND	ND	ND	ND	9.6	ND	ND	ND
33:23:30	112:11:06	Well at A-01-02 31AAA	503	6/3/80	ND	1500	ND	ND	ND	ND	0	ND	14	ND	4	ND
33:24:18	112:11:16	Well at A-01-02 30ADA	503	6/20/80	ND	530	ND	ND	ND	ND	ND	ND	1.4	ND	ND	ND
33:23:33	112:11:18	Well at A-01-02 30DDC	503	6/24/80	ND	700	ND	ND	ND	ND	ND	ND	10	ND	ND	ND
33:23:08	112:11:33	Well at A-01-02 31DBB	503	6/28/80	1	290	ND	ND	ND	0	ND	ND	0.6	ND	0	ND
33:24:47	112:11:42	Well at A-01-02 19CAD	503	6/23/80	1	530	ND	10	ND	ND	0.1	ND	1.1	ND	0	ND
33:23:33	112:12:08	Well at A-01-01 36AAD	503	6/24/80	ND	1600	ND	ND	ND	ND	ND	ND	9.1	ND	ND	ND
33:23:23	112:12:08	Well at A-01-01 36AAD	503	7/27/83	0.5	1800	ND	30	ND	ND	ND	ND	16	ND	ND	ND
33:22:49	112:12:09	Well at A-01-01 36DDA	503	6/24/80	ND	10000	ND	ND	ND	ND	0.1	ND	17	ND	6	ND
33:24:31	112:12:10	Well at A-01-02 30BBB	503	7/3/80	ND	580	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND
33:23:44	112:12:11	Well at A-01-01 25DDD	503	6/28/80	ND	560	ND	ND	ND	ND	ND	ND	1.6	ND	ND	ND
33:23:22	112:12:11	Well- owner SRP	503	8/10/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:23:32	112:13:12	Well at A-01-01 26DDD	503	6/30/80	ND	170	ND	ND	ND	ND	ND	ND	0.9	ND	ND	ND
33:23:19	112:13:18	Well at A-01-01 35ADB	503	6/24/80	1	ND	ND	10	ND	ND	0.4	ND	3	ND	1	ND
33:22:38	112:13:22	Well at A-01-01 35DDC	503	6/27/80	1	1000	ND	10	ND	ND	0	ND	5.9	ND	3	ND
33:22:25	112:14:11	Well at D-01-01 02BBC	503	6/28/80	ND	1300	ND	ND	ND	ND	0	ND	7.9	ND	4	ND
33:23:43	112:14:44	Well at A-01-01 27CDD	503	7/1/80	1	580	ND	10	ND	ND	0.1	ND	6.6	ND	3	ND
33:22:38	112:14:45	Well at D-01-01 03BAA	503	6/25/80	1	730	ND	10	ND	ND	0.2	ND	5.6	ND	4	ND
33:23:34	112:16:27	Rigby Water Co-Childress-Well No. 3	503	3/28/82	ND	ND	50	ND	ND	1	ND	5	ND	5	ND	ND
33:23:52	112:18:15	Rigby Water Co-Rigby Well No. 1	503	3/28/82	ND	ND	50	ND	ND	ND	1	2.5	ND	5	ND	ND

ND = No Data

**Table 4-26**  
**Detailed Analysis - Groundwater Quality**  
**Reach 4: 23rd Avenue WWTP Outfall to Confluence with Gila River**  
(Continued)

Latitude	Longitude	Sampled Location	Source Code	Date	Bromodichloro- methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo- methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)
33:25:23	112:06:55	Stream at 20th St. and University	503	6/17/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1120
33:25:18	112:06:56	Well at A-01-02 24BBB2	503	8/20/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	820
33:26:00	112:07:00	Well at A-01-02 14AAD	503	6/17/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1260
33:24:23	112:07:42	Well at A-01-02 26BAB	503	6/20/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1570
33:25:05	112:08:19	Well at A-01-02 22ACA	503	6/26/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				7/1/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	585
33:24:13	112:08:44	Well at A-01-02 27BAC	503	6/30/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1410
33:25:01	112:09:03	Stream at A-01-02 22BCC	503	8/26/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	878
33:23:54	112:09:34	Well at A-01-02 28CAD	503	6/30/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1840
33:25:20	112:09:50	Well at A-01-02 21BAB	503	6/18/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1170
33:24:07	112:10:02	Well at A-01-02 28BCC	503	6/20/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000
33:23:30	112:10:04	Well at A-01-02 32AAA2	503	6/23/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1940
33:24:38	112:10:32	Well at A-01-02 20DCB	503	7/2/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	711
33:23:32	112:10:34	Well at A-01-02 32BAA	503	6/28/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2090
33:23:30	112:11:06	Well at A-01-02 31AAA	503	6/3/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1910
33:24:18	112:11:16	Well at A-01-02 30ADA	503	6/20/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	688
33:23:33	112:11:18	Well at A-01-02 30DDC	503	6/24/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1740
33:23:08	112:11:33	Well at A-01-02 31DBB	503	6/28/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000
33:24:47	112:11:42	Well at A-01-02 19CAD	503	6/23/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	904
33:23:33	112:12:08	Well at A-01-01 36AAD	503	6/24/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1990
33:23:23	112:12:08	Well at A-01-01 36AAD	503	7/27/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:49	112:12:09	Well at A-01-01 36DDA	503	6/24/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2760
33:24:31	112:12:10	Well at A-01-02 30BBB	503	7/3/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	862
33:23:44	112:12:11	Well at A-01-01 25DDD	503	6/28/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	689
33:23:22	112:12:11	Well- owner SRP	503	8/10/83	0.3	0.6	0.4	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:23:32	112:13:12	Well at A-01-01 26DDD	503	6/30/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	736
33:23:19	112:13:18	Well at A-01-01 35ADB	503	6/24/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1200
33:22:38	112:13:22	Well at A-01-01 35DDC	503	6/27/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2450
33:22:25	112:14:11	Well at D-01-01 02BBC	503	6/28/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2670
33:23:43	112:14:44	Well at A-01-01 27CDD	503	7/1/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2390
33:22:38	112:14:45	Well at D-01-01 03BAA	503	6/25/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3670
33:23:34	112:16:27	Rigby Water Co-Childress-Well No. 3	503	3/28/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:23:52	112:18:15	Rigby Water Co-Rigby Well No. 1	503	3/28/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = No Data

MULTI-CITY SUBREGIONAL OPERATING GROUP  
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Middle Gila River Watershed Phase I

*Table 4-27*  
**Detailed Analysis - Groundwater Quality**  
**Reach 5: Confluence with Gila River to Gillespie Dam**

Greeley and Hansen  
July 1998

Latitude	Longitude	Sampled Location	Source Code	Date	Beryllium Dissolved (ug/l)	Boron (ug/l)	Copper Total (ug/l)	Copper Dissolved (ug/l)	Cyanide (mg/l)	Mercury Total (ug/l)	Mercury Dissolved (ug/l)	Nitrate (mg-N/l)	Nitrate/Nitrite Diss (mg-N/l)	Selenium Total (ug/l)	Selenium Dissolved (ug/l)	Thallium (ug/l)
33:23:26	112:19:09	Rigby Water Co - Holly Acres - Well No. 2	503	3/28/82	ND	ND	50	ND	ND	1	ND	1.3	ND	5	ND	ND
33:25:53	112:20:19	Lakin Water Co - Well No. 2	503	3/8/86	ND	ND	50	ND	ND	1	ND	3.7	ND	5	ND	ND
33:22:26	112:20:28	Well at C-01-01 03AAD	503	8/2/84	ND	390	ND	ND	ND	ND	0.5	ND	1.1	ND	1	ND
33:23:34	112:22:07	Well at B-01-01 28CDC	503	8/26/80	1	380	ND	10	ND	ND	0	ND	6.6	ND	2	ND
33:22:23	112:22:01	Maricopa County - Estrella Mts Regional Pk - Well No. 1	503	10/7/80	ND	ND	50	ND	ND	1	ND	ND	ND	5	ND	ND
				12/29/83	ND	ND	50	ND	ND	1	ND	ND	ND	5	ND	ND
33:22:23	112:22:01	Well at B-01-01 29DBC	503	8/26/80	1	1200	ND	10	ND	ND	0	ND	9.4	ND	3	ND
33:23:53	112:23:56	Well at B-01-01 30DBB	503	9/3/80	1	920	ND	10	ND	ND	0	ND	9.7	ND	2	ND
33:23:53	112:24:53	Well at B-01-02 25DBA1	503	8/18/80	ND	180	ND	ND	ND	ND	ND	ND	10	ND	ND	ND
33:23:55	112:25:29	Well at B-01-02 25CBB	503	8/18/80	1	580	ND	10	ND	ND	0	ND	7.3	ND	3	ND
33:23:17	112:27:44	Well at A-01-01 33AAD	503	6/19/80	1	700	ND	ND	ND	ND	0	ND	4.7	ND	2	ND
33:22:27	112:28:38	Well at C-01-02 05BAD	503	8/22/80	1	720	ND	10	ND	ND	0	ND	9.9	ND	1	ND
33:20:05	112:31:18	Well at C-010-3 14DDD2	503	5/13/83	0.5	800	ND	10	ND	ND	ND	ND	3.9	ND	ND	ND
33:21:47	112:33:56	Well at C-01-03 04CDD	503	7/13/84	ND	2400	ND	ND	ND	ND	0.1	ND	19	ND	10	ND
33:22:30	112:34:36	Town of Buckeye - Well No. 9	503	5/26/82	ND	ND	50	ND	ND	1	ND	1.6	ND	5	ND	ND
33:22:30	112:34:36	Town of Buckeye - Well No. 10	503	2/8/82	ND	ND	50	ND	ND	1	ND	20.2	ND	5	ND	ND
				5/7/82	ND	ND	50	ND	ND	1	ND	20.2	ND	5	ND	ND
33:21:22	112:35:31	Well at C-01-03 06CDB	503	7/13/84	ND	2700	ND	ND	ND	ND	0.1	ND	18	ND	12	ND
33:19:28	112:37:03	Well at C-01-04 24CAD	503	7/11/84	ND	1300	ND	ND	ND	ND	ND	ND	4	ND	1	ND
33:18:58	112:39:33	Well	503	5/13/83	ND	ND	ND	ND	ND	ND	ND	ND	4.9	ND	ND	ND
33:18:58	112:39:33	Well at C-01-04 27BBC1	503	5/31/83	0.8	1300	ND	40	ND	ND	ND	ND	4.9	ND	ND	ND
33:20:15	112:41:06	Well at C-01-04 17DCB	503	7/11/84	ND	3900	ND	ND	ND	ND	0.1	ND	21	ND	13	ND
33:23:02	112:42:30	Well at B-01-04 31BCD	503	8/22/83	0.5	2100	ND	20	ND	ND	ND	ND	19	ND	ND	ND
33:21:50	112:43:10	Well at C-01-05 01DCC	503	8/16/83	0.5	2400	ND	20	ND	ND	ND	ND	26	ND	ND	ND
33:21:50	112:43:10	Well	503	8/16/83	ND	ND	ND	ND	ND	ND	ND	ND	26	ND	ND	ND
33:20:03	112:43:11	Well at C-01-05 13CDD	503	6/24/81	ND	1700	ND	ND	ND	ND	ND	ND	6.6	ND	ND	ND
33:23:06	112:43:45	Well at B-01-05 35DAA2	503	6/24/81	ND	160	ND	ND	ND	ND	ND	ND	6.5	ND	ND	ND
33:22:08	112:44:38	Hassayampa Landfill Monitoring Well 01	503	9/14/82	ND	320	23	ND	ND	0.5	ND	0.5	5.1	5	ND	ND
33:22:08	112:44:38	Well at C-01-05 03DAA	503	5/14/82	ND	390	ND	ND	ND	ND	ND	ND	5.1	ND	ND	ND
33:21:57	112:44:46	Hassayampa Landfill Monitoring Well 03	503	9/14/82	ND	400	14	ND	ND	0.5	ND	ND	ND	5	ND	ND
33:22:01	112:44:55	Well at C-01-05 03DAC	503	5/14/82	ND	410	ND	ND	ND	ND	ND	ND	6.1	ND	ND	ND
33:17:38	112:45:01	Well at C-01-05 34DBD	503	6/24/81	ND	2100	ND	ND	ND	ND	ND	ND	5.1	ND	ND	ND
33:20:00	112:45:01	Well at C-01-05 21BBB1	503	6/24/81	ND	610	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND
33:19:21	112:46:37	Arlington School - Well No 1	503	2/29/86	ND	ND	50	ND	ND	1	ND	10.9	ND	5	ND	ND
33:20:00	112:46:47	Well at C-01-05 21BBB3	503	6/24/81	ND	610	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND

ND = No Data

**Table 4-27**  
**Detailed Analysis - Groundwater Quality**  
**Reach 5: Confluence with Gila River to Gillespie Dam**  
(Continued)

Latitude	Longitude	Sampled Location	Source Code	Date	Bromodichloro-methane Total (ug/l)	Bromoform Total (ug/l)	Chloroform Total (ug/l)	Chlorodibromo-methane Total (ug/l)	Chlordane (ug/l)	P,P' DDD (ug/l)	P,P' DDE (ug/l)	P,P' DDT (ug/l)	Diazinon (ug/l)	Dieldrin Total (ug/l)	Lindane (ug/l)	Toxaphene Total (ug/l)	Dissolved Oxygen (mg/l)	TDS (mg/l)
33:23:26	112:19:09	Rigby Water Co- Holly Acres- Well No. 2	503	3/28/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:25:53	112:20:19	Lakin Water Co- Well No. 2	503	3/8/86	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:26	112:20:28	Well at C-01-01 03AAD	503	8/2/84	ND	ND	ND	ND	0.1	0.01	0.01	0.01	ND	0.01	0.01	1	ND	ND
33:23:34	112:22:07	Well at B-01-01 28CDC	503	8/26/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2120
33:22:23	112:22:01	Maricopa County- Estrella Mts Regional Pk- Well No. 1	503	10/7/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				12/29/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:23	112:22:01	Well at B-01-01 29DBC	503	8/26/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2710
33:23:53	112:23:56	Well at B-01-01 30DBB	503	9/3/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1920
33:23:53	112:24:53	Well at B-01-02 25DBA1	503	8/18/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1430
33:23:55	112:25:29	Well at B-01-02 25CBB	503	8/18/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1430
33:23:17	112:27:44	Well at A-01-01 33AAD	503	6/19/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2080
33:22:27	112:28:38	Well at C-01-02 05BAD	503	8/22/80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1490
33:20:05	112:31:18	Well at C-010-3 14DDD2	503	5/13/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:21:47	112:33:56	Well at C-01-03 04CDD	503	7/13/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:30	112:34:36	Town of Buckeye- Well No. 9	503	5/26/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:30	112:34:36	Town of Buckeye- Well No. 10	503	2/8/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5/7/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:21:22	112:35:31	Well at C-01-03 06CDB	503	7/13/84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:19:28	112:37:03	Well at C-01-04 24CAD	503	7/11/84	ND	ND	ND	ND	0.1	0.01	0.01	0.01	ND	0.01	0.01	1	ND	ND
33:18:58	112:39:33	Well	503	5/13/83	0.3	0.6	0.4	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:18:58	112:39:33	Well at C-01-04 27BBC1	503	5/31/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:20:15	112:41:06	Well at C-01-04 17DCB	503	7/11/84	ND	ND	ND	ND	0.1	0.01	0.01	0.01	ND	0.01	0.01	1	ND	ND
33:23:02	112:42:30	Well at B-01-04 31BCD	503	8/22/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:21:50	112:43:10	Well at C-01-05 01DCC	503	8/16/83	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:21:50	112:43:10	Well	503	8/16/83	0.3	0.6	5	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:20:03	112:43:11	Well at C-01-05 13CDD	503	6/24/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2290
33:23:06	112:43:45	Well at B-01-05 35DAA2	503	6/24/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	615
33:22:08	112:44:38	Hassayampa Landfill Monitoring Well 01	503	9/14/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:08	112:44:38	Well at C-01-05 03DAA	503	5/14/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	677
33:21:57	112:44:46	Hassayampa Landfill Monitoring Well 03	503	9/14/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:22:01	112:44:55	Well at C-01-05 03DAC	503	5/14/82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	543
33:17:38	112:45:01	Well at C-01-05 34DBD	503	6/24/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3020
33:20:00	112:45:01	Well at C-01-05 21BBB1	503	6/24/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	569
33:19:21	112:46:37	Arlington School- Well No 1	503	2/29/86	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33:20:00	112:46:47	Well at C-01-05 21BBB3	503	6/24/81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	569

ND = No Data

## 5. WATER QUANTITY ANALYSIS

Water quantity analysis in the MGRW study considered surface water flow and groundwater sources. Surface water was subdivided into continuous water flows and ephemeral sources as explained in Section 2.4.

### 5.1 Continuous Flow Sources

Sources of inflow to the MGRW study area that were not directly due to stormwater runoff or flood flow releases from upstream dams were placed in the continuous flow sources category. These included:

- NPDES Permit Discharges
- Agricultural Drainage

#### 5.1.1 NPDES Permit Discharges

The NPDES permits used in the water quality analysis in Section 4 were reviewed to separate the data into two categories; NPDES permit data relevant to WWTPs, industrial sites, and gravel mines and stormwater NPDES permits which were analyzed as ephemeral water sources (Section 5.2.2). In Section 5.1.1, flow information from the 23rd and the 91st Avenue WWTPs was not separated into a separate category. **Table 5-1** presents the NPDES permit data analyzed in this section of the MGRW study. NPDES permit discharge quantity is a key factor in calculating loading in the environment. It was recognized that not all of the NPDES permit discharges were continuous all year. In some cases the reuse of treated effluent results in zero discharge for part of the year. During periods when the effluent was not reused the discharge was continuous.

