CENTRAL ARIZONA PROJECT
ANNUAL WATER QUALITY REPORT
1998

Prepared by the
Water Control Department
May 1999

Contributing Efforts by: Environmental Department
Water Planning Department
BACKGROUND

The Central Arizona Project (CAP) delivers Colorado River water from Lake Havasu on Arizona’s western border to central and southern Arizona. The total CAP system is 336 miles long and consists of open channel canals, siphon pipelines, tunnels, pumping plants, check structures, and turnouts. The CAP is Arizona’s largest supplier of renewable water.

The CAP is a multi-purpose project and will deliver an average of 1.5 million acre-feet of water each year to cities, industries, Indian communities, and agricultural customers as it crosses the arid desert. The Colorado River water offsets groundwater mining which benefits the state in water conservation, long-term storage for future use, supplementing surface water supplies, and complying with the Arizona Groundwater Management Act. The CAP also provides flood control, power management, recreation, and fish and wildlife benefits. Other water-short areas of Arizona or other states such as California, Nevada, and New Mexico, may benefit from the CAP through water exchanges.

The CAP has a fully operational connection with the Salt River Project (SRP) canal system. This allows transfers and delivery of Colorado River water to SRP for customer use and direct recharge. SRP manages and operates a storage reservoir and canal system which supplies water to a 240,000 acre service area within the metropolitan area of Phoenix, Arizona.

WATER QUALITY STANDARDS

The CAP does not provide potable water directly to the public. Instead, the CAP is a raw water supplier and delivers Colorado River water to the municipal water treatment plants. These plants perform filtering and disinfection of the water to remove suspended particles and bacteria. The treated water is pumped through the municipal distribution system for domestic use.

The CAP has developed and performs a water quality monitoring program which addresses three areas:

1) Ongoing monitoring of primary pollutants and general water chemistry.
2) Ongoing corrosion and materials studies.
3) Customers’ parameters of interest.

Water quality monitoring provides data and information to CAP staff and customers about patterns and trends in the canal and Lake Pleasant water quality. The data can also be used to identify potential pollution sources.
Water comes from two basic sources: (1) Colorado River, and (2) Lake Pleasant. As previously mentioned, the Colorado River is the main source of CAP water, but Agua Fria River inflows from rainfall/runoff on the Lake Pleasant watershed can mix with Colorado River water that is stored in the reservoir.

The CAP canal system has cross-drainage over chute structures which are designed to prevent any offsite runoff from entering the canal. Onsite runoff along the aqueduct is minimal.

WATER QUALITY PROGRAM

The water quality program consists of scheduled grab samples which are analyzed by a commercial laboratory, and real-time water quality data from sensors installed at various locations along the canal system.

Grab Sample Program:

In January 1998, the CAP contracted with aqualab inc., currently doing business as Acculabs Inc., a State of Arizona licensed and certified laboratory, to perform the water quality grab sample tests. This program includes the following constituents and sampling sites:

- Water Quality Constituents:

<table>
<thead>
<tr>
<th>General Parameters</th>
<th>Temperature</th>
<th>pH</th>
<th>Dissolved Oxygen (DO)</th>
<th>Conductivity</th>
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<td>(field &amp; lab measured)</td>
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Alkalinity
Calcium
Chloride
Copper
Iron
Magnesium
Manganese
Potassium
Sodium
Sulfate

Total Dissolved Solids (TDS)
Total Coliform and Fecal Coliform
(as needed basis only, not part of routine schedule)

Taste and Odor: MIB / Geosmin
Pathogens: Giardia / Cryptosporidium
Priority Pollutants: Heavy Metals (As,Cd,Cr,Pb,Hg,Se,Ag)
Volatile Organic Compounds (VOC's)
Volatile Organic Aromatics (VOA's)
Organophosphorus Pesticides
Carbamate Pesticides
Chlorinated Herbicides

The general parameters were sampled weekly and monthly depending on the scheduled site. The priority pollutants were sampled quarterly and the pathogens were sampled bi-monthly. No MIB & Geosmin tests were run in 1998 as part of the CAP grab sample program, however, some tests were run and analyzed by the City of Glendale. Extensive MIB and Geosmin tests were conducted as part of the Taste and Odor Study completed by the University of Arizona, and the detailed results are included in that report. Refer to the 1998 CAP Canal Sampling Schedule.

Water Quality Sampling Sites:

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<th>CAP Canal at Milepost</th>
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<td>Havasu Pump Plant</td>
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<td>99th Avenue</td>
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<td>McKellips Road</td>
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<td>Bratby Pump Plant</td>
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<td>San Xavier Pump Plant</td>
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The water quality data is presented in the attached tables. The data represents average values for each month per site, including the yearly mean, maximum, and minimum. In addition, several graphs are attached which provide a graphical representation of site and time comparisons.
Real-Time Water Quality Program:

The real-time water quality program consists of a Hach turbidity meter and a Hydrolab multi-probe sensor installed at each of three sites:

(1) Havasu Pump Plant
(2) Hassayampa Pump Plant
(3) Waddell Pump/Generator Plant

The real-time data is collected and stored in the CAP’s control system database and daily summary reports are generated. The following are the real-time parameters:

Hach: Turbidity (0-1000 NTU)
Hydrolab: Temperature
                  pH
                  Dissolved Oxygen
                  Conductivity
                  Total Dissolved Solids
                  Turbidity

The real-time water quality data is available to the general public by calling an automated voice/data program on the CAP’s control system. The number is (623) 869-2182.

HISTORICAL WATER QUALITY

Prior to 1996, the USBR and CAWCD had cooperated with the United States Geological Survey (USGS) for a water quality sampling program. The USGS collected monthly and quarterly grab samples at three sites on the CAP canal system:

(1) Planet Ranch Road bridge (MP 8)
(2) 7th street bridge (MP 162)
(3) County Road bridge just upstream of the Santa Rosa Turnout (MP 162)

The water quality program tested and analyzed over 50 parameters and the historical CAP water quality data is available in the annual USGS Water Resources Data for Arizona reports. The period of record for the historical data is October 1985 through September 1995. The cooperative agreement with the USGS sampling program expired on September 30, 1995.
Copies of the USGS annual reports can be obtained by contacting the USGS Tucson Office at (520) 673-6671.

