

**ORGAN PIPE CACTUS NATIONAL MONUMENT
RESEARCH**

Project Title: Study of Ground Water Conditions at Quitobaquito Springs, OPCNM

Principal Investigator: Steven R. Anderson, US Geological Survey

Project Start Date: 1983

Project End Date: 19

CORRESPONDENCE

03/12/85	From: Chief, Water Resources Division To: District Chief, USGS, Water Resources Division Subject: Authority for USGS for the Study of Ground water Conditions at Quitobaquito Springs, Organ Pipe Cactus National Monument for FY 1985
06/12/84	From: Chief, Water Resources Branch To: District Chief, USGS Subject: Authority for USGS for study of ground water conditions at Quitobaquito Springs, Organ Pipe Cactus National Monument for FY 1984
12/30/83	From: General Supt., SOAR To: Regional Director, WR Subject: Proposed Land Exchanges at Organ Pipe Cactus National Monument
12/01/83	From: District Chief, Water Resources Division To: Regional Director, Division of Water Resources Subject: Long-Term Study at Quitobaquito - Funding Available
11/17/83	From: Acting Regional Director, WR To: USGS, District Chief, Water Resources Division Subject: Authorization for USGS Study of Quitobaquito Spring area, OPCNM, AZ
04/08/83	From: Acting Regional Director, WR To: USGS, District Chief, Water Resources Division Subject: Authorization for USGS for study of ground water conditions at Quitobaquito Springs and La Abra Plain, OPCNM, for FY83
07/20/81	From: Acting Regional Director, WR To: USGS, District Chief, Water Resources Division Subject: Authorization for USGS for study of ground water conditions at Quitobaquito Springs and La Abra Plain, OPCNM
03/13/83	From: To: FILE Subject: USGS Visit Documentation

PROPOSAL

Water Resources

Proposed by Chief, Division of Budget, WR

Project Leader: Steven R. Anderson, Hydrologist, USGS, Water Resources Division, Tucson, Arizona

MARGINS

MARGINS are changed by pressing SHFT-F8, then 3. Enter a number for the new left margin, then a number for the new right margin.

LINE SPACING

LINE SPACING is changed by pressing SHFT-F8, then 4. Enter a 1 for single-spacing, a 2 for double-spacing, etc.

JUSTIFICATION

Press CTRL-F8, then select choice 3 to turn off right justification, choice 4 to turn it back on.

CENTERING TEXT

To center a line of text, press SHFT-F6, enter the text to be centered on the line, and then press "Enter" to end centering.

You can also center existing text by blocking the text to be centered (see BLOCK OPERATIONS below) and then pressing SHFT-F6.

UNDERLINING TEXT

To underline a block of text, press F8, enter the text to be underlined, and then press F8 again to end underlining.

You can also underline existing text by blocking the text to be underlined (see BLOCK OPERATIONS below) and then pressing F8.

INDENTING TEXT

In many word processing situations, you want a short block of text to be indented relative to the rest of the document. To begin indenting, press F4. The cursor will move one tab stop to the right. Any subsequent text you enter will use this tab stop as a temporary left margin. To end indenting, press "Enter", and the cursor moves back to the original left margin.

Each time you press F4, the cursor moves another tab stop to the right and begins indenting. The right margin is not affected. If you wish to indent both left and right margins, press SHFT-F4.

CERTIFICATION/CONTRACT

FINANCIAL DOCUMENTATION

PERMITS

INVESTIGATOR'S ANNUAL REPORT

11/17/83 - Yearly Report submitted by Steven R. Anderson

FINAL REPORT

OTHER REPORTS

DATABASE

OTHER

Daily Discharge Data for Quitobaquito Spring through February 14, 1984

Provisional Data - Lukeville Well - 1983

Rough Draft - Quitobaquito Management

EDITING CODES

The REVEAL CODES key (ALT-F3) displays and allows you to edit codes defining underlining, justification, margin settings, etc.

After pressing ALT-F3, the screen is split into two parts. The top section displays a portion of your document. The bottom section displays the same text, but includes codes.

To delete a code, either move the cursor to the left of the code while watching the bottom half of the screen and press DEL, or move the cursor to the right of the code and press BS.

To leave Reveal Codes, press the space bar.

BLOCK OPERATIONS

To mark a block of text, place the cursor at the beginning of the block. Press ALT-F4. The "Block On" message will flash in the lower left hand corner of the screen. Move to the end of the block. Then:

To DELETE the block, press DEL, then Y.

To MOVE the block, press CTRL-F4, then 1. Move the cursor to the point where you want the block moved. Press CTRL-F4, then 5.

To COPY the block, press CTRL-F4, then 2. Move the cursor to the point where you want the block copied. Press CTRL-F4, then 5.

To SAVE the block as a separate file, press F10. You will be prompted for a filename.

Press the CANCEL key (F1) to start over if you make a mistake.

If you wish to perform any of the above block operations on a complete SENTENCE or PARAGRAPH, don't mark the block as above. Instead, move the cursor to the sentence or paragraph desired. Press CTRL-F4 and choose either 1 or 2 from the menu. (NOTE: you are NOT limited to just moving text, as the menu

L54 (479)
ORP1/USGS
X 444 52-7

March 12, 1985

RECEIVED	
Organ Pipe Cactus N.M.	
MAR 22 '85	
ACTION INFO	
	SUPERINTENDENT
	ADMIN. TECH.
	CH. RANGER
	RESOURCE MGMT.
	CH. MAINTENANCE
	INTERP. SUPERVISOR
	PARK RANGER
	PARK TECH.
	SHRUB
	CH
	FILE

MEMORANDUM

To: District Chief, U.S. Geological Survey
Water Resources Division, 301 West Congress
Tucson, Arizona 85701

From: Chief, Water Resources Division
Ft. Collins, CO

Subject: Authority for USGS for the study of ground water conditions at
Quitobaquito Springs, Organ Pipe Cactus National Monument for FY 1985

This responds to your memorandums of October 15, 1982 and September 21, 1984 on
the above subject. We request the U.S. Geological Survey to perform this work
in accordance with your proposal of October 15, 1982.

This memorandum may be considered your formal authority for this project in
accordance with our interagency agreement of June 1984.

As you know, the objective of the project is to provide data, the analysis of
which will allow future projections of the ground water conditions along the
international border--in particular at Lukeville, and regarding the flow at
Quitobaquito Springs. This project is as recommended in your reports of
February 1978 and August 1978.

We are pleased to advise that funds in the amount of \$8,100 are available to
cover the costs of the Survey's assistance in this project. The cost of the
program is on a reimbursable basis, based on actual cost, and will be paid upon
completion of the work. Please submit your bill, using the SISAC system, to
Chief, Water Resources Division, at the above address. The funds are being
reserved under the following account number.

Account No. 0479-0001-417 \$8,100
AIA No. 14-10-0000

During the course of this project, if you should have any questions in regard
to this program, please contact Gerard S. Witucki, (PIS) 555-8660, in San
Francisco.

To insure proper field protocol and coordination, we request that your
personnel continue to coordinate your field work with the park Superintendent,
Harold Smith, Organ Pipe Cactus NM, Route 1 Box 100, Ajo, AZ 85201, prior to
actually beginning any field work.

2

We request an annual summary of project efforts and results, and request that reports and data which relate to the assistance provided by the Survey be submitted to Chief, Water Resources Division, Ft. Collins, with a copy to the Regional Director, Western Region, for review and comment prior to any distribution. Requests from the Survey for National Park Service approval of Press Releases and/or reports for release to the open-file or other purposes can be given consideration at that time. Four copies of the final submittal should be sent to this office.

We would appreciate your prompt acknowledgement of this memorandum.

Your continued cooperation and assistance are appreciated.

Thomas W. Lucke

Thomas W. Lucke

cc: Regional Director, WRO
Superintendent, ORPI

June 12, 1984

LS4 (479)
ORPI/USGS

Memorandum

To: District Chief, U.S. Geological Survey, Water Resources Division,
301 West Congress, Tucson, Arizona 85701

From: Chief, Water Resources Branch
Ft. Collins, CO

Subject: Authority for USGS for study of ground water conditions at
Quitobaquito Springs, Organ Pipe Cactus National Monument for FY
1984.

This responds to your memoranda of October 15, 1982, and April 5, 1984, on the above subject. We request the Geological Survey to perform this work in accordance your proposal of October 15, 1982. This memorandum may be considered your formal authority for this program in accordance with our interagency agreement of April 1945.

As you know, the objective of the project is to provide data, the analysis of which will allow future projections of the ground conditions along the International Border--in particular at Lukeville, and regarding the flow at Quitobaquito Springs. This project is as recommended in your reports of February 1978, and August, 1978.

We are pleased to advise that funds in the amount of \$7,800 are available to cover the costs of the Survey's assistance in this project. The cost of the program is on a reimbursable basis, based on actual cost, and will be paid upon completion of the work and submission of Standard Form 1081 to the Chief, Water Services Unit, National Park Service, Federal Bldg., Rm. 335, 301 South Howes St., Ft. Collins, CO 80521. The funds are being reserved under the following account numbers:

Account No. 0479-0003-417 \$7,200
Account No. 0479-0002-189 \$600

During the course of this project, if you should have any questions in regard to this program, please contact Gerard S. Witucki, Branch of Water Resources, (415) 556-8660, at San Francisco.

To insure proper field protocol and coordination, we request that your personnel notify the park Superintendent, Harold Smith, Organ Pipe Cactus NM, Route 1 Box 100, Ajo, AZ 85321, prior to actually beginning any field work.

RECEIVED	
Organ Pipe Cactus, N. M.	
JUN 15 84	
ACTION INFO	NOTES
☐ SUPERINTENDENT	
☐ ADMIN. CLERK	
☐ CH. RANGER	
☒ RESOURCE MGR.	Bm
☐ CH. MAINTENANCE	
☐ INTER. SPECIAL	
☐ PARK RANGER	
☐ PARK TECH	
☐ SPMA	
☐ EO	
☒ FILE	

We request an annual summary of project efforts and results, and ask that reports and data which relate to the assistance provided by the Survey be submitted to the Chief, Water Services Unit, of this office, for review and comment prior to any distribution. Requests from the Survey for National Park Service approval of Press Releases and/or reports for release to the open-file for other purposes can be given consideration at that time. Four copies of the final submittal should be sent to this office.

We would appreciate your prompt acknowledgement of this memorandum.

Thank you for your continued cooperation and assistance.

/sgd/ Thomas W. Lucke

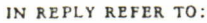
Thomas W. Lucke

bc: Regional Director, WRO

WASO Finance--please obligate \$7,200 against Acct. #0479-0003-417 and
\$600 against Acct. #0479-0002-189

✓ Superintendent, Organ Pipe Cactus NM
WRO-Witucki
0475 - Berte'

FNP:CPayne:pml:5/31/84:221-5341:05301oa.dft (ORPI)



NATIONAL PARK SERVICE
Southern Arizona Group
1115 N. 1st Street
Phoenix, Arizona 85004

L1425

December 30, 1983

Memorandum

To: Regional Director, Western Region

From: General Superintendent, Southern Arizona Group

Subject: Proposed land exchanges at Organ Pipe Cactus NM

In the last decade we have eliminated grazing and mining, established wilderness, fenced the boundary and mine shafts, and started on a resource recovery effort at Organ Pipe Cactus NM. I am pleased about these accomplishments. However, a serious problem remains -- the ownership of the Dowling Ranch and the Stack property by an inholder, Al Gay.

At the time the last of the Gray brothers died, Mr. Gay moved quickly and purchased the Dowling Ranch property. Both properties have water and are therefore easy to use for purposes that may not be in the interest of the monument. Moreover, the Puerto Blanco loop drive passes through a portion of the Dowling Ranch. It now hangs like a sword of Damocles over the National Park Service. We and our visitors are actually trespassing on his property.

I think we should get ownership of the Dowling Ranch and the property formerly owned by Will Stack. In addition to the trespass and possible adverse use considerations, the control of the water will assist in the monitoring of the water table level now threatened by pumping for farming immediately across the border in Mexico.

All this is for refreshing your memory and introducing the proposal recently made by Al Gay in a visit to Superintendent Harold Smith (see attached memo). The hooker is the restrictions we have imposed on ourselves in planning documents for Lukeville. I think we were all heavily influenced 10 years ago by Lyle McDowell's concern that the National Park Service should own all inholdings at Lukeville and lease them for operation by concessioners. My belief now is a concession operation would be a real headache; also, I doubt we could even justify funding for outright purchase. I favor an exchange of the former Kalil property for the Dowling Ranch and the Stack property. Because Customs has condemned some of Mr. Gay's prime property to build their facilities, he is squeezed for development space.

While it flies in the face of previous planning, the Kalil property is our trump card and logically should be used for commercial development. If we traded property, we would have all commercial use contained in a small, already biologically disturbed area. At the same time, we would make legal our use of the Dowling Ranch and control two important water sources.

John H. Clay

Enclosure

cc:
Supt., ORPI

Water Resources Division
301 W. Congress, Box FB-44
Tucson, Arizona 85701

RECEIVED	
Organ Pipe Cactus, N.M.	
DEC 5 - '83	
ACTION INFO	NOTED
☒ GOVERNMENT	☒
☒ ADVICE	☒
December 1, 1983	
☒ RESOURCE	☒
☒ MANAGEMENT	☒
☒ PLANNING	☒
☒ RESEARCH	☒
☒ EDUCATION	☒
☒ PUBLIC AFFAIRS	☒
☒ LEGAL	☒
☒ FINANCE	☒
☒ PERSONNEL	☒
☒ SAFETY	☒
☒ TRAVEL	☒
☒ UTILITIES	☒
☒ OTHER	☒

Regional Director
Division of Water Resources
National Park Service
Box 36063
450 Golden Gate Avenue
San Francisco, CA 94102

Dear Sir:

Additional funding was received by the U.S. Geological Survey, WRD, in 1983 to further study the geohydrology of the Quitobaquito Spring area of the Organ Pipe Cactus National Monument. The long-term study objectives are to determine the origins and mechanisms of springflows in the vicinity of Quitobaquito Spring, and the potential for ground-water pumpage in Mexico to adversely impact the springflow system. This letter summarizes the results of work accomplished in order to fulfill the study objectives as outlined in the project proposal dated June 2, 1983. In addition, the letter contains recommendations for further investigations of the area that are needed to accomplish the long-term study objectives.

