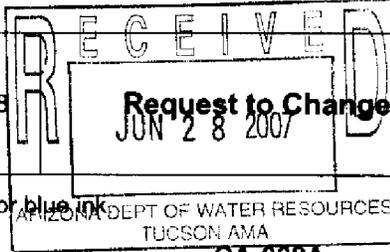




**Arizona Department of Water Resources**  
 Water Management Support Section  
 P.O. Box 458 • Phoenix, Arizona 85001-0458  
 (602) 771-8500 • (800) 352-8488  
 www.azwater.gov



FILE NUMBER  
**D(14-1)8DDD**  
 WELL REGISTRATION NUMBER  
**55 - 579475**

- ❖ Review instructions prior to completing form in black or blue ink
  - ❖ You **must** include with your Notice:
    - check or money order for any required fee(s)
  - ❖ Authority for fee: A.A.C. R12-15-151(B)(4)(a), A.R.S. § 45-113(B)
- \*\* PLEASE PRINT CLEARLY \*\***

| SECTION 1. REGISTRY INFORMATION   |  |  |   |                           |  |                           |
|---|--|--|---|---------------------------|--|---------------------------|
| Well Owner  |  |  | Location of Well  |                           |  |                           |
| FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL<br><b>City of Tucson / Tucson Water</b> |  |  | WELL LOCATION ADDRESS (IF ANY)  |                           |  |                           |
| MAILING ADDRESS<br><b>P.O. Box 27210</b>  |  |  | TOWNSHIP (N/S)<br><b>14S</b>  | RANGE (E/W)<br><b>11E</b> | SECTION<br><b>08</b>   | 160 ACRE<br><b>SE 1/4</b> |
| CITY / STATE / ZIP CODE<br><b>Tucson, AZ 85726-7210</b>                                   |  |  | LATITUDE  |                           | LONGITUDE  |                           |
| CONTACT PERSON NAME AND TITLE<br><b>Joe Huerstel, Lead Hydrologist</b>                    |  |  | Degrees    Minutes    Seconds    "N   |                           | Degrees    Minutes    Seconds    "W  |                           |
| TELEPHONE NUMBER<br><b>(520) 791-2689</b>   |  |  | FAX<br><b>(520) 791-3293</b>  |                           | METHOD OF LATITUDE/LONGITUDE (CHECK ONE) <input type="checkbox"/> *GPS: Hand-Held  |                           |
|   |  |  |   |                           | <input type="checkbox"/> USGS Quad Map <input type="checkbox"/> Conventional Survey <input checked="" type="checkbox"/> *GPS: Survey-Grade |                           |
|   |  |  |   |                           | *IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE)  |                           |
|   |  |  | <input checked="" type="checkbox"/> NAD-83 <input type="checkbox"/> Other (please specify): |                           | COUNTY WHERE WELL IS LOCATED   |                           |
|   |  |  | BOOK  | MAP                       | PARCEL   |                           |

**Type of Request (CHECK ONE)**

Change of Well Drilling Contractor (Fill out Section 2)     Change of Well Ownership (Fill out Section 3)     Change of Well Information (location, use, etc.) (Fill out Section 4)

| SECTION 2. REQUEST TO CHANGE WELL DRILLING CONTRACTOR (\$10 Fee Required)  |     | \$10 FEE  |
|--|-----|---|
| ♦ If drilling or abandoning a well, the Department must receive this request and issue authorization to the new drilling firm prior to the commencement of well drilling or abandonment. |     |   |
| <b>Current Well Drilling Contractor</b>  |     | <b>New Well Drilling Contractor</b>               |
| FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL  |     | FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL |
| DWR LICENSE NUMBER   |     | DWR LICENSE NUMBER    ROC LICENSE CATEGORY        |
| TELEPHONE NUMBER   | FAX | TELEPHONE NUMBER    FAX                           |

| SECTION 3. STATEMENT OF CHANGE OF WELL OWNERSHIP (\$10 Fee Required)                                       |     | \$10 FEE  |
|--|-----|---|
| ♦ If this change pertains to more than one well and the names are the same, only one \$10 fee is required. |     |   |
| <b>Previous Well Owner</b>   |     | <b>New Well Owner</b>                             |
| FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL  |     | FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL |
| MAILING ADDRESS  |     | MAILING ADDRESS                                   |
| CITY / STATE / ZIP CODE  |     | CITY / STATE / ZIP CODE                           |
| CONTACT PERSON NAME AND TITLE  |     | CONTACT PERSON NAME AND TITLE                     |
| TELEPHONE NUMBER   | FAX | TELEPHONE NUMBER    FAX                           |

| SECTION 4. CHANGE OF WELL INFORMATION (No Fee Required) | NO FEE |
|---|--------|
|---|--------|

**NOTE:** Applies only to wells that have already been drilled. For proposed wells, an amended Notice of Intent to Drill a Well must be filed.

EXPLAIN  
**The casing diameter is 20 inches.**

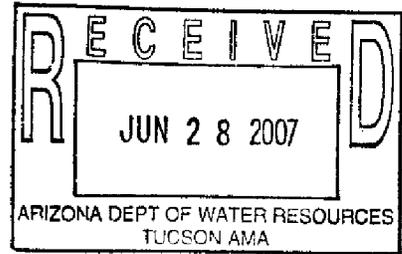
I HEREBY CERTIFY that the above statements are true to the best of my knowledge and belief.

|   |                             |                        |
|---|-----------------------------|------------------------|
| TYPE OR PRINT NAME AND TITLE<br><b>Ralph Marra, Administrator</b> | SIGNATURE OF WELL OWNER<br> | DATE<br><b>6/28/07</b> |
|---|-----------------------------|------------------------|



CITY OF  
TUCSON

TUCSON WATER  
DEPARTMENT



June 28, 2007

Ms. Diane Kusel, Water Resources Specialist  
Tucson Active Management Area  
Arizona Department of Water Resources  
400 West Congress Street, Suite 518  
Tucson, Arizona 85701

SUBJECT: Completed Forms: **Request to Change Well Information** for Tucson  
Water Wells: 55-572658 (CA-001A), 55-579474 (CA-002A), and 55-  
579475 (CA-008A)

Dear Ms. Kusel:

Please find attached the completed forms *DWR 55-71A* for the three wells noted above. All of the changes are informational. Please have this information forwarded to the Phoenix Office.

If you have any questions regarding the completed forms, please contact me at your convenience: (520) 791-2689.