**Table 5-1** presents the following information about the NPDES permit discharges:

- Location of the discharge point as latitude and longitude
- Description of facility covered by NPDES permit
- Source code to identify source of data
- NPDES permit number
- Permit discharge flow rate in million gallons per day (mgd). This was included to document the maximum discharge rate allowed under the permit
- Average flow rate which presents the quantity of flow discharged, expressed as cfs, mgd, and acre-feet per year. These data provide a projection of the quantity of discharge associated with each NPDES permit

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*Middle Gila River Watershed Management Study  
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**Table 5-1  
NPDES Permits (WWTPs and Others)**

Greeley and Hansen  
July 1998

Latitude	Longitude	Description	Source Code	NPDES #	Permit Discharge Flow Rate (mgd)	Average Flow Rate			Dates Averaged	Discharges Into	Comment
						(cfs)	(mgd)	(af/yr)			
33:26:20	111:53:10	Northwest Reclamation Plant, City of Mesa, Outfall 001	204	100369	8	0	0	0	11/31/96 - 7/31/97	Salt River	Outfall is on tribal land, negotiations are ongoing
33:27:10	111:51:30	Northwest Reclamation Plant, City of Mesa, Outfall 002	204	100369	8	0	0	0	11/31/96 - 7/31/97	Salt River	Outfall is on tribal land, negotiations are ongoing
33:26:10	111:53:10	Northwest Reclamation Plant, City of Mesa, Outfall 003	204	100369	8	0	0	0	11/31/96 - 7/31/97	Salt River	Discharge on non-tribal land
33:26:38	111:56:04	Papago Water Plant, City of Tempe	408	101392	No Flow Limit	0.36	0.23	258	yearly average	Papago Park Pond (a tributary of the Salt)	Annual average flow from Deena Pierre
33:21:44.6	111:56:36.2	Kyrene Reclamation Plant, City of Tempe	408	100405	4.5	2.45	1.58	1774	5-8/92; 10-12/94; 1-12/95; 1-12/96; 1-5/97	Salt River	
33:25:31	112:03:34	Ame.on, Inc.: Concrete Pipe Manufacturing Facility	204	101596	0.028	0	0	0		Salt River	No discharge other than during storm events.
33:30:30	112:04:00	One Camelback, Inc.	204	102894	0.288	0.059	0.038	42.7	4/94-6/96	Storm sewer tributary to Salt River	
33:30:30	112:05:16	Union Rock and Materials Corporation	204	100331	140	8.74	5.64	6333	1991; 1-6/92; 7/93; 11,12/94; 1,2,4-6/95; 1-6,8-10/96	Salt River	
33:24:46	112:07:00	23rd Avenue WWTP, City of Phoenix, Outfall 001	403	100578	63	33.25	21.45	24084	1/95-8/97	Roosevelt Irrigation District (RID)	Discharge here when demand exists
33:24:43	112:08:02	23rd Avenue WWTP, City of Phoenix, Outfall 002	403	100578	63	34.9	22.5	25263	1/95-8/97	Salt River at 35th Ave.	Discharge here when not to RID
33:24:45	112:06:36	23rd Avenue WWTP, City of Phoenix, Outfall 003	403	100578	63	10	10	10	1/95-8/97	Peterson Farms	10 mgd consistently

**Table 5-1**  
**NPDES Permits (WWTPs and Others)**  
(Continued)

Latitude	Longitude	Description	Source Code	NPDES #	Permit Discharge Flow Rate (mgd)	Average Flow Rate			Dates Averaged	Discharges Into	Comment
						(cfs)	(mgd)	(af/yr)			
33:26:32	112:10:07	Western Cotton Services Corp. (aka Anderson Clayton)	204	100953	1.6	2.48	1.6	1797	when operating	Seasonal operation; discharges occur between Oct.-Apr.	
33:25:45	112:14:54	City of Tolleson WWTP	204	100339	N/A	8.96	5.78	6490	1,3,5-10/94; 1,2,4-6,8,9,11,12/95; 3,5,7,8,9/96; 1-4/97	Salt River	Discharge to river is intermittent
33:23:21	112:15:12	91st Avenue WWTP, City of Phoenix	403	100579	153.75	151.8	97.9	109922	6/92-7/97	Salt River	
33:23:56	112:21:07	City of Avondale WWTP	204	100573	3.5	2.32	1.5	1684	1,8-9,12/94; 1-12/95; 1-6,9-12/96; 1-4/97	Agua Fria River	
33:25:54	112:21:40	Lockheed Martin Discharge 001	204	101570	0.25*	0.056	0.0363	40.76	1-12/95; 1-12/96; 1,2,4,5/97	Irrigation ditch - tributary to B.I.D. Canal into Hassayampa into Gila	Non-contact cooling water
33:25:35	112:21:38	Lockheed Martin Discharge 002	204	101570	1*	0.11	0.0711	79.8	1-12/95; 1-12/96; 1,2,4/97	Irrigation ditch - tributary to B.I.D. Canal into Hassayampa into Gila	Metal treatment rinse water
33:25:34	112:21:39	Lockheed Martin Discharge 003	204	101570	0.065*	0.034	0.022	24.7	1-12/95; 1-12/96; 1,2,4,5/97	Irrigation ditch - tributary to B.I.D. Canal into Hassayampa into Gila	Domestic wastewater and photo rinse
33:26:04	112:21:39	Lockheed Martin Discharge 004	204	101570	N/A	0	0	0		Irrigation ditch - tributary to B.I.D. Canal into Hassayampa into Gila	Rainwater only; no limit on discharge volume, concentration Std. only
33:23:51	112:23:14	City of Goodyear WWTP	204	101324	N/A	1.94	1.24	1392	1-12/94; 1,4,6-12/95; 9/96	Buckeye Irrigation District	As of 4-97 they use 100% SAT recharge; no discharge
33:21:04	112:27:02	Estrella WWTP, City of Goodyear	204	102424	0.2	0	0	0	--	Corgett Wash-tributary to Gila River	No discharge most of the time
33:21:00	112:34:55	Town of Buckeye WWTP	407	100574	0.6	0.465	0.30	337	1-3/91; 4-6/92; 7-9/93; 10-12/94; 4-6/95; 1-3/96	Arlington Canal	Canal discharges to Gila River upstream of Gillespie

\* Permit is on mass loading basis, assuming this maximum flow rate.

- Dates averaged is the period used to calculate the average flow rate
- Discharges into is the discharge point
- Comment is an explanation of other facts related to the NPDES discharge

### 5.1.2 Agricultural Discharge

Limited information was available on measured agricultural discharges quantity. References documented discharge points but there were few measurements of discharge quantities. Salt River Project (SRP) provided discharge quantity information for three agricultural drains. Recent water conservation rules have resulted in reductions in irrigation tailwater quantities.

The main agricultural discharge identified in the MGRW study was the SRP discharge to the Gila River. The Kent Decree required that SRP provide a quantity of water equal to 1.1 percent of the flow diverted at Granite Reef Dam to the Gila River to meet the water rights of the Buckeye Irrigation Company (BIC). This water mixes with other water in the Gila River and is diverted by BIC about 0.5 miles downstream from the SRP discharge point.

The agricultural discharge data is presented in **Table 5-2**.

## 5.2 Ephemeral Flow Sources

The MGRW study placed surface flow data related to flood flows and stormwater runoff in the ephemeral flow category. The sources were:

- Stream Flows Data
- Stormwater Runoff Data

### 5.2.1 Stream Flows

This category of water quantity information includes surface water flows in channels. The majority of the information is from U.S. Geological Survey (USGS) gaging stations, a network of stream flow monitoring locations throughout Arizona. The USGS does not maintain a gage at Granite Reef Dam but data for this location was obtained from SRP. Releases from Granite Reef Dam that exceeded 10,000 cfs from November 1912 through December 1995 are shown in **Table 5-3**. Flows of less than 10,000 cfs were not included because it is unlikely these flows would reach the 91st Avenue area. The Granite Reef Dam flows were for spills and releases to the Salt River and did not include irrigation diversions.

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**Table 5-2  
Irrigation Return Flows**

Greeley and Hansen  
July 1998

<i>Latitude</i>	<i>Longitude</i>	<i>Source Code</i>	<i>Description</i>	<i>Year</i>	<i>Total Flow (ac-ft)</i>	<i>Year</i>	<i>Total Flow (ac-ft)</i>	<i>Comment</i>
33:17:10.794	111:57:54.247	507	Gila Drain near 48th Street and Pecos	1995	9582	1996	8058	
33:20:55.146	112:12:5.219	507	Laveen Drain into Deadhorse Ditch	1995	3280	1996	2179	
33:22:49.005	112:13:31.356	507	Maricopa Drain off Lateral 14 on Western Canal	1995	3255	1996	3020	
33:23:30.321	112:21:8.025	507	Lennox Drain into Buckeye Irrigation Co. Feeder	1995	21073	1996	24224	Discharge is to Gila which flows into Buckeye Feeder Canal

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**Table 5-3**  
**Salt River Flood Flows**  
**Salt River Releases at Granite Reef Dam**  
**Flow Events with 10,000 cfs Discharge**  
**Period of Record November 1912 through December 1995**

Greeley and Hansen  
July 1998

Period of Flow Start Date	Period of Flow End Date	Flow Event Max. Avg. Daily Flow (cfs)
02/07/14	07/02/14	15,800
01/29/15	08/18/15	18,700
01/15/16	05/15/16	79,100
09/08/16	02/04/17	21,100
04/17/17	05/15/17	23,400
03/07/18	03/26/18	28,400
11/25/19	12/14/19	46,200
01/04/20	04/25/20	87,800
12/26/21	01/09/22	24,100
02/08/22	02/18/22	10,000
03/16/22	04/10/22	18,000
09/18/23	09/22/23	24,100
12/26/23	01/08/24	42,800
03/31/26	04/16/26	28,800
02/14/27	03/19/27	49,800
09/12/27	09/20/27	16,200
04/04/29	04/19/29	17,200
02/12/31	02/20/31	22,900
02/09/32	03/29/32	48,700
02/06/37	03/25/37	36,891
02/28/39	03/17/38	58,739
02/05/41	05/25/41	32,206
12/21/65	01/12/66	64,000
02/20/73	06/05/73	22,273
02/28/78	04/11/78	95,800
12/16/78	04/19/79	110,000
01/29/80	06/03/80	137,725
02/02/83	06/17/83	30,000
09/27/83	10/24/83	39,878
12/24/83	01/24/84	11,200
12/21/84	06/01/85	25,604
12/22/91	06/21/92	12,898
08/21/92	09/08/92	13,615
12/28/92	06/04/93	99,396
01/20/95	05/02/95	53,316

Salt River Project Information based on average daily flow releases at Granite Reef Dam

USGS gages record daily flow measurements. Stream flow measurement sites are listed in **Table 5-4**. The majority of time, zero flow occurs in the river. The flows were related to flood flow releases and stormwater flow at all but two of the locations, Salt River gage 09502000 and Verde River gage 09511300. The initial stream flow analysis involved eliminating days with zero flow recorded. A review of the remaining data showed measured flows could range from less than 1 cubic foot per second up to the maximum flow at the location. The quantity, duration of flow, and time of the year when flow was measured varied from year to year.

Surface flow quantity data was important to the MGRW study because the flows could transport contaminants and sediment through the study area and would dilute the concentration of pollutants of concern entering the Salt and Gila Rivers from other sources. Calculation of loading for TMDL establishment requires volume as well as concentration data.

**Table 5-4** presents the Stream Flow Data used in the MGRW study. The information compiled includes:

- Location as defined by latitude and longitude
- Description of the location of the flow measuring site
- Source code of the source of the data
- Gage number for the USGS gage station
- Period of record is the duration that flow records were measured at that site
- Drainage area in square miles. The larger tributary drainage areas will have a greater variation of flow quantities between zero and the maximum flow
- Maximum flow is the greatest gaged flow or the greatest projected flow based on historic records. It is not the theoretical 100-year storm flow.
- Maximum discharge date is when the maximum discharge occurred
- Comments are additional notes about the flow monitoring site

### 5.2.2 Stormwater Runoff

The NPDES stormwater flow data was obtained from the Flood Control District of Maricopa County records. Stormwater flow quantity was measured at NPDES permit monitoring sites. Stormwater quantity data at ungaged sites and due to overland flow was not available. **Table 5-5** presents the stormwater runoff data collected as part of the MGRW study. Some of the stormwater quantity sites in **Table 5-5** were in Indian Bend Wash or the Salt River. Flow data at these locations was cross-checked with the Granite Reef Dam spill data. This allowed identification of flow events related to

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**Table 5-4  
Stream Flow Information**

Greeley and Hansen  
July 1998

Latitude	Longitude	Description	Source Code	Gage #	Period of Record	Drainage Area (sq mi)	Maximum Flow (cfs)	Maximum Discharge Date	Comment
33:33:10	111:34:33	Salt River below Stewart Mountain Dam	104	09502000	3/30 to present	6,232	75,200	02/15/80	
33:33:31	111:40:07	Verde River near Scottsdale	104	09511300	2/61 to present	6,615	127,000	01/08/93	
33:30.6:31.	111:43.2:38.	Granite Reef Dam	506	N/A	1914-1995	13,000 est.	137,725	02/16/80	Drainage Area Estimated
33:26:22	111:57:37	Salt River at Priest Drive near Phoenix, AZ	104	09512165	12/93-9/94	13,077 est.	300,000	2/1891	No flow during period of record; maximum flow is outside period of record. Drainage Area Estimated
33:24:56	112:01:45	Salt River at 24th Street at Phoenix, AZ	104	09512190	82-92	ND	35,700	10/03/84	
33:20:49	112:05:03	Salt River Tributary at South Mountain Park	104	09512200	1/61 to present	1.75	1,210	08/15/90	
33:15:25	112:09:59	Gila River near Laveen, AZ	104	09479500	1/40-9/46; 12/47 to present	20,615	41,600	01/20/93	
33:13:56	112:10:08	Santa Cruz River near Laveen, AZ	104	09489000	1/40-9/46; 12/47 to present	8,581	33,000	10/04/83	
33:36:24	112:18:14	Agua Fria River at El Mirage	104	09513650	10/62-4/79; 10/80-9/93	1,628	58,400	12/19/78	
33:32:12	112:16:52	New River near Glendale, AZ	104	09513910	61-63; 2/64-10/70; 71-79; 4/90 to present	324	19,800	12/19/67	
33:23:15	112:23:30	Gila River at Estrella Park near Goodyear, AZ	104	09514100	8/92 to present	45,585	162,000	01/09/93	
33:20:50	112:43:30	Hassayampa River near Arlington	104	09517000	61-77; 10/77-9/90; 10/90 to present	1,471	39,000	09/05/70	
33:18:37	112:52:52	Centennial Wash at Southern Pacific Railroad Bridge, near Arlington	104	09517490	5/80-9/84; 10/84-9/85; 10/89 to present	1,817	15,600	09/02/84	
33:13:45	112:46:00	Gila River above diversions at Gillespie Dam	104	09518000	6/35-11/39; 12/39-9/71; 72-73; 10/73 to present	49,650	130,000	01/09/93	
33:13:45	112:46:00	Gila River below Gillespie Dam	104	09519500	8/21 to present	49,650	250,000	02/16/80	

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**Table 5-4  
Stream Flow Information**

Greeley and Hansen  
July 1998

Latitude	Longitude	Description	Source Code	Gage #	Period of Record	Drainage Area (sq mi)	Maximum Flow (cfs)	Maximum Discharge Date	Comment
33:33:10	111:34:33	Salt River below Stewart Mountain Dam	104	09502000	3/30 to present	6,232	75,200	02/15/80	
33:33:31	111:40:07	Verde River near Scottsdale	104	09511300	2/61 to present	6,615	127,000	01/08/93	
33:30.6:31.	111:43.2:38.	Granite Reef Dam	506	N/A	1914-1995	13,000 est.	137,725	02/16/80	Drainage Area Estimated
33:26:22	111:57:37	Salt River at Priest Drive near Phoenix, AZ	104	09512165	12/93-9/94	13,077 est.	300,000	2/1891	No flow during period of record; maximum flow is outside period of record. Drainage Area Estimated
33:24:56	112:01:45	Salt River at 24th Street at Phoenix, AZ	104	09512190	82-92	ND	35,700	10/03/84	
33:20:49	112:05:03	Salt River Tributary at South Mountain Park	104	09512200	1/61 to present	1.75	1,210	08/15/90	
33:15:25	112:09:59	Gila River near Laveen, AZ	104	09479500	1/40-9/46; 12/47 to present	20,615	41,600	01/20/93	
33:13:56	112:10:08	Santa Cruz River near Laveen, AZ	104	09489000	1/40-9/46; 12/47 to present	8,581	33,000	10/04/83	
33:36:24	112:18:14	Agua Fria River at El Mirage	104	09513650	10/62-4/79; 10/80-9/93	1,628	58,400	12/19/78	
33:32:12	112:16:52	New River near Glendale, AZ	104	09513910	61-63; 2/64-10/70; 71-79; 4/90 to present	324	19,800	12/19/67	
33:23:15	112:23:30	Gila River at Estrella Park near Goodyear, AZ	104	09514100	8/92 to present	45,585	162,000	01/09/93	
33:20:50	112:43:30	Hassayampa River near Arlington	104	09517000	61-77; 10/77-9/90; 10/90 to present	1,471	39,000	09/05/70	
33:18:37	112:52:52	Centennial Wash at Southern Pacific Railroad Bridge, near Arlington	104	09517490	5/80-9/84; 10/84-9/85; 10/89 to present	1,817	15,600	09/02/84	
33:13:45	112:46:00	Gila River above diversions at Gillespie Dam	104	09518000	6/35-11/39; 12/39-9/71; 72-73; 10/73 to present	49,650	130,000	01/09/93	
33:13:45	112:46:00	Gila River below Gillespie Dam	104	09519500	8/21 to present	49,650	250,000	02/16/80	

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**Table 5-5**  
**Stormwater Flow**

Greeley and Hansen  
July 1998

Latitude	Longitude	Description	Source Code	Drainage Area (ac)	Date	Instantaneous Discharge (cfs)	Storm ration (mi)	Preceding Dry Days (min)	Total Storm Runoff (ft <sup>3</sup> )	Comment
33:27:22	111:48:55.2	Downstream side of Alma School Road Bridge over Salt River	301	ND	01/07/95	730	ND	ND	ND	Flood Flow Period
					01/30/95	110	ND	ND	ND	Flood Flow Period
					02/16/95	22,000	ND	ND	ND	Flood Flow Period
33:25.2:10.8	111:54.6:42	Dorsey and University Drive	301	155.2	08/25/93	7.61	255	ND	ND	
					11/11/93	2.68	180	0	ND	
						0.44	180	0	ND	
						1.48	180	41	ND	
					12/15/93	2.3	180	13	ND	
					01/25/94	4.08	180	28	ND	
					02/07/94	0.52	185	12	ND	
					03/19/94	4.74	185	6	ND	
					03/25/94	0.76	175	ND	ND	
					09/02/94	1.9	185	51	ND	
					12/05/94	6.9	180	8	ND	
					01/12/95	0.5	185	13	ND	
					01/25/95	0.36	185	27	ND	
					02/21/95	32.67	250	ND	ND	
					08/14/95	7.65	250	5	ND	
					08/19/95	22.2	130	21	ND	
09/28/95	ND	ND	ND	ND						
02/01/96	ND	ND	ND	ND						
02/26/96	ND	ND	ND	ND						
03/13/96	ND	ND	ND	ND						
33:26.4:1.2	111:54.6:28.8	Indian Bend Wash at Curry Road	301	ND	02/08/94	129	ND	ND	ND	
					10/15/94	22	ND	ND	ND	
					12/06/94	98	ND	ND	ND	
					12/06/94	48	ND	ND	ND	
					01/05/95	449	ND	ND	ND	
					01/06/95	124	ND	ND	ND	
					08/20/95	124	ND	ND	ND	

ND = No data

**Table 5-5  
Stormwater Flow  
(Continued)**

Latitude	Longitude	Description	Source Code	Drainage Area (ac)	Date	Instantaneous Discharge (cfs)	Storm Duration	Preceding Dry Days (min)	Total Storm Runoff (ft <sup>3</sup> )	Comment
33:26.4:1.2	111:54.6:28.8	Indian Bend Wash at Curry Road (Continued)	301	ND	09/28/95	979	ND	ND	ND	
					02/26/96	2.6	ND	ND	ND	
					07/26/96	2.6	ND	ND	ND	
					08/19/96	18	ND	ND	ND	
					09/02/96	138	ND	ND	ND	
33:25.2:30	111:56.4:9	Fifth Street east of Ash Avenue, Tempe	301	34.2	08/25/93	2.1	255	ND	ND	
					09/13/93	2.69	215	19	ND	
					11/12/93	2.76	185	60	ND	
					03/07/94	1.74	255	28	ND	
					03/25/94	5.56	180	18	ND	
					04/26/94	0.71	185	32	ND	
					05/25/94	1.84	190	29	ND	
					08/08/94	3.99	190	75	ND	
					12/05/94	2.66	280	ND	ND	
					01/12/95	4.44	180	7	ND	
					01/25/95	14.6	185	13	ND	
					02/21/95	0.5	190	9	ND	
					08/14/95	11.42	250	ND	ND	
					08/19/95	97.31	250	5	ND	
					09/07/95	9.81	265	19	ND	
02/01/96	ND	ND	ND	ND						
02/25/96	ND	ND	ND	ND						
33:25.8:13.8	111:57.6:9	Downstream side of Priest Drive Bridge over the Salt River	301	ND	12/31/92	10	ND	ND	ND	
					01/04/93	8,600	ND	ND	ND	Flood Flow Period
					01/12/93	47,800	ND	ND	ND	Flood Flow Period
					02/11/93	25,500	ND	ND	ND	Flood Flow Period
					01/06/95	1,430	ND	ND	ND	
					01/12/95	60	ND	ND	ND	
					02/15/95	53,100	ND	ND	ND	Flood Flow Period
33:24.6:31.8	111:58.2:30	48th Street Drain	301	39	11/10/91	7.7	138	13	ND	
					12/18/91	0.97	528	7	ND	
					03/08/92	2.1	336	1	ND	
					03/27/92	2.7	348	18	ND	
					05/20/92	5	162	1	ND	
					08/05/92	32	162	6	ND	
					02/28/93	1.9	294	8	ND	
					03/26/93	3.1	90	26	ND	
					08/25/93	1	102	15	ND	

Table 5-5  
Stormwater Flow  
(Continued)