Items 1,2,4, and 5 as listed in the approach section of the 1983 proposal were accomplished. Pozo Salado and Hocker Wells were not instrumented to monitor water-level changes (item 3) because bimonthly tape measurements of the levels over the past two years have documented that water levels in these wells have undergone only small seasonal changes. Furthermore, conditions that may lead to ground-water level changes in these wells, such as may occur as a result of ground-water pumpage in Mexico, may have little or no effect on spring flows as indicated by tentative results of the recent investigation, which suggests an alternative hypothesis of the spring-flow mechanism that was described by Anderson and Laney (1978). To ensure that conditions that lead to changes in ground-water levels at Pozo Salado and Hocker Wells have no effect on the monument spring-flow system, these wells will be instrumented should any significant changes in their water levels be detected during future bimonthly tape measurements.

The recent investigation focused primarily on detailed geologic mapping of the southern part of the Quitobaquito Hills, and on collection of ground water from the monument and Mexico for chemical analysis. Initial results of the geologic mapping suggest that both the lithology and fractures of the granitic rocks of the Quitobaquito Hills influence the location of springs and seeps and the amount of flow. Initial results of the water chemistry analyses suggest that spring water may be related to alluvial ground water northeast of the Quitobaquito Hills in the vicinity of Aguajita Wash and the mine shaft that lies to the north of Aguajita Spring.

- ① In 1983 a relation was observed between the quantity of flow of Quitobaquito and Aguajita Springs, and apparent changes in the ground-water level in the mine shaft. In June of 1983, the mine shaft was dry. The bottom of the shaft was 13 ft below land surface. In June of 1983, the discharge of Quitobaquito Spring at the weir was about 26 gallons per minute (gpm) and the flow of Aguajita Spring was estimated as much less than 1 gpm. In September of 1983 after heavy monsoon rains in July and August, the water level in the mine shaft was 6 ft below land surface. In August of 1983, the flow of Quitobaquito Spring at the weir was about 33 gpm. The flow may have been greater; it was observed in September that some flow had breached the channel leading to the weir. In September of 1983, the flow of Aguajita Spring was estimated as 3 to 5 gpm. The water level in the mine shaft apparently rose 7 ft and perhaps much more during the period affecting the discharge at Quitobaquito and Aguajita Springs. In December of 1976, the water level in the mine shaft was 18 ft below the land surface, the flow of Quitobaquito Spring at the weir was about 30 gpm, and the flow at Aguajita Spring was estimated as 5 gpm (R.L. Laney, written communication). It is possible, therefore, that the water-level rise in the mine shaft was greater than 12 ft during the 1983 summer rains. These relations assume that the
- ② water levels in the mine shaft are indicative of the surrounding ground-water levels, rather than perched water in the bottom of the shaft. The significance of these water-level fluctuations is critical to understanding the spring-flow system. It is also critical to quantify the flows of Quitobaquito and Aguajita Springs. Quitobaquito Spring is gaged, but the flow that is channeled to the weir often (7) breaches the conveyance system as a result of vegetation growth or other causes. It is mandatory to have local NPS personnel respond immediately to any observed diversions of water away from the weir if measurements are to have any long-term significance. Quantification of Aguajita Spring flows need to be addressed. It is likely that Quitobaquito and Aguajita Springs discharge water derived from a similar source because the temperatures and water chemistries of these springflows are similar. The temperatures are similar to those of ground-water sampled from wells in the vicinity
- ③

ditch above weir was cleaned of large quantities of sand (which had been deposited resulting from the h. rains) in October, 1983.

of the springs, and the flows of the springs apparently respond to changes in ground water levels along Aguajita Wash. In addition to the observed water level rise in the mine shaft during the summer of 1983, the water level in Bonita Well, which lies along Aguajita Wash about 4.5 miles to the northeast of the mine shaft, rose 6 ft from August to November of 1983.

The tentative results from this investigation indicate that granitic rocks may form a restriction to locally derived ground-water flowing through alluvium along the course of Aguajita Wash in the vicinity of the mine shaft. Granitic rocks outcrop to the west and east of the wash in the vicinity of the mine shaft. These rocks also outcrop in the wash between Aguajita Spring and the mine shaft. Area springs and seeps may be the result of fractures in the granitic rocks that act as conduits for ground-water flow. The fractures may allow ground-water from the porous and permeable alluvial "reservoir" to flow through the relatively impervious and impermeable crystalline rock "barrier." Because of this hydraulic connection, increases in ground-water levels in the alluvium near the mine shaft may result in periodic increased flow through numerous seeps and springs on the southwestern and southern extremities of the Quitobaquito Hills. The ultimate source of recharge to the alluvial aquifer is at this time still uncertain, but presumably is derived from the infiltration of rainfall and surface flow into the alluvium that lies to the north or northeast of the mine shaft in the vicinity of Cipriano Hills along Aguajita Wash.

Further study of the flow system is needed to document the relations described above. The following course of study is proposed, which is primarily local rather than regional in nature and is based on the results of recent observations.

1. Continue with systematic monitoring of water levels, springflow, and rainfall. Add bimonthly measurements of Aguajita Spring and continuous measurement of ground-water level fluctuations in a proposed well (or wells) near the mine shaft (item 2). Pozo Salado and Hocker Wells should be equipped with ground-water recorders in the event that ground-water levels in these wells are significantly affected by pumpage in Mexico, as indicated by future bimonthly tape measurements. \$10,000
2. Establish test well (or wells) in the vicinity of the mine shaft north of Aguajita Spring for determination of ground-water level fluctuations, water chemistry, and lithology and thickness of alluvial materials. The following options are proposed:
 - A. As a minimum effort, deepen and/or drive a sand point into the bottom of the mine shaft and install a ground-water recorder. An alternative is to auger a 30 ft well in the vicinity of the mine

shaft with a portable auger, and equip with recorder. These methods would provide ground-water level and chemistry information for a small expense and would have minimal environmental impact. However, the methods may not yield satisfactory data about the lithology and thickness of alluvial materials because of inherent depth limitations. Such data are needed to calibrate a proposed gravity survey of the area (item 3). It should be noted that it may not be feasible to auger or drive sand points if the alluvium contains large gravel or cobbles.

- B. Drill and case a small diameter well about 100 ft in depth in the vicinity of the mine shaft. The well would provide calibration data for the proposed gravity survey. A cased 8-inch diameter well could be equipped with a submersible pump in the event that emergency water is ever needed to supplement springflow into the pupfish pond.
 - C. Two additional test wells should be considered; one in the area north of the mine shaft just south of Cipriano Pass, and another in the area northeast of the mine shaft and southeast of the Cipriano Hills along Aguajita Wash near existing roads. These wells could be augered or drilled (as in options A and B) and would aid in defining sources of recharge, local ground-water gradients, and distribution and thickness of alluvial materials (if drilled rather than augered).
- 3. Conduct detailed gravity survey in the vicinity of Aguajita Wash from Aguajita Spring to the Cipriano Hills in order to estimate the thickness of the alluvial materials and, thus, the ground-water storage capacity. Five linear miles of gravity lines would adequately define the basin. A gravity survey would be done with portable equipment and would have no environmental impact.
 - 4. Periodically inventory irrigated acreage in Mexico near Quitobaquito Spring and La Abra Plain and relate to annual pumpage in Mexico and water-level declines in the monument. Would be accomplished by photogrammetric methods as required. May need additional aerial photography at later time to compare with 1983 color-IR photographs of Mexico and the monument to document changes through time.
 - 5. Collection and analysis of additional water samples that may be useful in defining the source and direction of movement of ground water upgradient from Quitobaquito Spring. Consider collection and analysis of additional ground-water samples from within the monument boundaries, and in Mexico for comparisons of regional water types and sources.

6. Conduct resistivity and seismic surveys in the vicinity of Aguajita Wash, especially if the proposed test-well drilling is not accomplished. These are alternative methods that may yield an estimate of ground-water levels in and storage capacity of the alluvial aquifer. The survey lines would approximate those of the proposed gravity survey. Seismic and resistivity surveys could be accomplished with portable equipment and would have negligible environmental impact.

The present data collection efforts (item 1) should be continued. Test-well drilling and associated monitoring of water levels (item 2) as well as the gravity survey, (item 3) and additional collection and analysis of ground-water samples (item 5) are logical next steps to aid in accomplishing the long-term objectives. The seismic and resistivity surveys (item 6), in conjunction with monitoring of head levels of the mine shaft, are alternative methods to items 2 and 3 should test-well drilling not be accomplished. These surveys also would enhance the proposed test-well drilling and gravity survey should they be accomplished. The estimated costs of these efforts are shown on the attached sheet.

The investigation of the Quitobaquito Spring area has progressed extremely well. The above suggested proposal for additional study will ultimately lead to a sound understanding of the geohydrologic framework of the Quitobaquito Spring area. If sufficient funding is available, a publication that outlines the origins and mechanisms of spring flows and the potential impact of ground-water pumpage in Mexico on those spring flows could be completed at the end of a two-year period. A well-illustrated water-supply paper or circular that is written so as to be easily understood by monument visitors might be an effective format for these study results. The estimated manpower costs for interpretation of data and preparation of such a report are included. There are numerous options for conducting future geohydrologic studies of the area depending on the available level of funding. A formal project proposal outlining all or parts of the above options will be sent at your request.

Sincerely yours,

Robert D. Mac Nish
District Chief

ATTACHMENT

cc: Gerald S. Witucki, National Park Service, San Francisco, CA

Harold J. Smith, National Park Service, Organ Pipe
Cactus National Monument, AZ

*Sam + Bill would
we should at
least get this*

Quitobaquito Spring—Additional Study Cost Estimates
(1984 dollars)

	<u>Dollars</u>
Continuation of basic data collection effort; includes monitoring of additional water levels at proposed well sites and Aguajita Spring.	10,000 per year
Test well (or wells)	
A. Augered (30 ft and cased)	1,000 each
B. Drilled (100 ft, 8-inch diameter and cased)	8,000 each
Gravity survey	4,000
Aerial photography	2,000
Water quality	7,000
Resistivity survey	4,000
Seismic survey	4,000
Report	
A. Salaries for hydrologist and geochemist; includes compilation, interpretation, and documentation of all pertinent data	30,000 to 50,000 depending on extent of investigation
B. Reports section and drafting, ADP support	10,000 to 15,000 depending on extent of investigation



United States Department of the Interior

* NATIONAL PARK SERVICE

WESTERN REGION

450 GOLDEN GATE AVENUE, BOX 36063
SAN FRANCISCO, CALIFORNIA 94102

RESOURCE
MANAGEMENT
OFFICE

IN REPLY REFER TO:

L54 (WR-RNW)

June 14, 1983

Steve Anderson
Jim Boles

Memorandum

To: U.S. Geological Survey, District Chief, Water Resources Division
301 West Congress, Tucson, Arizona 85701

From: ~~ACTING~~ Regional Director, Western Region

Subject: Authorization for U.S. Geological Survey study of Quitobaquito Spring area, Organ Pipe Cactus National Monument, Arizona

This responds to your letter of June 2, 1983, on the above subject. During fiscal year 1983, we request the Geological Survey to conduct the proposed study. This memorandum may be considered your formal authority for this program.

As you know, the basic objective of this project is to evaluate what, if any hydrologic effects will occur in the Quitobaquito Spring area due to ground water withdrawal in Mexico. This will further our previous effort as stated in your report: "Reconnaissance of ground-water conditions in the Quitobaquito Spring and La Abra Plain area, Organ Pipe Cactus National Monument, Arizona."

We are pleased to advise that funds in the amount of \$25,000 are available to cover the costs of the Survey's assistance in this project. The cost of the program is on a reimbursable basis, based on actual cost, and will be paid upon completion of the work and submission of Standard Form 1081. The funds are being reserved under the following appropriation:

Appropriation: 1431036

Account No.: 8094-2530-183 (In billing, please make reference to Miscellaneous Transaction (MT-806230282))

During the course of this project, if you should have any questions in regard to this program, please contact Gerard S. Witucki, Chief, Division of Water Resources (415) 556-8660, of this Office.

We request an annual summary of project efforts and results, and request that reports and data which relate to the assistance provided by the Survey be submitted to this Office for review and comment prior to final distribution. Requests from the Survey for National Park Service approval of reports for release to the open-file and for other purposes can be given consideration at that time. Four copies of the final submittal should be sent to this Office.

Your continued cooperation and assistance are greatly appreciated.

(sgd) W. Lowell White

cc:

Superintendent, Organ Pipe, w/inc.
General Superintendent, SOAR, w/inc.



United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division
301 W. Congress, Box FB-64
Tucson, Arizona 85704

RECEIVED
JUN 07 '83
JUN 2, 1983
WESTERN REGIONAL OFFICE
ACTION INFO INITIAL DATE
D DOE A O R EO DPA

Regional Director
Division of Water Resources
National Park Service
Box 36063
450 Golden Gate Avenue
San Francisco, CA 94102

Dear Sir:

Attached is a proposal for work to be accomplished in Organ Pipe Cactus National Monument during the present fiscal year. This represents what we feel is the best next step in attaining the long-term objective of defining the ground-water system near Quitobaquito Spring and evaluating possible impacts of ground-water development on the flow of the spring. The proposed work involves detailed geologic mapping, collection of water-quality data, and monitoring of water levels in two existing wells. The cost for this work is estimated to be \$20,000. Of the recommended follow-up work, we could sample a few additional wells, analyze for minor and trace elements, and possibly conduct one or two tests for age-dating the ground water for up to \$5,000 of additional funding.

The proposal indicates a slightly different direction than suggested in the reconnaissance report previously submitted (Anderson and Laney, 1978). The reason for this is based on the data collected subsequent to that report. We feel it is more important to obtain better information on the local geology of the Quitobaquito Hills because the ground-water flow may be principally controlled by the faults and fractures in the hardrock. Our recommendation of geophysical work in La Abra Plain still needs to be done and may be greatly enhanced by better documentation of the local geology. Geochemistry work may prove to be the best approach to defining the extent and workings of the ground-water system. So, at the present time, prioritizing any follow-up work should wait until that recommended herein is completed and fully analyzed.