The CAP began publishing an annual water quality report in 1996. Copies of the 1996 and 1997 reports can be obtained by contacting the CAP Water Control Department at (623) 869-2573.

LAKE PLEASANT RESERVOIR

The CAP aqueduct system utilizes Lake Pleasant as a seasonal pump-storage reservoir. During a typical year, Colorado River water is pumped into the lake from mid-October to mid-June when water demands and electricity costs are lower. From mid-June to mid-October, when water demands and electricity costs are higher, water is released from the lake for customer deliveries, while generating electricity and minimizing CAP pumping from the Colorado River.

The Agua Fria River drains into Lake Pleasant and the inflows vary each year. During dry years on the watershed, the reservoir storage is mostly Colorado River water, and during wet years with substantial runoff, the reservoir has a blend of Colorado River and Agua Fria River water.

The CAP conducted the following water quality sampling on Lake Pleasant in 1998:

1. Agua Fria River Sampling - January 22, 1998:

   Approximately 65,000 acre-feet of Agua Fria River inflow occurred during January through April, 1998. The inflow volume represented about 8.5% of the total lake volume at the end of the filling period in June 1998.

   The January water quality samples may represent the typical water chemistry found in the Agua Fria River when enough rainfall/runoff occurs on the watershed to produce inflow to Lake Pleasant. However, one sample does not provide enough data to fully assess and validate the typical water quality conditions of the Agua Fria River. Refer to the attached table for the Agua Fria River water quality data (January 22, 1998).

   Overall, the water quality does not differ significantly from the Colorado River water, which is diverted through the CAP canal and pumped into Lake Pleasant. The single parameter that differentiates the two water sources is TDS (Total Dissolved Solids). The TDS level is lower in Agua Fria River water, which is about
400 mg/l, as compared to typical TDS levels in Colorado River water, which average about 600 mg/l.

(2) Lake Pleasant Sampling - May 12 and July 15, 1998

Water quality samples were taken at Lake Pleasant on May 12 and July 15, 1998. On May 12, the total volume in the reservoir was about 785,000 acre-feet. As previously mentioned, the Agua Fria River discharged about 65,000 acre-feet into Lake Pleasant, which is about 8.5% of the total lake storage. The CAP completed the filling cycle for the season and pumped about 590,000 acre-feet of Colorado River water into the reservoir, which is about 77% of total lake storage. The remaining portion of lake storage was carryover water and some dead storage.

Typically, with seasonal pump/storage operations in Lake Pleasant, the majority of reservoir storage is Colorado River water, which was the case in 1998.

The water quality values were consistent and similar. The lake, with mostly Colorado River water, was very clear with Turbidity levels of 0.3 NTU or less, and TDS levels of 619 to 630 mg/l.

Refer to the attached tables for the Lake Pleasant water quality values dated May 12 and July 15, 1998.

(3) Lake Pleasant Depth Profiles:

The largest changes in lake water chemistry are related to seasonal changes and depth. Depth profile samples were conducted on June 9 and July 15, 1998. The water quality parameters included temperature, pH, specific conductivity, and dissolved oxygen.

The June 9 sampling was analyzed at three locations on the reservoir: (1) 500 yards north of New Waddell Dam, (2) 1,500 yards north of New Waddell Dam, and (3) Agua Fria River mouth which is at the northeast end of Lake Pleasant.

The July 15 sampling was analyzed at five locations on the reservoir: (1) south side of intake towers, (2) 250 yards north of New Waddell Dam, (3) 1,000 yards north of New Waddell Dam, (4) One mile north of New Waddell Dam, and (5) Agua Fria River mouth.

The profiles were completed by CAP staff and they used a portable Hydrolab multi-probe water quality sensor.
The profiles indicated that stratification occurred within the lake and a distinctive thermocline or boundary was formed between two layers. The upper layer (epilimnion) was oxygen rich, with a higher temperature, as well as having a slightly higher pH, conductivity, and TDS. The lower layer (hypolimnion), was lower in dissolved oxygen (but not at anoxic conditions of 1 mg/l or less) with lower temperatures and slightly lower pH and conductivity (which is a measure of TDS). Refer to the attached graphs of Lake Pleasant depth profiles for June 9 and July 15, 1998.

The dissolved oxygen levels at the lower depths ranged from 4 to 6 mg/l. This verifies that at the beginning of summer, the overall water quality profile is in good condition. As the summer progresses, the DO level tends to drop below 1 mg/l and reaches an anoxic condition (oxygen deficit).

The oxygen deficit conditions at the lower depths may have profound impacts on water chemistry and composition. If the sediment/water interface is exposed to prolonged periods of anoxia, reducing conditions may prevail. This reduction may lead to sapropel formation, a compound which is high in hydrogen sulfide and methane and has a shiny, black color due to the presence of ferrous sulfide. This compound is responsible for the occasional "rotten-egg" odor associated with water releases from the hypolimnion layer through the lower portal on the intake towers. Additionally, nutrients, such as nitrogen and phosphorous become unbound from their ionic association with metals, such as iron, manganese, and aluminum. This process may free up nutrients which contribute to algae blooms in the canal system, and precipitate iron and manganese which causes discolored water and treatment problems.

Typically, the degree of stratification gradually forms during the summer and lasts until the latter part of fall. Usually by November or December, the lake has "turned over". This phenomenon is caused by the decrease in surface water temperatures which increase the surface water density and result in displacement or mixing of surface water with deeper water. This restores the lake to more uniform water chemistry profiles throughout the winter until the warming cycle begins again during the summer.

Refer to the attached graphs which present the Lake Pleasant Depth profile results.

The intake towers at the New Waddell Dam have sets of intake portals at two different levels, which are 100 feet apart in elevation. Adjustable operations and optimum use of the upper and lower portals offers the CAP opportunities to maximize the quality of water released from the lake for customer deliveries.
In past years, water releases were made through the upper gates as long as possible. It was believed that this zone had the best water quality. By the end of the summer, the lake elevation was lower than the upper gates so all releases were switched over to the lower gates. At that time, the lower quality water from the bottom zone of the lake was introduced into the canal system resulting in treatment concerns for the cities.