Latitude	Longitude	Description	Source Code	Drainage Area (ac)	Date	Instantaneous Discharge (cfs)	Storm Duration	Preceding Dry Days (min)	Total Storm Runoff (ft <sup>3</sup> )	Comment
33:24.6:31.8	111:58.2:30	48th Street Drain (Continued)	301	39	03/25/94	1	150	6	ND	
					05/24/94	16	10.8	29	ND	
					10/15/94	11	90	20	ND	
					11/12/94	3.5	198	27	ND	
					01/04/95	1.7	1,074	7	ND	
					08/14/95	5.7	72	32	ND	
					08/19/95	23	30	4	ND	
					11/01/95	74	138	34	ND	
					02/01/96	3.7	876	8	ND	
					07/25/96	9.4	78	10	ND	
					09/02/96	6.3	56	3	ND	
					33:25.2:46.2	111:59.4:9	Salt River at 40th Street	301	120.32	01/03/92
02/06/92	ND	ND	ND	ND						
03/26/92	ND	ND	ND	ND						
08/14/95	21.95	140	ND	54,000						
08/19/95	25.03	162	5	36,000						
09/28/95	17.63	256	20	ND						
11/01/95	12.14	140	33	ND						
02/01/96	3.48	104	91	10,500						
02/26/96	5.1	240	25	ND						
03/13/96	2.94	1,166	16	ND						
07/09/96	4.6	292	118	7,800						
09/04/96	ND	ND	ND	ND						
33:25.2:15	112:0.6:42	Salt River 500 feet east of I-10 Bridge over Salt	301	631.04	01/03/92	ND	ND	ND	ND	
					02/06/92	ND	ND	ND	ND	
					03/26/92	ND	ND	ND	ND	
					08/05/92	ND	ND	ND	ND	
					01/04/95	34.58	720	ND	ND	
					01/25/95	27	600	21	ND	
					08/19/95	114.93	42	ND	418,000	
					09/27/95	175.03	46	20	984,000	
					11/01/95	79.09	46	33	1,281,000	
					02/01/96	19.61	276	91	72,500	
					02/26/96	20	402	25	47,600	
					03/13/96	ND	871	16	ND	
07/25/96	47	85	16	319,600						
09/02/96	45.5	189	5	131,000						
09/11/96	28.8	327	7	148,000						

**Table 5-5  
Stormwater Flow  
(Continued)**

Latitude	Longitude	Description	Source Code	Drainage Area (ac)	Date	Instantaneous Discharge (cfs)	Storm Duration	Preceding Dry Days (min)	Total Storm Runoff (ft <sup>3</sup> )	Comment
33:24.6:42	111:1.8:3.6	Downstream Side of 24th Street Bridge over the Salt River	301	ND	08/24/92	16,500	ND	ND	ND	Flood Flow Period
					09/02/92	1,140	ND	ND	ND	Flood Flow Period
33:24:55.8	112:6.6:39	Salt River at 27th Avenue	301	45	12/10/91	3	660	11	ND	
					12/18/91	1.2	720	7	ND	
					03/02/92	1.8	1,056	18	ND	
					03/08/92	0.63	780	1	ND	
					07/11/92	2	198	4	ND	
					08/22/92	2.3	126	14	ND	
					12/08/92	2.7	402	41	ND	
					11/13/93	0.71	336	2	ND	
					02/07/94	0.33	414	83	ND	
					03/25/94	0.96	168	6	ND	
					10/15/94	1.3	132	22	ND	
					12/05/94	0.5	1,134	49	ND	
					01/04/95	0.5	846	5	ND	
					11/01/95	8.1	132	53	ND	
					02/01/96	0.71	804	8	ND	
					02/25/96	1.3	84	24	ND	
					03/14/96	0.71	978	16	ND	
07/06/96	7.1	50	114	ND						
07/09/96	7.1	108	2	ND						
07/25/96	2.7	90	10	ND						
33:24.6:33.6	112:7.8:48	Salt River at 35th Avenue	301	1363.2	01/03/92	ND	ND	ND	ND	
					02/06/92	ND	ND	ND	ND	
					03/26/92	ND	ND	ND	ND	
					08/22/92	ND	ND	ND	ND	
					12/05/94	16.7	720	ND	ND	
					01/04/95	27.17	600	18	ND	
					03/11/95	3.96	334	11	51,000	
					08/14/95	7.09	394	156	68,800	
					08/19/95	2.66	670	5	34,300	
					09/07/95	9.36	212	18	64,600	
					09/28/95	136.51	252	18	611,000	
11/01/95	86.18	196	33	ND						

**Table 5-5  
Stormwater Flow  
(Continued)**

Latitude	Longitude	Description	Source Code	Drainage Area (ac)	Date	Instantaneous Discharge (cfs)	Storm Duration	Preceding Dry Days (min)	Total Storm Runoff (ft <sup>3</sup> )	Comment
33:24.6:33.6	112:7.8:48	Salt River at 35th Avenue (Continued)	301	1363.2	03/13/96	3.39	366	16	41,320	
					07/07/96	38.6	270	116	128,000	
					07/15/96	1.6	405	7	ND	
					07/25/96	361.49	149	10	2,243,110	
					09/11/96	13.6	510	10	129,000	
33:24:33.6	112:9.6:51	51st Avenue Bridge	301	ND	01/07/95	675	ND	ND	ND	Flood Flow Period
					01/30/95	140	ND	ND	ND	Flood Flow Period
					02/17/95	19,500	ND	ND	ND	Flood Flow Period

local stormwater runoff only and those that were related to flood flows or releases from Granite Reef Dam. Stormwater runoff data in **Table 5-5**, presents:

- Location as latitude and longitude
- Description of the site was the monitoring location
- Source code or reference to the data source
- Date when the flow measurement was taken
- Drainage area, where provided, is the size of the area in acres tributary to the storm flow measurement point
- Instantaneous discharge was the flow in cubic feet per second (cfs) at the time of the monitoring
- Storm duration is the time of the runoff event in minutes
- Preceding dry days was the period prior to the runoff event when there was no discharge. This was a key factor to evaluate loading because it affects the accumulation of contaminants
- Total storm runoff was a projection of the volume of flow in cubic feet associated with the event
- Comments are additional notes related to the event

### **5.3 Groundwater**

Groundwater contributes to the surface flow in the Gila River downstream of 115th Avenue. This is the generally accepted location where the Salt and Gila Rivers combine and the Gila River transitions from a losing stream to a gaining stream. Upstream from 115th Avenue the groundwater table is below the surface and flow infiltrates to recharge the groundwater. Downstream from 115th Avenue the groundwater table is at the surface and groundwater contributes to surface flow in the Gila River.

The location of the gaining-losing stream point varies depending on climate and anthropogenic factors. During drought periods the gaining-losing stream point will migrate downstream while in wet periods it will move upstream. Groundwater pumping can result in seasonal shifts as withdrawals lower the water table and the gaining-losing point moves downstream.

The quantity of groundwater inflow could not be quantified and was identified in the MGRW study as a data gap.

## 6. HABITAT AND SPECIES ANALYSIS

Habitat and species analysis in the MGRW consisted of identifying the basic habitat types in the study area and the key plants and animal species associated with them. Much of the information in the section was extracted from the "Salt-Gila River Baseline Ecological Characterization" prepared for the City of Phoenix.

### 6.1 Salt and Gila Rivers Habitats

There were five basic habitat types identified in the MGRW study area. They are:

- Cottonwood-Willow Habitat
- Salt Cedar Habitat
- Mesquite Habitat
- Marsh/Strand Habitat
- Cobble/Flood Scoured Habitat

From Granite Reef Dam to the 23rd Avenue WWTP outfalls, the habitat in and around the river was primarily cobble/flood scoured. Cobble/flood scoured areas were characterized by a lack of perennial vegetation. Vegetation that may have occurred in these areas, was washed away by flood events. Vegetation that exists in these areas is dominated by quailbush and other weedy annuals (City of Phoenix, 1997).

In and around the active river channel in the remainder of the study area, all five habitat types were identified. The Salt-Gila River Baseline Ecological Characterization study inventoried the habitat types and plant communities present along the Salt-Gila River from 75th Avenue to the Buckeye Irrigation Company (BIC) diversion dam at approximately 167th Avenue. It was reasonable to project that habitats from the BIC diversion to Gillespie Dam were similar to those inventoried in the Salt-Gila River Baseline Ecological Characterization. Habitats between 91st Avenue and Gillespie Dam are dominated by Salt Cedar (City of Phoenix, 1997).

**Table 6-1** shows the relative abundance by areal coverage of each habitat type along the river between 75th Avenue and the BIC diversion. Minor habitats such as desert and desert wash are also included in **Table 6-1**. It is projected that the ratios of each habitat type remain relatively constant from the BIC diversion to Gillespie Dam.

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*Table 6-1*  
*Total Cover by Type Within the Salt/Gila Baseline*  
*Ecological Characterization Project Area*

Greeley and Hansen  
July 1998

Habitat Type	Structural Type	Acres	% of Total
Cottonwood-Willow	II	22	0.5
Cottonwood-Willow	III	220	5.2
Cottonwood-Willow	IV	268	6.3
Salt Cedar	II	10	0.2
Salt Cedar	III	400	9.4
Salt Cedar	IV	628	14.8
Salt Cedar	V	262	6.2
Salt Cedar	VI	90	2.1
Honey Mesquite	IV	125	3.0
Honey Mesquite	V	30	0.7
Quailbush- Saltbush		220	5.2
Cobble		1,342	31.7
Desert		157	3.7
Desert Wash (Xeric-riparian)		6	0.1
Open Water		440	10.4
Marsh		16	0.4
<b>TOTAL</b>		<b>4,236</b>	

**Table 6-2** lists the key plant species associated with each habitat type and their relative abundance by areal coverage in the Salt-Gila River Baseline Ecological Characterization study area. The cottonwood-willow habitat is dominated by Salt cedar, Goodding's willow and Fremont's cottonwood. Cottonwood willow communities were once common along rivers and streams of the Sonoran Desert. Cottonwood-willow habitats are maintained by periodic spring floods which are essential for seed dispersal, seed germination and sapling recruitment (Brown 1982). Cottonwood-willow stands along the Salt-Gila River were sparsely vegetated with mature specimens.

Salt cedar habitats are dominated by salt cedar, baccharis or mule's fat and spidergrass (**Table 6-2**). Salt cedar or tamarisk is an exotic species which invaded much of Arizona's rivers that were once dominated by native species such as mesquite, cottonwood and willows.

The mesquite habitats are dominated by fourwing saltbush, honey mesquite and Jerusalem thorn (**Table 6-2**). Mesquite bosques are most prevalent along the old alluvium of dissected floodplains.

In marsh areas knotweed and cattail are pervasive but plants that may also be found range from attached algae to the saplings of native riparian species (cottonwood-willow) and flood tolerant species such as salt cedar. Cobble areas characteristically have sparse vegetation, but the vegetation that is present is dominated by brittlebush and sage.

## **6.2 Associated Species**

The majority of the species information presented in this report was obtained from Arizona Game and Fish specialists or from the Salt-Gila River Baseline Ecological Characterization study. Species that may be found in the MGRW study area were separated into the following categories:

- Fish
- Reptiles
- Amphibians
- Mammals
- Birds

Fish that may be found in the Salt-Gila Rivers are listed in **Table 6-3**. Native fish and those that have been introduced were separated in **Table 6-3**. Native fish include Desert Mountain Sucker, Sonora Sucker, Longfin Dace and Roundtail Chub. The number of species of introduced fish was greater than the number of natives.

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**Table 6-2**  
**Percentage Areal Coverage of Key Plant Species for each Habitat Type**  
**Along the Salt/Gila River between 75th Avenue and the BIC Diversion Dam**

Greeley and Hansen  
July 1998

% Areal Coverage	Plant Species	
	Common Name	Scientific Name
<b>Cottonwood-Willow Habitat</b>		
30.61	salt cedar/fivestamen tamarisk	<i>Tamarix pentandra</i>
30.60	Goodding's willow	<i>Salix gooddingii</i>
20.54	Fremont's cottonwood	<i>Populus fremontii</i>
3.10	bermuda grass	<i>Cynodon dactylon</i>
2.69	camphorweed	<i>Heterotheca subaxillaris</i>
1.68	baccharis/mule's fat	<i>Baccharis salicifolia</i>
1.45	foxtail barley	<i>Hordeum jubatum</i>
1.22	bromegrass/cheatgrass	<i>Bromus tectorum</i>
1.22	cobble	N/A
1.14	Londonrocket	<i>Sisymbrium irio</i>
1.00	fourwing saltbush	<i>Atriplex canescens</i>
0.95	canaigre dock	<i>Rumex hymenosepalus</i>
0.91	black mustard	<i>Brassica nigra</i>
<b>Salt Cedar Habitat</b>		
31.86	salt cedar/fivestamen tamarisk	<i>Tamarix pentandra</i>
18.20	baccharis/mule's fat	<i>Baccharis glutinosa</i>
18.20	threeawn/spidergrass	<i>Aristida sp.</i>
7.28	desertbroom	<i>Baccharis sarathroides</i>
7.28	camphorweed	<i>Heterotheca subaxillaris</i>
6.49	Londonrocket	<i>Sisymbrium irio</i>
2.18	fourwing saltbush	<i>Atriplex canescens</i>
1.58	foxtail barley	<i>Hordeum jubatum</i>
1.46	aster	<i>Aster spinosus</i>
1.46	catseye/cryptantha	<i>Cryptantha sp.</i>
1.46	snakeweed	<i>Gutierrezia sarothrae</i>
<b>Mesquite Habitat</b>		
53.19	fourwing saltbush	<i>Atriplex canescens</i>
21.28	honey mesquite	<i>Prosopis glandulosa</i>
21.28	Jerusalem thorn	<i>Parkinsonia aculeata</i>
4.26	elderberry	<i>Sambucus Mexicana</i>
<b>Marsh Habitat</b>		
30.07	knotweed	<i>Polygonum sp.</i>
27.45	cattail	<i>Typha sp.</i>
11.44	salt cedar/fivestamen tamarisk	<i>Tamarix pentandra</i>
7.84	Goodding's willow	<i>Salix gooddingii</i>
7.19	buttercup	<i>Ranunculus sp.</i>
3.27	black mustard	<i>Brassica nigra</i>
3.27	canaigre dock	<i>Rurnex hymenosepalus</i>
3.27	willow	<i>Salix sp.</i>
3.27	cattail	<i>Typha sp.</i>
<b>Cobble</b>		
71.43	goldenhills/brittlebush	<i>Encelia farinosa</i>
28.57	sage	<i>Salvia sp.</i>

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**Table 6-3**  
***Fish Known to Occur in the MGRW Study Area***

Greeley and Hansen  
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Native	Introduced
Desert Mountain Sucker	Common Carp
Sonora Sucker	Flathead Minnow
Longfin Dace	Goldfish
Roundtail Chub	Golden Shiner
	Red Shiner
	Threadfin Shad
	Black Bullhead
	Channel Catfish
	Yellow Bullhead
	Rainbow Trout
	Black Crapple
	Bluegill
	Green Sunfish
	Largemouth Bass
	Redear Sunfish
	Yellow Bass
	Tilapia
	Guppy
	Mexican Molly
	Mosquitofish
	Sailfin Molly

**Table 6-4** lists the key reptiles that are known to occur in the MGRW study area. Reptiles in **Table 6-4** were separated into aquatic and terrestrial species. The aquatic species are known to occur anywhere there is permanent water. The Gila Monster and Desert Tortoise are terrestrial reptiles that are protected species. The Mexican Garter Snake is a native species that few, if any, remain in the area.

**Table 6-5** lists key aquatic and terrestrial amphibians that are known to occur in the study area. The Rio Grande Leopard Frog and the Bull Frog are the two aquatic amphibians that may be found in the MGRW study area. The Low Land Leopard Frog is a protected terrestrial amphibian.

Key mammals that occur in the MGRW study area are listed in **Table 6-6**. Mammals were separated into those associated with the flood plain and others associated with the area. Of those associated with the flood plain, the Spotted Bat and California Leaf-Nosed Bat are protected species. The Lesser Long-Nosed Bat was typically not associated with the flood plain and is also a protected species.

**Table 6-7** lists the birds that may be present in the study area and their associated habitats. The birds in **Table 6-7** were separated into birds of special concern and common bird species. For each bird species, the seasonal status was also given. In the marsh/strand and open water habitats there are a number of birds of special concern. The Yumma Clapper Rail and Peregrine Falcon are two federally listed endangered species that are typically associated with marsh/strand or open water habitats. In cottonwood-willow habitats, the Peregrine Falcon (endangered), Yellow-Billed Cuckoo and Willow Flycatcher (endangered) are birds of special concern. In salt cedar habitats, the Peregrine Falcon and Willow Flycatcher are also known to occur. In mesquite and cobble habitats, the Peregrine Falcon is the only bird of special concern known to occur. The vast majority of birds of special concern are associated with marsh or open water habitats.

## **7. GIS INFORMATION**

Data bases of the information described in Sections 4, 5 and 6 of this report were incorporated into a Geographic Information System (GIS) format. The program used was ArcView v.3. The maps were prepared using the UTM Zone 12 coordinate system.

### **7.1 GIS Projects**

A goal of the MGRW study was to compile the information so that it could be used by others. Potential users have different needs for their analyses and information will be used on computers with

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**Table 6-4**  
***Reptiles Known to Occur in the MGRW Study Area***

Greeley and Hansen  
July 1998

Aquatic Species <sup>1</sup>	Terrestrial Species
Spiny Soft Shelled Turtles	Mexican Garter Snake <sup>2</sup>
Black Necked Garter Snake	Tree Lizard
Checkered Garter Snake	Long Tailed Brush Lizard
	Side Blotched Lizard
	Western Whiptail
	Desert Spiney Lizard
	Western Banded Gecko
	Regal Horned Lizard
	Desert Horned Lizard
	Gila Monster (PROTECTED)
	Desert Tortoise (PROTECTED)
	Gopher Snakes
	Common or California King Snake
	Ground Snake
	Blind Snake
	Black Headed Snake
	Long Nose Snake
	Desert Patchnosed Snake
	Coach Whip
	Western Shovelnose Snake
	Sonoran Whip Snake
	Glossy Snake
	Knight Snake
	Western Coral Snake
	Western Diamondback Rattlesnake
	Mohave Rattlesnake
	Sidewinder Rattlesnake
	Blacktail Rattlesnake
	Speckled Rattlesnake
	Tiger Rattlesnake
	Snapping Turtle
	Red Eared Turtle

<sup>1</sup> Aquatic species will be found anywhere there is permanent water.

<sup>2</sup> Native species which few, if any, remain.

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*Table 6-5*  
*Amphibians Known to Occur in the MGRW Study Area*

Greeley and Hansen  
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Aquatic Species <sup>1</sup>	Terrestrial Species
Rio Grande Leopard Frogs Bull Frogs	Woodhouse Toad Couch's Spadefoot Southern Spadefoot (New Mexico Spadefoot) Red Spotted Toads Colorado River Toads Great Plains Toad Low Land Leopard Frog (PROTECTED) Arizona Toad

<sup>1</sup> Aquatic species will be found anywhere there is permanent water.