Sincerely yours,

Joseph D. Camp
For Robert D. Mac Nish
District Chief

Attachments

cc: Gerard S. Witucki, National Park Service, San Francisco, CA

Quitobaquito Spring: Source of flow and possible
effects of ground-water withdrawal in
Mexico on the amount of flow

Background and problem

The potential effects of ground-water withdrawals in Mexico on the natural flow of Quitobaquito Spring are not known because the source of the flow is not clearly understood. A reconnaissance of the geologic and ground-water conditions was made of the area in 1976 and 1977 and hypotheses were made based on a small amount of data (Anderson and Laney, 1978). During 1981 the systematic monitoring of springflow, ground-water levels, and rainfall was begun to investigate possible relations between springflow and rainfall amounts and to document the effects of ground-water withdrawals on water levels in the National Monument.

Since the reconnaissance of the area in 1976 and 1977, there has been surficial geologic mapping and gravity and aeromagnetic surveys made by the U.S. Geological Survey. There also has been a vegetation survey and aerial photography of the area.

Objectives

The long-term objective of studying the geohydrology of the Quitobaquito Spring area is to evaluate the effects of ground-water withdrawals in Mexico on the natural flow of the Spring and on ground-water levels near the spring. As a step in attaining the long-term goal, detailed geologic mapping of the Quitobaquito Hills area needs to be done. This will provide documentation of the presence of secondary permeability features in the crystalline rocks that may serve as the major means of ground-water flow that culminates in discharge at the spring. Water-quality information may serve as the major tool in analysing the ground-water system.

Approach

- ✓ 1. Perform field reconnaissance and detailed field mapping of the geology in the Quitobaquito Hills to supplement the recent U.S. Geological Survey regional mapping (Haxel and Tosdal). Emphasis will be on definition of fracture patterns in the crystalline rock near the spring and to the north and east of the springs.
- ✓ 2. Collect water samples for chemical analysis from springs and wells not previously sampled and from several wells previously sampled. Analyse for common ions for comparison of waters from different formations. About 10 samples.

3. Install ground water recorders on Pozo Salado Well and Hocker Well. These well are near the border and in geohydrologic setting that may be influenced by Mexican pumpage on the ground water system near the spring. Changes in water levels may indicate possible effect of Mexican pumpage on the ground water system near the spring.
- ✓ 4. Literature Search - Biologic and Geohydrologic studies and information pertinent to Quitobaquito Spring flow need to be documented. Empahsis is on information obtained since Anderson and Laney Reconnaissance Report (1978).
 - A. Vegetation (Turner and Bowers, U of A and USGS)
 - B. Photography (Haxel and Harshbarger, USGS and Boundary Commission).
 - C. Gravity and aeromagnetic (USGS)
 - D. Surficial Geologic Mapping (Haxel and Tosdal, USGS)
- ✓ 5. Obtain infrared aerial photographs of crystalline rocks in spring area and Quitobaquito Hills and of irrigated acreage along border in Mexico. Photos are to be used to aid in the geologic mapping to determine the existence of vegetation lineaments that might correspond to geologic observations, and to document the nature and extent of irrigated acreage in Mexico.

Manpower

Geologist, GS-11 - 3 weeks
Geologist, GS-11 - 2 weeks
Geologist, GS-5 - 4 weeks
Typist, GS-5 - 1 day

Cost

\$20,000 for FY 83 (detailed costs shown on financial summary sheets)

Report

No formal report will result from this work. The information will be transmitted in letter form. Formal publication of the geologic map will be simultaneous with the publication of a summary of available hydrologic data and an analysis of the implications of that data.

Recommended follow-up work to accomplish the long-term objective:

1. Continue with systematic monitoring of water levels, springflow, and rainfall.
2. Periodically inventory irrigated acreage in Mexico near Quitobaquito Spring and La Abra Plain and relate to annual pumpage.

3. Conduct detailed gravity and resistivity surveys in the area of La Abra Plain to delineate extent of pediment and thickness of the alluvium in La Abra Plain.
4. Collect additional geochemical and hydraulic information that may be helpful in defining the source and direction of movement of ground water and the areal extent of the aquifer upgradient of Quitobaquito Springs.
5. Consider other methods that could yield information on the relative hydraulic conductivities and extent of the crystalline rocks, and alluvial sediments, including test-hole drilling.

During the course of the project, if you should have any questions in regard to this program, please contact Gerard S. Witucki, Chief, Division of Water Resources, (415) 556-8660, of this Office.

We request an annual summary of project efforts and results, and request that reports and data which relate to the assistance provided by the Survey be submitted to this Office for review and comment prior to final distribution. Requests from the Survey for National Park Service approval of reports for release to the open-file and for other purposes can be given consideration at that time. Four copies of the final submittal should be sent to this Office.

Your continued cooperation and assistance are greatly appreciated.

(Sgd) John D. Cherry

cc:

Superintendent, ORPI, w/c inc.

General Superintendent, SOAR, w/c inc.



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Water Resources Division
301 W. Congress, Box FB-44
Tucson, Arizona 85701

October 15, 1982

Memorandum

To: Gerard S. Witucki, Division of Water Resources,
National Park Service, San Francisco, CA

From: Associate District Chief, WRD, Tucson, AZ

Subject: PROGRAMS AND PLANS—Quitobaquito Spring Study
for Fiscal Year 1983.

Plans for the Quitobaquito Spring Study for fiscal year
1983 include the following:

1. Prepare a summary of data collected during the
1982 fiscal year.
2. Continue the streamflow record collection on
Quitobaquito Spring.
3. Continue operation of a water-level recorder on
the well at Lukeville and recording rain gages
at two sites.
5. Continue operation of the crest-stage gage at
Alamo Wash tributary.

The funding needed to accomplish the work outlined above
is \$7,200. Please send a letter to us authorizing these
funds no later than December 1, 1982. Our manpower re-
sources are being stretched pretty thin and we need a firm
commitment to continue operation of this project.

Joseph D. Camp
Joseph D. Camp

LS4
ORPI/USGS
(WR)RNW

July 20, 1981



Memorandum

To: U.S. Geological Survey, District Chief, Water Resources
Division, 301 West Congress, Tucson, Arizona, 85701

From: ~~ACTING~~ Regional Director, Western Region

Subject: Authorization for U.S. Geological Survey for study of ground water
conditions at Quitobaquito Springs and La Abra Plain, Organ Pipe Cactus
National Monument

This responds to your memorandum of June 24, 1981, on the above subject. We request the Geological Survey to perform this work in accordance with your proposal of June 14, 1981. Further, this memorandum may be considered your formal authority for this program.

As you know, the objectives of the project is to provide data, the analysis of which will allow future projections of the ground conditions along the International Border--in particular at Lukeville, and regarding the flow at Quitobaquito Springs. This project is as recommended in your reports of February 1978 and August 1978 and should be in accordance with your recent memorandum of June 24, 1981.

We are pleased to advise that funds in the amount of \$7,000 are available to cover the Survey's assistance in this project for the remainder of this fiscal year. The cost of this study is on a reimbursable basis, based upon actual cost, and will be paid upon the completion of the work and submission of Standard Form 1081. The funds are reserved under the following appropriation:

Appropriation: 1411036
Account No. 8094-1113-180 (In billing, please make reference to
Miscellaneous Transaction (MT) 8062-1-0300)

During the course of the project, if you should have any questions in regard to this program, please contact Gerard S. Witucki, Chief, Division of Water Resources, (415) 556-8660, of this Office.

We request that reports and data which relate to the assistance provided by the Survey be submitted to this Office for review and comment prior to final distribution. Requests from the Survey for the National Park Service approval of reports and data for release to the open-file and for other purposes can be given consideration at that time. Five copies of the final submittal should be sent to this Office.

Your continued cooperation and assistance are greatly appreciated.

(SGD) JOHN H. DAVIS

cc: Superintendent, ORPI, w/c inc.
General Superintendent, SOAR, w/c inc.



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
301 W. Congress, Box FB-44
Tucson, Arizona 85701

June 24, 1981

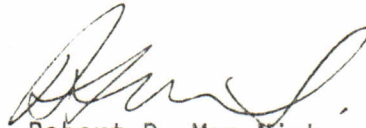
Memorandum

TO: Gerald S. Witucki, Chief, Water Resources,
Western Region, National Park Service,
San Francisco, CA

FROM: District Chief, WRD, Tucson, AZ

SUBJECT: PROGRAMS AND PLANS: Program proposal for Quitobaquito
Spring study

Enclosed is our program proposal for a study of the "Ground-water conditions around Quitobaquito Spring and in La Abra Plain, Organ Pipe Cactus National Monument, Pima County, Arizona." Included are the estimated costs associated with the study for the current, 1982, and 1983 fiscal years.


Robert D. Mac Nish

Enclosure

PROGRAM PROPOSAL

Ground-water Conditions Around Quitobaquito Spring and in La Abra Plain, Organ Pipe Cactus National Monument, Pima County, Arizona

Quitobaquito Spring is in Organ Pipe Cactus National Monument, Pima County, in southern Arizona. The spring is near the south end of the northwest - trending Quitobaquito Hills and less than one-quarter mile north of the international boundary between the United States and Mexico. La Abra Plain is east of the Quitobaquito Hills and slopes greatly toward the southwest. The plain extends into Mexico and is drained by the Sonoita River, which is just south of and approximately parallel with the west-northwest trending international boundary. For further information, see "Reconnaissance of ground-water conditions in the Quitobaquito Spring and La Abra Plain area, Organ Pipe National Monument, Arizona" by T. W. Anderson and R. L. Laney (February 1978).

PROBLEM:

Quitobaquito Spring serves as habitat for the rare desert pupfish (Cyprinodon ^{la} Mocularius), and concern has been expressed about the possible effects of ground-water withdrawals adjacent to the area, in Mexico, on the spring flow. The ground water apparently moves southwesterly across at least the northern part of La Abra Plain, through the well-fractured granitic gneiss of Quitobaquito Hills, and at least part of the down-valley flow is discharged at Quitobaquito and other springs in the immediate area.

OBJECTIVES:

The objectives of this study are to:

1. Continuously monitor the flow of Quitobaquito Spring, and the rainfall in the La Abra Plain area, for a sufficient time to allow development of possible rainfall-discharge relations. Periodic measurement of the flow of the other springs will also be made.
2. Define the seasonal water-level fluctuations at each of seven sites (Pozo Salado, Bonita Well, the mine shaft, Hocker Well, Corner Well, and wells at Lukeville and Blankenship).
3. Using several years of data from the monitoring program prepare a report describing the ground-water conditions.

APPROACH:

1. Continuously monitor the flow of Quitobaquito Spring and measure the rainfall using a rain gage (possibly two) in the La Abra Plain area. Periodically measure discharge of other springs in the area. A crest-stage gage at Alamo Wash tributary will be reactivated to record peak stages from runoff events.
2. Make bimonthly water-level measurements for a year at seven sites to determine seasonal fluctuations, with semi-annual measurements obtained in subsequent years.
3. Summarize the data collected in a brief annual informal report.
4. The data collected should be analyzed after several years to determine the need for continued monitoring. The analysis would be a function of what the data indicate.

PLANNED PUBLICATIONS:

1. Data collected each water year will be summarized annually in a brief, informal report. The first report will summarize the data collected from gage installation thru September 1982.
2. An analysis will be prepared after several years of data have been collected. The results will be presented in an open-file report.

COST ESTIMATE:

FY 1981:

Construct a streamflow gage on Quitobaquito Spring, install a rain gage, and re-activate crest-stage gage on Alamo Wash tributary near Ajo -----	\$3,500
Reconnaissance for consturction and start- up costs -----	3,000
First trip to measure wells and other springs (August or September 1981) -----	500
Fiscal Year 1981 TOTAL	<u>\$7,000</u>

FY 1982 (includes inflation estimate):

First full year operation of stream gage, rain gage, and crest-stage gage -----	\$3,300
Obtain summer and winter water quality samples of Quitobaquito Spring for standard analysis (Schedule 11) -----	200
Bimonthly (6) measurements of wells and springs -----	2,500
Fiscal Year 1982 TOTAL	<u>\$6,000</u>

FY 1983:

Data summary (annual informal report including all data thru Sept. 30, 1982)	----- \$ 400
Second full year operation of stream gage, rain gage, and crest-stage gage	----- 3,800
Semi-annual (2) measurements of wells and springs	----- 1,000
Fiscal Year 1983 TOTAL	\$5,200

FY 1984:

No cost estimate made because data collected during the previous years may be adequate to make an analysis. If data are not of sufficient length or significance, another year of data collection may be necessary.

NOTES TO FILE

USGS, JEFF BABBY WAS IN ORPI MARCH 13, ¹⁹⁸³ AND THAT
EVENING, TAKING WELL DEPTHS, QUITOBAQUITO WIER, AND RAINGAGES AT AGUAJITA AND
BONITA WELL.

USGS, SAM JONES WAS IN ORPI, FEBRUARY 15, 1983,
TAKING WELL DEPTHS, QUITOBAQUITO WIER READINGS, + RAINGAGES AT
AGUAJITA AND BONITA WELL.

PROGRAM CHANGE/INNOVATION PROPOSAL

WR 83-3

TITLE OF PROPOSED PROJECT

Water Resources

PROPOSED BY *W. N. Pathe* 4/8/83
Chief, Division of Budget, Western Region

ACTION INFO

TYPE OF ACTION

☐ Innovation ☒ Modification

IMPACT ON EXISTING PROGRAM:

☐ New Money ☒ Deferred Work

DATE

March 28, 1983

PART I

PROPOSAL

This proposal is submitted to: 1) readjust funds so that the original estimates of project costs will now match updated U.S. Geological Survey proposals (Death Valley package 151, Death Valley package 819, Montezuma Castle package 804, Organ Pipe Cactus package 803, Santa Monica Mountains package 801, Yosemite package 819, and John Muir package 140); and 2) readjust funds so that the Grand Canyon project now reflects the funding agreed upon with the park. SEE ATTACHED PROPOSAL SHEETS.

NEED

We are not requesting additional funding at this time. This PC/IP does not concern any non-previously submitted project proposal.

IMPACT

The present reduction in program funding necessitates the postponement of one of our lowest priority projects for this fiscal year (Devils Hole). This option was chosen since, at this time, we have no firm proposal for this project. Additionally, it is one of the lowest priorities.