In 1998, a new operational scheme was used to manage the water quality from the releases at Lake Pleasant. This new scheme consisted of using only the lower portals for releases during the entire summer. The use of the lower gates during the initial releases in June allowed medium-oxygenated bottom water to be released early in the release period, while prolonging the retention of the high-oxygenated epilimnion water. This minimized the volume of anoxic water which would have been delivered from the lake during the latter part of the summer release period. At the end of summer, when the bottom zone of water reached anoxic conditions, releases were switched to the upper portals only. The result was within a few days, customer complaints were received which identified musty/moldy odors. This condition could have been caused by the algae rich, warmer water of the upper zone which would have promoted growth of taste and odor constituents in the canal water.

A 50% blend of Colorado River water was implemented and there was no noticeable improvement to the water quality.

The lower and upper portals were opened for releases and the result was improved water quality. The bottom zone water might have minimized the amount of algae released and diluted the canal water.

Refer to the attached summary of the 1998 Lake Pleasant Water Quality which presents the historical tower operation schemes and chronology of events. In addition, refer to the attached summary tables presenting Taste and Odor Sampling results conducted at various sites downstream of the Waddell Turnout during the switching of Waddell tower gates.

TASTE AND ODOR: COOPERATIVE RESEARCH PROGRAM

Municipal water treatment plants which treat water supplies from the CAP and SRP systems have experienced seasonal taste and odor episodes. The water has been described as having a “musty-moldy-earthy” taste or odor which is suspected of being associated with biological activity in reservoirs and canal systems. Water treatment plants can treat this water with activated carbon to reduce or eliminate the offensive tastes and odors, but this method is expensive.
The CAP participated with SRP and several valley cities in a research program to try to identify and control the sources of the taste and odor problems, instead of treating the problem at the treatment plants. This two-year study ran from April 1996 to October 1998, and was conducted by a team of scientists from the University of Arizona. Participating cities included Chandler, Glendale, Mesa, Scottsdale, and Tempe. The total program cost approximately $180,000, which equated to about $15,000 per participant per year.

The objectives of this study were:

1. Identify sources and mechanisms of the taste and odor problems in the CAP and SRP systems.
2. Present recommendations to prevent the taste and odor problems in drinking water.

The final report was published in October 1998, and listed below are some of the conclusions which related to the CAP system:

1. Compounds produced by Cyanobacteria (blue-green algae) are the suspected causes of the taste and odor problems. Two compounds of concern are Geosmin and 2-methyisoborneol (MIB) which can produce odors at levels as low as 1 part per trillion (ppt). The taste and odor constituents are an aesthetic problem and do not present a health concern at these extremely low levels.

2. MIB detected in samples from several treatment plants appear to be due to planktonic Oscillatoria and both planktonic and periphytic Lyngbya. Geosmin detected in samples appear to come from periphytic Anabaena and Lyngbya.

3. The project was successful in the last year in achieving a reduction in complaints regarding taste and odors in those parts of the valley supplied directly with CAP water. There was also a decrease in carbon requirements to remove MIB and geosmin. Managing the operations of the Waddell Dam and adjusting the pattern of water removal appears to have altered the nutrient availability for the causative algae.

4. 1998 was the second year of managing Lake Pleasant with early removals from the hypolimnion. The limnological survey of Lake Pleasant revealed that there was sediment nutrients released into the hypolimnion. These nutrients may add to overall eutrophication of the CAP canal which may also increase taste and odor complaints. Mesocosm studies of Lake Pleasant sediments conducted at the Environmental Research Laboratory discerned that sediments deposited by incoming CAP water released more phosphorous, ferrous iron and ammonia-nitrogen than sediments not affected by CAP influent.
5. CAP water is not a significant contributor of nitrate to the SRP system.

6. Lake Pleasant does not contribute more nitrate, orthophosphate, dissolved iron, MIB, or geosmin than the other water sources. Lake pleasant does contribute nutrients but the Colorado, Salt, and Verde Rivers contribute similar concentrations of nutrients measured. The one exception is that the Verde River contributes more dissolved iron than the other water sources.

7. Water samples from water treatment plants showing MIB and geosmin are not due to MIB and geosmin coming from the Colorado River or Lake Pleasant. Therefore, Lake Pleasant and Lake Havasu do not need to be monitored for blue-green algae blooms nor treated for such blooms to prevent taste and odor episodes at the treatment plants.

8. The initial attempt to conduct a field trial to determine whether a shade structure could reduce light levels enough to impact algae growth failed due to inadequate anchoring of the shade material. When a more sturdy anchoring system was installed, the operations of the canal itself interfered with the structure. The cost and complexity of a more workable and stable design that would cover a full size canal may be quite expensive for large scale implementation.

ANNUAL CANAL FLUSH

Deliveries to the MVD (Maricopa Water District) Turnout all summer, along with numerous days of pass through pumping, kept the water flowing in the west end of the canal with no stagnation. Thus, no "flushing" operations were needed in 1998.

WATER QUALITY IMPACT FROM BILL WILLIAMS RIVER

As previously mentioned, the CAP aqueduct system begins at Lake Havasu. The intake area for the Havasu Pumping Plant is located in a bay-like feature which is at the mouth of the Bill Williams River as it flows into Lake Havasu. The Bill Williams River, together with its headwaters at Alamo Lake, form the majority of the drainage area of west-central Arizona. During periods of heavy rainfall and runoff, the flows in the Bill Williams River dominate this area of Lake Havasu, and the water quality tends to be low in TDS but very turbid with high concentrations of organic matter and suspended sediments along with strong odors.
The water quality deteriorates and causes treatment problems for the municipalities. To avoid pumping this water into the CAP system and delivering it to customers, the Havasu pumps are shut down until the water quality improves and clears up.

In 1993 and 1995, the Havasu pumping had to be curtailed for a week or more due to the releases from Alamo Lake. The reservoir watershed was normal in 1998 with minimal runoff, therefore no water quality episodes occurred on the Bill Williams River.