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*Table 6-6*  
*Mammals Known to Occur in the MGRW Study Area*

Greeley and Hansen  
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Associated with Floodplain	Others Associated with Area
California Leaf-Nosed Bat (PROTECTED)	Lesser Long-Nosed Bat (PROTECTED)
Yuma Myotis	Harris' Antelope Squirrel
Cave Myotis	Round-Tailed Ground Squirrel
California Myotis	Little Pocket Mouse
Western Pipistrelle	Arizona Pocket Mouse
Big Brown Bat	Desert Pocket Mouse
Hoary Bat	Rock Pocket Mouse
Spotted Bat (PROTECTED)	Merriam's Kangaroo Rat
Pallid Bat	Ord's Kangaroo Rat
Mexican Free-Tailed Bat	Desert Kangaroo Rat
Desert Shrew	Southern Grasshopper Mouse
Black-Tailed Jackrabbit	Cactus Mouse
Desert Cottontail	Desert Wood Rat
Rock Squirrel	Coati
Pocket Gopher	
Beaver	
Western Harvest Mouse	
Deer Mouse	
Hispid Cotton Rat	
White-Throated Wood Rat	
Muskrat	
House Mouse	
Porcupine	
Coyote	
Kit Fox	
Gray Fox	
Ringtail	
Raccoon	
Badger	
Spotted Skunk	
Striped Skunk	
Mountain Lion	
Bobcat	
Javelina	
Mule Deer	
White-Tailed Deer	

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**Table 6-7**  
**Birds and Associated Habitats in the MGRW Study Area**

Greeley and Hansen  
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**STRAND / MARSH / OPEN WATER**

Birds of Special Concern	Seasonal Status	Common Bird Species	Seasonal Status
American Bittern	Rare during migration and winter	Abert's Towhee	Abundant resident
Least Bittern	Local, uncommon summer breeder	Song Sparrow	Common resident
Great Egret	Uncommon resident, does not breed (yet)	Great Blue Heron	Common resident
Snowy Egret	Common resident, does not breed (yet)	Mourning Dove	Abundant resident
Cattle Egret	Uncommon resident, does not breed	Common Yellowthroat	Common resident
White-Faced Ibis	Common migrant, rare winter	Red-Winged Blackbird	Abundant resident
Black Bellied Whistling Duck	Local, uncommon summer breeder	House Finch	Abundant resident
Osprey	Fairly common in migration and winter	Pied-Billed Grebe	Common resident
Bald Eagle	Rare during migration and winter	Cliff Swallow	Abundant summer/nests under bridges
Peregrine Falcon	Uncommon during migration and winter	Green-Winged Teal	Common during winter
Yuma Clapper Rail	Locally uncommon breeder, rare winter	Mallard	Abundant during winter
Black-Necked Stilt	Uncommon summer breeder, common migrant	Ruby-Crowned Kinglet	Abundant during winter
American Avocet	Common during migration	White-Crowned Sparrow	Abundant during winter
Long-Billed Curlew	Uncommon during migration, rare in winter		
Belted Kingfisher	Common during migration and winter		
Marsh Wren	Possibly local breeder, abundant during winter		

**COTTONWOOD-WILLOW**

Birds of Special Concern	Seasonal Status	Common Bird Species	Seasonal Status
Peregrine Falcon	Uncommon during migration and winter	Abert's Towhee	Abundant resident
Yellow-Billed Cuckoo	Local, uncommon summer breeder	Song Sparrow	Common resident
Willow Flycatcher	Uncommon during migration	Mourning Dove	Abundant resident
		Anna's Hummingbird	Common resident
		House Finch	Abundant resident
		White-Winged Dove	Abundant summer breeder
		Ash-Throated Flycatcher	Common summer breeder
		Cliff Swallow	Abundant summer/nests under bridges
		Yellow Warbler	Uncommon summer breeder
		Lucy's Warbler	Fairly common summer breeder
		Yellow-Rumped Warbler	Abundant during winter
		Orange-Crowned Warbler	Abundant during winter
		Ruby-Crowned Kinglet	Abundant during winter
		White-Crowned Sparrow	Abundant during winter

**SALT CEDAR / TAMARISK**

Birds of Special Concern	Seasonal Status	Common Bird Species	Seasonal Status
Peregrine Falcon	Uncommon during migration and winter	Abert's Towhee	Abundant resident
Willow Flycatcher	Uncommon during migration	Mourning Dove	Abundant resident
		House Finch	Abundant resident
		White-Winged Dove	Abundant summer breeder
		Cliff Swallow	Abundant summer/nests under bridges
		Yellow-Rumped Warbler	Abundant during winter
		Orange-Crowned Warbler	Abundant during winter
		Ruby-Crowned Kinglet	Abundant during winter
		White-Crowned Sparrow	Abundant during winter

**MESQUITE / PALO VERDE / CREOSOTE BUSH**

Birds of Special Concern	Seasonal Status	Common Bird Species	Seasonal Status
Peregrine Falcon	Uncommon during migration and winter	Abert's Towhee	Abundant resident
		Gambel's Quail	Common resident
		Mourning Dove	Abundant resident
		House Finch	Abundant resident
		White-Winged Dove	Abundant summer breeder
		Ash-Throated Flycatcher	Common summer breeder
		Bell's Vireo	Common summer breeder
		Cliff Swallow	Abundant summer/nests under bridges
		Lucy's Warbler	Fairly common summer breeder
		Ruby-Crowned Kinglet	Abundant during winter
		White-Crowned Sparrow	Abundant during winter

**FLOOD SCoured / COBBLE**

Birds of Special Concern	Seasonal Status	Common Bird Species	Seasonal Status
Peregrine Falcon	Uncommon during migration and winter	Abert's Towhee	Abundant resident
		Mourning Dove	Abundant resident
		House Finch	Abundant resident
		Bell's Vireo	Common summer breeder
		Cliff Swallow	Abundant summer/nests under bridges
		Ruby-Crowned Kinglet	Abundant during winter
		White-Crowned Sparrow	Abundant during winter

different data storage requirements. A decision was made to keep the MGRW study data in a simple GIS format rather than trying to accommodate the specific format requirements of all potential users.

The first GIS format decision was to divide the information into several projects. This was to allow potential users to focus on the data related to their needs without having to sort through all of the GIS data. The projects developed for the MGRW study are:

- Base Map
- Designated Uses Standards
- Surface Water Quality
- Stormwater Quality
- Groundwater Quality
- Fish Tissue Quality
- Sediment Quality
- Surface Water Quantity
- Habitat
- 23rd Avenue and 91st Avenue WWTP Analyses

The next GIS format decision was how to format the pollutant of concern data. Each project contained data for the 22 pollutants of concern, numerous sampling locations, and numerous dates of sampling at each location. In the MGRW study GIS format, each pollutant of concern was made into a layer in each project. This allows a potential user to compare all of the information for a specific pollutant of concern from the different MGRW projects at the same time without having to sort through the data for all the pollutants of concern. The database format used for the pollutants of concern in each project will be discussed in the specific description of that project.

## **7.2 Base Map Project**

The GIS Base Map project provides the following information:

- Maricopa County, Arizona
- Jurisdictions in Maricopa County, the attribute table lists the name of the jurisdiction
- U.S. Geological Survey 7-1/2 minute Quadrangle maps in the MGRW study area, the attribute table lists the quadrangle names.
- The Salt and Gila River area within the MGRW study area.
- The tributary streams to the MGRW study area.

The Base Map was prepared to assist the potential users to locate the study area within Maricopa County and to provide a data base of background geographic data.

### **7.3 Designated Uses Standards**

The Designated Uses project used a simplified base map for information presentation. The base map included the Maricopa County outline, quadrangle maps, and Salt and Gila Rivers MGRW study area. The purpose of the Designated Uses project was to present the standards for each pollutant of concern for the designated uses for each of the five (5) river reaches in the MGRW study area. Each pollutant of concern was designated as a separate layer and the pollutants of concern were listed alphabetically. The attribute table for each pollutant of concern presents:

- Each river reach by defining the starting location and the downstream ending location.
- The total list of designated uses as defined in Section 4.2.
- The standard associated with the designated use in that reach. The database showed a numeric value for the concentration, a D or T designator was included if the standard was for the total or dissolved fraction of the concentration, NNS if no numeric standard was established for the pollutant of concern for the designated use in that reach and NDU for not a designated use to show if the designated use was not designated for that river reach. The NDU designator was used in the MGRW study to permit consistency in the attribute tables for the five (5) river reaches and 22 pollutants of concern. This was more accurate than leaving attribute table cells blank.

### **7.4 Surface Water Quality**

The Surface Water Quality project was prepared to present NPDES permit data and other in stream water quality data. The same simplified base map used in the Designated Uses project and format for pollutant of concern layers was incorporated into the Surface Water Quality project. Locations where water quality samples were taken for the pollutants of concern were displayed as simple dots. The dot color corresponds to the color listed in the pollutant of concern layer.

The attribute table for the pollutants of concern used the following format.

- Location of the sampling point given as latitude and longitude.
- Text description of the sample location.
- Source code of the annotated bibliography sheet to reference the source of the water quality data.

- Concentration reporting units, usually ug/l.
- Water quality data consisting of a sample date and concentration for each sample occurrence. In some cases two concentration columns were used, one for a number and the second for a less than value or range. This was because the database could only accommodate a numeric value or text format in a column. If the concentration was reported as a value it was placed in the numeric column. If the concentration was reported as a less than (<0.02) value, it was placed in the text or “range” column. A less than value would have appeared as 0.00 in the numeric column and this would have been an inaccurate data point.

### 7.5 Stormwater Quality

The Stormwater Quality project followed the same format as the data in **Tables 4-18, 4-19 and 4-20**. Most of the surface water data for Reach 4 was in **Table 4-18**, but due to the volume of information available from the 23rd Avenue WWTP, a separate table was prepared for it and the 91st Avenue WWTP data.

Surface water quality data from NPDES permits and other sources was prepared as **Tables 4-15 through 4-21**. The format for these tables was the same as for **Tables 4-12 through 4-14**. The surface water quality data was compared to the contaminant standards and ADEQ PQL values. The following provides the appropriate tables references:

<i>Reach</i>	<i>Designated Use</i>	<i>Surface Water Quality</i>
1	Table 4-2	Table 4-15
2	Table 4-3	Table 4-16
3	Table 4-4	Table 4-17
4	Table 4-5	Table 4-18
5	Table 4-6	Table 4-21

Format used in the Storm and Surface Water Quality project, includes the simplified base map, pollutant of concern layers and attribute table for the database.

## **7.6 Groundwater Quality**

The Groundwater Quality project was prepared to present groundwater quality data for wells in and adjacent to the MGRW study area. The Groundwater Quality project used the same format as the Surface Water Quality project and Stormwater Quality project.

## **7.7 Fish Tissue Quality**

The Fish Tissue Quality project was prepared to allow a potential user to assess the quantity of pollutants of concern measured in fish tissues. This project used the simplified base map and each pollutant of concern as a layer. The Fish Tissue Quality project attribute table followed the same format as previous tables, but columns were added to define the units of measurement, mg/kg wet weight or ug/g and to define the fish type if known.

## **7.8 Sediment Quality**

The Sediment Quality project used the same GIS format and attribute table format as the Surface Water Quality project. The units of measurement in the Sediment Quality project were mg/kg dry or ug/kg dry or in mud.

## **7.9 Surface Water Quantity**

The Surface Water Quantity project used the simplified base map and separate layers for NPDES discharges, stream flow, stormwater, and agricultural drainage. The NPDES layer attribute table contains:

- Location given as latitude and longitude
- Description of the discharge site
- Source code of the annotated bibliography reference
- The NPDES permit number
- The average flow
- Dates of the average flow period
- The discharge location
- Comments about the record

The stream flow layer included gaging sites that measure surface flow tributary to the MGRW area or within the area. The attribute table contains:

- Location as latitude and longitude
- Description of the gage site
- Source code of reference
- Gage number
- Period of record
- Size of drainage area contributing flow to the gage in square miles
- Maximum flow in cfs
- Date of maximum flow
- Comments

The period of record was given rather than all the flow data because the USGS records daily flow. The flow gaged on most days within the MGRW study area was zero.

The stormwater flow data was from sites monitored by FCDMC. The data presented in the attributes table included:

- Location as latitude and longitude
- Description of the site
- Source code of the data reference
- Flow measurements given as date of measurement, instantaneous discharge in cfs, and total discharge in acre-feet.

Irrigation drainage flow data was provided by Salt River Project. The attribute table contains:

- Location as latitude and longitude
- Description of the drainage
- Source code of the data reference
- Flow data given as the year and annual discharge in acre-feet

### **7.10 Habitat**

The habitat project contained the simplified basemap and a layer for riparian vegetation and other vegetation types. The riparian layer defined habitat types located along perennial waters of Arizona. The habitat types listed for the MGRW area correspond to the same five major habitats listed in Section 6.1.

The vegetation layer provided information about all types of vegetation, not just those associated with a river or other water source. The habitat and vegetation layers were provided by the Arizona State Lands Department and the Arizona Land Resources Information System (ALRIS).

#### **7.11 23rd Avenue and 91st Avenue WWTP Analyses**

This project contained the same information located in **Tables 4-20** and **4-21**. The simplified basemap was used as a base and the 23rd Avenue WWTP and the 91st Avenue WWTP appear as dots on the map. Each pollutant of concern was a layer that could be viewed individually.

The GIS database was organized so that it can be used by various agencies to fit their specific needs. If the GIS database is properly managed, it can be updated easily in the future and can serve as a data clearinghouse for the Phoenix area.

### **8. DATA DEFICIENCIES**

One of the goals of the Middle Gila River Watershed Study was to inventory the adequacy of existing data and to recommend where future additional data/information is needed to characterize existing water quality conditions and degree of protection/attainment being achieved. Data deficiencies identified in the MGRW study were divided into four categories: monitoring sites, sampling frequency, analysis techniques and other. Each type of data gap is described in this section. The specific data gaps for each contaminant in each reach will be presented in Section 9.

#### **8.1 Monitoring Sites**

Monitoring site data gaps were locations where water quality had not been measured. Specific examples of monitoring site data gaps included the ungaged and unsampled discharges of agriculture drains and stormwater inflows. Ungaged inflows could likely be a source of contamination, but their actual affect could not be quantified because water quality was unknown. Monitoring site data deficiencies may also be those associated with in-river locations where water quality information was not known. These were reaches with limited sample sites or where there were large distances between sample sites and a change in water quality was noted.

#### **8.2 Sampling Frequency**

Sampling frequency data deficiencies were those where a contaminant or contaminants were measured once or a limited number of times. This was found to be a very important data deficiency when the limited sampling data indicated a contaminant resulted in a potential exceedance of a standard. When limited sampling data at a site was available, it was not possible to determine if the

concentration was changing over time and whether the noted analyses were representative of actual conditions. Implementation of sampling programs in selected locations, would be a viable way to fill this type of data gap.

### **8.3 Analysis Techniques**

Data deficiencies related to analysis techniques were very common in the MGRW study. These result from method detection limits (MDL) that are greater than the standard for a certain constituent. As discussed previously in Section 4.1, when the MDL was greater than the standard, as was common with many of the pesticides, it was impossible to quantify if the standard was actually being exceeded, or if noise was causing what appeared to be an exceedance. Analysis technique data deficiencies were commonly encountered when a concentration was reported as "< X.XX". Often times the X.XX was greater than the standard.

Another type of analysis technique data deficiency occurred when the reported concentration exceeded the standard, but the concentration was less than the practical quantitation limit (PQL). In these cases, it was known that the pollutant was present, but it was not known whether the standard was actually being exceeded, because the concentration was less than the PQL as set by ADEQ and, thus, the result was not 100 percent viable.

Where analysis technique data gaps were identified, it was recommended that analytical techniques change or ultra-clean sampling and analysis be considered. Using the ultra-clean techniques would make it possible to determine whether the concentration of a constituent was truly in exceedance.

### **8.4 Other**

The other types of data deficiencies were those that were rather administrative or political in nature. These included water quality from the Buckeye Irrigation Company and Arlington Canal Company. These entities did not provide water quality information because of what they felt were liability issues. They claim to have been accused of violations of standards in the past, and did not want to provide water quality information that they thought could be used against them in the future.

The National Water Quality Assessment program (NAWQA) initiated by the USGS also represents a data deficiency. Although the USGS did provide some water quality information, they made clear that it was for informational purposes only and should not be distributed until after the NAWQA results are made public in 1998.

## 9. CHARACTERIZATION

### 9.1 Explanation

In this section, surface water quality in the MGRW study area was characterized on a reach by reach basis. Each reach was analyzed individually and the potential impacts on downstream reaches were quantified. Data gaps were identified for each river reach.

In each reach, it was first determined if there were any exceedances of the most stringent standard for a given contaminant associated with stormwater, NPDES discharges, agricultural discharges and stream flows. If there were no exceedances, it was projected that there were negligible adverse impacts to the next downstream reach. Sediment pollutant concentrations were then analyzed to determine if contamination could occur during a flood event when sediment washes downstream to the next reach. Where surface water exceedances were noted, it was specified whether they were just potential exceedances based on bad method detection limits or reported concentration less than the PQL or whether they were verified exceedances and the reported concentration was greater than the standard and PQL. If the exceedance was a potential exceedance only, it was identified as an "analysis technique" data gap.

If the exceedance was based on reliable data, it was analyzed in two ways: temporally and spatially. Data at the location of the contaminant that was exceeded was analyzed over time, to identify temporal trends. If only one sample was taken, it was flagged as a "sampling frequency" data gap and a recommendation was made that a sampling program change was needed at that location. If data existed at the location for the contaminant over time, the data was analyzed and temporal trends were noted.

Verified exceedances were also analyzed spatially. It was determined if there was a trend in concentrations along the river, such as concentrations increasing downstream. If there was a spatial trend, it was noted and the source was identified when possible. If there did not appear to be a trend, the source of the contaminant at a location was attempted to be identified. If it could not be identified, the location was flagged as a "monitoring site" data gap and sampling could be recommended at some ungaged inflows such as storm and agriculture drains.

## 9.2 Reach 1: Granite Reef Dam to 2 km Downstream

### 9.2.1 Characterization

Reach 1 extended from Granite Reef Dam to 2 km downstream. The designated uses and associated standards for this reach are shown in **Table 4-2**. Flow in this reach occurred only when there were releases from Granite Reef Dam (**Table 5-3**).

There were no gauged stormwater discharges or NPDES discharges in this reach. The only water quality measurements for this reach, as shown in **Table 4-15** were those samples taken from the Arizona Canal at Granite Reef Dam. These samples were representative of the quality of water during floods. In September 1992, one sample exceeded the minimum designated uses standard for dissolved mercury of 0.01 ug/l. However, the concentration did not exceed the PQL of 0.5 ug/l and, thus, it could not be considered a verified exceedance. This represented an analytical technique data gap, as it was not possible to verify if the dissolved mercury concentration was in fact greater than the standard. The only available dissolved mercury measurements were for eight months in 1992. Therefore, there was also a sampling frequency data gap at Granite Reef Dam as it was unknown if the potential exceedance was a one time occurrence or if it reoccurred in previous and following years.

Overall, the quality of water at Granite Reef Dam was quite good, and it was highly unlikely that any downstream contamination would occur during floods, other than that of elevated sediment loading.

### 9.2.2 Reach 1 Summary

The only noted potential exceedance for this reach was for dissolved mercury. However, because the reported concentration was less than the PQL, this represented an analytical technique data gap. Dissolved mercury data was only available for part of 1992 and also represented a sampling frequency data gap. The quality of water at Granite Reef Dam was good and it was not expected that downstream contamination would occur during flood events.

## 9.3 Reach 2: 2 km Downstream of Granite Reef Dam to I-10 Bridge

### 9.3.1 Characterization

Reach 2 extended from 2 km downstream of Granite Reef Dam to I-10 Bridge and the Salt River. The designated uses and associated standards for this reach are shown in **Table 4-3**. Stormwater quality and surface water quality for Reach 2 are shown in **Table 4-12** and **Table 4-16**, respectively.