BENEFITS

This program will best cover the needs of the Western Region, without requesting more funds, by allowing us to fund all but one of our approved projects this fiscal year.

COSTS

- (Check One)
- ☐ Preliminary Study
- ☐ Total Proposed Project

MAN-YEARS

TOTAL COST

SOURCE OF FUNDING

0

PWE 417 and PWE 414

CONCURRING OFFICIAL (Sig. & Title)

(Date)

(Priority)

No DSC involvement

ASSISTANT DIRECTOR

(Signature)

(Date)

David S. Smith 4/20/83

ASSISTANT DIRECTOR (Signature & Date)

David Wright 4.22.83

ACTING DEPUTY

Charles T. Albright 4/20/83

(Refer to Form 10-239a for Instructions)

PROPOSAL

<u>Park, Pkg and Title</u>	<u>Prior Status</u>	<u>Increase</u>	<u>Decrease</u>	<u>Now Stands</u>
✓ Death Valley, Pkg 151 Environmental Implications of Groundwater Withdrawal at Stovepipe Wells O-81-8130-420 8094-1301-417	13,000	3,880✓	0	16,880✓
✓ Death Valley, Pkg 819 Spring Flow and Water Use Surveillance at Furnace Creek O-81-8130-406 8094-1302-417	3,500	300✓	0	3,800✓
✓ Montezuma Castle, Pkg 804 Environmental Implications of Recent Housing Development O-81-8650-404 8094-1303-417	2,000	0	150	1,850✓
✓ Organ Pipe Cactus, Pkg 803 Interrelationship of Flow at Quitobaquito Springs/Rainfall La Abra Plain/Groundwater -81-8660-404 8094-1304-417	7,000	200✓	0	7,200✓
✓ Grand Canyon, Pkg 819 Water Resources Management Plan O-81-8210-402 8213-2500-417	25,000	0	2,130	22,870✓
✓ Santa Monica Mountains, Pkg 801 Water Resources Management Plan O-81-8540-403 8094-1305-417	25,000	0	0	25,000✓
✓ Yosemite, Pkg 819 Water Resources Management Plan O-81-8800-101 8094-1306-417	15,000	0	0	15,000✓
✓ Death Valley, Pkg 839 Radioactive Contamination and Environmental Implications of Fort Irwin Development O-81-8130-425	6,000	0	6,000	0

PROPOSAL

<u>Park, Pkg and Title</u>	<u>Prior Status</u>	<u>Increase</u>	<u>Decrease</u>	<u>Now Stands</u>
John Muir, Pkg 140 Flood Hazard Study of Franklin Creek 0-81-8510-400	10,000	3,900	0	13,900
Operating Program 0-81- 8094-1083-414	124,900	0	0	124,900*
	231,400	8,280	8,280	231,400

* 124,900 (PWE 414)
+ 20,700 (Regional Reserves)

145,600 (Operating Program)

PROJECT TITLE:

Geohydrologic investigation of Quitobaquito Spring area

PROJECT LEADER: Steven R. Anderson
(NAME/ADDRESS) U.S. Geological Survey
Water Resources Division
Federal Building
301 W. Congress
Tucson, Arizona 85701

NAME OF PARK AREA:

Organ Pipe National Monument, Arizona

NPS CONTRACT NUMBER:
(IF APPLICABLE)

DATE PROJECT STARTED:

July, 1983 (continuation of earlier investigations)

ANTICIPATED TERMINATION DATE:

Dependent upon USGS and NPS choice of additional study options, and the need for a minimum of an additional two years of data collection.

RESEARCH OBJECTIVES:

1. Determine the origins and mechanisms of springflow in the vicinity of Quitobaquito Spring, Organ Pipe National Monument.
2. Determine the potential impact of ground-water pumpage in Mexico on monument springflows.

PROGRESS TO DATE:

1. Administrative report entitled "Reconnaissance of ground-water conditions in the Quitobaquito Spring and LaAbra Plain area (1978)
2. Continued data collection of springflow quantity, ground-water levels, and precipitation.
3. Mapped detailed lithologies and fractures in the crystalline rocks of the southern part of the Quitobaquito Hills.
4. Analyzed additional water samples from several wells in the monument and in Mexico.

PLANS FOR NEXT YEAR:

1. Continue data collection effort.
2. Dependent upon forthcoming USGS and NPS choice of additional study options.

SUBMITTED BY: John K. Collins

DATE: 11/17/83



United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division
301 W. Congress, Box FB-44
Tucson, Arizona 85701

November 17, 1983

Harold J. Smith
National Park Service
Organ Pipe Cactus
National Monument
Route 1, Box 100
Ajo, Arizona 85321

*see project proposal (adjacent folder flap, by
Steve R. Anderson. Copy also attached).*

Dear Mr. Smith:

Enclosed is the completed yearly report form for the progress and plans of the geohydrologic study of the Quitobaquito Spring area. A letter concerning the recent geohydrologic investigation of the area is being routed through the Regional Director of Water Resources in San Francisco. The letter contains suggestions for further study based on recent observations.

Thanks for your assistance during our recent visits to the area. Your cooperation enabled a timely completion of the latest phase of the investigation.

Sincerely yours,

Steven R. Anderson
Hydrologist

Enclosure

PROJECT TITLE:

Geohydrologic investigation of Quitobaquito Spring area

PROJECT LEADER: Steven R. Anderson
(NAME/ADDRESS) U.S. Geological Survey
Water Resources Division
Federal Building
301 W. Congress
Tucson, Arizona 85701

NAME OF PARK AREA:

Organ Pipe National Monument, Arizona

NPS CONTRACT NUMBER:
(IF APPLICABLE)

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4. Analyzed additional water samples from several wells in the monument and in Mexico.

PLANS FOR NEXT YEAR:

1. Continue data collection effort.
2. Dependent upon forthcoming USGS and NPS choice of additional study options.

SUBMITTED BY: _____

DATE: _____



United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division
301 W. Congress, Box FB-44
Tucson, Arizona 85701

May 14, 1984

Mr. Bill Mikus
Organ Pipe Cactus
National Monument
Rt. 1, Box 100
Ajo, AZ 85321

Dear Mr. Mikus:

Enclosed are the daily discharge data for Quitobaquito Spring through February 14, 1984 as requested. Field data for the period February 14-May 9 are being collected this week. After processing of the gage-height records, an updated summary of daily discharges will be forwarded.

I have also enclosed copies of water-quality analyses for nine sites in the National Monument. The samples were collected as part of our field reconnaissance during the summer of 1983. If you have any questions, please call me.

Sincerely yours,

Tom. Welles

Thomas W. Anderson
Subdistrict Chief

Enclosures

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY

PROCESS DATE IS 04-16-84

STATION NUMBER 0953500
LATITUDE 415647

LONGITUDE 1170110

OUTCROUGHT SPRING NEAR LUKEVILLE, AZ
DRAINAGE AREA

NATUM 1080.00
SOURCE AGENCY USGS
STATE 04 COUNTY 019

OUTCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
2	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
3	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
4	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
5	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
6	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
7	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
8	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
9	.09	.06	.08	.07	.07	.07	.08	.08	.08	.08	.08	.08
10	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
11	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
12	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
13	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
14	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
15	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
16	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
17	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
18	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
19	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
20	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
21	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
22	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
23	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
24	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
25	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
26	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
27	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
28	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
29	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
30	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
31	.08	.06	.07	.07	.07	.07	.08	.08	.08	.08	.08	.08
TOTAL	2.57	2.40	2.26	2.23	---	---	---	---	---	---	---	---
MEAN	.083	.080	.073	.072	---	---	---	---	---	---	---	---
MAX	.09	.08	.08	.08	---	---	---	---	---	---	---	---
MIN	.08	.07	.07	.07	---	---	---	---	---	---	---	---
AC-FT	5.1	4.8	4.5	4.4	---	---	---	---	---	---	---	---
CAL YR 1983	TOTAL 25.73	MEAN .070	MAX .09	MIN .07	AC-FT 51							

EARLY MAR COLLECTED
GOOD CLEANED
SPRINGS + SPRING CHANNELS
FEB. 3, 1984.

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY

PROCESS DATE IS 04-20-84

STATION NUMBER 49335900
LATITUDE 315047EQUIDISTANT SPRING NEAR LUMEVILLE, AZ
LONGITUDE 1130110 DRAINAGE AREASPRING SOURCE AGENCY USGS
DATUM 1080.00 STATE 04 COUNTY 019DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	UC1	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.06	.05	.07	.08	.08	.09	.08	.07	.06	.05	.05	.05
2	.06	.05	.07	.08	.08	.09	.07	.07	.06	.05	.05	.07
3	.06	.05	.07	.08	.08	.09	.07	.07	.06	.05	.05	.07
4	.06	.06	.07	.08	.08	.09	.07	.07	.06	.05	.05	.07
5	.06	.06	.07	.08	.09	.09	.07	.07	.06	.05	.05	.07
6	.06	.06	.07	.08	.09	.09	.07	.07	.06	.05	.05	.07
7	.06	.06	.07	.08	.08	.09	.07	.07	.06	.05	.05	.07
8	.06	.06	.07	.08	.08	.09	.07	.07	.06	.05	.05	.07
9	.06	.06	.07	.08	.08	.09	.07	.07	.06	.05	.05	.07
10	.06	.07	.08	.08	.08	.09	.07	.07	.06	.05	.05	.07
11	.06	.07	.08	.08	.08	.09	.07	.07	.06	.05	.05	.07
12	.06	.07	.08	.08	.08	.09	.07	.07	.06	.05	.05	.07
13	.06	.07	.08	.08	.08	.09	.07	.07	.06	.05	.05	.07
14	.06	.07	.08	.08	.08	.09	.07	.07	.06	.05	.05	.07
15	.06	.07	.08	.08	.08	.09	.07	.07	.06	.05	.05	.07
16	.07	.07	.09	.07	.09	.08	.07	.06	.06	.05	.05	.07
17	.06	.07	.09	.07	.09	.08	.07	.06	.06	.05	.05	.07
18	.06	.07	.09	.07	.09	.08	.07	.06	.06	.05	.05	.07
19	.06	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
20	.07	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
21	.07	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
22	.07	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
23	.07	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
24	.07	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
25	.07	.07	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
26	.07	.06	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
27	.06	.06	.08	.07	.09	.08	.07	.06	.06	.05	.05	.07
28	.06	.06	.07	.07	.09	.08	.07	.06	.06	.05	.05	.07
29	.06	.06	.07	.07	.09	.08	.07	.06	.06	.05	.05	.07
30	.06	.06	.07	.07	.09	.08	.07	.06	.06	.05	.05	.07
31	.06	---	.07	.08	---	.08	---	.06	---	.05	.04	---
TOTAL	1.94	1.93	2.40	2.33	2.41	2.62	2.11	2.00	1.80	1.64	1.50	2.09
MEAN	.063	.064	.077	.075	.086	.085	.070	.065	.060	.053	.048	.070
MAX	.07	.07	.09	.08	.09	.09	.08	.07	.06	.05	.05	.05
MIN	.06	.05	.07	.07	.06	.08	.07	.06	.06	.05	.03	.05
AC-FT	3.8	3.8	4.8	4.6	4.6	5.2	4.2	4.0	3.6	3.3	3.0	4.1
CAL YR 1982	TOTAL 22.27	MEAN .061	MAX .09	MIN .03	AC-FT 44							
WIR YR 1983	TOTAL 24.71	MEAN .066	MAX .09	MIN .03	AC-FT 49							

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY AND
CENTRAL LABORATORY, DENVER, COLORADO

(C-17-7) 24 cdd
Pozo SALADO

LABORATORY ANALYTICAL SHEET FOR LAB-10 3216121 RECORD-N 52476

STATION ID: 3155331256401 COLLECTED: BEGIN DATE 03/07/70 END DATE TIME LAT-LONG: STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GTH. UNIT: 235.05
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE. STATUS: 1 SOURCE: 9 HYD. CONDITION: 9 SAMPLE TYPE: 9 HYD. EVENT: 9 PROJECT/ACCT-NR: 470400212 COST: 235.05
SAMPLE MEDIUM: 6 STATUS: 1 SOURCE: 9 HYD. CONDITION: 9 SAMPLE TYPE: 9 HYD. EVENT: 9 PROJECT/ACCT-NR: 470400212 COST: 235.05
COMMENT: 1 (1 INDICATES LAB-CODE CHANGE)
UNIQUE NUMBER REQUESTED: SCHEDULES USED: 651 11 0 0 TOTAL PARAMETERS: 30
WATSTORE STORAGE WAS REQUESTED. HEADLINE INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WATSTORE. PLEASE CHECK HEADER.
PRINTED ON 09/03/83 FIRST RETRIEVAL "LABPRIM" 09/03/83 F. MOORETSON

NAME	AMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	AMK/VALUE	UNITS	METHOD	W-CODE	LC
ALUMINUM, DIS.	239	MG/L	1-2050-76	90410	70	MANGANESE, DISSOLV.	3600	MG/L	1-1454-76	1056	42
ANALYZING AGENCY	80020	UG/L	1-1052-76	1106	4	MERCURY, DISSOLVED	0.2	UG/L	1-2462-76	71690	220
ARGONIC, DISSOLVED	17	UG/L	1-2062-76	1000	112	METALS DIS. CHE-EXT	1	MG/L	1-2545-76	631	220
BARIUM, DIS.	100	UG/L	1-1064-76	1005	7	NITR DIS. NO2+NO3 -N	1.3	MG/L	1-2507-81	403	68
BORON, DISSOLV.	4400	UG/L	1-1114-82	1020	1163	PM (LABORATORY)	7.9	MG/L	1-1586-77	400	51
CADMIUM, DIS.	1	UG/L	1-1136-76	1025	73	PH FIELD	0.15	MG/L	1-2601-76	471	162
CALCIUM, DISSOLV.	360	MG/L	1-1152-76	915	12	PHOS DIS. URTHO AS P	8.1	MG/L	1-1650-76	954	54
CENTRAL LAB-10-N	3216121			99998	1500	POTASSIUM, DISSOLVED	8720	MG/L	1-1751-78	70501	26
CHLORIDE, DISSOLVED	4200	MG/L	1-2187-76	940	13	RESIDUE DIS. CALC SUM	5	MG/L	1-2687-76	1145	87
CHROMIUM, DIS.	1	UG/L	1-2327-76	1032	16	SELENIUM, DISSOLVED	33	MG/L	1-2700-76	955	56
FLUORIDE, DISSOLVED	5.4	MG/L	1-2327-76	950	31	SILICA, DIS.	25	MG/L	1-1735-78	931	57
HAZARDNESS	1900	MG/L	1-1340-76	900	33	SODIUM, ABSORP. RATIO	74	MG/L	1-1740-76	932	60
HAZARDNESS N.CARB. L-EP	1700	MG/L		95902	1181	SODIUM, PERCENT	14000	UNITS	1-1780-77	945	21
IRON, DIS.	20	UG/L	1-1361-76	1046	172	SP. CONDUCTANCE LAB	13000	UNITS	1-2761-A1	90095	69
LEAD, DIS.	2	UG/L	1-1400-76	1049	38	SILICONIUM, DIS.	4600	MG/L	1-1800-76	1080	62
LITHIUM, DISSOLV.	210	UG/L	1-1425-76	1130	39	SULFATE, TURB. DIS.	1200	MG/L		945	1200
MAGNESIUM, DISSOLV.	230	MG/L	1-1447-76	925	40						