CITY OF SCOTTSDALE SEWAGE SPILL - OCTOBER 25, 1998

On October 25, 1998, a sewage spill occurred at the North Pump Station, located at Frank Lloyd Wright Blvd. and Pima Road. A raw sewage pump had failed to start. The cause of failure was an I/O board in the Remote Terminal Unit (RTU) which controls the North Pump Station. This resulted in backed up flow in the collection system which eventually discharged through the nearest manhole. The spill followed a natural drainage path and entered the CAP canal. Based on calculations performed by the design engineers, approximately 7,259 gallons of raw sewage was discharged.

All M&I Customers, downstream of the incident, were notified immediately. Travel times were calculated and the CAP customers were notified of the day, date, and time, when they could expect to see evidence of the spill. All notifications and contacts to the Department of Environmental Quality and Maricopa County Environmental Services Department were handled by the City of Scottsdale.

The City of Scottsdale implemented 6 changes to their system to prevent future spills:

1. The I/O board in the RTU was replaced.
2. They installed a high level float in the manhole.
3. A second high level float was installed in the collection system and attached to a separate RTU for redundancy.
4. An auto dialer was installed and connected to the high level alarms which pages the plant operator when a high level alarm comes in.
5. An alarm was installed at the main water campus which alarms if no flow is detected at the North Pump Station.
6. A 16-inch overflow pipe has been scheduled for installation and will connect to a new sewer diversion structure south of the canal.

These modifications should minimize the threat of spills in the future.
GROUNDWATER RECHARGE PROJECTS - WATER QUALITY

This report includes copies of 1998 water quality data for two groundwater recharge projects along the CAP canal system in the Tucson area. The recharge projects were operational in 1998 and administered by the CAP.

Refer to the attached:

Table 4: Avra Valley Recharge Project
Table 6: Pima Mine Road Recharge Project

The values are based on water quality samples of the CAP source water which is near the inlet to the recharge basins or immediately downstream of the CAP canal turnout.

GENERAL DISCUSSION

Overall, the CAP water quality is very good. Many variables determine the quality of water and not just a single constituent.

Turbidity > The suspended solids are very low with turbidity levels averaging 1-4 NTU with an occasional spike exceeding 100 NTU. The water in the canal and Lake Pleasant is very clear, and the lake bottom can be seen at depths of 25-30 feet. In general, when canal flows are lower or steady, the turbidity is low; when large flow increases occur, the higher velocities cause an increase in suspended particles and turbidity levels rise until a new equilibrium is reached and the suspended material either settles in the pumping plant forebays or is diverted through the turnouts. Also, seasonal increases in algae can interfere with visibility and increase turbidity levels.

TDS > Total dissolved solids represent the concentration of dissolved minerals in the water. The TDS levels in CAP water are high when compared to most groundwater sources. For the year, the average TDS was 605 mg/l and maintained consistent values throughout the canal system until the southern end near Tucson, where the average TDS was 685 mg/l. The higher TDS concentrations in the Tucson area can be attributed to low water deliveries, minimal flows for water replenishment in the stagnant areas of the canal, and evaporation losses which further concentrate the minerals. Until regular deliveries are resumed in the Tucson area, the canal will remain in a stagnant mode and most constituents will remain at higher concentrations than normal.
Note: The 1998 average TDS levels (665 mg/l) in the CAP canal near the Tucson area, were much lower as compared to 1996 and 1997 levels, which were 872 mg/l and 840 mg/l, respectively. This improvement in water quality was probably due to higher water deliveries to direct recharge sites in the Tucson area, which minimizes water stagnation in the CAP canal.

pH ➤ The average pH ranged from 8.2 at the Havasu area to 8.5 at the Tucson area. The increase in pH can be attributed to the progressive increase in dissolved, alkaline minerals due to the reasons mentioned in the previous paragraph.

Temperature ➤ Average water temperatures for the year ranged from 61 to 67 degrees Fahrenheit with minimal differences between the Havasu, Phoenix, and Tucson areas of the canal system. However, monthly and seasonal temperatures varied considerably along the canal system. Maximum temperatures reach 86 degrees Fahrenheit and minimum temperatures are about 47 degrees Fahrenheit.

Note: From June to mid-October, when Lake Pleasant water is released for customer deliveries downstream of the Waddell Turnout, the canal water temperatures range from 58 to 69 degrees Fahrenheit. This water is 15 to 25 degrees cooler than normal canal water temperatures upstream of the Waddell Turnout and further downstream towards the Pinal County area. This represents excellent water temperature conditions for the municipalities and other customers in the Phoenix area. When the ambient temperatures exceed 100 degrees Fahrenheit, there are very few complaints about the colder water.

DO ➤ The average dissolved oxygen levels were fairly uniform throughout the canal system. However, the Havasu area had a lower average DO of 6.8 mg/l, which increased to an average 9.5 mg/l in the Phoenix area, then decreased to 8.4 mg/l in the Tucson area.

Metals ➤ The concentrations of dissolved heavy metals are very low to below laboratory detection limits throughout the CAP canal system.

Pathogens ➤ A significant amount of public drinking water in the urban areas of central and southern Arizona is treated CAP water. One of the biggest concerns is the presence of pathogens in treated water, including Giardia and Cryptosporidium. In 1998, all designated sampling sites on the CAP system produced non-detectable results for Giardia and Cryptosporidium.
SUMMARY

This report has presented and discussed a variety of parameters in the CAP water quality monitoring program. CAP employees are sensitive to customer needs, and as changes occur along with increased interest in other constituents, the water quality monitoring and sampling program will be revised accordingly and the data will be published in future annual water quality reports.

CAP canal water quality information is also available on the CAP Internet web site at www.cap-az.com.