Sincerely,

Terry Miley  
Hydrologist

TM:TM P:\R\CAV\Recovery\_Wells\WellInfoChanges.doc

Attachment: Forms – Request to Change Well Information (three each)

cc: Ralph Marra, Tim Thomure, Wally Wilson, Chuck Faas, Hydrology File  
Diane Kusel (ADWR-TAMA)



Run Date: 06/23/2006

# AZ DEPARTMENT OF WATER RESOURCES

## WELL REGISTRY REPORT - WELLS55

Location D 14.0 11.0 8 D D D Well Reg.No 55 - 579475 AMA TUCSON AMA

Registered Name CITY OF TUCSON/TUCSON WATER  
PO BOX 27210  
TUCSON AZ 85726  
File Type NEW WELLS (INTENTS OR APPLICATIONS)  
Application/Issue Date 02/24/2000

Owner OWNER  
Driller No. 621  
Driller Name A Z C A DRILLING & PUMP, INC.  
Driller Phone 928-923-9118  
County PIMA  
Well Type NON-SERVICE  
SubBasin AVRA VALLEY  
Watershed SANTA CRUZ RIVER  
Registered Water Uses MUNICIPAL  
Registered Well Uses WATER PRODUCTION  
Discharge Method CURRENT - VENTURI METER - FLOW  
Power ELECTRIC MOTOR > 100 HP  
Intended Capacity GPM 2,000.00

Well Depth 1,000.00 Case Diam 32.00 Tested Cap 2,000.00  
Pump Cap. 2,000.00 Case Depth 1,000.00 CRT X  
Draw Down 77.00 Water Level 345.00 Log X  
Acres Irrig 0.00 Finish STEEL - PERFORATED OR SLOTTED CASING

Contamination Site: NO - NOT IN ANY WQARF SITE

Comments 5/19/06 - The applicant needs to submit their model datasets. CN

### Places Of Use

1 D 14 0 11 0 8 D D D

### Current Action

6/15/2006 600 PERMIT ISSUED  
Action Comment: Recovery Well Permit #74-580079.0007

### Action History

5/31/2006 410 AMA APPLICATION/NOI REVIEW COMPLETE  
Action Comment: Recovery Well Permit #74-580079.0007  
5/30/2006 867 APP/NOI REVIEW BY HYDRO/WQARF COMPLETE  
Action Comment: Recovery Well Permit #74-580079.0007  
5/26/2006 400 HYDROLOGY APPLICATION REVIEW COMPLETE  
Action Comment: Recovery Well Permit #74-580079.0007  
5/19/2006 401 HYDROLOGY REVIEW - APPLICATION DEFECTIVE  
Action Comment: Recovery Well Permit #74-580079.0007  
5/12/2006 305 APP RCVD FOR A WELL PERMIT FOR A CONVERSION  
Action Comment: Recovery Well Permit #74-580079.0007  
5/12/2006 355 APP SENT TO AMA FOR REVIEW  
Action Comment: Recovery Well Permit #74-580079.0007  
5/12/2006 365 APP SENT TO HYDROLOGY FOR REVIEW  
Action Comment: Recovery Well Permit #74-580079.0007  
5/12/2006 866 APP/NOI SENT TO HYDRO/WQARF FOR REVIEW  
Action Comment: Recovery Well Permit #74-580079.0007  
4/4/2001 805 COMPLETION REPORT RECEIVED  
Action Comment: Recovery Well Permit #74-580079.0004  
3/5/2001 600 PERMIT ISSUED  
Action Comment: Recovery Well Permit #74-580079.0004

Run Date: 06/23/2006

**AZ DEPARTMENT OF WATER RESOURCES**  
**WELL REGISTRY REPORT - WELLS55**

---

|           |                 |   |
|-----------|-----------------|---|
| 1/19/2001 | 600             | PERMIT ISSUED                                 |
|           | Action Comment: | Recovery Well Permit #74-580079.0002          |
| 11/8/2000 | 320             | APP RCVD FOR A RECOVERY WELL                  |
|           | Action Comment: | Recovery Well Permit #74-580079.0002          |
| 8/17/2000 | 320             | APP RCVD FOR A RECOVERY WELL                  |
|           | Action Comment: | Recovery Well Permit #74-580079.0002          |
| 8/8/2000  | 600             | PERMIT ISSUED                                 |
|           | Action Comment: | Recovery Well Permit #74-580079.0002          |
| 7/5/2000  | 750             | WELL LOG RECEIVED                             |
|           | Action Comment: | Recovery Well Permit #74-580079.0007          |
| 6/1/2000  | 755             | WELL CONSTRUCTION COMPLETED                   |
|           | Action Comment: | Recovery Well Permit #74-580079.0004          |
| 3/24/2000 | 865             | CHANGE OF DRILLER RECEIVED                    |
|           | Action Comment: | Recovery Well Permit #74-580079.0002          |
| 3/24/2000 | 869             | CHANGE OF DRILLER PACKET ISSUED               |
|           | Action Comment: |   |
| 3/22/2000 | 320             | APP RCVD FOR A RECOVERY WELL                  |
|           | Action Comment: | Recovery Well Permit #74-580079.0002          |
| 3/17/2000 | 700             | SITE VERIFIED AS ACCURATE                     |
|           | Action Comment: |   |
| 3/3/2000  | 600             | PERMIT ISSUED                                 |
|           | Action Comment: |   |
| 3/3/2000  | 550             | DRILLING AUTHORITY ISSUED                     |
|           | Action Comment: |   |
| 2/24/2000 | 410             | AMA APPLICATION/NOI REVIEW COMPLETE           |
|           | Action Comment: |   |
| 2/17/2000 | 405             | WATER QUALITY APPLICATION/NOI REVIEW COMPLETE |
|           | Action Comment: |   |
| 2/16/2000 | 400             | HYDROLOGY APPLICATION REVIEW COMPLETE         |
|           | Action Comment: |   |
| 2/11/2000 | 300             | APP RCVD FOR A WELL PERMIT FOR A NEW WELL     |
|           | Action Comment: |   |
| 2/11/2000 | 350             | APP SENT TO WATER QUALITY FOR REVIEW          |
|           | Action Comment: |   |
| 2/11/2000 | 355             | APP SENT TO AMA FOR REVIEW                    |
|           | Action Comment: |   |
| 2/11/2000 | 365             | APP SENT TO HYDROLOGY FOR REVIEW              |
|           | Action Comment: |   |

ARIZONA DEPARTMENT OF WATER RESOURCES  
WATER MANAGEMENT DIVISION

3550 North Central Avenue, Phoenix, Arizona 85012  
Telephone 602 771-8585  
Fax 602 771-8688



JANET NAPOLITANO  
Governor

HERB GUENTHER  
Director

June 15, 2006

Ralph P. Marra  
City of Tucson/Tucson Water  
P.O. Box 27210  
Tucson, Arizona 85726-7210

RE: Non-Exempt, Non-Service Area Well Permit No. T-212102  
Well Registration No. 55-579475; File No. D (14-11) 8 DDD

Dear Permittee:

Your permit for the **conversion** of the above-referenced well is enclosed. The authority to enlarge this well is granted on the condition that all applicable provisions of the Groundwater Code are met.