CATIONS	(MG/L)	(MG/L)
CALCIUM, DISSOLV.	360	18.962
MAGNESIUM, DISSOLV.	230	16.927
POTASSIUM, DISSOLVED	8.1	0.207
SODIUM, DIS.	2500	108.750

ANIONS	(MG/L)	(MG/L)
CHLORIDE, DISSOLVED	4200	118.982
FLUORIDE, DISSOLVED	5.4	0.284
ALK. TOT. LAB. CACOD	239	4.775
NITR. DIS. NO2+NO3 -N	1.3	0.093
SULFATE, TURB. DIS.	1200	24.964

TOTAL 146.860
PERCENT DIFFERENCE = -0.60

TOTAL 148.610

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRD
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3199102 RECORD-# 49090

STATION-ID: 315533112562401 COLLECTED: BEGIN DATE 030707 TIME END DATE TIME LAT-LONG-SECT: 315533 1125624 01
NAME: C-17-07 24CUD STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO.UNIT: 95.00
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 95.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED U 0 0 0 TOTAL PARAMETERS 7
WATSTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SECT-#.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LABPRIM" 10/21/83 F.ROBERTSON

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	0 16/16 SIRA PER MIL	-7.0	UNITS	-	82085	489
CENTRAL LAB-ID-#	3199102	-	-	99996	1500	PH FIELD	8.4	UNITS I-1586-77	-	400	51
DEUTERIUM/H RAT. D/H	-53.5	-	-	82082	300	SP. CONDUCTANCE FLD	1400	UMHOS I-1780-77	-	95	21
						WATER TEMPERATURE	24.5	DEG C	-	10	64

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRO
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3196049 RECORD-# 4877

STATION-10: 320100113020001 COLLECTED: BEGIN DATE 830707 TIME END DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ARIZONA
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACT-#: 470400212 COST: 195.00
COMMENTS: SCHEDULES USED 0 0 0 TOTAL PARAMETERS 8
UNIQUE NUMBER REQUESTED
WATSTORE STORAGE WAS REQUESTED. HEADING INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WATSTORE. PLEASE CHECK HEADER.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LABPRIM" 10/21/83 F.KOBERTSON. NO SRC12 ADDED.

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	C 18/16 SIRA PER MIL	-7.0	UNITS I-1506-77	82085	489	
CARBON-13/12 (RATIO)	-11.5	-	-	82081	440	PH FIELD	8.1	UMHOS I-1780-77	400	51	
CENTRAL LAB-ID-#	3196049	-	-	99998	1500	SP. CONDUCTANCE FLD	2130	DEG C	95	21	
DEUTERIUM/H RAT. D/H	-52.5	-	-	82082	300	WATER TEMPERATURE	28.5		10	64	

*Lab records give the location of this well as (C-16-8) 24 dda 2. The discrepancy in location probably resulted because this area of the park is unsurveyed leaving section lines arbitrary.
5/29/84*

(C-16-8) 24 dda
Pogo Mueo Well

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WMD
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-10 3273016 RECORD-# 05702

(C-17-7) 17 bar
Mine shaft near
Jenkins well

STATION-10: 315709113002901 COLLECTED: BEGIN DATE 030920 TIME 1:00 END DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ARIZONA
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD. CONDITION: 9 SAMPLE TYPE: 9 HYD. EVENTS: 9 PROJECT/ACCT-#: 470400212 COST: 77.95
COMMENTS: (* INDICATES LAB-CODE CHANGE)
UNIQUE NUMBER REQUESTED SCHEDULES USED 11 0 0 0 TOTAL PARAMETERS 23
NOTE: THIS SAMPLE WAS LOGGED IN AS "X" TYPE DATA AND WILL NOT TRANSFER TO WATSTORE. "0" IN COL(51) OF AN "A" CARD CHANGES DISP.
PRINTED ON 11/11/83 FIRST RETRIEVAL "LABPRIN" 11/11/83 F. ROBERTSON FC SENT SEPARATE

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CAC03	393	MG/L	I-2030-78	90410	70	MANGANESE, DISSOLV.	560	UG/L	I-1454-78	1056	42
ANALYZING AGENCY	60020			28	91	NITR DIS NO2+NO3 -N	0.39	MG/L	I-2545-78	631	228
BORON, DISSOLV.	1500	UG/L	I-1114-82	1020	1183*	PH (LABORATORY)	7.8	UNITS	I-2587-81	403	68
CALCIUM, DISSOLV.	31	MG/L	I-1152-78	915	12	PHOS DIS ORTHO AS P	0.53	MG/L	I-2601-78	671	162
CENTRAL LAB-10-#	3273016			99998	1500	POTASSIUM, DISSOLVED	9.2	MG/L	I-1630-78	955	54
CHLORIDE, DISSOLVED	300	MG/L	I-2187-78	940	15	RESIDUE DIS CALC 8UM	1070	MG/L	I-1751-78	70301	28
FLUORIDE, DISSOLVED	1.6	MG/L	I-2327-78	950	31	SILICA, DIS.	26	MG/L	I-2700-78	955	56
HARDNESS	93	MG/L	I-1380-78	900	33	SODIUM, ABSORP RATIO	16			931	57
HARDNESS N.CARB L-EP	0	MG/L		95902	1161	SODIUM, DIS.	360	MG/L	I-1735-78	930	59
IRON, DIS.	450	UG/L	I-1381-78	1046	172	SODIUM, PERCENT	68	X	I-1740-78	932	60
MAGNESIUM, DISSOLV.	3.7	MG/L	I-1447-78	925	40	SP. CONDUCTANCE LAB	1840	UMHOS	I-2781-81	90095	69
						SULFATE, TURB. DIS.	100	MG/L		945	1200

TOTAL 17.747

TOTAL 18.509

PERCENT DIFFERENCE = -2.10

CATIONS
CALCIUM, DISSOLV.
MAGNESIUM, DISSOLV.
POTASSIUM, DISSOLVED
SODIUM, DIS.

(MG/L)
31
3.7
9.2
360

ANIONS
CHLORIDE, DISSOLVED
FLUORIDE, DISSOLVED
ALK TOT LAB. CAC03
NITR DIS NO2+NO3 -N
SULFATE, TURB. DIS.

(MG/L)
300
1.6
393
0.39
100

QUALITY CONTROL INFORMATION FOR LAB_10-# 3273018 RECORD-# 65702

VERIFIED. MANGANESE, DISSOLV. VALUE > LIMIT 200 P=01056

*THE PERCENT DIFFERENCE COMPUTED FOR THE ANALYSIS DOES NOT AGREE WITH THE CURVE VALUE =

1.9956

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
CENTRAL LABORATORY, DENVER, COLORADO

(C-16-7) 1c unsurveyed
Acuna well

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3216122 RECORD-# 52479

STATION-10: 320335112562001 COLLECTED: BEGIN DATE 8/30/08 TIME 1200 END DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ARIZONA LAT-LONG-SECT: *****
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD-CODE/CONDITION: 9 SAMPLE TYPE: 9 HYD-EVENT: 9 PROJECT/ACCI-#: 4/04000212 COUNTRY: 019 GEO-UNIT: 73.40
COMMENTS: (* INDICATES LAB-CODE CHANGE)
UNIQUE NUMBER REQUESTED
WATERSTORE STORAGE WAS REQUESTED. MEASURING INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WATERSTORE. PLEASE CHECK HEADER.
PRINTED ON 09/23/03 FIRST RETRIEVAL "LABPHIN" 09/23/03 F.ROBERTSON

NAME	NRK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	NRK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CACUS	330	MG/L	1-2030-78	90410	70	PH (LABORATORY)	8.0	UNITS	1-2507-81	403	60
ANALYZING AGENCY	60020				28	PH FIELD	7.9	UNITS	1-1506-77	400	51
BURON, DISSOLV.	2700	UG/L	1-1114-62	1020	1163+	PRODUS DIS UNTHU AS P	0.70	MG/L	1-2601-76	671	162
CALCIUM, DISSOLV.	440	MG/L	1-1152-78	915	12	POTASSIUM, DISSOLVED	6.7	MG/L	1-1650-78	935	54
CENTRAL LAB-ID-#	3216122			94998	1500	RESIDUE DIS CALC SUM	5580	MG/L	1-1751-78	70301	26
CHLORIDE, DISSOLVED	2100	MG/L	1-2187-78	940	15	SILICA, DIS.	54	MG/L	1-2700-78	935	70
CHLORIDE, DISSOLVED	0.9	MG/L	1-2327-78	950	31	SODIUM, ABSORP NATI	14	MG/L	1-1735-78	930	57
CHLORIDE, DISSOLVED	1800	MG/L	1-1340-78	900	33	SODIUM, DIS.	1300	MG/L	1-1740-78	932	59
CHLORIDE, DISSOLVED	1400	MG/L		95962	1181	SP. CONDUCTANCE FLD	62	UMHOS	1-1760-77	95	60
CHLORIDE, DISSOLVED	40	MG/L	1-1361-78	1046	172	SP. CONDUCTANCE LAB	4200	MG/L	1-2781-81	90045	21
CHLORIDE, DISSOLVED	160	MG/L	1-1447-78	925	40	SULFATE, TURB. DIS.	6150	MG/L		945	64
CHLORIDE, DISSOLVED	770	MG/L	1-1454-78	1056	42	WATER TEMPERATURE	1300	DEG C		10	64
CHLORIDE, DISSOLVED	3.9	MG/L	1-2545-78	631	226		25.0				
CATIONS		(MG/L)				ANIONS		(MG/L)			
CALCIUM, DISSOLV.	440					CHLORIDE, DISSOLVED	2100				
MAGNESIUM, DISSOLV.	160					FLUORIDE, DISSOLVED	0.9				
POTASSIUM, DISSOLVED	6.7					ALK TOT LAB. CACUS	330				
SODIUM, DIS.	1300					NITH DIS NO2+NO3 -N	5.9				
						SULFATE, TURB. DIS.	1300				
TOTAL	91.844					TOTAL	93.220				

PERCENT DIFFERENCE = -0.75

QUALITY CONTROL INFORMATION FOR LAB 10-8 4216122 RECORD-# 52479
VERIFIED. MANGANESE, DISSOLV. VALUE > LIMIT 200 P=01056
THE FOLLOWING PARAMETER MAY CONTRIBUTE TO CATION SUM--MN 0155
-- BOTH FIELD & LAB CONDUCTANCES SUBMITTED AND DIFFER BY > 10%

VALUE # 770.0000
VALUE # 15.1610

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRO
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3199096 RECORD-# 49076

STATION-ID: 320335115262001 COLLECTED: BEGIN DATE 630708 TIME END DATE TIME 1200 LAT-LONG-SE# ***** **
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ARI200A COUNTY: 019 GEO.UNIT: 195.00
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-# 470400212 COST: 195.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 0 TOTAL PARAMETERS 9
WASTURE STORAGE WAS REQUESTED. HEADING INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WASTURE. PLEASE CHECK HEADER.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LABRIDA" 10/21/83 F.ROBERTSON; NO SRCLE ADDED

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	0 18/16 SIRA PER MIL	-0.5	UNITS 1-1546-77	-	82085	489
CARBON-13/12 (RATIO)	-7.5	-	-	82081	440	PH FIELD	7.9	UNITS 1-1760-77	-	400	51
CENTRAL LAB-ID-#	3199096	-	-	99998	1500	SP. CONDUCTANCE FLD	9200	UNITS 1-1760-77	-	95	21
DEUTERIUM/H RATIO. O/H	-16.5	-	-	82082	300	WATER TEMPERATURE	23.0	DEG C	-	10	64

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY MRD
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3216119 RECORD-# 52472

ADUANTA SPRING
(C-17-7) 17ced

STATION-ID: 315623113003701 COLLECTED: BEGIN DATE 830622 TIME 1200 END DATE TIME
NAME: C-17-07 17CCD STATE: 04 USER CODE: 04 ARIZONA LAT-LONG-SECT: 315623 1130037 01
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 73.40
COMMENTS: (* INDICATES LAB-CODE CHANGE) SCHEDULES USED 11 0 0 0 TOTAL PARAMETERS 25
UNIQUE NUMBER REQUESTED
WATSTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SECT-#. PRINTED ON 08/27/83 FIRST RETRIEVAL "LABPRIM" 08/27/83 F.ROBERTSON