For further information, questions, or comments, please contact any of the following:

Brian Henning (623) 869-2567
Tom Curry (623) 869-2353
Tim Kacerek (623) 869-2563
WATER QUALITY SAMPLING SITES
1. HAVASU PUMPING PLANT
2. LITTLE HARQUAHALA PUMPING PLANT
3. 99TH AVENUE
4. 7TH STREET
5. McKELLIPS ROAD
6. BRADY PUMPING PLANT
7. SAN XAVIER PUMPING PLANT

CENTRAL ARIZONA PROJECT
GENERAL LOCATION MAP
"SUMMER"
JUNE - MID OCTOBER

CENTRAL ARIZONA PROJECT
GENERAL LOCATION MAP
<table>
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<tr>
<th>WEEK OF</th>
<th>HAVASU</th>
<th>L. MARQ.</th>
<th>LAKE PLE.</th>
<th>99TH AVG.</th>
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G = General Chemistry: alkalinity, calcium, chloride, copper, iron, magnesium, manganese, sulfate, specific conductance, total dissolved solids (TDS), turbidity.

H = Hydroprobe readings of temperature, dissolved oxygen, conductivity, and pH will be taken each month at Lake Pleasant. Four (4) locations will be depth surveyed with the Hydroprobe.

T/O = Taste and Odor: MIB, Geosmin will be analyzed for as needed, probably in the fall.

g/c = Giardia/Cryptosporidium


NOTE: General Chemistry, taste and odor samples analysis will be undertaken with a one-week "turn-around" time based on the time the laboratory receives the samples.

Giardia/Cryptosporidium and priority pollutant samples analysis will be undertaken with a two-week "turn-around" time based on the time the laboratory receives the samples.
CAP CANAL
WATER QUALITY DATA
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NT = Parameter was Not Tested
# 1998 WATER QUALITY DATA

**CAP CANAL at LITTLE HARQUAHALA PUMPING PLANT**

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ND = Parameter was Not Detected
NT = Parameter was Not Tested
## 1998 WATER QUALITY DATA

**CAP CANAL at SAN XAVIER PUMPING PLANT**

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<th>MAR</th>
<th>APR</th>
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<th>JUNE</th>
<th>JULY</th>
<th>AUG</th>
<th>SEPT</th>
<th>OCT</th>
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ND = Parameter was Not Detected
NT = Parameter was Not Tested
Central Arizona Project - Water Quality Data
CAP Canal - **TOTAL DISSOLVED SOLIDS**
1998

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<th>(Average Monthly Values)</th>
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<td>520</td>
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<td>500</td>
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- 100% Colorado River water
- 100% Lake Pleasant water
- 95% Lake Pleasant water

Prepared: 4/07/99
LAKE PLEASANT RESERVOIR
WATER QUALITY DATA
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<tr>
<td>Herbicides (EPA 515.1)</td>
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1 Agua Fria River samples were obtained to determine the quality of water being contributed to Lake Pleasant.
# LAKE PLEASANT

## MAY 12, 1998

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## LAKE PLEASANT DATA

**July 15, 1998**

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<td>1069 uS/cm @ surface</td>
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<td>7.62 mg/l @ surface</td>
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<td>No detect</td>
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<tr>
<td>Herbicides (EPA 515.1)</td>
<td>No detect</td>
</tr>
</tbody>
</table>
1998 Lake Pleasant Water Quality

- Tower gate operations:
  1995 - Released from upper gates until level was below upper gates, then switched to lower gates (Sept 25)
  1996 - Released only from upper gates all season
  1997 - Released from both upper and lower gates all season
  1998 - Released only from lower gates (almost) all season

- May 27 - Sept 27: Released only from lower gates

- Mid-September: Water began to have musty/moldy odor

- Monday Sept 28: Switched to upper gates, because:
  DO had dropped from 2.0 → 0.5
  Water had black color
  Lost some fish in canal

- Thursday Oct 1: Many complaints of musty/moldy odor

- Saturday Oct 3: Started 50% blend of Colorado River water
  Result: No noticeable improvement

- Wednesday Oct 7: Opened both upper and lower gates
  Result: Improved quality
### Taste and Odor Sampling Results

<table>
<thead>
<tr>
<th>DATE</th>
<th>LOCATION</th>
<th>MIB</th>
<th>GEOSMIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/1/98</td>
<td>99th Ave.</td>
<td>7.7</td>
<td>21.0</td>
</tr>
<tr>
<td>10/1/98</td>
<td>Check 23</td>
<td>9.1</td>
<td>64.4</td>
</tr>
<tr>
<td>10/1/98</td>
<td>McKellips Bridge</td>
<td>5.8</td>
<td>58.8</td>
</tr>
<tr>
<td>10/2/98</td>
<td>Pool 18</td>
<td>14.6</td>
<td>10.0</td>
</tr>
<tr>
<td>10/2/98</td>
<td>Waddell forebay near eastern-most penstock</td>
<td>11.2</td>
<td>2.5</td>
</tr>
<tr>
<td>10/2/98</td>
<td>Dam upper gate</td>
<td>35.4</td>
<td>4.9</td>
</tr>
<tr>
<td>10/2/98</td>
<td>Dam lower gate</td>
<td>5.2</td>
<td>&lt;2.0</td>
</tr>
<tr>
<td>10/2/98</td>
<td>Pyramid Peak (COG)</td>
<td>8.8</td>
<td>22</td>
</tr>
<tr>
<td>10/3/98</td>
<td>Pyramid Peak (COG)</td>
<td>22.7</td>
<td>35</td>
</tr>
<tr>
<td>10/4/98</td>
<td>Pyramid Peak (COG)</td>
<td>17.1</td>
<td>16.7</td>
</tr>
<tr>
<td>10/5/98</td>
<td>Glendale tap water</td>
<td>18.8</td>
<td>27.0</td>
</tr>
<tr>
<td>10/5/98</td>
<td>Pyramid Peak (COG)</td>
<td>18.8</td>
<td>27.0</td>
</tr>
<tr>
<td>10/7/98</td>
<td>99th Ave</td>
<td>7.5</td>
<td>6.3</td>
</tr>
<tr>
<td>10/7/98</td>
<td>Check 23</td>
<td>6.7</td>
<td>18.8</td>
</tr>
<tr>
<td>10/7/98</td>
<td>McKellips Bridge</td>
<td>6.9</td>
<td>23.4</td>
</tr>
<tr>
<td>10/14/98</td>
<td>99th Ave</td>
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<td>4.9</td>
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<td>10/14/98</td>
<td>Check 23</td>
<td>14.4</td>
<td>8.6</td>
</tr>
<tr>
<td>10/14/98</td>
<td>McKellips Bridge</td>
<td>13.6</td>
<td>9.0</td>
</tr>
</tbody>
</table>
## CAP CANAL – WATER QUALITY