A.R.S. § 45-600 requires the registered well owner to submit a Completion Report within thirty (30) days after the installation (reinstallation) of pumping equipment indicating the type and size of the installed pump. A Completion Report is enclosed for your use. You should ensure that the completion report is filed by the applicable deadline, if the pump equipment is changed.

Pursuant to the provisions of A.R.S. § 45-604, any person withdrawing groundwater from a non-exempt well in an active management area is required to use a water measuring device to record rates of withdrawal in order to provide or allow the computation of an annual volume of pumpage from the well. The total volume of pumpage shall be reported on an annual report. The annual report shall be submitted no later than March 31 following the end of each completed annual reporting period.

Under A.R.S. § 45-593, the person to whom a well is registered must notify the Department of a change in ownership, physical characteristics or any other data about the well in order to keep the well registration records current and accurate. For future changes, a Request to Change Well Information form is enclosed.

The Department has issued the authorization to convert (enlarge) this well pursuant to A.R.S. §§ 45-598 and 45-599. The legal nature of the water withdrawn from the well may be the subject of court action in the future as part of a determination of surface water rights in your area. If there are court proceedings that could affect your well, you will be notified and be given the opportunity to participate.

**Celebrating 25 Years**

City of Tucson/Tucson Water  
June 15, 2006  
Page Two

Your permit has been issued by this Department without a hearing. As such, it is an appealable agency action. You are entitled to appeal and your rights are described in the enclosed notice of right to appeal.

If you have any questions concerning your permit, please call Linda Ingraham of the Tucson AMA office at 520-770-3800.

Sincerely,

A handwritten signature in black ink, appearing to read "Darlene Sumpter-King". The signature is fluid and cursive, with the first name "Darlene" being larger and more prominent than the last name "Sumpter-King".

Darlene Sumpter-King  
Water Resources Specialist

Enclosure

cc: Linda Ingraham, Tucson AMA

*Celebrating 25 Years*



PERMIT NO. T-212102

Well Location: SE¼ of the SE¼ of the SE¼, Section 8, Township 14 South, Range 11 East, GSRB&M

Depth: 1000 ft.  
Casing Material: Steel  
Casing Diameter: 20 inches

Maximum Pumping Capacity: 3000 gallons per minute

Maximum Annual Volume: 3629 acre-feet

Authorized Place of Use for Groundwater Withdrawn: As authorized by Certificate of Type 1 Non-Irrigation Grandfathered Right Number 58-110579.0000

Authorized Use of Groundwater: As authorized by Certificate of Type 1 Non-Irrigation Grandfathered Right Number 58-110579.0000

WITNESS my hand and seal of office this 15th day of June 2006.

  
Sandra Fabritz-Whitney, Assistant Director

**IPR SUMMARY REVIEW SHEET**

*Prepared by Linda Ingraham, Tucson AMA  
May 31, 2006*

**APPLICANT:** Tucson Water / City of Tucson  
**APPLICATION NO:** 55-579475, T-212102 (TW Well CA-008A)  
**APPLICATION TYPE:** Non-Service Area Well Application

**Background Summary:** On May 12, 2006, Tucson Water submitted an application for a Permit to Drill or Operate a Non-Service Area Well for conversion (enlargement) of existing well 55-579475 located in D(14-11) 8 DDD. The well will be operated pursuant to their Type 1 Right (58-110579.0000). The well location is within the CAVSARP recharge project.

Tucson Water has requested to increase the annual volume from 2,800 acre-feet to 3,629 acre-feet per year with a pump capacity of 3000gpm. Hydrology's review agrees with the numerical model well spacing analysis submitted by Tucson Water. Hydrology's five-year 10-foot drawdown using straight boundaries was similar in the direction of the negative boundaries calculated by Tucson Water. Hydrology has also agreed with the applicant that the proposed enlarged volume for the 10-foot drawdown would range from a maximum of 7,200 feet to the northeast to a minimum of 5,100 feet to the southwest. The nearest registered water-production wells (55-518208 and 55-553084) are approximately 1,700 feet from the 10-foot drawdown contour, so no wells are impacted.

Hydrology and Hydro/WQARF divisions have both reviewed the application and support issuance.

**Issues:** None

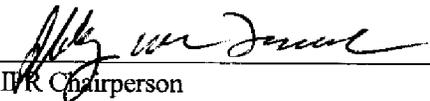
**Recommendations:** The Tucson AMA recommends approval to permit the well as requested for 3,000 gpm / 3,629 acre-feet per year.

IPR Committee Comments:

IPR Committee Recommendations:

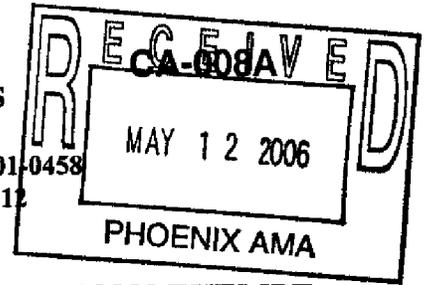
- Approve
- Deny
- Other (explanation) \_\_\_\_\_

Special Conditions to be included in permit:

  
\_\_\_\_\_  
IPR Chairperson

6/1/06  
\_\_\_\_\_  
Date

STATE OF ARIZONA  
DEPARTMENT OF WATER RESOURCES  
WATER MANAGEMENT DIVISION  
MAIL TO: P.O. BOX 458, PHOENIX, ARIZONA 85001-0458  
3550 North Central Avenue, Phoenix, Arizona 85012  
Phone (602) 771-8585 Fax (602) 771-8688