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CAC03	276	MG/L	I-2030-78	90410	70	NITR DIS NO2+NO3 -N	2.7	MG/L	I-2545-78	631	228
ANALYZING AGENCY	80020			28	91	PH (LABORATORY)	7.9	UNITS	I-2587-61	403	68
BORON, DISSOLV.	770	UG/L	I-1114-82	1020	1183*	PH FIELD	7.7	UNITS	I-1586-77	400	51
CALCIUM, DISSOLVED	40	MG/L	I-1472-79	915	659*	PHOS DIS ORTHO AS P	0.03	MG/L	I-2601-78	671	162
CENTRAL LAB-ID-W	3216119			99998	1500	POTASSIUM, DISSOLVED	8.5	MG/L	I-1630-78	935	54
CHLORIDE, DISSOLVED	160	MG/L	I-2187-78	940	31	RESIDUE DIS CALC SUM	763	MG/L	I-1751-78	70301	28
FLUORIDE, DISSOLVED	4.9	MG/L	I-2327-78	950	15	SILICA, DISSOLVED	40	MG/L	I-1472-79	955	667*
HARDNESS	150	MG/L	I-1340-78	900	33	SODIUM, ABSORP RATIO	8.1			931	57
HARDNESS N-CARB L-EP	0	MG/L		95902	1181	SODIUM, DISSOLVED	210	MG/L	I-1472-79	930	675*
IRON, DISSOLV.	33	UG/L	I-1472-79	1046	645*	SODIUM, PERCENT	75	X	I-1740-78	932	60
MAGNESIUM, DISSOLVED	11	MG/L	I-1472-79	925	663*	SP. CONDUCTANCE LAB	1170	UMHOS	I-2781-61	90095	69
MANGANESE, DISSOLVED	4	UG/L	I-1472-79	1056	648*	SULFATE, TURB. DIS.	110	MG/L		945	1200
						WATER TEMPERATURE	25.0	DEG C		10	64

CATIONS	(MG/L)	(MEQ/L)	ANIONS	(MG/L)	(MEQ/L)
POTASSIUM, DISSOLVED	8.5	0.217	CHLORIDE, DISSOLVED	160	4.514
CALCIUM, DISSOLVED	40	1.996	FLUORIDE, DISSOLVED	4.9	0.258
MAGNESIUM, DISSOLVED	11	0.905	ALK TOT LAB. CAC03	276	5.314
SODIUM, DISSOLVED	210	9.135	NITR DIS NO2+NO3 -N	2.7	0.193
			SULFATE, TURB. DIS.	110	2.290
TOTAL	12.253		TOTAL	12.769	

PERCENT DIFFERENCE = -2.06

(C-17-7) 17ccd

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3199097 RECORD-# 49000

STATION-ID: 315623113005701 COLLECTED: BEST DATE 830622 TIME 11.5 END DATE TIME 1200 LAT-LONG-SEQ#: 315623 1130057 01
NAME: C-17-07 17CCD STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO-UNIT:
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 195.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 0 TOTAL PARAMETERS 7
WASTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SEQ-#.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LAMPRI" 10/21/83 F.KOERTSON; NO SRC12 ADDED

NAME	RRK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RRK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	24	91	DEUTERIUM/H RAT. D/H	-61.5	-	-	82062	300
CARBON-13/12 (RATIO)	-11.1	-	-	82081	449	O 16/16 SIRA PER MIL	-8.5	-	-	82085	489
CENTRAL LAB-ID-#	3199097	-	-	99998	1500	PH FIELD	7.7	UNITS I-1586-77	-	400	51
						WATER TEMPERATURE	25.0	DEG C	-	16	64

QUALITY CONTROL INFORMATION FOR LAB_ID-# 3216119 RECORD-# 52472

**THE PERCENT DIFFERENCE COMPUTED FOR THE ANALYSTS DOES NOT AGREE WITH THE CURVE VALUE =

2.0100

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRO
CENTRAL LABORATORY, DENVER, COLORADO

(C-17-8) 11 dcd unsurveyed
Hocker well 1

LABORATORY ANALYTICAL SHEET FOR LAB-10 3216114 RECORD-N 52461

STATION-ID: 315712113032101 COLLECTED: BEGIN DATE 830707 TIME 1200 END DATE TIME
NAME: C-17-08 11DCD UNSURV STATE: 04 USER CODE: 04 ARIZONA LAT-LONG-SEGM: 315712 1130321 01
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-N: 470400212 COST: 235.05
COMMENTS: (+ INDICATES LAB-CODE CHANGE) SCHEDULES USED 11 651 0 0 TOTAL PARAMETERS 37
UNIQUE NUMBER REQUESTED
WATSTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SEGM.
PRINTED ON 09/03/83 FIRST RETRIEVAL "LABPRIM" 09/03/83 F.ROBERTSON

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	
ALK TOT LAB. CACU3	533	MG/L	I-2030-78	90410	70	MANGANESE, DISSOLV.	<	10	UG/L	I-1454-78	1056	42
ALUMINUM, DIS.	<	UG/L	I-1052-78	1106	4	MERCURY, DISSOLVED	0.3	UG/L	I-2402-78	71890	226	
ANALYZING AGENCY	80020			28	91	METALS DIS CHE-EXT	1			0	642	
ARSENIC, DISSOLVED	64	UG/L	I-2062-78	1000	112	NITR DIS NO2+NO3 -N	1.4	MG/L	I-2545-78	651	228	
BARIUM, DIS.	<	UG/L	I-1084-78	1005	7	PH (LABORATORY)	6.1	UNITS	I-2587-81	403	66	
BORON, DISSOLV.	1900	UG/L	I-1114-82	1020	1185+	PH FIELD	7.9	UNITS	I-1586-77	400	51	
CADMIUM, DIS.	1	UG/L	I-1136-78	1025	73	PHOS DIS ORTHO AS P	0.08	MG/L	I-2601-78	671	162	
CALCIUM, DISSOLV.	<	MG/L	I-1152-78	915	12	PUTASSIUM, DISSOLVED	5.2	MG/L	I-1630-78	935	54	
CENTRAL LAB-ID-N	3216114			99998	1500	RESIDUE DIS CALC SUM	1570	MG/L	I-1751-78	70301	28	
CHLORIDE, DISSOLVED	350	MG/L	I-2187-78	940	15	SELENIUM, DISSOLVED	5	UG/L	I-2607-78	1145	87	
CHROMIUM HEX., DIS.	<	UG/L	I-1232-78	1032	16	SILICA, DIS.	61	MG/L	I-2700-78	935	56	
FLUORIDE, DISSOLVED	10	MG/L	I-2327-78	950	31	SODIUM, ABSORP RATIO	22	MG/L	I-1735-78	930	59	
FLUORIDE, DISSOLVED	110	MG/L	I-1340-78	900	35	SODIUM, DIS.	540	MG/L	I-1740-78	932	60	
HARDNESS	0	MG/L		95902	1181	SODIUM, PERCENT	91	UMHOS	I-1780-77	95	21	
HARDNESS N-CARB L-EP	20	UG/L	I-1381-78	1046	172	SP. CONDUCTANCE FLD	2350	UMHOS	I-2781-81	90095	69	
IRON, DIS.	2	UG/L	I-1400-78	1049	36	SP. CONDUCTANCE LAB	530	UG/L	I-1600-78	1060	62	
LEAD, DIS.	200	UG/L	I-1425-78	1130	39	STRONTIUM, DIS.	240	MG/L		945	1200	
LITHIUM, DISSOLV.	10	MG/L	I-1447-78	925	40	SULFATE, TURB. DIS.	23.5	DEG C		10	64	
MAGNESIUM, DISSOLV.						WATER TEMPERATURE						
CATIONS		(MG/L)				ANIONS		(MG/L)				
CALCIUM, DISSOLV.	29			1.447		CHLORIDE, DISSOLVED	350			9.874		
MAGNESIUM, DISSOLV.	10			0.623		FLUORIDE, DISSOLVED	10			0.526		
POTASSIUM, DISSOLVED	5.2			0.133		ALK TOT LAB. CACU3	533			10.649		
SODIUM, DIS.	540			23.490		NITR DIS NO2+NO3 -N	1.4			0.100		
						SULFATE, TURB. DIS.	240			4.997		

PERCENT DIFFERENCE = -0.49

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRD
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3196051 RECORD-# 48781

STATION-ID: 315712113032101 COLLECTED: BEGIN DATE 830707 TIME 1200 END DATE TIME
NAME: C-17-08 110CD UNSURV STATE: 04 USER CODE: 04 ARIZONA LAT-LONG-SEQ#: 315712 1130321 01
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 195.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 0 TOTAL PARAMETERS 8
WAITSTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SEQ-#.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LABPRIM" 10/21/83 F.ROBERTSON NO SRCL2 ADDED

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	O 18/16 SIRA PER MIL	-8.1	UNITS	-	82085	489
CARBON-13/12 (RATIO)	-7.6	-	-	82081	440	PH FIELD	7.9	UNITS	-	400	51
CENTRAL LAB-ID-#	3196051	-	-	99998	1500	SP. CONDUCTANCE FLD	2350	UNITS	-	95	21
DEUTERIUM/H RAT. D/H	-63.5	-	-	82082	300	WATER TEMPERATURE	23.5	DEG C	-	10	64

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRO
CENTRAL LABORATORY, DENVER, COLORADO

(C-17-8) 9 add unsurveyed
CORNER WELL

LABORATORY ANALYTICAL SHEET FOR LAB-10 3216120 RECORD-N 52474

STATION-10: 315743113050201 COLLECTED: BEGIN DATE 030707 TIME 1200 END DATE TIME LAT-LONG-SECT: 315743 1130502 01
NAME: C-17-08 09ADD UNSURV STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO-UNIT: 15.40
SAMPLE MEDIUM: 6 STATUS: M SOURCE: 9 HYD. CONDITION: 9 SAMPLE TYPE: 9 HYD. EVENT: 9 PROJECT/ACCT-N: 470400212 COST: 75.40
COMMENTS: (* INDICATES LAB-CODE CHANGE)
UNIQUE NUMBER REQUESTED: SCHEDULES USED: 11 0 0 0 TOTAL PARAMETERS: 26
MAINTENANCE STORAGE REQUESTED: STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SECT-N.
PRINTED ON 09/30/63 FIRST RETRIEVAL "LABPRIM" 09/30/63 P. ROBERTSON
RETURN: CASE#7, M6810, M6830, CL=200, S04=200

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CAC03	279	MG/L	I-2030-76	90410	70	PH (LABORATORY)	7.4	UNITS	I-4587-81	403	64
ANALYZING AGENCY	80020			26	91	PH FIELD	7.5	UNITS	I-1586-77	400	51
BORON, DISSOLV.	1600	UG/L	I-1114-62	1020	1185*	PHOS DIS URTHO AB P <	0.01	MG/L	I-2601-78	671	162
CALCIUM, DISSOLVED	48	MG/L	I-1472-79	915	659*	POTASSIUM, DISSOLVED	7.0	MG/L	I-1650-78	955	54
CENTRAL LAB-10-M	3216120					RESIDUE DIS CALC SUM	1130	MG/L	I-1751-78	70301	26
CHLORIDE, DISSOLVED	280	MG/L	I-2187-78	940	15	SILICA, DISSOLVED	37	MG/L	I-1472-79	955	667*
CHLORIDE, DISSOLVED	6.0	MG/L	I-2327-76	950	31	SODIUM, ABSORP NATIU	12	MG/L	I-1472-79	931	57
CHLORIDE, DISSOLVED	160	MG/L	I-1340-76	900	35	SODIUM, DISSOLVED	350	MG/L	I-1472-79	930	675*
CHLORIDE, DISSOLVED	0	MG/L				SODIUM, PERCENT	81	%	I-1740-78	952	60
CHLORIDE, DISSOLVED	15	MG/L	I-1472-79	1046	685*	SP. CONDUCTANCE FLD	1850	UMHOS	I-1780-77	95	21
CHLORIDE, DISSOLVED	10	MG/L	I-1472-79	925	665*	SP. CONDUCTANCE LAB	1810	UMHOS	I-2761-81	90095	69
CHLORIDE, DISSOLVED	30	MG/L	I-1472-79	1056	644*	SULFATE, TURB. DIS.	200	MG/L		445	1200
CHLORIDE, DISSOLVED	6.7	MG/L	I-2545-78	651	228	WATER TEMPERATURE	51.0	DEG C		10	64

TOTAL 17.752

PERCENT DIFFERENCE = -2.26

TOTAL 16.575

CATIONS
POTASSIUM, DISSOLVED
CALCIUM, DISSOLVED
MAGNESIUM, DISSOLVED
SODIUM, DISSOLVED

(MG/L)
7.0
46
10
330

(MEQ/L)
0.179
4.395
0.823
14.355

ANIONS
CHLORIDE, DISSOLVED
FLUORIDE, DISSOLVED
ALK TOT LAB. CAC03
NITR DIS NUC+NO3 -M
SULFATE, TURB. DIS.

(MG/L)
280
0.0
279
8.7
200

(MEQ/L)
7.899
0.516
5.574
0.822
4.164

QUALITY CONTROL INFORMATION FOR LAB_ID-# 3216120 RECORD-# 52474
THE PERCENT DIFFERENCE COMPUTED FOR THE ANALYSIS DOES NOT AGREE WITH THE CURVE VALUE = 1.9950

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRD
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3196052 RECORD-# 48783

STATION-ID: 315743113050201 COLLECTED: BEGIN DATE 830707 TIME END DATE TIME LAT-LONG-SEQ#: 315743 1130502 01
NAME: C-17-08 09ADD UNSURV STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO.UNIT:
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 195.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 0 TOTAL PARAMETERS 8
WATSTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SEQ-#.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LAPRIM" 10/21/83 F.ROBERTSON NO SRCL2 ADDED

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	0 18/16 SIRA PER MIL	-6.0	UNITS I-1586-77	-	82085	489
CARBON-13/12 (RATIO)	-9.9	-	-	82081	440	PH FIELD	7.5	UMHOS I-1780-77	-	400	51
CENTRAL LAB-ID-#	3196052	-	-	99998	1500	SP. CONDUCTANCE FLD	1850			95	21
DEUTERIUM/H RAT. O/H	-61.0	-	-	82082	300	WATER TEMPERATURE	31.0	DEG C	-	10	64

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY AND
CENTRAL LABORATORY, DENVER, COLORADO

(C-16-7) 27 bcd
Bonita well

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3216113 RECORD-# 52459

STATION-ID: 320115112573001 COLLECTED: BEGIN DATE 8/30/76 TIME 1200 END DATE TIME LAT-LONG-SECT: 320115 1125730 01
NAME: C-16-07 2380 STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO.UNIT: 235.05
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACT-#: 470400212 COST: 235.05
COMMENTS: (* INDICATES LAB-CODE CHANGE) SCHEDULES USED 651 11 0 0 TOTAL PARAMETERS 34
UNIQUE NUMBER REQUESTED
WASTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SECT-#.
PRINTED ON 10/15/83 FIRST RETRIEVAL "LABPRIM" 10/15/83 F.ROBERTSON