Samples from Glendale Turnout Intake

<table>
<thead>
<tr>
<th>Date</th>
<th>MIB</th>
<th>Geosmin</th>
<th>Water Source</th>
<th>Lake Pleasant</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/08/98</td>
<td>4.1</td>
<td>5.6</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>10/09/98</td>
<td>4.9</td>
<td>8.4</td>
<td>10%</td>
<td>85%</td>
</tr>
<tr>
<td>10/10/98</td>
<td>2.3</td>
<td>3.0</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>10/11/98</td>
<td>5.1</td>
<td>4.6</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>10/12/98</td>
<td>4.1</td>
<td>5.1</td>
<td>42%</td>
<td>58%</td>
</tr>
<tr>
<td>10/13/98</td>
<td>5.2</td>
<td>6.5</td>
<td>42%</td>
<td>58%</td>
</tr>
</tbody>
</table>

Note: Sample units are in PPT (Parts per Trillion)
GROUNDWATER RECHARGE
WATER QUALITY DATA
<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNIT</th>
<th>SOURCE WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6/9/98</td>
</tr>
<tr>
<td>Indicator Parameters/Major Cation &amp; Anion Analytes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>°F</td>
<td>81.6</td>
</tr>
<tr>
<td>pH</td>
<td>pH</td>
<td>8.58</td>
</tr>
<tr>
<td>Specific Conductance</td>
<td>μS/cm</td>
<td>901</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>mg/L</td>
<td>620</td>
</tr>
<tr>
<td>Total Alkalinity</td>
<td>mg/L</td>
<td>130</td>
</tr>
<tr>
<td>Calcium</td>
<td>mg/L</td>
<td>66</td>
</tr>
<tr>
<td>Magnesium</td>
<td>mg/L</td>
<td>27</td>
</tr>
<tr>
<td>Potassium</td>
<td>mg/L</td>
<td>5.7</td>
</tr>
<tr>
<td>Sodium</td>
<td>mg/L</td>
<td>83</td>
</tr>
<tr>
<td>Bicarbonate Alkalinity HCO3</td>
<td>mg/L</td>
<td>126</td>
</tr>
<tr>
<td>Carbonate Alkalinity CO3</td>
<td>mg/L</td>
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</tr>
<tr>
<td>Chloride</td>
<td>mg/L</td>
<td>80</td>
</tr>
<tr>
<td>Sulphate</td>
<td>mg/L</td>
<td>240</td>
</tr>
<tr>
<td>Nutrient Analytes</td>
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<td></td>
</tr>
<tr>
<td>Nitrate As Nitrogen</td>
<td>mg/L</td>
<td></td>
</tr>
<tr>
<td>Total Metals Analytes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspx</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Arsenic</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Barium</td>
<td>mg/L</td>
<td>0.1</td>
</tr>
<tr>
<td>Beryllium</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Cadmium</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Chromium</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Cobalt</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Iron</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Lead</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Mercury</td>
<td>mg/L</td>
<td>0.0004</td>
</tr>
<tr>
<td>Nickel</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Selenium</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Thallium</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Vanadium</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Zinc</td>
<td>mg/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Organic Analytes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td>ug/L</td>
<td>BRL</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>ug/L</td>
<td>BRL</td>
</tr>
<tr>
<td>o-Dichlorobenzene</td>
<td>ug/L</td>
<td>BRL</td>
</tr>
<tr>
<td>p-Dichlorobenzene</td>
<td>ug/L</td>
<td>BRL</td>
</tr>
<tr>
<td>1,2-Dichloroethane</td>
<td>ug/L</td>
<td>BRL</td>
</tr>
</tbody>
</table>
## TABLE 4
AVRA VALLEY RECHARGE PROJECT
WATER QUALITY DATA SUMMARY

<table>
<thead>
<tr>
<th>CONSTITUENT</th>
<th>UNIT</th>
<th>SOURCE WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4/9/98</td>
</tr>
<tr>
<td>Organic Analytes EPA method 524.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,1-Dichloroethylene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethylene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethylene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>1,2-Dichloropropane</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Styrene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Trichloromethylethyl</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Toluene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Total Trihalomethanes</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>1,2,4-Trichlorobenzene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>1,1,2-Trichloroethane</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Xylenes (Total)</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Pesticides EPA methods 508 and 515.1</td>
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<td></td>
</tr>
<tr>
<td>Chlorpyrifos</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Dalapon</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Dimefox</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>2,4-Dichlorophenoxyacetic Acid (2,4-D)</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Endosulfan</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Hepachlor</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Hepachlor Epoxide</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Lindane</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Methoxychlor</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Pestimate Chlorophenol</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>pyfomethane</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>2,4,5-Trichlorophenoxyacetic Acid (2,4,5-TP)</td>
<td>ug/l</td>
<td>BRL</td>
</tr>
<tr>
<td>Microbiological EPA method 9221B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Coliforms</td>
<td>900/0000cfu</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: BRL = Below Reporting Limit
na = Not analyzed
<table>
<thead>
<tr>
<th>Sample Date</th>
<th>Method</th>
<th>Reporting</th>
<th>Units</th>
<th>AWSG</th>
<th>Spill Data</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Round 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6: Summary of Water Quality Monitoring Results**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (mg/L)</td>
<td>0.35</td>
<td>&lt;0.05</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Antimony (mg/L)</td>
<td>2.00</td>
<td>&lt;0.02</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Arsenic (mg/L)</td>
<td>0.05</td>
<td>&lt;0.005</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Barium (mg/L)</td>
<td>2.0</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Beryllium (mg/L)</td>
<td>1.0</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Cadmium (mg/L)</td>
<td>0.1</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Chromium (mg/L)</td>
<td>1.0</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Copper (mg/L)</td>
<td>0.05</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Lead (mg/L)</td>
<td>0.05</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Magnesium (mg/L)</td>
<td>1.0</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Mercury (mg/L)</td>
<td>0.05</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Nickel (mg/L)</td>
<td>0.1</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Polonium (mg/L)</td>
<td>0.5</td>
<td>&lt;0.05</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Silver (mg/L)</td>
<td>0.05</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Sodium (mg/L)</td>
<td>0.05</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Thallium (mg/L)</td>
<td>1.0</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Zinc (mg/L)</td>
<td>0.05</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
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</tr>
</tbody>
</table>