## 9.3.2 Stormwater

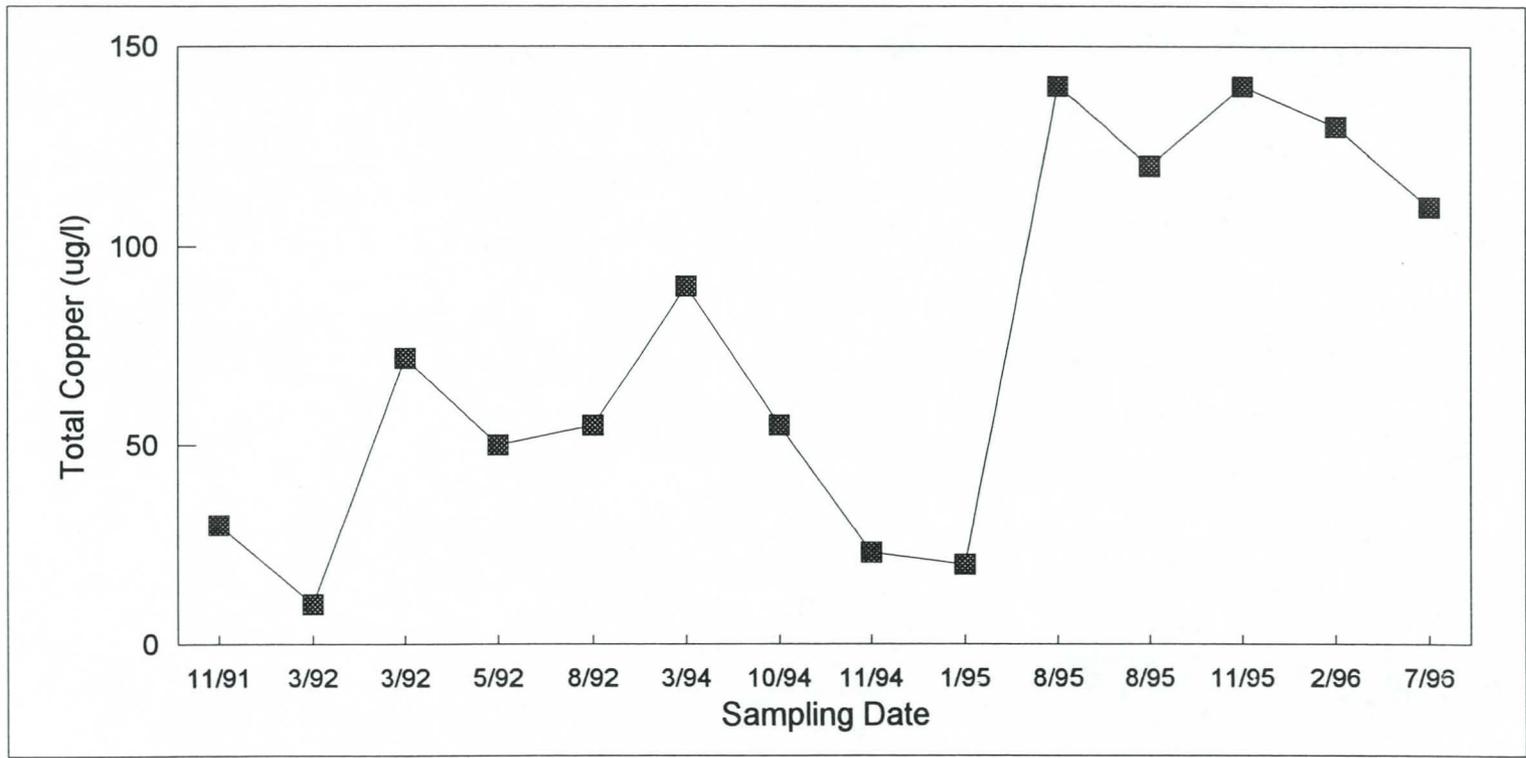
### 9.3.2.1 Copper

In Reach 2 stormwater data, there were six verified exceedances of the dissolved copper standard of 46 ug/l based on a hardness of 200 mg/l. In August 1993, at the 48th Street drain and the Salt River, a concentration of 70 ug/l dissolved copper was recorded. All eight samples taken at the 48th Street drain prior to August 1993 had dissolved copper concentrations <20 ug/l. However, following the 70 ug/l dissolved copper exceedance in August 1993, dissolved copper was no longer measured at the 48th Street Drain. This represented a sampling frequency data gap for dissolved copper in Reach 2.

This brings up an important data discrepancy. The surface water quality standard for copper in Reach 2 and 3 is defined for dissolved copper only. However, recently many of the NPDES permits, including the stormwater permits, require monitoring for total copper. If total copper only is measured, there is no way to know what fraction of that is dissolved and what fraction is particulate. Therefore, it is not known whether or not the dissolved copper standard is being exceeded. Standards should be consistent with monitoring requirements.

Because in Reach 2 there was no standard for total copper, there were no "exceedances". However, based on the concentrations of total copper measured at the 48th Street Drain, it was possible that significant amounts of copper were entering into the Salt River during storms. Between November 1991 and December 1996, 7 of the 14 stormwater samples collected and analyzed for total copper at 48th Street Drain had total copper concentrations greater than 70 ug/l and 5 of those had copper concentrations greater than 100 ug/l. **Figure 9-1** shows how total copper concentrations at the 48th Street Drain changed from November 1991 through December 1996. All of the total copper samples at the 48th Street Drain that had copper concentrations greater than 100 ug/l were collected during 1995 and 1996. This indicated that total copper concentration being washed into the Salt River from the 48th Street drain during storms have increased in recent years.

At 40th Street along the south bank of the River and 500 feet east of I-10 Bridge over the Salt River on the north bank, there were also verified exceedances of the minimum designated uses standard for dissolved copper (using a total hardness of 200 mg/l). There were three verified exceedances that occurred at 40th Street and three 500 feet east of I-10 Bridge between January 1992 and September 1996. There did not appear to be a trend for dissolved or total copper at these locations.



TOTAL COPPER IN STORMWATER AT 48TH STREET DRAIN

MULTI-CITY SUBREGIONAL OPERATING GROUP  
 and CITY OF TOLLESON  
 MIDDLE GILA RIVER WATERSHED PHASE I  
 JULY 1998

FIGURE 9-1

GREELEY AND HANSEN

In summary, it is apparent that copper is entering into the Salt River from storm drains in Reach 2.

#### **9.3.2.2 Cyanide**

The minimum designated uses standard for cyanide for Reach 2 was 19 ug/l and the PQL was 20 ug/l. There was one sample collected from a storm drain at 5th Street and Ash Avenue in Tempe that had a reported concentration of <25 ug/l. This represented a potential exceedance due to analytical technique limitations for cyanide at this location. However, because the all six other samples at this location between August 1993 and February 1996 had concentrations of 10 ug/l or less, it was unlikely that stormwater was contributing excessive amounts of cyanide to the river.

A verified exceedances of the cyanide standard occurred at the 48th Street Drain (20 ug/l), 40th Street (30 ug/l) and 500 feet east of the I-10 bridge (30 ug/ and 20 ug/l). The exceedance at 40th Street occurred in February 1992 while the exceedances at 48th Street and east of the I-10 Bridge both occurred in August and September 1995. However, the overall percentage of samples that contained cyanide in verified exceedance of the standard was very low at 0.7 percent, 10 percent and 20 percent for 48th Street, 40th Street and east of the I-10 Bridge, respectively.

In the Salt River at 40th Street, 50 percent of the samples had concentrations that were reported as <25 or <20 ug/l. Thus, these were potential exceedances because both were greater than the standard. At 500 feet east of the I-10 Bridge, 30 percent of the samples also were reported as <25 or <20 ug/l and were potential exceedances. These potential exceedances represent analytical technique data gaps for stormwater in Reach 2 of the Salt River.

As mentioned above, the minimum designated uses standard for cyanide in Reach 2 was 19 ug/l. However, the standard in Reaches 3, 4 and 5 reduces to 9.7 ug/l. Thus, cyanide washing down from Reach 2, that was not in exceedance in Reach 2, may result in exceedances downstream because of the stricter designated uses standard.

#### **9.3.2.3 Thallium**

The minimum designated uses standard for thallium for Reach 2, was 12 ug/l and there was no PQL. There were 23 potential exceedances in Reach 2, where the total or dissolved thallium concentrations were reported as a less than value which was greater than the standard of 12 ug/l and, thus, potentially was an exceedance. There were 13 times when the thallium concentration was reported as <500 ug/l. Thus, thallium in stormwater in Reach 2 represented an analytical technique data gap. It was not possible to determine from the reported detection limit whether the actual concentration

was 499 ug/l, or 10 ug/l and because the standard is 12 ug/l there was a possibility that thallium was higher than the standard.

#### **9.3.2.4 Pesticides**

Pesticides in the stormwater runoff of Reach 2 represented a major analytical technique data gap. There were 221 potential exceedances when the concentration of a pesticide was reported as less than a value that was greater than the minimum designated uses standard. A more sensitive analytical technique is needed for the pesticides in order to determine if standards are being exceeded by stormwater inflow.

### **9.3.3 Surface Water**

#### **9.3.3.1 Cyanide**

A potential exceedance was noted in one cyanide sample in effluent from the Kyrene Reclamation Plant which was reported as less <20 ug/l, where the standard was 19 ug/l. This was a potential exceedance of the standard, however, it was unlikely that the effluent is contributing cyanide to the river because of 33 cyanide samples analyzed between May 1992 and April 1997 and only one was a potential exceedance.

#### **9.3.3.2 Thallium**

There were three thallium samples collected from the Salt River at Priest Drive in January and February of 1993 and two of these were verified exceedances of the standard and PQL. The reported concentrations were 25 and 20 ug/l and both were reported in January 1993. Because there were only three thallium samples collected from this location in 1993, it was not possible to verify if exceedances were a common occurrence or if they represented an isolated incident. Thus, thallium at this location represented a sampling frequency data gap.

#### **9.3.3.3 Pesticides**

Pesticides were measured three times in Reach 2 surface water and all three were measured at the Salt River and Priest Drive. The reported concentrations of DDD, DDE, DDT and toxaphene exceeded the standard, but were less than the PQL at this location and were potential exceedances. Thus, the potential exceedances of pesticides in Reach 2 represented monitoring site, sampling frequency, and analytical technique data gaps.

### 9.3.4 Reach 2 Summary

#### 9.3.4.1 Stormwater

- Stormwater in Reach 2 was contributing dissolved and total copper to the Salt River.
- Dissolved copper represented a sampling frequency data gap at 48th Street because no samples were collected following a potential exceedance in August 1993.
- A data discrepancy existed for copper in Reaches 2 and 3 because the water quality standard was set for dissolved, but NPDES permits require measuring total.
- The amount of total copper entering the Salt River from the 48th Street drain increased in the last few years.
- Three exceedances of dissolved copper occurred at 40th Street and three 500 feet east of I-10 Bridge between January 1992 and September 1996. There does not appear to be a trend for dissolved or total copper at these two locations.
- Stormwater was identified as contributing cyanide to the river, but it could not be quantified. This was a result of analytical technique data gaps where cyanide concentrations were commonly reported as <20 ug/l or <25 ug/l and the standard was 19 ug/l.
- Thallium concentrations in stormwater were reported as <500 ug/l on 13 occasions and the standard was 12 ug/l. Thus, thallium in stormwater in Reach 2 also represented an analytical technique data gap.
- Pesticides in the stormwater runoff of Reach 2 represented a major analytical technique data gap.

#### 9.3.4.2 Surface Water

- In surface water data in Reach 2, a sampling frequency data gap was present for thallium

- Monitoring site, analytical technique and sampling frequency data gaps were present for pesticides in Reach 2.

#### **9.4 Reach 3: I-10 Bridge to 23rd Avenue WWTP Outfalls**

##### **9.4.1 Characterization**

Reach 3 extended from I-10 Bridge and the Salt River to the most eastern 23rd Avenue WWTP discharge. The designated uses and corresponding standards for Reach 3 are shown in **Table 4-4**. Stormwater quality and surface water quality data for Reach 3 are presented in **Table 4-13** and **Table 4-17**, respectively.

##### **9.4.2 Stormwater**

The only gauged stormwater drain in Reach 3 was located on the downstream side of the 24th Street Bridge over the Salt River. This drain was only sampled on August 24, 1992 and September 2, 1992 and there were no definitive exceedances of any of the water quality standards.

On August 24, 1992, the concentration of total copper measured at the 24th Street Bridge was 300 ug/l. This suggested that stormwater was contributing copper to the river in Reach 3, as it did in Reach 2. However, the overall affect of stormwater on the river in this reach, could not be quantified because of the minimal number of sampling locations and the limited number of sampling dates. Thus, stormwater in Reach 3 represented a monitoring site and sampling frequency data deficiency.

##### **9.4.3 Surface Water**

As shown in **Table 4-17**, there were only four surface water quality sampling locations in Reach 3 and two were NPDES regulated facilities that discharged to the Salt River; One Camelback, Inc. and Union Rock and Materials. There were no exceedances or potential exceedances from these two NPDES discharges. The other two sampling locations in Reach 3 were non-NPDES locations at the Salt River at 24th Street and the Salt River tributary in South Mountain Park. At these two locations, data was only available for two dates in 1992. Thus, for Reach 3 an overall monitoring location and sampling frequency data gap exists.

##### **9.4.3.1 Beryllium**

In 1992, both of the non-NPDES locations in Reach 3 had verified exceedances of the minimum designated uses standards for total beryllium. The standard for beryllium in Reach 3 was 0.21 ug/l

and the PQL was 0.5 ug/l. The reported concentrations at the two non-NPDES sampling locations was 10 ug/l. Additional sampling at these and other locations was needed to verify if beryllium concentrations consistently exceeded the standards in Reach 3.

In April 1985 a sediment sample collected from 19th Avenue and the Salt River contained 3,200 ug/g of beryllium. This indicated long-term presence of beryllium at this location. Additional sampling may be needed to determine if substantial beryllium contamination is still present. During a flood event, these sediments will wash downstream and cause contamination. Water may be depositing beryllium in the sediments, or the sediments may be contributing beryllium to the river.

#### **9.4.3.2 Selenium**

Selenium concentrations were low in the water quality samples in Reach 3. However, in April 1985 a soil sample collected had 3200 ug/g selenium. More sampling will be needed to determine if selenium contamination at this location persists.

#### **9.4.3.3 Thallium**

The standard for thallium in Reach 3 was 12 ug/l and on August 24, 1992, a thallium concentration of 20 ug/l was measured at 24th Street and the Salt River. This exceedance may be the result of the stormwater present in the river on this location on August 24, 1992. A sampling frequency and monitoring location data gap exists for Reach 3, for thallium. In April 1994 at 19th Avenue and the Salt River, a soil sample was collected that had 6,500 ug/g thallium and this value is extremely high.

#### **9.4.3.4 Mercury and Cyanide**

Mercury and cyanide were both measured in quantities greater than the standard but less than the PQL in Reach 3 and were potential exceedances. Thus, an analytical technique data gap exists for these constituents for Reach 3. No significant mercury or cyanide concentrations were noted in soil or in fish tissue for this reach.

#### **9.4.3.5 Pesticides**

An analytical technique data gap exists for pesticides in Reach 2 because measured concentrations were greater than the standard but less than the PQL. All exceedances of pesticides in Reach 2 were potential exceedances.

#### 9.4.4 Reach 3 Summary

- An overall monitoring location and sampling frequency data gap existed for Reach 3 for stormwater and surface water, for all pollutants of concern.
- A sediment sample from 1985 and some limited surface water samples, indicated that beryllium was being contributed to the river in Reach 3 or upstream reaches, but additional sampling will be needed to verify this.
- In 1985 a very high concentration of selenium was noted in soils at 19th Avenue. More sampling will be needed to determine if this contamination persists and what the source may be.
- One verified exceedance of thallium was noted at 24th Street and the Salt River. A sediment sample from 1985 also indicated the long term presence of excess thallium in Reach 3.
- Analysis technique data gaps were present for mercury, cyanide and pesticides in Reach 3.

#### 9.5 Reach 4: 23rd Avenue WWTP Outfalls to the Confluence of the Salt and Gila Rivers

##### 9.5.1 Characterization

Reach 4 extended from the most upstream 23rd Avenue WWTP outfall to the confluence of the Salt and Gila Rivers. The designated uses and corresponding surface water quality standards for Reach 4 are shown in **Table 4-5**. Stormwater quality and surface water quality data for Reach 4 are located in **Table 4-14** and **Table 4-18**, respectively.

##### 9.5.2 Stormwater

There were three sampled stormwater locations within Reach 4. They were: the Salt River at 27th Avenue, Salt River at 35th Avenue and the 51st Avenue Bridge over the Salt River. Verified exceedances of minimum designated uses surface water quality standards were noted for dissolved beryllium, dissolved copper, total mercury, DDE and DDT.

### 9.5.2.1 Beryllium

In March 1992 and June 1994, dissolved beryllium concentrations of 0.6 ug/l were reported in stormwater at 27th Avenue while the standard for Reach 4 was 0.21 ug/l and the PQL was 0.5 ug/l. There were 12 measurements of dissolved beryllium in stormwater in Reach 4. Two were definitive exceedances (both 0.6 ug/l), seven were potential exceedances reported as less than values greater than the standard but less than the PQL, and three were potential exceedances reported as less than values greater than the standard and the PQL. This indicated that beryllium was present in stormwater in Reach 4, but because of analytical technique data gaps the actual amount of beryllium in stormwater was not known.

There were no verified exceedances of the total beryllium standard and PQL, however, 24 of the 26 samples were potential exceedances because concentrations were reported as less than values that were greater than the standard and PQL. These were potential exceedances.

A sediment sample from the Salt River at 35th Avenue in June 1993 had a beryllium concentration of 2700 ug/g.

These results indicated that there was an analytical technique data gap associated with beryllium in stormwater in Reach 4.

### 9.5.2.2 Copper

There were three verified exceedances of the dissolved copper standard at the Salt River at 35th Avenue. The standard for dissolved copper was 34 ug/l using hardness of 200 mg/l. In January 3, 1992, August 22, 1992 and March 13, 1996, the concentrations of dissolved copper were 280 ug/l, 100 ug/l, and 50 ug/l, respectively. These represented substantial exceedances.

Although there was no standard for total copper in Reach 4, 15 of the 31 samples had total copper concentrations greater than 100 ug/l and 5 had copper concentrations greater than 200 ug/l. The maximum total copper concentration in Reach 4 was 420 ug/l which was measured at the Salt River at 35th Avenue on September 28, 1995.

These results indicated that stormwater in Reach 4 was contributing copper to the river, as was noted in Reach 2. Data presented in Section 9.5.2 demonstrated the 23rd Avenue WWTP was not the source of the copper because the 198 copper analyses did not result in an exceedance. It also appeared that during storm events, copper increased downstream. **Table 9-1** shows total copper

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Middle Gila River Watershed Phase I

*Table 9-1*  
*Total Copper in Stormwater Along the Salt River*  
*in August and September 1995*

Greeley and Hansen  
July 1998

Location	Date	Total Copper (ug/l)
Dorsey and University	09/28/95	26
Indian Bend Wash at Curry	09/28/95	25
Fifth Street east of Ash	09/07/95	18
48th Street Drain	08/19/95	120
Salt River at 40th Street	09/28/95	230
500 ft east of I-10 Bridge	09/27/95	76
Salt River at 35th Avenue	09/28/95	420

concentrations in August and September 1995 and the trend to increase downstream. The bridge at 51st Avenue was the farthest downstream stormwater monitoring location. Additional storm drain and in river monitoring locations may be necessary in order to verify how copper increases as the river flows downstream.

Copper concentrations of up to 5.62 ug/g were found in fish tissue between 1994 and 1995 at the Salt River at 59th Avenue.

#### **9.5.2.3 Cyanide**

The minimum designated uses standard for cyanide was 9.7 ug/l and the PQL was 20 ug/l. In the 33 measurements for cyanide, 2 were potential exceedances where the concentration was 10 ug/l, which was greater than the standard but less than the PQL. The other 31 samples had reported concentrations of <10 ug/l, also potential exceedances. These represent analytical technique data gaps.

#### **9.5.2.4 Selenium and Thallium**

An analytical technique data gap existed for selenium and thallium in Reach 4 stormwater. Concentrations were reported as less than values that were greater than the standard or the standard and the PQL.

#### **9.5.2.5 DDE AND DDT**

There were five verified exceedances of the standard and PQL for DDE and two of DDT for stormwater at the Salt River at 27th Avenue. It was not probable that DDE and DDT washed downstream, from the upstream reaches. The most likely source of DDE and DDT was local stormwater runoff in Reach 4, perhaps runoff from farms that contributed to the storm drain and were the source of DDE and DDT. It was possible that soil contaminated years ago before the ban of DDT, was the source of DDE and DDT as these pesticides are very persistent in the environment. Concentrations of DDE were as high as 1.1 ug/l on March 8, 1992 and DDT concentrations were 0.1 ug/l on March 1992 and December 1992. DDE and DDT samples taken in Reach 4 after 1992, did not provide definitive results, rather results were expressed as less than values that were greater than the standard or the standard and PQL. These represented potential exceedances. Sampling frequency and analytical technique data gaps existed for DDE and DDT in stormwater in Reach 4.