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CAC03	267	MG/L	I-2030-76	90410	70	MAGNESIUM, DISSOLVED	14	MG/L	I-1472-79	925	663*
ALUMINUM, DIS.	10	UG/L	I-1052-76	1106	4	MANGANESE, DISSOLVED	1	UG/L	I-1472-79	1050	640*
ANALYZING AGENCY	80020			28	91	MERCURY, DISSOLVED	0.1	UG/L	I-2462-78	71690	226
ARSENIC, DISSOLVED	5	UG/L	I-2062-76	1000	112	METALS DISS CHE-EXT	1			0	642
BARIUM, DISSOLVED	22	UG/L	I-1472-79	1005	641*	NITR DIS NO2+NO3 -N	1.3	MG/L	I-2345-78	631	228
BORON, DISSOLV.	100	UG/L	I-1114-82	1020	1183*	PH (LABORATORY)	7.9	UNITS	I-2587-81	403	68
ADMIUM, DISSOLVED	1	UG/L	I-1472-79	1025	673*	PHOS DIS ORTHO AS P	0.02	MG/L	I-1630-76	935	54
CALCIUM, DISSOLVED	60	MG/L	I-1472-79	915	659*	POTASSIUM, DISSOLVED	0.7	MG/L	I-1751-76	70301	28
CENTRAL LAB-ID-#	3216113			99988	1500	RESIDUE DIS CALC SUM	362	MG/L	I-1751-76	1145	87
CHLORIDE, DISSOLVED	16	MG/L	I-2187-78	940	15	SELENIUM, DISSOLVED	1	MG/L	I-2667-78	955	667*
CHROMIUM HEX., DIS.	1	UG/L	I-1232-78	1032	16	SILICA, DISSOLVED	42	MG/L	I-1472-79	931	57
FLUORIDE, DISSOLVED	0.5	MG/L	I-2327-78	950	31	SODIUM, DISSOLVED	1.4	MG/L	I-1472-79	930	675*
HARDNESS	210	MG/L	I-1340-78	900	33	SODIUM, ABSORP RATIO	44	MG/L	I-1472-79	932	60
HARDNESS N-CARB L-EP	0	MG/L		95902	1181	SODIUM, PERCENT	32	MG/L	I-1740-76	90095	69
IRON, DISSOLV.	3	UG/L	I-1472-79	1046	645*	SP. CONDUCTANCE LAB	577	UMHOS	I-2781-81	1080	652*
LEAD, DIS.	1	UG/L	I-1400-78	1049	38	STRONTIUM, DISSOLVED	540	UG/L	I-1472-79	945	1200
LITHIUM, DISSOLVED	14	UG/L	I-1472-79	1130	664*	SULFATE, TURB. DIS.	18	MG/L			

TOTAL 6.078
PERCENT DIFFERENCE = -1.63

TOTAL 6.280

CATIONS
POTASSIUM, DISSOLVED
CALCIUM, DISSOLVED
MAGNESIUM, DISSOLVED
SODIUM, DISSOLVED

ANIONS
CHLORIDE, DISSOLVED
FLUORIDE, DISSOLVED
ALK TOT LAB. CAC03
NITR DIS NO2+NO3 -N
SULFATE, TURB. DIS.

(MG/L) (MEQ/L)
16 0.451
0.5 0.026
267 5.335
1.3 0.093
18 0.375

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRO
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3196050 RECORD-# 48779

STATION_ID: 520115112573001 COLLECTED: BEGIN DATE 830706 TIME 1200 END DATE TIME LAT-LONG-SECT: 520115 1125730 01
NAME: C-16-07 2580 STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO. UNIT: 195.00
SAMPLE MEDIUM: 6 STATUS: M SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 195.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 0 TOTAL PARAMETERS 6
MAISTONE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SECT-#.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LABPRIM" 10/21/83 FRED ROBERTSON. NO SCL2.

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	20	91	O 10/16 SIRA PER MIL	-7.5	UNITS	-	82055	489
CAMBUN-13/12 (MATIU)	-12.7	-	-	82081	400	PH FIELD	7.4	UNITS	1-1586-77	400	51
CENTRAL LAB-10-M	3196050	-	-	99998	1500	SP. CONDUCTANCE FLD	610	UMHUS	I-1760-77	95	21
DEUTERIUM/M MAT. U/M	-53.0	-	-	82082	300	WATER TEMPERATURE	25.5	DEG C	-	10	64

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY WRO
CENTRAL LABORATORY, DENVER, COLORADO

*Quintoado Springs
C-17-7) 18 d unsurveyed*

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3199100 RECORD-# 49086

STATION_ID: 315640113010301 COLLECTED: BEGIN DATE 830622 TIME END DATE TIME LAT-LONG-SEG#: 315640 1130103 01
NAME: C-17-07 18UNSURV STATE: 04 USER CODE: 04 ARIZONA COUNTY: 019 GEO.UNIT: 95.00
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 95.00
COMMENTS: UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 TOTAL PARAMETERS 4
WATSTORE STORAGE REQUESTED. STATION HEADER DATA WAS SUBSTITUTED. PLEASE CHECK NAME, STATE CODE, COUNTY, AND LAT-LONG-SEG-#. PRINTED ON 10/21/83 FIRST RETRIEVAL "LABPRIM" 10/21/83 F.ROBERTSON

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	DEUTERIUM/H RAT. U/H	-63.0	-	-	82082	300
CENTRAL LAB-ID-#	3199100	-	-	99998	1500	O 18/16 SIRA PER MIL	-8.4	-	-	82085	489

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY MRO
CENTRAL LABORATORY, DENVER, COLORADO

MEXICO
LA GROSS BURNED
300 m S. of La Casa MAT.

LABORATORY ANALYTICAL SHEET FOR LAB-10 3216110 MCUMD-2 52470

STATION-ID: 515634115023001 COLLECTED: BEGIN DATE 8/30/77 TIME 1200 PM DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ANIOMA
SAMPLE MEDIUM: 9 STATUS: M SOURCE: 9 HYD. CONDITION: 9 SAMPLE TYPE: 9 HYD. EVENT: 9 PROJECT/ACT-#1 4/0400212 COAST: 235.03
COMMENT: 1 (C INDICATES LAB-CODE CHANGE) SCHEDULES USED: 631 11 0 0 TOTAL PARAMETERS: 34
UNIQUE NUMBER REQUESTED: 0
MASTURE STORAGE WAS REQUESTED. HEADLINE INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO MASTURE. PLEASE CHECK HEADLINE.
PRINTED ON 09/03/83 FIRST RETRIEVAL "LABPHIM" 09/03/83 P. NUMBER: 1500

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CACUS	521	MG/L	1-2030-76	90410	70	MAGNESIUM, DISSOLV.	14	MG/L	1-1447-76	925	40
ALUMINUM, DIS.	10	UG/L	1-1052-76	1106	4	MANGANESE, DISSOLV.	20	UG/L	1-1454-76	1056	42
ANALYTIC AGENCY	80020			20	91	MERCURY, DISSOLVED	0.1	UG/L	1-2462-76	71640	426
ARSENIC, DISSOLVED	44	UG/L	1-2062-76	1000	112	METALS DIS. CHE-EXT	1			0	442
BARIUM, DIS.	100	UG/L	1-1044-76	1005	7	NITR DIS. NO2+NO3 -M	1.3	MG/L	1-2545-76	631	424
BORON, DISSOLV.	1700	UG/L	1-1114-62	1020	1183	PH (LABORATORY)	8.1	UNITS	1-2567-81	403	44
CADMIUM, DIS.	1	UG/L	1-1116-76	1025	73	POTASSIUM, DISSOLVED	0.06	MG/L	1-2601-76	471	142
CALCIUM, DISSOLV.	37	MG/L	1-1152-76	915	12	PHOS DIS. URTHO AS P	5.3	MG/L	1-1650-76	955	54
CENTRAL LAB-10-#	5216116			99498	1500	RESINUT DIS. CALC SUM	1740	MG/L	1-1751-76	70301	24
CHLORIDE, DISSOLVED	430	MG/L	1-2107-76	940	15	SELENIUM, DISSOLVED	7	UG/L	1-2607-76	1145	87
CHROMIUM, DIS.	1	UG/L	1-1232-76	1032	16	SILICA, DIS.	49	MG/L	1-2700-76	955	50
FLUORIDE, DISSOLVED	11	MG/L	1-2327-76	950	31	SODIUM, ABSORP. MATIU	21	MG/L	1-1755-76	930	54
IRON, DIS.	150	MG/L	1-1340-76	900	35	SODIUM, DIS.	590	MG/L	1-1740-76	932	50
MANGANESE, N.CARB L-EP	0	MG/L		95902	1161	SODIUM, PERCENT	69			90095	69
MARONESS, DIS.	10	UG/L	1-1301-76	1046	172	SP. CONDUCTANCE LAB	2750	UMHNS	1-2741-81	1000	62
LEAD, DIS.	3	UG/L	1-1400-76	1049	34	STRONTIUM, DIS.	750	UG/L	1-1400-76	945	1200
LITHIUM, DISSOLV.	170	UG/L	1-1425-76	1130	39	SULFATE, TURB. DIS.	280	MG/L			

TOTAL 28.794

PERCENT DIFFERENCE = -0.42

TOTAL 29.041

CATIONS
CALCIUM, DISSOLV.
MAGNESIUM, DISSOLV.
POTASSIUM, DISSOLVED
SODIUM, DIS.

ANIONS
CHLORIDE, DISSOLVED
FLUORIDE, DISSOLVED
ALK TOT LAB. CACUS
NITR DIS. NO2+NO3 -M
SULFATE, TURB. DIS.

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3199099 RECORD-# 49084

STATION-ID: 315630113023801 COLLECTED: BEGIN DATE 030707 TIME 1200 END DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 00 ARIZONA COUNTY: 019 GEO.UNIT: 95.00
SAMPLE MEDIUM: 6 STATUS: M SOURCE: 9 MTD.CONDITION: 9 SAMPLE TYPE: 9 MTD.EVENT: 9 PROJECT/ACT-#: 470400212 COST: 49084
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 0 TOTAL PARAMETERS 5
WATSTORE STORAGE WAS REQUESTED. HEADING INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WATSTORE. PLEASE CHECK HEADER.
PRINTED ON 10/21/83 FIRST RETRIEVAL "LABPRIM" 10/21/83 F.ROBERTSON

NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	RMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	80020	-	-	28	91	DEUTERIUM/H RAT. D/H	-60.0	-	-	82062	500
CENTRAL LAB-ID-#	3199099	-	-	99998	1500	0.18/18 SIRA PER MIL	-7.6	-	-	82065	489
						PH FIELD	7.6	UNITS	1-1586-77	400	51

UNITED STATES DEPARTMENT OF THE INTERIOR
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CENTRAL LABORATORY, DENVER, COLORADO

MEXICO
E. PARADOTE

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3216123 RECORD-# 52481

STATION-ID: 31561113003401 COLLECTED: BEGIN DATE 630707 TIME 1200 END DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ARIZONA
SAMPLE MEDIUM: 6 STATUS: H SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 235.05
COMMENTS: (+ INDICATES LAB-CODE CHANGE)
UNIQUE NUMBER REQUESTED
WATSTORE STORAGE WAS REQUESTED. HEADING INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WATSTORE. PLEASE CHECK HEADER.
PRINTED ON 09/03/83 FIRST RETRIEVAL "LABPRIN" 09/03/83 F.ROBERTSON

NAME	MMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	MMK/VALUE	UNITS	METHOD	W-CODE	LC
ALK TOT LAB. CACU3	557	MG/L	I-2030-78	90410	70	MANGANESE, DISSOLV.	<	10	UG/L	I-1454-78	1056
ALUMINUM, DIS.	10	UG/L	I-1052-78	1106	4	MERCURY, DISSOLVED	<	0.1	UG/L	I-2462-78	71690
ANALYZING AGENCY	80020		-	28	91	METALS DISS CHE-EXT	1				0
ARSENIC, DISSOLVED	44	UG/L	I-2062-78	1000	112	NITR DIS NO2+NO3 -N	2.0	MG/L	I-2545-78	651	
BARIUM, DIS.	100	UG/L	I-1084-78	1005	7	PH (LABORATORY)	8.2	UNITS	I-2587-81	403	
BORON, DISSOLV.	2600	UG/L	I-1114-82	1020	1183+	PH FIELD	7.5	UNITS	I-1566-77	400	
CADMIUM, DIS.	1	UG/L	I-1136-78	1025	73	PHOS DIS URTHU AS P	0.04	MG/L	I-2601-78	671	
CALCIUM, DISSOLV.	39	MG/L	I-1152-78	915	12	POTASSIUM, DISSOLVED	5.6	MG/L	I-1630-78	935	
CENTRAL LAB-ID-#	3216123		-	99998	1500	RESIDUE DIS CALC SUM	1910	9	MG/L	I-1751-78	70301
CHLORIDE, DISSOLVED	440	MG/L	I-2187-78	940	15	SELENIUM, DISSOLVED	57	UG/L	I-2667-78	1145	
CHROMIUM HEX., DIS.	1	UG/L	I-1232-78	1032	16	SILICA, DIS.	22	MG/L	I-2700-78	931	
FLUORIDE, DISSOLVED	12	MG/L	I-2327-78	950	31	SODIUM, ABSORP RATIO	640	MG/L	I-1735-78	930	
HARDNESS	160	MG/L	I-1340-78	900	33	SODIUM, DIS.	89	X	I-1740-78	932	
HARDNESS N-CARB L-EP	0	MG/L	-	95902	1181	SODIUM, PERCENT	3150	UMHOS	I-1760-77	95	
IRON, DIS.	20	UG/L	I-1361-78	1046	172	SP. CONDUCTANCE FLD	3000	UMHOS	I-2781-81	90095	
LEAD, DIS.	1	UG/L	I-1400-78	1049	38	STRONTIUM, DIS.	740	UG/L	I-1800-78	1080	
LITHIUM, DISSOLV.	160	UG/L	I-1425-78	1130	39	SULFATE, TURB. DIS.	350	MG/L	-	945	
MAGNESIUM, DISSOLV.	16	MG/L	I-1447-78	925	40				-	1200	
CATIONS						ANIONS					
CALCIUM, DISSOLV.	39	(MG/L)		1.946		CHLORIDE, DISSOLVED	440	(MG/L)		12.412	
MAGNESIUM, DISSOLV.	16			1.317		FLUORIDE, DISSOLVED	12			0.632	
POTASSIUM, DISSOLVED	5.6			0.143		ALK TOT LAB. CACU3	557			11.129	
SODIUM, DIS.	640			27.840		NITR DIS NO2+NO3 -N	2.0			0.143	
						SULFATE, TURB. DIS.	350			7.287	

CATIONS (MG/L) (MED/L) ANIONS (MG/L) (MED/L)
CALCIUM, DISSOLV. 39 1.946 CHLORIDE, DISSOLVED 440 12.412
MAGNESIUM, DISSOLV. 16 1.317 FLUORIDE, DISSOLVED 12 0.632
POTASSIUM, DISSOLVED 5.6 0.143 ALK TOT LAB. CACU3 557 11.129
SODIUM, DIS. 640 27.840 NITR DIS NO2+NO3 -N 2.0 0.143
SULFATE, TURB. DIS. 350 7.287
TOTAL 31.246 TOTAL 31.603
PERCENT DIFFERENCE = -0.57

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY MRU
CENTRAL LABORATORY, DENVER, COLORADO

MEXICO
LA CASA Q.T.