**Other Constituents**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanide (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Total Petroleum Hydrocarbons (mg/L)</td>
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<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Total Organic Carbon (mg/L)</td>
<td>0.00</td>
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<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Coliforms (MPN/100mL)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Volatile Organic Compounds (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

**Organochlorines Pesticides**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al狄rim (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Acetamid (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Anilim (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Atrazine (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Dieldrin (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Endrin (mg/L)</td>
<td>0.00</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

- Table 6 provides a summary of water quality monitoring results for a specific location.
- The data includes various parameters such as Alkalinity, Chloride, Conductivity, Fluoride, and others.
- The values are presented in mg/L for most parameters.
- The data is rounded to two decimal places for most parameters.
- The notes section indicates that the data is presented in micrograms per liter.

**Spill Data**

- The spill data section includes information on the spill location, date, and volume of spill.
- The spill data is presented in both volume and liquid.
- The notes section indicates that the spill data is presented in cubic meters.

**Additional Information**

- The table includes a column for the method of analysis, with methods such as GC-MS.
- The units column includes units such as mg/L, mg, and ppm.
- The AWSG column includes data for different agencies involved in the monitoring process.
- The notes section includes additional information on the monitoring process and data collection methods.
REGULATORY STANDARDS
<table>
<thead>
<tr>
<th>Analyte</th>
<th>Range of Detections (Per Sample Event)</th>
<th>Average Value</th>
<th>US EPA Maximum Contaminant Level (MCL) (Health-based)</th>
<th>US EPA Secondary Maximum Contaminant Level (Aesthetics-based)</th>
<th>Arizona Health-based Guidance Level (HBGL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (degrees F)</td>
<td>47 - 86</td>
<td>See Note 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>pH</td>
<td>7.6 - 8.9</td>
<td>See Note 2</td>
<td>-</td>
<td>6.5 - 8.5</td>
<td>-</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/l)</td>
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<tr>
<td>Alkalinity: Carbonate -</td>
<td>92 - 180</td>
<td>129</td>
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<tr>
<td>Bicarbonate -</td>
<td>2 - 2.6</td>
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<tr>
<td>(mg/l)</td>
<td>117 - 140</td>
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<td>Sodium (mg/l)</td>
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<tr>
<td>Potassium (mg/l)</td>
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<td>Calcium (mg/l)</td>
<td>34 - 120</td>
<td>72</td>
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<td>Chloride (mg/l)</td>
<td>65 - 130</td>
<td>74</td>
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<td>250</td>
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<td>Copper (mg/l)</td>
<td>&lt;0.01 - 1.35</td>
<td>0.04*</td>
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<td>1.0</td>
<td>0.260</td>
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<td>Iron (mg/l)</td>
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<td>0.3</td>
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<td>Magnesium (mg/l)</td>
<td>23.1 - 43.9</td>
<td>27.4</td>
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<td>Manganese (mg/l)</td>
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<td>Sulfate (mg/l)</td>
<td>190 - 370</td>
<td>230</td>
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<tr>
<td>Electric conductivity</td>
<td>775 - 1390</td>
<td>936</td>
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<tr>
<td>Total Dissolved Solids</td>
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<td>Turbidity (NTU)</td>
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<td>1.46</td>
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<td>WATER QUALITY ANALYTES AND REGULATORY LEVELS</td>
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<tr>
<td>See Note 3</td>
<td>See Note 2</td>
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<td>----------------------------</td>
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<tr>
<td><strong>Giardia lamblia</strong></td>
<td><strong>&lt;0.25/100 ml</strong></td>
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<tr>
<td><strong>Cryptosporidium</strong></td>
<td><strong>&lt;0.25/100 ml</strong></td>
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<td><strong>Total coliform</strong></td>
<td>See Note 3</td>
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<tr>
<td><strong>Fecal coliform</strong></td>
<td>See Note 3</td>
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### Non-detect** (mg/l)

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<tr>
<td>arsenic</td>
<td>&lt;0.03</td>
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<tr>
<td>cadmium</td>
<td>&lt;0.005</td>
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<tr>
<td>chromium</td>
<td>&lt;0.01</td>
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<tr>
<td>lead</td>
<td>&lt;0.04</td>
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<tr>
<td>mercury</td>
<td>&lt;0.0002</td>
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<td>selenium</td>
<td>&lt;0.04</td>
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<td>silver</td>
<td>&lt;0.01</td>
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### Volatile Organic Compounds

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<td>benzene</td>
<td>0.0007</td>
</tr>
<tr>
<td>ethylbenzene</td>
<td>0.007</td>
</tr>
<tr>
<td>xylenes</td>
<td>0.0005 &amp; 0.0156</td>
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<tr>
<td>chloroform</td>
<td>0.008 &amp; 0.0181</td>
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<tr>
<td>bromodichloromethane (see attached list for all compounds tested)</td>
<td>0.0013</td>
</tr>
<tr>
<td></td>
<td>0.1***</td>
</tr>
<tr>
<td></td>
<td>0.1**</td>
</tr>
<tr>
<td></td>
<td>0.0657</td>
</tr>
<tr>
<td></td>
<td>0.055</td>
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### Herbicides

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<th>Detected twice in 56 samples.</th>
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<td>2,4-D</td>
<td>.0005</td>
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<tr>
<td></td>
<td>0.07</td>
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**Note 1:** Values presented are based upon laboratory method detection limits, better defined as the lowest level that the laboratory can definitively identify the analyte exists in the sample. All method detection limits are below any existing EPA maximum contaminant level (MCL).

**Note 2:** Average value was not calculated as samples were not obtained consistently throughout the year.

**Note 3:** Analyses were taken in response to specific episodes of concern on the canal and are not presumed to be typical of CAP water on whole.