**APPLICATION FOR A PERMIT TO DRILL OR OPERATE A NON-EXEMPT,  
NON-SERVICE AREA WELL WITHIN AN ACTIVE MANAGEMENT AREA  
PURSUANT TO A.R.S. § 45-599**

**I. INSTRUCTIONS:**

1. This application should be used to obtain a permit to:
  - (a) Drill a non-exempt well in conjunction with a General Industrial Use Permit Application or a Certificate of Grandfathered Right.
  - (b) Convert (enlarge) an existing well to a non-exempt use.
2. CITIES, TOWNS, PRIVATE WATER COMPANIES OR IRRIGATION DISTRICTS WISHING TO DRILL OR OPERATE A SERVICE AREA WELL SHOULD USE DWR FORM 55-0002.
3. Complete all appropriate items on this application, sign in the appropriate place and mail to P.O. Box 458, Phoenix, Arizona 85001-0458 or hand deliver to 3550 North Central Avenue, Phoenix, Arizona 85012.
4. Pursuant to A.R.S. § 45-113, the application fee is \$150.00 and the permit fee is \$30.00. You may submit both checks at the time of filing the application.
5. If multiple wells are involved or if the proposed design pump capacity is in excess of 500 gallons per minute, the applicant must attach a hydrological study which delineates projected declines in water levels due to the operation of the proposed well or wells as required by Department Rule R12-15-830.

**II. GENERAL DATA:**

1. Applicant City of Tucson / Tucson Water  
 Mailing Address P.O. Box 27210  
Tucson AZ 85726-7210  
 City State Zip Code  
 Contact Person Ralph P. Marra  
 Telephone Number (520) 791-2689

2. Name of Land Owner City of Tucson / Tucson Water  
 Mailing Address Same as above

| FOR DEPARTMENT USE ONLY |                         |
|-------------------------|-------------------------|
| Application No.         | <u>T-212102</u>         |
| Registration No.        | <u>55-579475</u>        |
| File No.                | <u>D(14-11)8 DDD</u>    |
| Date Received           | <u>5/12/2006</u>        |
| AMA                     | <u>Tucson</u>           |
| W/S                     | <u>09</u> S/B <u>15</u> |

City State Zip Telephone Number

3. Applicant is:  Owner  Lessee

4. Proposed well is:  New well  Conversion (enlargement) of existing well  Replacement well in a new location.

5. Claim of entitlement to withdraw groundwater is based upon:  
 Certificate of Grandfathered Right No: 58-110579.0000  
 Groundwater Withdrawal Permit No: \_\_\_\_\_  
 Application for General Industrial Use Permit No. 59- \_\_\_\_\_

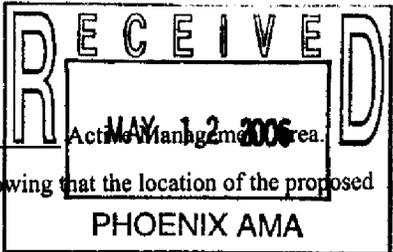
6. The principal use(s) of groundwater will be (be specific) All ancillary uses pertinent to a municipal water provider.

---

7. Well location: SE ¼ SE ¼ SE ¼ Section 08 Township 14 S N/S Range 11 E E/W  
 10 Acre 40 Acre 160 Acre

8. Position location of the well: Latitude 32 ° 13 ' 11.9 " N Longitude 111 ° 14 ' 12.5 " W

9. Design Pump Capacity 2000 gpm Depth 1000 feet  
 Diameter 20 inches Type of casing Steel



- 10. Proposed annual volume of water 3,629 acre feet
- 11. Well is located in the Avra Valley subbasin of the Tucson Active Management Area.
- 12. If the well is located in the Santa Cruz AMA, please attach documentation and explanation showing that the location of the proposed well is consistent with the management plan, as required by A.R.S. § 45-599(C).
- 13. Approximate date construction will begin: MONTH \_\_\_\_\_ YEAR \_\_\_\_\_  
Estimated time to complete new well \_\_\_\_\_ (If longer than 1 year, attach explanation.)
- 14. Legal description of the land where the groundwater will be used: **Tucson Water Department's Service Area**  
\_\_\_\_\_ ¼ \_\_\_\_\_ ¼ \_\_\_\_\_ ¼ Section \_\_\_\_\_ Township \_\_\_\_\_ N/S Range \_\_\_\_\_ E/W. County \_\_\_\_\_  
10 Acre    40 Acre    160 Acre
- 15. Is the proposed well site within 100 feet of a septic tank system, sewage disposal area, landfill, hazardous waste facility or storage area of hazardous materials?  Yes  No (if yes, a request for a variance must accompany this application pursuant to R12-15-820.)
- 16. Driller's Name \_\_\_\_\_ DWR License No: \_\_\_\_\_ ROC License Category \_\_\_\_\_  
Mailing Address: \_\_\_\_\_  
Street \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Telephone Number \_\_\_\_\_
- 17. Attach a New Well construction Supplement, DWR form 55-90, and include a detailed construction diagram as indicated on the form.

**III. FOR REPLACEMENT WELL ONLY:**

- 18. Registration number of existing well 55- \_\_\_\_\_
- 19. Location of the original well: \_\_\_\_\_ ¼ \_\_\_\_\_ ¼ \_\_\_\_\_ ¼ Section \_\_\_\_\_ Township \_\_\_\_\_ N/S Range \_\_\_\_\_ E/W  
10 Acre    40 Acre    160 Acre
- 20. Depth \_\_\_\_\_ feet. Diameter \_\_\_\_\_ inches.
- 21. Distance between original well and proposed replacement well \_\_\_\_\_ feet.
- 22. Will the original well be abandoned if applicant receives a permit to drill a replacement well?  Yes  No.  
(If yes, please submit a completed Notice of Intent to Abandon a Well along with this application.)  
If no, explain the planned use of the original well \_\_\_\_\_

**IV. FOR CONVERSION (ENLARGEMENT) OF EXISTING WELL ONLY:**

- 23. Registration number of the existing well 55- 579475 Present pump design capacity 2,000 gallons per minute.
- 24. The new design pump capacity will be 3,000 gallons per minute.
- 25. The existing well has previously been used in conjunction with or for the following: Municipal Uses

It is understood that the permit, if granted, will be in accordance with the Groundwater Management Act (Title 45, Chapter 2), and the rules adopted thereunder. The permittee will be bound by the provisions of such law and the provisions of the permit issued.