#### **9.5.2.6 Other Pesticides**

As with the upstream reaches, an analytical technique data gap existed for pesticides in Reach 4 stormwater.

### **9.5.3 Surface Water**

#### **9.5.3.1 Beryllium**

Verified beryllium exceedances in surface water at 27th Avenue and 51st Avenue correspond to the beryllium exceedances noted for stormwater. Some beryllium concentrations in the effluent from the 23rd and 91st Avenue WWTP's were reported as less than values that were greater than the standard and PQL. These were analytical technique data gaps.

A verified exceedance of the minimum designated uses standard for beryllium was noted in the discharge from a gravel mine 0.4 miles east of 83rd Avenue. On February 23, 1994, a concentration of 9.2 ug/l was measured in the discharge.

Multiple verified exceedances were also noted in New River in 1994-1996 which is a tributary to the Agua Fria River. Verified exceedances were also found at the Salt River at 107th Avenue near Tolleson and ½ mile east of the 115th Avenue river crossing.

Analytical technique and sampling frequency data gaps existed for beryllium in the effluent from the Tolleson WWTP. There was also a monitoring location data gap for beryllium in the ungaged SRP drains.

#### **9.5.3.2 Boron**

No substantial boron concentrations were noted upstream of Reach 4. Thus, high boron observed in Reach 4 was likely to have originated in the area. A verified exceedance of the minimum designated uses standard (1000 mg/l) was noted in the SRP Maricopa Drain just off lateral 14, where a boron concentration of 1040 mg/l was measured. This exceedance occurred on February 13, 1996.

A major monitoring location data gap existed for boron in Reach 4 because essentially no data was available regarding boron concentrations in ungaged SRP agricultural drains.

There were 60 analyses for boron in the effluent from the 23rd Avenue WWTP and 42 from the 91st Avenue WWTP and the maximum concentrations observed were 48 and 440 mg/l, respectively. Thus, these treatment plants were not contributing significant boron to the river.

#### **9.5.3.3 Copper**

There were three verified and numerous potential exceedances of the minimum designated uses standard for copper in the effluent from the Tolleson WWTP, assuming a hardness of 200 mg/l.

There were 198 copper samples analyzed from the effluent at of the 23rd Avenue WWTP between December 1992 and March 1997. The highest concentration noted was 17 ug/l. This was substantially lower than the copper standard and makes it apparent that copper contamination in Reach 4 was not coming from the 23rd Avenue WWTP.

There were 204 copper samples taken from the effluent of the 91st Avenue WWTP between December 1992 and March 1997, and the standard was not exceeded. The maximum concentration reported was 31 ug/l.

#### **9.5.3.4 Mercury**

The only verified exceedances of the standard and PQL that were observed for mercury, were those observed in the effluent from the Tolleson WWTP. Concentrations of 1.5 ug/l and 25.5 ug/l were measured on July 1990 and June 1996, respectively.

#### **9.5.3.5 Selenium**

Verified exceedances of the minimum designated uses standard for selenium at 27th Avenue and the Salt River appeared to correspond with the potential exceedances noted for stormwater at the same location, on roughly the same dates.

Other verified exceedances of the standard for selenium were measured in the City of Tolleson WWTP discharge and in the Salt River ½ mile south of the 91st Avenue discharge. There were 46 selenium samples collected from the City of Tolleson WWTP discharge and 4 were verified exceedances of the 2.0 ug/l standard while 41 were potential exceedances where the concentrations were reported as less than values that were greater than the standard and PQL.

There were 150 selenium analyses and only 3 exceedances of the standard and PQL for the 23rd Avenue WWTP effluent. The highest concentration noted was 11 ug/l. There were 69 selenium

analyses from the 91st Avenue WWTP effluent and none were verified exceedances of the standard. The maximum concentration noted was 1 ug/l.

Verified exceedances of the selenium standard were also noted at the Salt River at 107th Avenue and ½ mile east of the 115th Avenue river crossing.

#### **9.5.3.6 Thallium**

A verified exceedance of the surface water standard was noted for thallium at 27th Avenue and the Salt River. This exceedance corresponded to the stormwater exceedance noted at the same location and on the same date.

Sampling frequency and analytical technique data gaps existed for thallium in the Tolleson WWTP effluent. Concentrations were consistently reported as less than values greater than the standard and PQL. The 23rd Avenue and 91st Avenue WWTP's showed no definitive exceedances of the thallium standard. There were 12 potential exceedances of the standard at the 23rd Avenue and 91st Avenue WWTP's. The highest concentration reported for both was <20 ug/l.

Verified exceedances of the thallium standard were noted ½ mile south of the 91st Avenue discharge and ½ mile east of 115th Avenue. In both cases, thallium measured in April 1996 was 60 ug/l and in June 1996 was 25 ug/l. These exceedances may have been due to stormwater contamination, or they may be the result of a monitoring site data gap.

#### **9.5.3.7 Lindane**

At 27th Avenue and the Salt River, there were six potential exceedances of the standard for lindane. The reported concentrations (0.03 ug/l) were greater than the standard (0.02 ug/l) but less than the practical quantitation limit (0.05 ug/l). There were three potential exceedances related to samples taken from New River near Glendale.

Both the 23rd Avenue WWTP and the 91st Avenue WWTP had some exceedances of the minimum designated uses standard for lindane. As **Table 4-21** shows, of 1,474 lindane analyses from the 23rd Avenue WWTP effluent, 45 percent had concentrations greater than the standard but less than the PQL, so they were only potential exceedances. 13 percent were verified exceedances and had concentrations higher than the standard and PQL. As **Table 4-20** shows, of the 1,397 lindane samples taken from the 91st Avenue WWTP effluent, 29 percent were potential exceedances where concentrations were higher than the standard, but less than the PQL while only 2 percent were

verified exceedances and had concentrations greater than the standard and PQL. Lindane concentrations were not available downstream of 91st Avenue and, thus, it was not possible to quantify the extent of downstream contamination. A monitoring location data gap was present for lindane downstream of the 91st Avenue WWTP and for the Tolleson WWTP discharge.

A lindane concentration of 25 ug/g was measured in carp tissue at 91st Avenue on April 1994. High lindane concentrations were also noted in the sediment in Reach 4, as **Table 4-23** shows.

#### **9.5.3.8 Other Pesticides**

There were many verified exceedances of pesticides at 27th Avenue and the Salt River. These exceedances corresponded directly to the reported stormwater concentrations at the same location and on the same date. The FCDMC reported the pesticide concentrations at 27th Avenue as "less than" values in each case. The EPA Storet, however reported the concentrations as the same value without the less than. This was viewed as a data conflict because the EPA reporting could be interpreted as an actual concentration rather than a detection limit. Therefore, the potential exceedances were not definitive because method detection limits were higher than the standard.

Data gaps existed for pesticides in Reach 4. Pesticide concentrations were not measured at the majority of locations in Reach 4. Therefore, a monitoring location data gap existed for pesticides in Reach 4.

Pesticides in Reach 4 also represented analysis technique data gaps. Ultra clean sampling could be implemented to verify the actual concentration of pesticides.

#### **9.5.3.9 Trihalomethanes**

Trihalomethanes were only sampled at two locations in Reach 4; 27th Avenue and the Salt River and New River near Glendale. There were no possible exceedances at these locations. However, because data was only available for these two locations, monitoring location data gaps existed for trihalomethanes in Reach 4.

#### 9.5.4 Reach 4 Summary

##### 9.5.4.1 Stormwater Summary

- Dissolved and total beryllium was being contributed to the river from stormwater. Because of high method detection limits, the extent of beryllium in stormwater could not be quantified.
- Analyses indicated that stormwater in Reach 4 was contributing a significant amount of copper to the river, as was noted in Reach 2. During storm events, copper tended to increase downstream.
- High concentrations of copper (up to 5.62 ug/g) were measured in fish at 59th Avenue.
- Results suggested that stormwater may have been contributing cyanide to the river in excess of the standard, but improved method detection limits will be necessary to verify this.
- An analytical technique data gap existed for selenium and thallium in Reach 4 stormwater because concentrations were reported as less than values that were greater than the standard or the standard and PQL.
- At the Salt River at 27th Avenue, there were five verified exceedances of the standard and PQL for DDE and two for DDT. It was not likely that DDE and DDT washed into the reach from upstream as they were not observed in stormwater upstream. Because DDE and DDT are so persistent in the environment, it was very likely that the high concentrations are the result of previously contaminated soils washing into storm drains.
- Analytical technique data gaps and sampling frequency data gaps were present for DDE and DDT in Reach 4.
- An analytical technique data gap existed for pesticides in Reach 4 stormwater.

#### 9.5.4.2 Surface Water Summary

- Beryllium in surface water corresponded to that measured in stormwater. Thus, it appeared that stormwater was a source of beryllium in Reach 4. New River and the gravel mine discharging 0.4 miles west of 83rd Avenue also showed verified exceedances of the beryllium standard.
- A monitoring location data gap existed for beryllium, for the ungedged SRP drains.
- One verified exceedance of the minimum designated use standard for boron (1000 mg/l) was noted in the SRP Maricopa Drain just off lateral 14, where a boron concentration of 1040 mg/l was measured. Elevated boron concentrations in Reach 4 were likely to have originated within the reach, as no substantial boron concentrations were noted upstream.
- There were 60 analyses for boron in the effluent from the 23rd Avenue WWTP and 42 from the 91st Avenue WWTP and the maximum concentrations observed were 48 and 440 mg/l, respectively. These WWTP's did not appear to be the major sources of boron.
- Data gaps for boron were primarily associated with monitoring locations, particularly ungedged agricultural drains.
- There were no copper exceedances out of 198 samples taken from the effluent of the 23rd Avenue WWTP and 204 samples from the 91st Avenue WWTP between December 1992 and March 1997. Copper in Reach 4 could primarily be attributed to stormwater runoff.
- The only verified exceedances for mercury, were those observed in the effluent from the Tolleson WWTP effluent. Concentrations of 1.5 ug/L and 25.5 ug/L were measured in July 1990 and June 1995, respectively.
- Verified exceedances of the minimum designated uses standard for selenium at 27th Avenue and the Salt River, appeared to correspond well to the potential exceedances noted for stormwater at the same location, on about the same dates. The Tolleson WWTP had 4 verified exceedances out of 46 analyses. The 115 analyses from the

23rd Avenue WWTP had 3 verified exceedances of the standard and PQL and the 69 analyses at the 91st Avenue WWTP had no exceedances.

- Verified surface water exceedances for thallium corresponded to the less than values reported for stormwater. There were no definitive exceedances of the standard in the effluent from the 23rd Avenue and 91st Avenue WWTP.
- Monitoring location data gaps exist for thallium in Reach 4.
- Out of 1,474 lindane samples taken from the 23rd Avenue WWTP effluent, 45 percent were potential exceedances only and 13 percent were verified exceedances. Of the 1,397 lindane samples taken from the 91st Avenue WWTP effluent, 29 percent had concentrations higher than the standard but less than the PQL and were potential exceedances while only 2 percent were verified exceedances. Lindane concentrations were not available downstream of 91st Avenue and, thus, it was not possible to quantify the extent of downstream contamination. A monitoring location data gap was present for lindane downstream of the 91st Avenue WWTP.
- A lindane concentration of 25 ug/g was measured in carp tissue at 91st Avenue on April 1994 and some high sediment concentrations were also measured.
- Monitoring location data gaps existed for lindane in the effluent from the Tolleson WWTP and for in-river locations downstream of 91st Avenue.
- Many data gaps exist for pesticides other than lindane.

## **9.6 Reach 5: Confluence of the Salt and Gila Rivers to Gillespie Dam**

### **9.6.1 Characterization**

Reach 5 extended from the confluence of the Salt and Gila Rivers downstream to Gillespie Dam. The designated uses standards for Reach 5 are listed in **Table 4-6**. There were no gauged stormwater drains identified in Reach 5. The surface water quality data for Reach 5 is located in **Table 4-19**.

#### 9.6.1.1 Beryllium

A review of eleven beryllium samples collected from the Gila River upstream of the confluence with the Salt River showed all were verified exceedances because their concentrations were higher than the standard and PQL. However, the only data available for the Gila River upstream of the Salt confluence, was for 1990. Thus, a sampling frequency data gap existed for beryllium in the Gila River upstream of the confluence with the Salt.

At the Gila River just downstream of the confluence and 115th Avenue (near Phoenix International Raceway) verified beryllium exceedances directly corresponded to the exceedances noted in the Gila upstream of the confluence. These also were only measured in 1990 and represented a sampling frequency data gap.

There were two beryllium samples collected in April and June 1996 one mile downstream of 115th Avenue at El Mirage Road . Both of these samples were verified exceedances of the water quality standard and the PQL. These results indicated that beryllium continued to exceed water quality standards downstream of the confluence of the Salt and Gila Rivers.

In February 1982, a soil sample was collected from the Gila River upstream of Highway 85 Bridge that had a beryllium concentration of 4,600 ug/g. More recent sampling is needed to determine if this was a one time occurrence or if these soil concentrations persist.

At the Gila River upstream of the diversions at Gillespie Dam, 18 measurement of total beryllium were taken between January 1990 and November 1995. All 18 of these samples were verified exceedances because the concentrations were greater than the standard and PQL. Dissolved beryllium was measured nine times in the same time period and each time concentrations exceeded the standard and PQL, thus were verified exceedances. The dissolved beryllium concentration was equal to the total beryllium concentration in eight of the nine samples. This implied that almost all the beryllium present upstream of Gillespie Dam was in the dissolved form and particulate beryllium was not significant. These results also implied that beryllium consistently occurred at the diversions above Gillespie Dam in concentrations greater than the standard.

Beryllium was being contributed to the River system from numerous sources including: stormwater, New River which is a tributary to the Agua Fria, and the Gila River prior to the confluence with the Salt.

#### 9.6.1.2 Boron

Figure 9-2 shows the concentration of boron in the Gila River prior to the confluence with the Salt and the Gila River downstream in 1990. Concentrations of boron in the Gila prior to the confluence were consistently much higher than the minimum designated uses standard. Concentrations of boron on approximately the same date in the Gila downstream of the confluence with the Salt River were significantly less than the standard. This indicated the boron concentrations in the pre-Salt Gila were being diluted by water from the Salt River. Data at these location was only available for 1990, thus, this represented a sampling frequency data gap for boron.

Monitoring location and sampling frequency data gaps were also present in Reach 5 for boron. There were only two boron measurements taken from the diversions above Gillespie Dam between January 1990 and November 1995.

#### 9.6.1.3 Copper

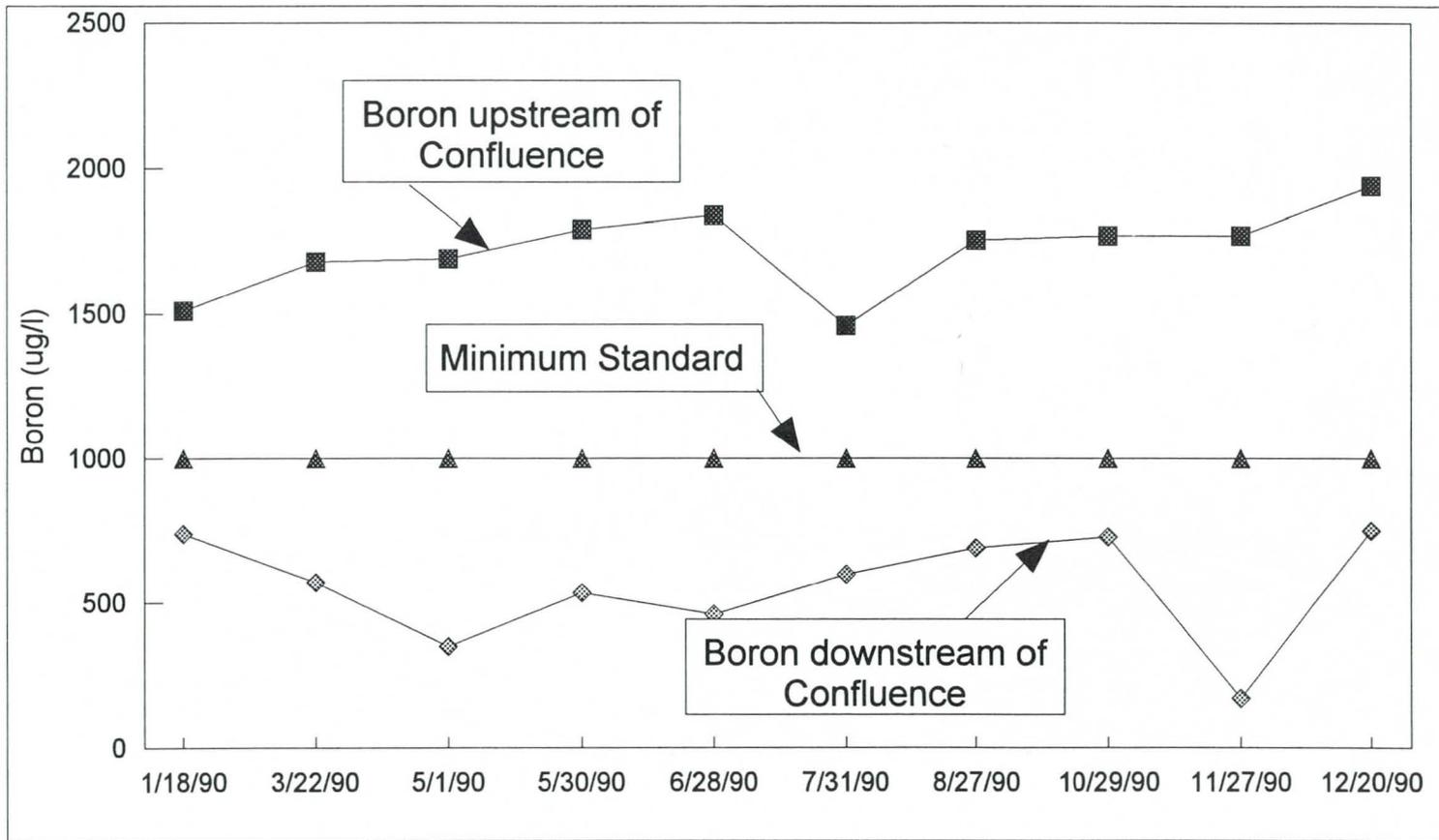
There was only one verified exceedance of the dissolved copper standard (9.7 ug/l) in Reach 5. It occurred at the Gila River above the diversions at Gillespie Dam on July 26, 1998 (40 ug/l). There was also one verified exceedance of the total copper standard (500 ug/l) at the diversions above Gillespie Dam on January 12, 1993 (550 ug/l).

#### 9.6.1.4 Cyanide

The standard for cyanide in Reach 5 is 9.7 ug/l and the PQL is 20 ug/l. There were 23 cyanide analyses for the effluent from the Avondale WWTP, and 3 of the 23 were verified exceedances. There were 12 potential exceedances where data was reported as less than values that were greater than the standard, but less than the PQL. There were 8 potential exceedances where the concentrations were reported as less than a value greater than the standard and greater than the PQL. Thus, it was possible that Avondale was adding cyanide to the river in concentrations greater than the standard. However, the Avondale WWTP represented an analytical technique data gap.

Cyanide was also noted in NPDES discharge 001 from Lockheed Martin. There were 4 potential exceedances of the cyanide standard. These were also analytical technique data gaps.

The City of Goodyear WWTP and the Town of Buckeye WWTP also had potential exceedances of the cyanide standard. In both cases, analytical techniques made it impossible to determine if the standard was being exceeded. The City of Goodyear did have one verified exceedance of 28 ug/l in July through September of 1995.



BORON IN THE GILA RIVER BEFORE AND AFTER CONFLUENCE WITH SALT

MULTI-CITY SUBREGIONAL OPERATING GROUP  
 and CITY OF TOLLESON  
 MIDDLE GILA RIVER WATERSHED PHASE I  
 JULY 1998

FIGURE 9-2

A monitoring location data gap existed for cyanide at the diversions above Gillespie Dam, as no cyanide data was available for this location.