**Note 4:** Volatile organic compounds (VOCs) were sampled for quarterly at 4 locations. VOCs detected were never detected at more than one location during any quarter.

* For the purpose of obtaining averages, calculations were made using one-half the method detection limit for those samples reported at below detection limits.
** Arsenic at 0.013 mg/l and Mercury at 0.003 mg/l were detected in Aqua Fria/Elver water during a "one-time" sampling event.
*** These values are goal water providers are attempting to obtain, but are not actual enforceable MCLs.
LIST OF SYNTHETIC ORGANICS
ANALYZED QUARTERLY
1998
**METHOD AND QUALITY CONTROL:**
The results in this report are Arizona Certified and were generated using approved methods referenced by the U.S. EPA and the Arizona Department of Health Services.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>METHOD</th>
<th>RESULT</th>
<th>UNITS</th>
<th>ADHS NO.</th>
<th>ANALYZED</th>
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</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>EPA 524.2</td>
<td>&lt;0.0005</td>
<td>mg/L</td>
<td>A20563</td>
<td>1/19/98</td>
</tr>
<tr>
<td>Bromobenzene</td>
<td>EPA 524.2</td>
<td>&lt;0.0005</td>
<td>mg/L</td>
<td>A20563</td>
<td>1/19/98</td>
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<tr>
<td>Bromochloromethane</td>
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<td>Bromomethane</td>
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<tr>
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Page 1 of 2
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<td>Xylenes, total</td>
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<td>Vinyl Chloride</td>
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<td>1/19/98</td>
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</tbody>
</table>

Surrogate: % Recovery

- 4-Bromofluorobenzene: 52%
- 1,2-Dichlorobenzene-d4: 79%
### SAMPLE IDENTIFICATION:

### METHOD AND QUALITY CONTROL:

The results in this report were generated using approved methods referenced by the U.S. EPA and the Arizona Department of Health Services.

### RESULTS:

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>METHOD</th>
<th>RESULT</th>
<th>UNITS</th>
<th>ADHS NO.</th>
<th>ANALYZED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalapon</td>
<td>EPA 515.1</td>
<td>&lt;0.0002</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>1/21/98</td>
</tr>
<tr>
<td>Dicamba</td>
<td>EPA 515.1</td>
<td>&lt;0.0002</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>1/21/98</td>
</tr>
<tr>
<td>Dinoeb</td>
<td>EPA 515.1</td>
<td>&lt;0.0001</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>1/21/98</td>
</tr>
<tr>
<td>2,4-D</td>
<td>EPA 515.1</td>
<td>&lt;0.0001</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>1/21/98</td>
</tr>
<tr>
<td>Pichloram</td>
<td>EPA 515.1</td>
<td>&lt;0.0001</td>
<td>mg/L</td>
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<td>1/21/98</td>
</tr>
<tr>
<td>Pentachlorophenol</td>
<td>EPA 515.1</td>
<td>&lt;0.00004</td>
<td>mg/L</td>
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<td>1/21/98</td>
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<tr>
<td>2,4,5-TP (Silvex)</td>
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<td>&lt;0.0001</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>1/21/98</td>
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</table>

<table>
<thead>
<tr>
<th>SURROGATE</th>
<th>% RECOVERY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-Dichlorophenylacetic Acid</td>
<td>85</td>
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</table>
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</thead>
<tbody>
<tr>
<td>Hexachlorobenzene</td>
<td>EPA 525.2</td>
<td>&lt;0.0001 mg/L</td>
<td>AZ0563</td>
<td>1/23/98</td>
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<tr>
<td>Simazine</td>
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<tr>
<td>Atrazine</td>
<td>EPA 525.2</td>
<td>&lt;0.0002 mg/L</td>
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<td>1/23/98</td>
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<tr>
<td>Metribuzin</td>
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<td>&lt;0.0005 mg/L</td>
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<td>1/23/98</td>
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<tr>
<td>Alachlor</td>
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<td>&lt;0.0005 mg/L</td>
<td>AZ0563</td>
<td>1/23/98</td>
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<tr>
<td>Metolachlor</td>
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<td>&lt;0.0005 mg/L</td>
<td>AZ0563</td>
<td>1/23/98</td>
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<tr>
<td>Butachlor</td>
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<td>&lt;0.0005 mg/L</td>
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<td>1/23/98</td>
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<tr>
<td>Di(2-Ethylhexyl)Adipate</td>
<td>EPA 525.2</td>
<td>&lt;0.0005 mg/L</td>
<td>AZ0563</td>
<td>1/23/98</td>
<td></td>
</tr>
<tr>
<td>Bis(2-Ethylhexyl)Phthalate</td>
<td>EPA 525.2</td>
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<td>1/23/98</td>
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<tr>
<td>Benzo(a)Pyrene</td>
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<td>&lt;0.0001 mg/L</td>
<td>AZ0563</td>
<td>1/23/98</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SURROGATE</th>
<th>% RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3 Dimethyl-2-Nitrobenzene</td>
<td>92</td>
</tr>
<tr>
<td>Triphenyl Phosphate</td>
<td>96</td>
</tr>
<tr>
<td>Perylene-D12</td>
<td>78</td>
</tr>
</tbody>
</table>

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Robert V. Woods  
Laboratory Director
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<th>ADHS NO.</th>
<th>ANALYZED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldicarb Sulfoxide</td>
<td>EPA 531.1</td>
<td>&lt;0.005</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>01/08/98</td>
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<tr>
<td>Aldicarb Sulfone</td>
<td>EPA 531.1</td>
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<td>01/08/98</td>
</tr>
<tr>
<td>Oxydemyl</td>
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<td>Methomyl</td>
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<td>3-Hydroxy Carbofuran</td>
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<td>01/08/98</td>
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<td>mg/L</td>
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<td>01/08/98</td>
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<tr>
<td>Carbofuran</td>
<td>EPA 531.1</td>
<td>&lt;0.0009</td>
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<td>Carbaryl</td>
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<td>&lt;0.005</td>
<td>mg/L</td>
<td>AZ0563</td>
<td>01/08/98</td>
</tr>
</tbody>
</table>

Robert V. Woods
Laboratory Director

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