I (we), Ralph P. Marra hereby swear that all information provided in this application is true and correct to the best of my/our  
(print name) knowledge and belief.  
Signature of Applicant *Ralph P. Marra* Date 5/8/06

**ARIZONA DEPARTMENT OF WATER RESOURCES  
HYDROLOGY DIVISION  
TECHNICAL SUPPORT SECTION - WQARF UNIT**

**MEMORANDUM**

DATE: May 30, 2006  
TO: Darlene Sumpter-King, Groundwater Management Support  
Jeff Tannler, Tucson AMA  
FROM: David Christiana, WQARF Unit   
SUBJECT: Wells 55-579475  
APPLICATION: T-212102 - Application for Permit to Drill a Non-Exempt, Non-Service Area Well – Tucson Water

Hydrology has reviewed the above referenced application for a permit to drill a service area well for water quality concerns and well construction for conformance to Arizona well construction standards.

**Water Quality**

1. The proposed well is not located within or near an area of known groundwater contamination that is being actively remediated pursuant to an U.S. Environmental Protection Agency, Arizona Department of Environmental Quality (ADEQ), or Department of Defense program. See the attached Water Quality map.
2. According to the ADEQ Groundwater Database, no sample results from wells located within one mile of the subject well indicate parameter concentrations exceeding maximum contaminant level (MCL) standards, secondary MCLs (MCL2), or Arizona Health Based Guidance Levels (HBGLs). Water quality data are limited. No other water quality data are readily available.

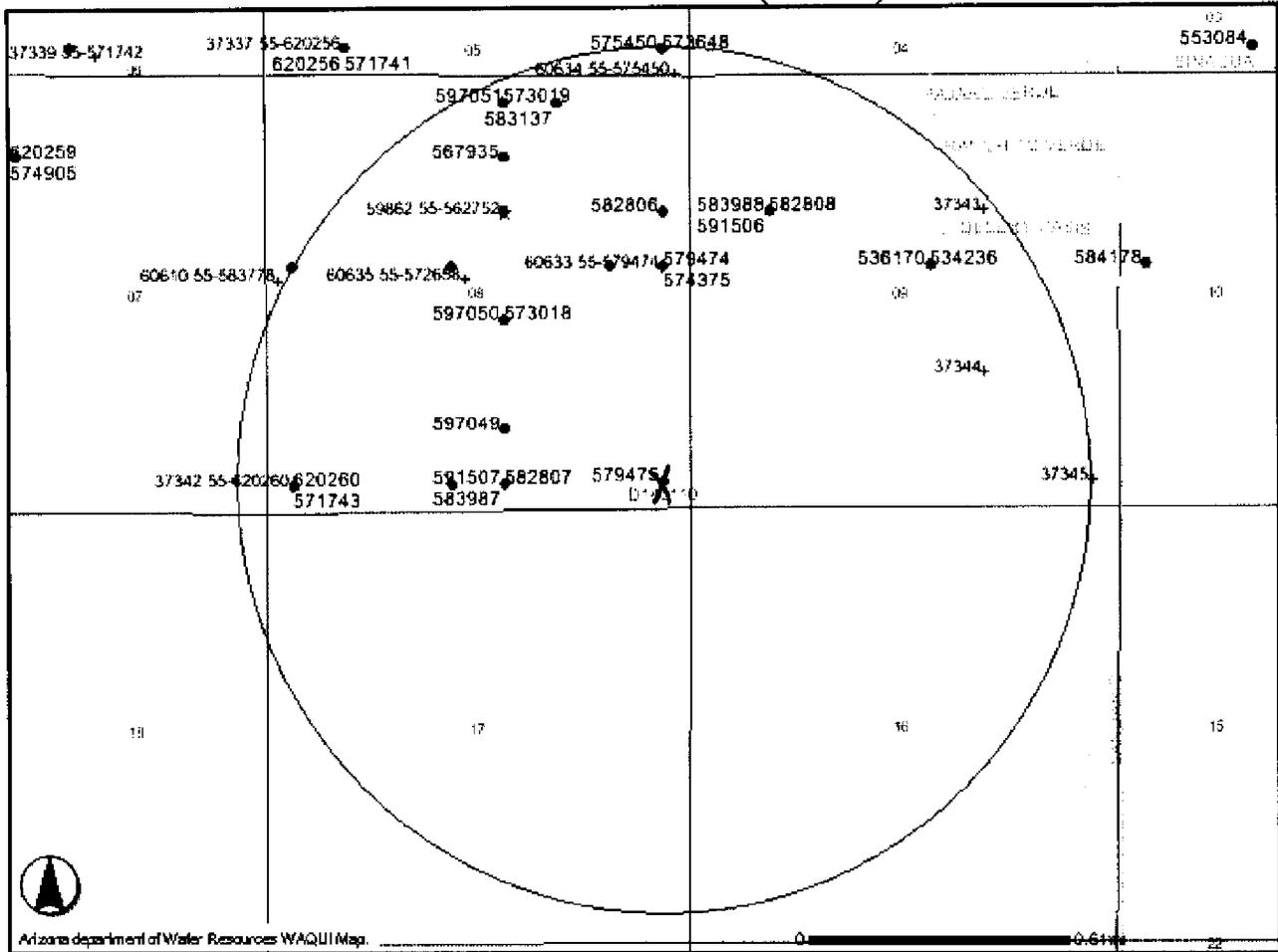
**Well Construction Standards**

3. The subject well was drilled in 2000 to 1000 feet and screened from 580 to 980 feet. Well construction meets minimum well construction standards. No special well construction requirements are necessary.

The Hydrology WQARF Unit has no objections to approving this permit. If additional information is needed, please contact me at extension 1-8548.