#### **9.6.1.5 Mercury**

The minimum designated uses standard for mercury in Reach 5 was 0.2 ug/l dissolved and 0.6 ug/l total. The PQL was 0.5 ug/l. In January 1990, there was a verified exceedance for total mercury at the Gila River downstream of 115th Avenue, with a concentration of 1.8 ug/l. Dissolved mercury was not measured at this location. Thus, a monitoring location data gap existed for dissolved mercury at 115th Avenue and the Gila River.

There was one potential exceedance of the total mercury standard in the Town of Buckeye WWTP effluent in April 1996. A concentration of <0.79 ug/l was reported. This represented an analytical technique data gap.

At the Gila River upstream of diversions at Gillespie Dam, there were 5 potential exceedances of the minimum standard for dissolved mercury, out of 26 samples taken. The five potential exceedances were samples whose concentrations were greater than the standard but less than the PQL. There were 64 samples analyzed for total mercury at the diversion upstream of Gillespie Dam. Of these, 63 were reported as 0.1 ug/l which is less than the standard and PQL. On July 30, 1993 a total mercury concentration of 1 ug/l was measured. This exceedance appeared to be the exception rather than the rule at this location. There did not appear to be a major mercury problem in Reach 5.

#### **9.6.1.6 Selenium**

The standard for selenium was 2 ug/l and the PQL was 5 ug/l. At the Gila River upstream of the Salt River at 115th Avenue, all eleven samples taken in 1990 were verified exceedances of the standard and PQL. A concentration of 50 ug/l was noted at this location upstream of the confluence in August 1990. A sampling frequency data gap was present at 115th Avenue for selenium, as no samples had been taken there since 1990.

Selenium samples taken just downstream of the confluence of Salt and Gila Rivers in 1990 were also all verified exceedances of the standard and PQL. The highest concentration noted at this location was 10 ug/l in September 1990. No data was available at this location following 1990, thus it was a sampling frequency data gap.

Verified selenium exceedances were also noted in all four samples taken at El Mirage Road North in the Salt River channel and El Mirage Road South in the Gila River channel, in 1996. This indicated that selenium levels in this area consistently exceeded the minimum designated uses standard. These exceedances may have been due to stormwater runoff.

The Avondale WWTP sampled 25 times for selenium between January 1994 and April 1997 and three of these were verified exceedances of the standard and PQL and 22 were potential exceedances reported as less than a number that was greater than the standard and greater than the PQL. Thus, it was likely that Avondale was contributing selenium to the river, however, because of the analytical technique data gap at this location, the extent of selenium contributions from the Avondale WWTP could not be quantified.

The City of Goodyear WWTP had six potential exceedances of selenium. In all cases, concentrations were expressed as <10 ug/l. This was an analytical technique data gap.

In 1996 just upstream of the Buckeye Canal discharge, four selenium samples were reviewed and all four were verified exceedances of the standard.

The Town of Buckeye WWTP had 11 selenium samples taken from December 1994 to June 1997 and one of these was a verified exceedance of the standard and the other 10 were potential exceedances where the concentration was a less than number greater than the standard and PQL. There was an analytical technique data gap for the Town of Buckeye WWTP.

At the Gila River above diversions at Gillespie Dam, 64 total and dissolved selenium samples were taken between January 1990 and November 1995. Of these, 14 percent were verified exceedances of the total selenium standard and 16 percent were definitive exceedances of the dissolved standard. In addition, 67 percent of the total selenium samples were potential exceedances and 58 percent of the dissolved selenium samples were potential exceedances.

These results indicated that beryllium was present in concentrations greater than the standard, but actual concentrations could not be quantified because of high method detection limits.

#### **9.6.1.7 Thallium**

The thallium standard for Reach 5 was 12 ug/l and there was no PQL. Verified thallium exceedances of the standard were noted at:

- Gila River upstream of the Salt River at 115th Avenue (2 exceedances)
- Gila River downstream of 115th Avenue (1 exceedance)
- El Mirage Road North (2 exceedances)
- El Mirage Road South (2 exceedances)
- Salt River upstream of Buckeye Canal Discharge (2 exceedances)

A monitoring location data gap existed for thallium at the Gila River above diversions at Gillespie Dam. No samples were available for this location.

In May 1981 at the Arlington Canal at an unnamed drain and at the location of the Buckeye irrigation return flows west of Buckeye, sediment thallium concentrations of 23,600 ug/g and 32,500 ug/g, respectively, were measured. No sediment samples had been taken at this location since, so it was not possible to determine if this contamination continues at these locations. The sediment could have been contributing thallium to the river, or the river could have been causing thallium to accumulate in the soils.

In May 1980, 2.7 ug/g thallium was measured in fish tissue from the Buckeye Canal at Litchfield. Additional fish tissue sampling at this location is needed to determine if these high concentrations persist.

#### **9.6.1.8 Bromodichloromethane**

One verified exceedance of the minimum designated uses standard (22 ug/l) and PQL was noted in the City of Goodyear, Estrella WWTP discharge on May 17, 1995. This was the only sample available for the Estrella WWTP discharge. Thus, this location represented a sampling frequency data gap. Bromodichloromethane was not measured at the Gila River above the Diversions at Gillespie Dam. Therefore, this location represented a monitoring location data gap.

#### **9.6.1.9 Chlordane**

There was one potential exceedance of the standard for chlordane in the discharge from the Estrella WWTP. The concentration was reported as <0.15 ug/l and represents an analytical technique data gap. Only one sample was available at this location and therefore, it also represented a sampling frequency data gap.

#### 9.6.1.10 Pesticides

There were potential exceedances of the standards for lindane and toxaphene at the following locations:

- City of Avondale WWTP
- Estrella WWTP
- Town of Buckeye WWTP

A potential exceedance of the dieldrin standard also occurred in the effluent from the Estrella WWTP. These possible exceedances were the result of high method detection limits or insufficient analytical techniques. An ultra clean sampling program would be needed to remedy this data gap.

Monitoring location data gaps for pesticides were also present in Reach 5. There were no in-river pesticide samples taken in Reach 5. All pesticide concentrations measured were in NPDES discharges.

#### 9.6.2 Reach 5 Summary

- No gauged stormwater drains were located in this reach
- Beryllium appeared to be consistently present in this reach at concentrations exceeding the minimum designated uses standard and PQL.
- Sampling frequency data gaps existed for beryllium for the Gila river just upstream of the confluence of the Salt and Gila Rivers and just downstream of the confluence. Samples were only taken at this location in 1990.
- The majority of beryllium measured at the diversions above Gillespie Dam was in the dissolved form. The particulate fraction of total beryllium was not significant.
- Concentrations of boron in the Gila River upstream of the confluence were greater than the standard and were verified exceedances. Downstream of the confluence, boron concentrations decreased as if being diluted by the Salt River flow.
- A sampling frequency data gap for boron existed both upstream and downstream of the confluence of the Salt and Gila Rivers. Monitoring location and sampling

frequency data gaps existed for boron in Reach 5. There were only two boron measurements taken at the diversions above Gillespie Dam between January 1990 and November 1995.

- Only one verified exceedance of total copper and dissolved copper occurred at the diversions above Gillespie Dam out of hundreds of samples. Thus, it did not appear that copper was a significant problem in this part of Reach 5.
- Cyanide in the Avondale WWTP effluent represented an analytical technique data gap.
- There were 4 potential exceedances of the cyanide standard observed in the discharge from Lockheed Martin.
- Analytical technique data gaps occurred for the effluent from the City of Goodyear WWTP and the Town of Buckeye WWTP.
- Monitoring location data gap existed for cyanide at the diversions above Gillespie Dam as no samples were taken from there.
- In January 1990 the minimum designated uses standard for total mercury was exceeded at the Gila River downstream of 115th Avenue
- In April 1996, a potential exceedance of the minimum designated uses standard for mercury was noted in the effluent from the Town of Buckeye WWTP.
- Analytical technique data gaps existed at the Gila River above the diversions at Gillespie Dam for mercury. There were 5 potential exceedances of the dissolved mercury standard out of 26 samples and there was one verified exceedance out of 64 analyses for total mercury.
- All selenium samples taken from the Gila River upstream of the confluence with the Salt and downstream of the confluence with the Salt in 1990 were verified exceedances of the selenium standard. No samples were available from these locations following 1990. This represented a sampling frequency data gap.

- In 1996, all 4 selenium samples taken at El Mirage Road, were verified exceedances. These 1996 results combined with the results from 1990, indicated that selenium was present at concentrations greater than the standard in Reach 5.
- There were 25 selenium samples taken from the effluent of Avondale's WWTP and 3 of these were verified exceedances of the standard. There were 21 potential exceedances because the data was reported as a less than value that was greater than the standard and PQL. Thus, an analytical technique data gap existed for selenium in the effluent from the Avondale WWTP.
- Analytical technique data gaps for selenium were also present for potential exceedances associated with the City of Goodyear WWTP, and the Town of Buckeye WWTP.
- At the Gila River above diversions at Gillespie Dam, 64 total and dissolved selenium samples were taken between January 1990 and November 1995. Of these 14 percent were verified exceedances of the total selenium standard and 16 percent were verified exceedances of the dissolved selenium standard. Sixty-seven percent of the total selenium samples were potential exceedances and 58 percent of the dissolved selenium samples were potential exceedances.
- Verified thallium exceedances of the standard were noted at:
  - ▶ Gila River upstream of the Salt River at 115th Avenue (2 exceedances)
  - ▶ Gila River downstream of 115th Avenue (1 exceedance)
  - ▶ El Mirage Road North (2 exceedances)
  - ▶ El Mirage Road South (2 exceedances)
  - ▶ Gila River upstream of Buckeye Canal Discharge (2 exceedances)
- A monitoring location data gap existed for thallium at the Gila River above diversions at Gillespie Dam. No samples were available for this location.
- In May 1981 sediment thallium concentrations of 23,600 ug/g and 32,500 ug/g were observed at the Arlington Canal at an unnamed drain and at the location of the

Buckeye irrigation return flows west of Buckeye, respectively. No sediment samples were taken from these locations following 1981.

- In May 1980, 2.7 ug/g thallium was measured in fish tissue from the Buckeye Canal at Litchfield. Additional sampling was needed at this location.
- There was one verified exceedance of the bromodichloromethane standard noted in the City of Goodyear, Estrella WWTP discharge on May 17, 1995. Because only one sample was available for this location, it represented a sampling frequency data gap.
- There was one potential exceedance of the chlordane standard also observed in the discharge from the Estrella WWTP. This was an analytical technique data gap.
- Potential exceedances of water quality standard for pesticides other than chlordane were present at:
  - ▶ City of Avondale WWTP
  - ▶ Estrella WWTP
  - ▶ Town of Buckeye WWTP
- Monitoring location data gaps were present for pesticides in Reach 5. All pesticide measurements taken in Reach 5 were taken in NPDES discharges. In-river pesticide sampling should be implemented in Reach 5.

## 10. CONCLUSIONS

The objectives of the MGRW study were to inventory available water quality and water quantity data, to analyze the information, and to prepare a characterization of the Salt and Gila River conditions. The following are the conclusions developed as a part of the MGRW study.

### 10.1 Data Gaps

It was recognized at the initiation of the MGRW study that the information developed could be used by Federal and state regulators as a part of their assessments to develop future water quality standards and TMDLs for discharges to the rivers. The MGRW study identified many potential exceedances of the water quality standards that were not verified exceedances, but rather were questionable exceedances. These potential exceedances were related to data deficiencies identified as data gaps

in the MGRW study. It was concluded that future studies to assess water quality in the Salt River and Gila River watersheds should include a data quality assessment task. The MGRW study concluded that if data is used by regulators without being analyzed, it could lead to erroneous exceedance conclusions which could influence future regulations. The three major types of data gaps identified in the MGRW study were:

- **Analytical Technique Data Gaps.** These were data gaps associated with the analytical techniques used to measure concentrations of contaminants. In some cases, the concentrations were reported as a value which was greater than the standard, but less than the practical quantitation limit. Another analytical technique data gap was related to the method detection limit when data was reported as a "less than" value such as <0.X. In many cases, the <0.X was greater than the standard or standard and PQL. In both cases, the data could be identified as a potential exceedance, but was not a verified exceedance. More sensitive analytical techniques, which may include ultra clean sampling are needed to rectify this type of data gap.
- **Monitoring Location Data Gaps.** These occurred where there were ungaged and unsampled inflows or where there were large gaps between data points along the river. The most significant monitoring location data gaps associated with ungaged inflows to the river, were the ungaged SRP agricultural drains and ungaged storm water drains. Quality monitoring sites should be established in or near these ungaged drains. Additional monitoring locations may also be required in locations along the river where little data is available and where the data from upstream or downstream monitoring locations indicates potential exceedances.
- **Sampling Frequency Data Gaps.** These occurred when a contaminant was measured only once or a limited number of times at a location and the results indicated a potential or verified exceedance. In these locations, more frequent sampling is needed to assess conditions and to determine if a trend exists.

## 10.2 Quality and Quantity

The MGRW study found that quality and quantity must be considered together to assess watershed conditions. In this study, storm water quantity readings were cross checked with releases from Granite Reef Dam to determine if the flows were actually of stormwater drain origin or were impacted by flood flows. The dates surface water samples were collected were also cross checked

with dates of storms and floods to determine if the surface water sample was impacted by storm water or flood water. This type of analysis is important because if loading were calculated without assessing the origin or impacts on flow, results could be misleading.

### **10.3 Copper**

There were numerous verified and potential exceedances of the minimum designated uses standard for copper in the MGRW study area. These verified and potential exceedances were primarily associated with storm water. In Reaches 2 and 3 of the river, there was a standard for dissolved copper, but no standard for total copper. However, the majority of NPDES discharges are required to measure total copper only. This represents a major inconsistency between water quality standards and NPDES monitoring requirements. In Reaches 1, 4 and 5 the minimum standard for dissolved copper was approximately 32 ug/l (based on 200 mg/l hardness) and the minimum standard for total copper was 500 ug/l. However, in many cases dissolved copper was not measured, but total copper concentrations would have exceeded the dissolved standard, had the majority of copper been in the dissolved form. In these cases, it is important that either dissolved copper be measured, or a partitioning study be performed to determine the fraction of total copper that is dissolved and particulate.

### **10.4 Thallium and Selenium**

There were also numerous verified or potential exceedances of the minimum designated uses standard for thallium and selenium. Both thallium and selenium had analytical technique data gaps associated with them, where the method detection limit was greater than the standard so it was not possible to determine if the standard was actually being exceeded. More sensitive analytical techniques are needed.

### **10.5 Mercury**

Prior to conducting this MGRW study, there was a concern about the potential amount of mercury present in the MGRW study area. However, results from this study indicate that there were few verified exceedances and a limited number of potential exceedances associated with mercury in the study area. Mercury did not appear to be a major contaminant.

### **10.6 Pesticides**

In all the study reaches, there were numerous potential exceedances of the pesticide standards but very few verified exceedances. The high number of potential exceedances were due to the analytical techniques used to measure them and the associated high method detection limits. Essentially any

detection of a pesticides, was a potential exceedance of the standard. More sensitive analytical techniques are needed to measure pesticides for the results to be meaningful and allow for the development of accurate conclusions.

#### **10.7 Wastewater Treatment Plants**

In general, discharges from WWTPs in the study area did not exceed minimum designated uses standards for the 22 pollutants of concern. Potential exceedances at some WWTPs were related to analytical technique data gaps. Verified exceedances of the standards for lindane and copper were observed at some of the plants.

#### **10.8 Stormwater**

There was an overall monitoring location data gap for stormwater through the study area. There were no stormwater monitoring locations in Reach 1 or 5, and Reach 3 had only one monitoring location. There were also analytical technique data gaps for stormwater, as many concentrations were reported as a less than number that was greater than the standard and PQL. This was particularly the case with thallium.

## REFERENCES

Australian Water Resources Council. 1974. A Compilation of Australian Water Quality Criteria. Australian Water Resources Council Technical Bulletin Number 7. Canberra, Australia.

BCMOELP (British Columbia Ministry of Environment Lands and Parks). 1994. Approved and Working Criteria for Water Quality - 1994. Water Quality Branch. Environmental Protection Department. British Columbia Ministry of Environmental Lands and Parks. ISBN 0-7726-2062-X. Victoria, British Columbia. 45pp.

Brown, D.E. ed. 1982 *Biotic Communities of the American Southwest-United States and Mexico*. Desert Plants, Special Issue. 4 (1-4).

City of Phoenix. 1997 *Salt-Gila River Baseline Ecological Characterization*. Prepared by CH2MHILL in association with Logan, Simpson & Dye and EcoPlan Associates, Inc.

Newell, A.J., D.W. Johnson, and L.K. Allen. 1987. Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife. Technical Report 87-3. Division of Fish and Wildlife. Bureau of Environmental Protection. New York State Department for Environmental Conservation. Albany, New York. 182 pp.

USEPA (U.S. Environmental Protection Agency). 1989. *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish. A Guidance Manual*. EPA-503/8-89-002. Office of Marine and Estuarine Protection and Office of Water Regulations and Standards. Washington, District of Columbia.

**APPENDIX A**

**Annotated Bibliographies**

CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/30/97

1. SOURCE OF DATA

Information Source: U.S. Fish and Wildlife Service  
Address: 2321 W. Royal Palm Road, Suite 103  
Phoenix, AZ 85021  
Contact: Kirke A. King, Brenda J. Andrews  
Title: \_\_\_\_\_  
Phone/Fax: (602) 640-2720 / (602) 640-2730

2. TYPE OF DATA

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Species     | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1995/1997  
Data Description: (1) Copy of a report published February 1995, titled Contaminants in Fish and Wildlife of the Middle Gila River, Arizona.  
(2) Copy of draft data to be published in 1997, titled Environmental Contaminants in Fish and Wildlife of the Lower Gila River, Arizona.  
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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 7/1/97

## 1. SOURCE OF DATA

Information Source: U.S. Army Corps. of Engineers  
 Address: 3636 N. Central Avenue, Suite 740  
Phoenix, Arizona 85012-1936  
 Contact: Mike Turnack  
 Title: \_\_\_\_\_  
 Phone/Fax: (602) 640-2003

## 2. TYPE OF DATA

- |  |   |
|--|---|
| <input type="checkbox"/> Species                           | <input checked="" type="checkbox"/> Surface Water Quality |
| <input checked="" type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

## 3. LOCATION

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

## 4. DESCRIPTION OF DATA

Dates of Available Data: March 1995  
 Data Description: Rio Salado, Salt River, Arizona  
Reconnaissance Report - The study focuses on flood, water quality, riparian habitat and  
recreation opportunities along the Salt River in the Phoenix and Tempe metropolitan  
areas.  
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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 7/1/97

**1. SOURCE OF DATA**

Information Source: U.S. EPA  
Address: Water Management Division, 75 Hawthorne Street (W-5-1)  
San Francisco, California 94105-3901  
Contact: Jack Landy  
Title: \_\_\_\_\_  
Phone/Fax: (415) 744-1922

**2. TYPE OF DATA**

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity  |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: \_\_\_\_\_  
Data Description: A disk containing EPA Region 9 Data Management Protocols in GIS  
format.  
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\_\_\_\_\_  
\_\_\_\_\_  
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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 8/8/97**1. SOURCE OF DATA**Information Source: United States Geological SurveyAddress: 375 South Euclid AvenueTucson, AZ 85719

Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone/Fax: \_\_\_\_\_

**2. TYPE OF DATA**

- |  |  |
|--|--|
| <input type="checkbox"/> Species                           | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity  |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

**4. DESCRIPTION OF DATA**Dates of Available Data: Daily values for: Oct. 1993-Sept. 1994;Average values for 1925-1953, 1956-1994

Data Description: USGS water resources data for Arizona water year 1994. The book contains information on USGS gaging stations in Arizona, including location, drainage area, daily discharge and average discharge values. Daily flow information is provided for Oct. 1993-Sept. 1994 and average and extreme flow data is presented for water years 1925-1953 and 1956-1994. A map showing locations of gaging stations is also included.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 11/21/97

**1. SOURCE OF DATA**

Information Source: Bureau of Reclamation  
Address: P.O. Box 9980  
Phoenix, AZ 85068-0980  
Contact: Sandy Eto  
Title: \_\_\_\_\_  
Phone/Fax: (602) 395-5688

**2. TYPE OF DATA**

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity  |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: \_\_\_\_\_

Data Description: Programmatic Environmental Impact statement for Pima-Maricopa Irrigation Project. Prepared by Gila River Indian Community for U.S. Dept. of the Interior, Bureau of Reclamation, and Bureau of Indian Affairs. Contains basic information about existing conditions and vegetation, outside the study area along the pre-salt Gila River.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/27/97

1. SOURCE OF DATA

Information Source: Arizona Department of Water Resources  
Address: 500 N. Third Street  
Phoenix, AZ 85004  
Contact: Dale Mason  
Title: \_\_\_\_\_  
Phone/Fax: (602) 417-2400, ext. 7329

2. TYPE OF DATA

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality           |
| <input type="checkbox"/> Habitat                | <input checked="" type="checkbox"/> Groundwater Quantity |
| <input type="checkbox"/> Surface Water Quantity | <input checked="" type="checkbox"/> Groundwater Quality  |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1946 - 1996  
Data Description: Four computer files from the Ground Water Site Inventory (GWSI) Database. 1) GWSI AB contains well location, water use, well depth, and name of USGS topographic map the well is located on. 2) GWSI WL contains measured water levels for GWSI sites. 3) GWSI WP contains a description of the water level measurement point for the GWSI site. 4) GWSI WQ contains six basic water quality parameters measured in the field - specific conductivity, site location, fluoride, temperature (degrees C), pH, alkalinity.

CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 7/1/97

1. SOURCE OF DATA

Information Source: Arizona Geological Survey  
Address: 416 W. Congress, Suite 100  
Tucson, Arizona 85701  
Contact: Rick Trapp  
Title: \_\_\_\_\_  
Phone/Fax: (520) 770-3500 / (520) 770-3505

2. TYPE OF DATA

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity  |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: \_\_\_\_\_

Data Description: The information received is a 20 page bibliography for the study  
area. The bibliography contains sources for obtaining geological information in the  
study area.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/30/97

1. SOURCE OF DATA

Information Source: Arizona Department of Environmental Quality  
Address: 3033 N. Central Avenue  
Phoenix, AZ 85012  
Contact: Kris Randall  
Title: \_\_\_\_\_  
Phone/Fax: (602) 207-2300

2. TYPE OF DATA

- |   |   |
|---|---|
| <input type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input checked="" type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 10/1/90-9/30/95  
Data Description: 305B Report - "Water Quality Assessment Report, 1996" describes the status of surface water and groundwater quality in Arizona.  
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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 6/30/97**1. SOURCE OF DATA**

Information Source: Arizona Department of Environmental Quality  
Address: 3033 North Central Avenue  
Phoenix, AZ 85012  
Contact: Mike Tenczar and Connie Smith  
Title: Water Quality Enforcement Unit  
Phone/Fax: (602) 207-4623

**2. TYPE OF DATA**

- |                                     |                        |                                     |                       |
|-------------------------------------|------------------------|-------------------------------------|-----------------------|
| <input type="checkbox"/>            | Species                | <input checked="" type="checkbox"/> | Surface Water Quality |
| <input type="checkbox"/>            | Habitat                | <input type="checkbox"/>            | Groundwater Quantity  |
| <input checked="" type="checkbox"/> | Surface Water Quantity | <input type="checkbox"/>            | Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: Current  
Data Description: ADEQ provided information on all NPDES permits. Information includes water quality data and discharge amounts obtained from Discharge Monitoring Reports and Self Monitoring Report forms. A compliance status list for all non-compliant NPDES facilities in Arizona was also provided

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/30/97

1. SOURCE OF DATA

Information Source: ADEQ (Solid Waste Department)  
Address: 3033 North Central Avenue  
Phoenix, Arizona 85012  
Contact: Roger Kennett / Barry Abbott  
Title: \_\_\_\_\_  
Phone/Fax: (602) 207-4174 / (602) 207-2226

2. TYPE OF DATA

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity  |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 10/8/96

Data Description: ADEQ provided a solid waste section directory of closed solid waste facilities; updated 10/8/96.

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 8/12/97

## 1. SOURCE OF DATA

Information Source: Arizona Department of Environmental QualityAddress: 3003 N. Central AvenuePhoenix, AZ 85012-2809

Contact: \_\_\_\_\_

Title: \_\_\_\_\_

Phone/Fax: \_\_\_\_\_

## 2. TYPE OF DATA

- |                                     |                        |                                     |                       |
|-------------------------------------|------------------------|-------------------------------------|-----------------------|
| <input checked="" type="checkbox"/> | Species                | <input checked="" type="checkbox"/> | Surface Water Quality |
| <input type="checkbox"/>            | Habitat                | <input type="checkbox"/>            | Groundwater Quantity  |
| <input type="checkbox"/>            | Surface Water Quantity | <input type="checkbox"/>            | Groundwater Quality   |

## 3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area
- Outside Area

## 4. DESCRIPTION OF DATA

Dates of Available Data: 1986 - 1989

Data Description: "Risk Assessment for Recreational Usage of the Painted Rock Borrow Pit Lake at Gila Bend, Arizona". It was prepared by the Arizona Department of Health Services and contains information about levels of contamination present in environmental media sampled from Painted Rock Reservoir, including sediment, water and fish.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 7/1/97

1. SOURCE OF DATA

Information Source: Arizona State Land Department

Address: \_\_\_\_\_

Contact: Jim Riedman

Title: \_\_\_\_\_

Phone/Fax: (602) 542-4061

2. TYPE OF DATA

- |   |  |
|---|--|
| <input type="checkbox"/> Species                | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity  |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: \_\_\_\_\_

Data Description: ALRIS GIS DATA DOCUMENTATION - consists of a book of  
available information from ALRIS (Arizona Land Resources Information System).

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 6/30/97**1. SOURCE OF DATA**

Information Source: Maricopa Flood Control District  
 Address: 2801 W. Durango Street  
Phoenix, AZ  
 Contact: Dave Gardner  
 Title: \_\_\_\_\_  
 Phone/Fax: (602) 605-1501

**2. TYPE OF DATA**

- |                                     |                        |                                     |                       |
|-------------------------------------|------------------------|-------------------------------------|-----------------------|
| <input type="checkbox"/>            | Species                | <input checked="" type="checkbox"/> | Surface Water Quality |
| <input type="checkbox"/>            | Habitat                | <input type="checkbox"/>            | Groundwater Quantity  |
| <input checked="" type="checkbox"/> | Surface Water Quantity | <input type="checkbox"/>            | Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: 1992-1996

Data Description: Stormwater information is in two computer files. The first file is a key that contains site location, land use and name of party maintaining the site. The second file is a large file with stormwater sampling data, dates, sampling agency, land use, analyzing agency.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/30/97

1. SOURCE OF DATA

Information Source: Pima County  
Address: 201 N. Stone Avenue  
Tucson, Arizona 85701-1207  
Contact: Edward F. Curley  
Title: Program Manager - Special Project Wastewater Management Dept.  
Phone/Fax: (520) 740-6500 / (520) 620-0135

2. TYPE OF DATA

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Species     | <input checked="" type="checkbox"/> Surface Water Quality |
| <input checked="" type="checkbox"/> Habitat     | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: February 1993  
Data Description: Report titled "Rationale for a Program of Research to Develop  
Water Quality Criteria for Effluent - Dependent Ephemeral Streams and Riparian  
Habitats in the Arid West." The report has good species, habitat, and water quality  
data, but has little information in the Middle Gila Study Area.  
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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 7/1/97**1. SOURCE OF DATA**

Information Source: City of Phoenix  
 Address: 200 W. Washington Street, 9th Floor  
Phoenix, AZ 85003  
 Contact: Bob Hollander  
 Title: Compliance & Regulatory Affairs Administrator  
 Phone/Fax: (602) 262-4992 / (602) 495-5542

**2. TYPE OF DATA**

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input checked="" type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input checked="" type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

**4. DESCRIPTION OF DATA**Dates of Available Data: 1996Data Description: Salt-Gila River Baseline Ecological Characterization, April 1997.

This report contains information for nine miles of the Salt-Gila River, extending from  
75th Avenue west to the confluence of the Gila River and the Buckeye Irrigation District  
Diversion Dam. This report contains information on hydrology and soils, water quality,  
vegetation, species and environmental contaminants.

CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/27/97

1. SOURCE OF DATA

Information Source: City of Phoenix  
Address: 200 West Washington Street, 9th Floor  
Phoenix, Arizona 85003-1611  
Contact: Bob Hollander  
Title: Compliance and Regulatory Affairs Administrator  
Phone/Fax: (602) 262-4992 / (602) 495-5542

2. TYPE OF DATA

- |   |   |
|---|---|
| <input type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: August 1993  
Data Description: Report titled "Development of Site-Specific Partitioning Coefficients for Metals in the Salt River." The report contains data on specific metals (arsenic, beryllium, cadmium, chromium, copper, lead, nickel, silver, thallium, zinc) and suspended solids from both 91st Avenue and 23rd Avenue.

CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/30/97

1. SOURCE OF DATA

Information Source: City of Phoenix  
Address: 200 West Washington Street, 9th Floor  
Phoenix, Arizona 85003-1611  
Contact: Bob Hollander  
Title: Compliance and Regulatory Affairs Administrator  
Phone/Fax: (602) 262-4992 / (602) 495-5542

2. TYPE OF DATA

- |   |   |
|---|---|
| <input type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1990-1997

Data Description: Effluent quality data for 23rd Avenue and 91st Avenue in two dBASE files.

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 7/9/97**1. SOURCE OF DATA**

Information Source: City of Phoenix

Address: 200 West Washington Street  
Phoenix, Arizona 85003-1611

Contact: Bob Hollander

Title: Compliance and Regulatory Affairs Administrator

Phone/Fax: (602) 262-4992 / (602) 495-5542

**2. TYPE OF DATA**

- |   |   |
|---|---|
| <input type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: 1994 - 1996

Data Description: One copy of the "Reasonable Potential Analysis" report prepared by Malcolm Pirnie, Inc. The report contains data of discharges from both the 23rd Avenue and 91st Avenue WWTPs. The report also contains a list of the pollutants with reasonable potential to exceed water quality standards for both WWTPs (16 for 23rd Avenue and 14 for 91st Avenue).

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 6/27/97

## 1. SOURCE OF DATA

Information Source: Town of Gila Bend  
Address: P.O. Box A, 644 W. Pima St.  
Gila Bend, AZ 85337-0019  
Contact: Gene Merritt  
Title: \_\_\_\_\_  
Phone/Fax: (602) 683-2255/ (602) 256-7856

## 2. TYPE OF DATA

- |  |   |
|--|---|
| <input type="checkbox"/> Species                           | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity             |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

## 3. LOCATION

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

## 4. DESCRIPTION OF DATA

Dates of Available Data: 96-97Data Description: Wastewater treatment plant discharge quantity for 1996 through  
March 1997. Water quality information was also provided for February 1997.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/27/97

1. SOURCE OF DATA

Information Source: City of Tolleson  
Address: 9555 W. Van Buren  
Tolleson, Arizona 85353  
Contact: Scott Schroth/David Tyler  
Title: Director of Wastewater Utilities/Chief Operator  
Phone/Fax: (602) 936-3381

2. TYPE OF DATA

- |  |   |
|--|---|
| <input type="checkbox"/> Species                           | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity             |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1990-1997  
Data Description: Effluent water quality data from 1990-1997 and effluent quantities discharged to the river from 1994-1997. Also nitrate and Ammonia data for water discharged to the river between 1994-1997.  
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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 7-12-97

1. SOURCE OF DATA

Information Source: Town of Buckeye  
 Address: P.O. Box 157  
Buckeye, Arizona 85326  
 Contact: Ron Long / Kit Jackson  
 Title: \_\_\_\_\_  
 Phone/Fax: (602) 386-2487

2. TYPE OF DATA

- |  |   |
|--|---|
| <input type="checkbox"/> Species                           | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity             |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: Jan-March 1991; April-June 1992; July-Sept 1993; Oct-Dec 1994;  
April-June 1995; Jan-Mar 1996

Data Description: Data includes minimum, average and maximum effluent flows for each  
month. Cyanide, copper, selenium, mercury, nitrate, lindane, and THMs were sampled  
for December 1994, June 1995, and March 1996.

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 7-17-97**1. SOURCE OF DATA**

Information Source: City of Tempe  
 Address: P.O. Box 5002  
Tempe, Arizona 85280  
 Contact: Dena Pierre  
 Title: \_\_\_\_\_  
 Phone/Fax: (602) 350-2623

**2. TYPE OF DATA**

- |  |   |
|--|---|
| <input type="checkbox"/> Species                           | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity             |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

**4. DESCRIPTION OF DATA**Dates of Available Data: 1992 - 1997

Data Description: Discharge data from Papago Water Plant provided for 1993-June 1997  
(flow data only). Discharge data from Kyrene Reclamation Plant provided for May 1992 -  
May 1997 and includes cyanide, boron, copper, selenium, mercury and flow.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/27/97

1. SOURCE OF DATA

Information Source: Salt River Project  
Address: Mail Station PAB106, P.O. Box 52025  
Phoenix, Arizona 85072-2025  
Contact: Gregg O. Elliott, Ph.D.  
Title: Principal Environmental Scientist, Water Engineering  
Phone/Fax: (602) 236-5545 / (602) 236-2737

2. TYPE OF DATA

- |   |   |
|---|---|
| <input type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality              |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1996

Data Description: Water quality data for the head of the Buckeye Canal. This is the  
water that might be diverted to the Tres Rios area.

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 10/10/97

## 1. SOURCE OF DATA

Information Source: Salt River Project  
 Address: Mail Station PAB106, P.O. Box 52025  
Phoenix, AZ 85072-2025  
 Contact: Gregg O. Elliott, Ph.D.  
 Title: Principal Environmental Scientist  
 Phone/Fax: (602) 236-5545/(602) 236-2737

## 2. TYPE OF DATA

- |                                     |                        |                                     |                       |
|-------------------------------------|------------------------|-------------------------------------|-----------------------|
| <input type="checkbox"/>            | Species                | <input checked="" type="checkbox"/> | Surface Water Quality |
| <input type="checkbox"/>            | Habitat                | <input type="checkbox"/>            | Groundwater Quantity  |
| <input checked="" type="checkbox"/> | Surface Water Quantity | <input type="checkbox"/>            | Groundwater Quality   |

## 3. LOCATION

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

## 4. DESCRIPTION OF DATA

Dates of Available Data: 1/96 - 6/97Data Description: Water quality (metals and organics) for four locations that drain into study area. Locations are: 1) Buckeye Feeder and Lennox Drain at Head2) Laveen Drain at Project Line Deadhorse Ditch3) Maricopa Drain off Lateral 14 on Western Canal4) Gila Drain at Project Line

CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 7-8-97

## 1. SOURCE OF DATA

Information Source: EarthInfo, Inc.  
 Address: 5541 Central Avenue  
Boulder, Colorado 80301  
 Contact: Scott Edwards  
 Title: \_\_\_\_\_  
 Phone/Fax: (303) 938-1788; (303) 938-8183

## 2. TYPE OF DATA

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input checked="" type="checkbox"/> Groundwater Quantity  |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input checked="" type="checkbox"/> Groundwater Quality   |

## 3. LOCATION

- SR-Granite Reef to 2 km downstream  
 SR-2 km downstream to I-10 Bridge  
 SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River  
 SR-23rd Avenue WWTP to confluence with Gila River  
 GR-Confluence to Gillespie Dam  
 Entire Area

## 4. DESCRIPTION OF DATA

Dates of Available Data: 1920 - July 1996  
 Data Description: EPA Storet CD contains information from hundreds of organizations and agencies who are given data input guidelines and protocols by EPA. Storet contains information on over 17,000 stations through Arizona. Available information includes water quality data (total and dissolved), flow rates, fish tissue concentrations, and sediment concentrations.  
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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 7-8-97

1. SOURCE OF DATA

Information Source: EarthInfo, Inc.  
Address: 5541 Central Avenue  
Boulder, Colorado 80301  
Contact: Scott Edwards  
Title: \_\_\_\_\_  
Phone/Fax: (303) 938-1788; (303) 938-8183

2. TYPE OF DATA

- |  |  |
|--|--|
| <input type="checkbox"/> Species                           | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity  |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- ~~SR~~-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1898 - 1994  
Data Description: A CD containing USGS Daily Values purchased from EarthInfo, Inc.  
The CD contains stream flow information about past and present USGS gaging stations  
in Arizona. Daily mean, maximum and minimum flows are provided.  
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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 6/30/97

1. SOURCE OF DATA

Information Source: St. John's Irrigation District

Address: \_\_\_\_\_  
\_\_\_\_\_

Contact: Adron Reichert

Title: \_\_\_\_\_

Phone/Fax: \_\_\_\_\_

2. TYPE OF DATA

- |  |  |
|--|--|
| <input type="checkbox"/> Species                           | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity  |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1912-1979

Data Description: Statistical Summaries of Arizona stream flow data.

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CITY OF PHOENIX  
Phoenix, Arizona

## Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*Date 12/08/97**1. SOURCE OF DATA**

Information Source: Salt River Project

Address: Mail Station PAB 106  
P.O. Box 52025, Phoenix, AZ 85072-2025

Contact: Greg Elliot

Title: Principal Environmental Scientist

Phone/Fax: (602) 236-5545 / (602) 236-2737

**2. TYPE OF DATA**

- |  |  |
|--|--|
| <input type="checkbox"/> Species                           | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity  |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: November 1912 - December 1995

Data Description: Data consists of all releases from Granite Reef Dam from  
November 1912 through December 1995. Data is in a large text computer file and includes  
year, month and date of release.

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 12/09/97**1. SOURCE OF DATA**

Information Source: Salt River Project

Address: Mail Station PAB 106, P.O. Box 52025  
Phoenix, AZ 85072

Contact: Rich Siegel

Title: SRP, Water Rights and Contracts Division

Phone/Fax: (602) 236-2277 / (602) 236-2159

**2. TYPE OF DATA**

- |  |  |
|--|--|
| <input type="checkbox"/> Species                           | <input type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                           | <input type="checkbox"/> Groundwater Quantity  |
| <input checked="" type="checkbox"/> Surface Water Quantity | <input type="checkbox"/> Groundwater Quality   |

**3. LOCATION**

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

**4. DESCRIPTION OF DATA**

Dates of Available Data: 1995 and 1996

Data Description: Rich provided us with drain quantity information for the years 1995 and 1996 for the Gila Drain, Laveen Drain, Maricopa Drain and Buckeye Feeder Drain. For each location, the total acre-feet for each year was provided. Rich asked that we note that the flow amounts given may have been used by water users along the river (i.e., GRIC, downstream irrigation districts, etc.)

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CITY OF PHOENIX  
Phoenix, Arizona

Middle Gila River Watershed Phase I

*Annotated Bibliography Sheet*

Date 12/12/97

1. SOURCE OF DATA

Information Source: Salt River Project 1992 Annual Water Quality Report  
Address: Mail Station PAB 106, P.O. Box 52025  
Phoenix, AZ 85072  
Contact: Oren D. Thompson  
Title: Associate General Manager, Customer, Marketing & Water Serv.  
Phone/Fax: \_\_\_\_\_

2. TYPE OF DATA

- |   |   |
|---|---|
| <input type="checkbox"/> Species                | <input checked="" type="checkbox"/> Surface Water Quality |
| <input type="checkbox"/> Habitat                | <input type="checkbox"/> Groundwater Quantity             |
| <input type="checkbox"/> Surface Water Quantity | <input checked="" type="checkbox"/> Groundwater Quality   |

3. LOCATION

- SR-Granite Reef to 2 km downstream
- SR-2 km downstream to I-10 Bridge
- SR-I-10 Bridge to 23rd Avenue WWTP outfall to Gila River
- SR-23rd Avenue WWTP to confluence with Gila River
- GR-Confluence to Gillespie Dam
- Entire Area

4. DESCRIPTION OF DATA

Dates of Available Data: 1/92 - 12/92

Data Description: Book contains surface and groundwater quality information for 1992  
for SRP canals and wells.

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