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3216117 RECORD-# 52468

STATION-101 315641113022901 COLLECTED: BEGIN DATE 030707 TIME 1200 END DATE TIME
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE STATE: 04 USER CODE: 04 ARIZONA LAT-LONG-SECT: *****
SAMPLE MEDIUM: 6 STATUS: SOURCE: 9 HYD.CONDITION: 9 SAMPLE TYPE: 9 HYD.EVENT: 9 PROJECT/ACCT-#: 470400212 COST: 235.05
COMMENT: (* INDICATES LAB-CODE CHANGE) SCHEDULES USED 651 11 0 0 TOTAL PARAMETERS 34
UNIQUE NUMBER REQUESTED
WATSTORE STORAGE WAS REQUESTED. HEADLINE INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO WATSTORE. PLEASE CHECK HEADER.
PRINTED ON 06/27/83 FIRST RETRIEVAL LABPRIM 06/27/83 F.ROBERTSON

NAME	MMK/VALUE	UNITS	METHOD	M-CODE	LC	NAME	MMK/VALUE	UNITS	METHOD	M-CODE	LC
ALK TOT LAB. CAC03	367	MG/L	I-2030-76	90410	70	MAGNESIUM, DISSOLVED	14	MG/L	I-1472-79	925	663*
ALUMINUM, DIS.	10	UG/L	I-1052-78	1106	4	MANGANESE, DISSOLVED	1	UG/L	I-1472-79	1056	648*
ANALYZING AGENCY	80020			28	91	MERCURY, DISSOLVED	0.1	UG/L	I-2462-78	71690	226
ARSENIC, DISSOLVED	15	UG/L	I-2062-78	1000	112	METALS DIS NO2+NO3 -N	1.3	MG/L	I-2505-78	651	228
BARIUM, DISSOLVED	43	UG/L	I-1472-79	1005	641*	PH (LABORATORY)	0.6	UNITS	I-2587-81	403	68
BORON, DISSOLV.	980	UG/L	I-1118-82	1020	1183*	PHOS DIS ORTHO AS P	0.01	MG/L	I-2601-78	671	162
CADMIUM, DISSOLVED	1	UG/L	I-1472-79	1025	673*	RESIDUE DIS CALC SUM	4.6	MG/L	I-1630-78	935	54
CALCIUM, DISSOLVED	42	MG/L	I-1472-79	915	659*	SELENIUM, DISSOLVED	1000	MG/L	I-1751-78	70301	26
CENTRAL LAB-ID-M	3216117			99998	1500	SODIUM, ABSURP RATIO	3	UG/L	I-2667-78	1145	67*
CHLORIDE, DISSOLVED	210	MG/L	I-2187-78	940	15	SODIUM, DISSOLVED	56	MG/L	I-1472-79	931	57
CHROMIUM HEX., DIS.	1	MG/L	I-1232-76	1032	16	SILICA, DISSOLVED	11	MG/L	I-1472-79	930	675*
FLUORIDE, DISSOLVED	6.8	MG/L	I-2327-78	950	31	SODIUM, DISSOLVED	300	MG/L	I-1740-78	932	60
HARDNESS	160	MG/L	I-1340-78	900	33	SP. CONDUCTANCE LAB	80	UMHOS	I-2761-81	9095	69
HARDNESS N-CARB L-EP	0	MG/L		95902	1181	SULFATE, TURB. DIS.	1580	UG/L	I-1472-79	1080	652*
IRON, DISSOLV.	4	UG/L	I-1472-79	1046	645*		580	UG/L		945	1200
LEAD, DIS.	3	UG/L	I-1400-78	1049	38		140	MG/L			
LITHIUM, DISSOLVED	150	UG/L	I-1472-79	1130	664*						

CATIONS
(MG/L)
POTASSIUM, DISSOLVED 4.6
CALCIUM, DISSOLVED 42
MAGNESIUM, DISSOLVED 14
SODIUM, DISSOLVED 300

ANIONS
(MEQ/L)
CHLORIDE, DISSOLVED 0.118
FLUORIDE, DISSOLVED 2.096
ALK TOT LAB. CAC03 1.152
NITR DIS NO2+NO3 -N 13.050
SULFATE, TURB. DIS.

TOTAL 16.415

TOTAL 16.622

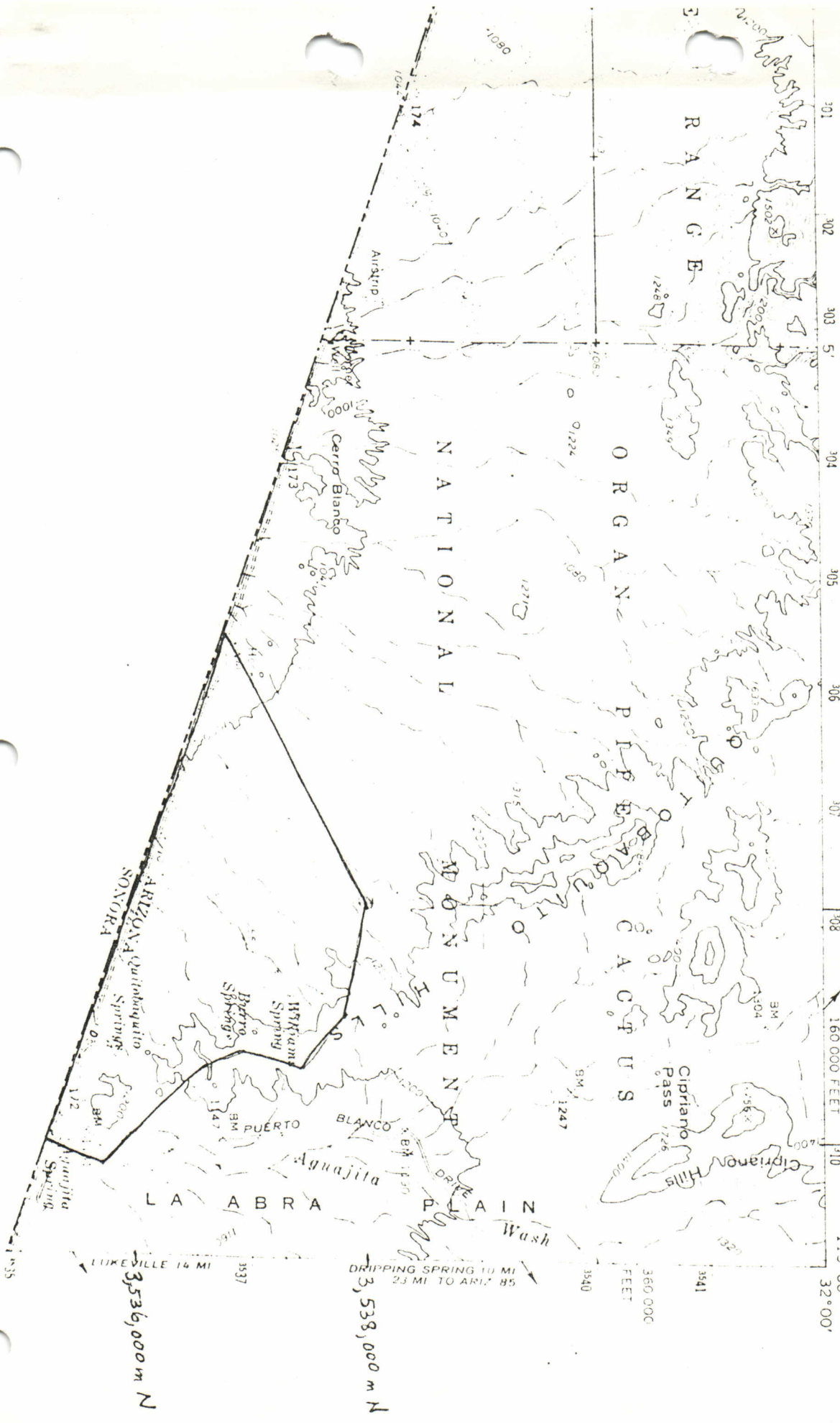
PERCENT DIFFERENCE = -0.63

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY AND
CENTRAL LABORATORY, DENVER, COLORADO

LABORATORY ANALYTICAL SHEET FOR LAB-ID 3199098 RECORD-N 49062

STATION-ID: 31564113022901 COLLECTED: BEGIN DATE 030707 TIME 1200 END DATE TIME LAT-LONG-STATE: *****
NAME: DATA TO BE RETRIEVED FROM HEADER WHEN COMPLETE. STATE: 06 USER CODE: 04 ARIZONA COUNTY: 019 GEO-UNIT: 195.00
SAMPLE MEDIUM: 6 STAYUSI M SOURCE: 9 HYD-COMPOSITION: 9 SAMPLE TYPE: 9 HYD-EVENT: 9 PROJECT/ACCT-N: 470400212 COST: 195.00
COMMENTS:
UNIQUE NUMBER REQUESTED SCHEDULES USED 0 0 0 TOTAL PARAMETERS 7
MAISTORE STORAGE WAS REQUESTED. HEADING INFORMATION COULD NOT BE FOUND. NO DATA TRANSFERRED TO MAISTORE. PLEASE CHECK HEADER.
PRINTED ON 10/21/03 FIRST RETRIEVAL "LABPRIM" 10/21/03 F.ROBERTSON/JNO SHEL2 ADDED

NAME	MMK/VALUE	UNITS	METHOD	W-CODE	LC	NAME	MMK/VALUE	UNITS	METHOD	W-CODE	LC
ANALYZING AGENCY	00020	-	-	20	91	DEUTERIUM/H RAT. U/H	-01.5	-	-	02062	300
CANBON-13/12 (RATIO)	-12.6	-	-	A2081	440	0.18/16 SIRA PER MIL	-0.3	-	-	02085	489
CENTRAL LAB-ID-N	3199098	-	-	99998	1500	PM FIELD	7.4	UNITS	1-1586-77	400	51
						SP. CONDUCTANCE FLU	1060	UMHOS	1-1760-77	95	21



QUITOBAQUITO SPRINGS QUADRANGLE
ARIZONA-PIMA CO.
15 MINUTE SERIES (TOPOGRAPHIC)

BATES WELL 15 MI
160,000 FEET

113° 00'
32° 00'

3448 III
(KINO PEAK)

308,000 m

310,000 m

3536,000 m N

3,538,000 m N

LUKEVILLE WELL
(C-18-5) 7AAA

This report from
my Honey 4/6/83
from recording gauge
at Lukeville Well.

PROVISIONAL DATA

<u>MONTH</u>	<u>MIN</u>	<u>MAX</u>	<u>REMARKS</u>
OCT	67.7	68.5	10/22 - 10/31
NOV	67.5	68.7	
DEC	67.1	68.6	
¹⁹⁸² JAN	67.0	67.8	
FEB	67.1	67.9	PARTIAL RECORD
MAR	67.3	68.0	}
APR.	68.0	68.5	
MAY	—	—	NO RECORD
JUNE	70.1	71.4	PARTIAL RECORD
JULY	69.8	71.4	}
AUG	71.4	72.9	
SEPT	70.2	72.8	PARTIAL RECORD
OCT	68.1	71.6	PARTIAL RECORD

Rough
Draft

Quitobaguito Management

Spring maint.

Spring head requires occasional checking:

1. to insure outlet stilling well + pipe are free from vegetation.
2. adequate screening vegetation for stilling well to hide it from inquisitive visitors who might plug outlet pipe.

V-Notch Weir

THIS clean out of ditch is done on new pullings a bullrushes to create a 10" wide channel to weir from pipe. Turning through bullrushes reduces down to them & keeps it looks more natural.

Requires the following maintenance quarterly

1. Clean out vegetation in main flow channel directly above weir to insure that total spring discharge is passing through weir. (Early signs of flow diversion are:

- a. a greening-up of sedges and bullrushes immediately north of the stilling well/weir area.
- b. An increase in the time required to fill $\frac{3}{4}$ cu. ft. bucket (ie. reduced flow).

1 that is desirable?

The "Normal" flow is 43 gpm or about 11 seconds to fill container.

2. Check condition of weir cover and readability of scale
3. Remove all vegetation growing from inside of weir. (note: do not alter existing Volumetric dimensions such as remove or add quantity of sand to bottom).

Main Stilling Well

Maint. Recommended

1. Check cover for Securness. (ex. can it sustain the weight of a visitor standing on it etc.)
2. Make certain all the flow is passing through the outlet pipe to pupfish Viewing pond. Learn to estimate the proper sucking power of pipe so you can recognise ^{easily} signs of restriction by placing your hand over it & releasing it, (this will also clear

out small restrictions.

Pupfish Viewing Pond

maint. reg.

1. Remove those bullrushes on North + west side to facilitate viewing. (leave some on far side (east side) for cover to hide in.
2. Remove cottonwood roots from pool overflow pipe by pulling from pool end of pipe. When roots start plugging overflow viewing pool level increases and eventually overflows creating water along the entrance pathway (east of pool) and an increase of Rushes along path.
3. Clean out outlet ditch all the way to the pond. Leave rushes along the margin of ditch for pupfish protection and to help discourage visitor encroachment to pond through thicket.