Attachment: WAQUI map

# Tucson Water NOID Non-Exempt Non-Service Area Well T-212102 / 55-579475 / D(14-11)8DDD



Working Together



**Arizona  
Department  
of Environmental  
Quality**



**Arizona  
Department  
of Water  
Resources**

Map generated on 5/30/2006

Water Quality Sample Test Results for ADEQ Wells

**Information provided is preliminary and subject to revision.**

**It may not represent the full extent of known water quality concerns.**

- Legend**
- theBuffer
  - theBufferTarget *579475*
  - VRP Sites
  - ADEQ Wells
  - Wells > HBGL
  - Wells > Secondary MCL
  - Wells > MCL
  - No Exceedence
  - REGISTERED WELLS
  - Streets
  - Sections
  - Townships
  - GWR LUST Buffer
  - RCRA Site Buffer
  - VRP Site Buffer

May 26, 2006

# Memorandum

**To:** File 55-579475 (T-212102) D (14-11) 08 ddd  
**From:** Carol E. Norton  
**Date:** May 26, 2006  
**Re:** Well Impact Analysis for City of Tucson

---

The Hydrology Division is in receipt of the above referenced Application to Drill a Non-Exempt, Non-Service Area Well. The applicant submitted a numerical model for its well spacing study. The analysis included a curved boundary located 9,500 feet northeast of the well location. Hydrology's five-year, 10-foot drawdown impact analysis using a straight boundary was similar in the direction of the negative boundary, to the drawdown calculated by the applicant. Since the numerical model submitted by the applicant using a curved boundary is more comparable to the physical boundaries of the actual topography, than the analytical method used by Hydrology staff, the applicant's well spacing analysis was accepted by the Department for the final analysis.

**From:** Carol Norton  
**To:** Sumpter-King, Darlene  
**Date:** 5/25/06 9:56AM  
**Subject:** City of Tucson 55-579475 D(14-11)08 ddd (T-212102)

**CC:** Corkhill, Frank; Ingraham, Linda; Swieczkowski, Drew; Tannler, Jeff

**From:** Carol Norton  
**To:** wrjmt  
**Date:** 5/19/06 1:54PM  
**Subject:** 55-579475 D(14-11)08 ddd (T-212102) City of Tucson

This well application for an existing well came in and the well spacing analysis submitted used a model (ModFlow), done by Errol Montgomery using a curved boundary to the east of the wellsite. The City of Tucson has submitted this same analysis 10's of times in the past, and when I run my own analysis using THWells, my output has always been the same as the model's. That is, until recently (in the last 2 years). Lately my output has been different, and we decided we needed to review their model. Therefore, I have left a message for Ralph Marra to send us their model datasets.

**Frank, since I will be out of the office until May 24, I left a message for Ralph Marra to call you with any questions.** I stated in the message that we would like him to send the ModFlow datasets used for the output, including the Wells package. I also informed him that Jeff would be sending an I & I letter since we don't know how long it will take for sending the model and our review.

Jeff, please send an I & I letter stating:

"Please send Carol Norton the ModFlow datasets used for the output for the well spacing report for well no. 55-579475 D(14-11)08 ddd. Please include the Wells package. If you have any questions, please call Frank Corkhill at (602) 771-8537."

Thanks  
5/19/06

Carol Norton  
Hydrology Division

**CC:** Corkhill, Frank; Sumpter-King, Darlene; Swieczkowski, Drew

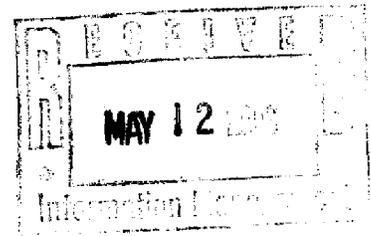


CITY OF  
TUCSON

TUCSON WATER  
DEPARTMENT

May 8, 2006

Ms. Darlene Sumpter-King  
Water Management Support Section  
Arizona Department of Water Resources  
PO BOX 458  
Phoenix, Arizona 85001-0458



**Subject: Filing of Application for a Permit to Enlarge a Non-Exempt, Non-Service Area Well Within the Tucson AMA Tucson Water Well 55-579475 (CA-008A)**

Dear Ms. Sumpter-King:

Please find attached an application for a permit to enlarge a non-service area well within the Tucson Active Management Area. Accompanying the application is the associated Hydrologic Impact Report, and a warrant (#244423) for one hundred-eighty dollars (\$180.00) to cover the cost of the application fee (\$150.00) and permit fee (\$30.00).

Well Name  
CA-008A

Well Location  
D(14-11)08DDD

The current permitted maximum annual volume for well 55-579475 is 2,800 acre feet. Tucson Water requests to enlarge the permitted maximum annual volume from 2,800 to 3,629 acre feet. The drawdown projection documented in the attached Hydrological Impact Report was derived using a numeric model. Because a numerical solution provides a more realistic representation of the actual curved boundary, the location of the 10-foot draw down contour is considered more accurate than what could be obtained by using a simpler analytical method. Hence, the numerical modeling results should be used as the basis for evaluating the projected drawdown impact of well CA-008A. If you have any questions regarding the permit application or the Hydrologic Impact Report for the proposed well, please direct your inquiry to Joe Huerstel at (520) 791-5080, extension 1408.

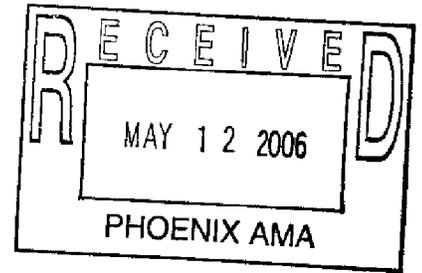
Sincerely,

Ralph P. Marra  
Water Administrator

Attachments

xc: Chuck Faas, Joe Huerstel, Jonathan Sax, Dee Korich, Well File,  
Hydrology File





**PROJECTED IMPACT  
FROM ENLARGING  
A WATER-SUPPLY WELL  
FOR  
CITY OF TUCSON  
(D-14-11) 08DDD[CA-008A]**

By

Tucson Water  
Planning & Engineering Division  
Research and Technical Support Section

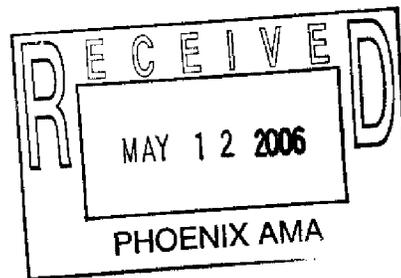
May 8, 2006

TABLE OF CONTENTS

| <u>Page</u> |  |
|-------------|--|
|             | INTRODUCTION ..... 2   |
|             | REVIEW OF WELLS OF RECORD ..... 2  |
|             | HYDROLOGIC CONDITIONS ..... 2  |
|             | AQUIFER PARAMETERS..... 4  |
|             | PROJECTED DEMAND ..... 7   |
|             | PROJECTED IMPACT ..... 8   |
|             | REFERENCES ..... 10  |
|             | APPENDIX A: LISTING OF REGISTERED WELLS IN STUDY AREA ..... 11                   |
|             | APPENDIX B: AQUIFER TEST DATA AND PLOT FOR<br>TUCSON WATER WELL AF-034A ..... 24 |

ILLUSTRATIONS

|  |   |
|--|---|
|  | FIGURE 1: WELL SITE LOCATION MAP ..... 3          |
|  | FIGURE 2: PROJECTED HYDROLOGIC IMPACT MAP ..... 9 |



## INTRODUCTION

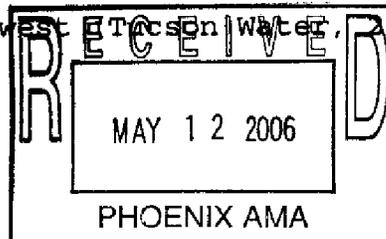
The purpose of this report is to evaluate the potential hydrologic impact from enlarging an existing City of Tucson municipal supply well CA-008A [55-579475] on the local aquifer system. Well CA-008A is located in the SE 1/4, SE 1/4, SE 1/4 of Section 08, Township 14 South, Range 11 East, based on the Gila and Salt River Baseline and Meridian. The well is being operated pursuant to Type I Non-Irrigation Grandfathered Water Right Certificate number 58-110579.0000.

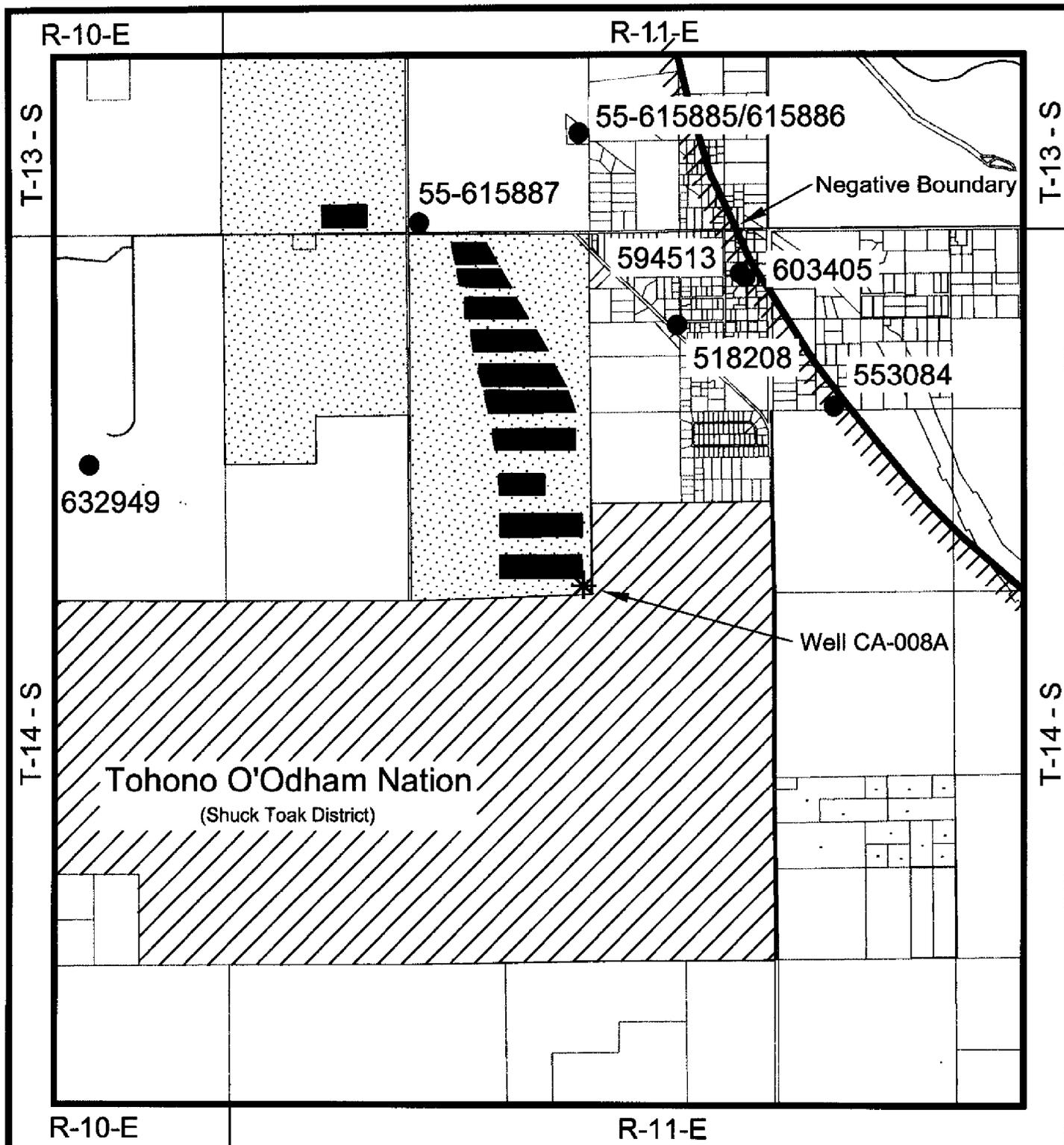
## REVIEW OF WELLS OF RECORD

A current list of wells of record within the area was obtained from the Arizona Department of Water Resources (ADWR) Tucson Active Management Area office on April 11, 2006. The well listing provided by ADWR is in Appendix A. Only the nearest registered non-City of Tucson owned wells having a "W" (Water Production) or "WC" (Water Production/Capped) Well Use Code in the area of the proposed wellsite are shown on Figure 1.

## HYDROLOGIC CONDITIONS

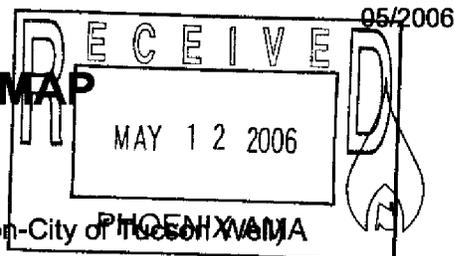
Well CA-008A is located within the alluvial sediments in the central part of Avra Valley. Ground water in the area results from precipitation which occurs in the higher elevations of the Avra Valley and Altar Valley watershed. The direction of groundwater flow is generally to the northwest (Tucson Water, 2000).





**FIGURE 1  
WELL SITE LOCATION MAP**

- \* SUBJECT WELL SITE
- REGISTERED WELL LOCATION (Non-City of Tucson Wells)
- CITY OF TUCSON PROPERTY
- RECHARGE BASIN (CAVSARP)



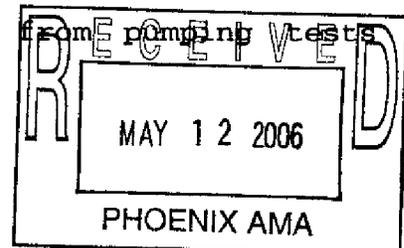
0 2,000 4,000  
Distance in Feet

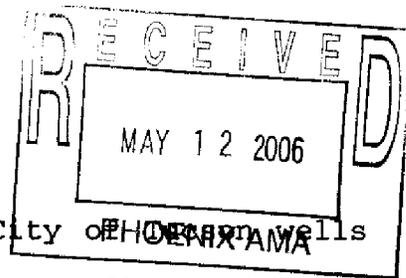
Well CA-008A is located within the Central Avra Valley Storage and Recharge Project (CAVSARP). CAVSARP currently consists of eleven recharge basins with the nearest, a thirty-nine acre recharge basin, located about 200 feet north of the well site. Water levels fluctuate significantly due to effects associated with the recharge operations. In 2005 the depth to water in the area of CA-008A ranged from 315 to 354 feet (Tucson Water, 2006). The effects of recharge from these basins function as a positive boundary. The influence of this positive boundary was disregarded so that a worst case scenario for the well impact analysis could be assessed.

Bedrock complexes located generally to the east and west of the subject well function as negative boundaries. The eastern negative boundary is projected as the aquifer boundary along the Tucson Mountains located about 9,400 feet east of the proposed well (Freethy and others, 1986). The approximate location of this boundary is shown on Figure 1. The western negative boundary is projected as the aquifer boundary along the Roskrige Mountains located about 20,000 feet west of the subject well (Freethy and others, 1986).

#### AQUIFER PARAMETERS

Aquifer parameters were inputted into a groundwater flow model to project drawdown impact from groundwater withdrawals for the water supply well CA-008A. Aquifer parameters required for the ground-water flow model were derived from pumping tests



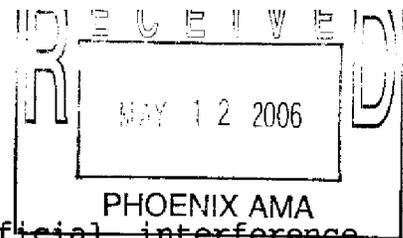


conducted at well AF-034B and other nearby City of Phoenix wells (Montgomery & Associates, 1999). The groundwater flow model was constructed by Errol L. Montgomery & Associates (Montgomery & Associates, 1999) using MODFLOW, a numerical finite-difference code developed by the USGS (McDonald and Harbaugh, 1988).

The active area of the groundwater flow model encompasses approximately 1,387 square miles. The model grid consists of one layer of 237 rows and 140 columns. Each model grid cell in the central part of the model area, in the vicinity of the CAVSARP site, has dimensions of 660 by 660 feet. The dimensions of the grid cells increase to a maximum column width of 6,200 feet by a maximum row width of 6,600 feet near the north and south boundaries of the model grid.

The regional aquifer in Avra Valley is bounded to the east and west by hydrogeologic barrier boundaries corresponding to the bedrock complex. No-flow boundaries were specified in the groundwater flow model to represent these aquifer boundaries. Locations of aquifer boundaries in the model are based on aquifer system boundaries defined by (Freethey and others, 1986).

Hydraulic communication between aquifers in the Tucson basin and Avra Valley is believed to be poor (Montgomery & Associates, 1999). Therefore, worst-case no-flow boundaries were specified between the Tucson Mountains and Tortolita Mountains, and between the Tucson Mountains and Sierrita Mountains. Worst-case no-flow boundaries were also specified along the edges of the model grid north and west of the Picacho Mountains. The model grid extends a sufficiently large distance beyond the area of hydrologic



influence from well CA-008A to avoid artificial interference effects from the no-flow boundaries specified along the edges of the model grid.

Aquifer parameters required for the groundwater flow model are hydraulic conductivity and specific yield. Aquifer hydraulic conductivity was calculated using saturated thickness and transmissivity obtained from pumping tests conducted at well AF-034B and at nearby retired irrigation wells owned by City of Tucson (Montgomery & Associates, 1999).

Transmissivity in central Avra Valley ranges from 31,000 to 200,000 gpd/ft. and the calculated hydraulic conductivity ranges from 74 to 1,100 gpd/ft<sup>2</sup>. For the model, hydraulic conductivity was specified as 143 gpd/ft<sup>2</sup> and initial saturated thickness was specified as 630 feet, corresponding to a transmissivity of 90,000 gpd/ft. (Montgomery & Associates, 1999). These model input parameters are consistent with aquifer parameters obtained from the pumping test conducted in 1996 at well AF-034B. Aquifer parameters obtained from the pumping test at well AF-034B are transmissivity of 89,000 gpd/ft, and calculated hydraulic conductivity of 140 gpd/ft<sup>2</sup> (Montgomery & Associates, 1999). The graphical representation of test data collected from the pump test at AF-034B from observation well AF-034A is shown in Appendix B.

A reliable measure of specific yield (Sy) could not be estimated from aquifer tests conducted in the area. Estimates of specific yield in the alluvial aquifer above a depth of 1,000 feet in Avra Valley range from 0.10 to 0.18 and average about

0.15 (White and others, 1966; Moosburner, 1972; Anderson, 1972; Whallon 1983). For purposes of this investigation, the more conservative long-term storage coefficient value of 10 percent was selected as being representative for the regional aquifer, and was specified in the model for the present investigation (Montgomery & Associates, 1999).

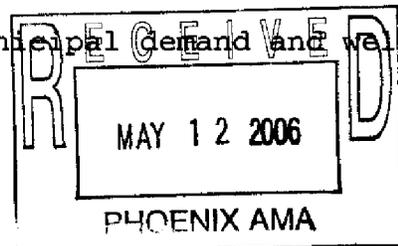
PROJECTED DEMAND

The original projected demand for well CA-008A was based on an annual average pumping discharge rate (Q) of 1,736 gallons per minute (gpm). The new projected demand for CA-008A based on normal usage will require an annual average pumping discharge rate of about 2,250 gallons per minute (gpm). An average discharge rate of 2,250 gpm was therefore entered into the program.

The well spacing and well impact rules (R12-15-830) prescribed by ADWR require that the projected cumulative declines in water levels be calculated for the proposed well after the first five years of operation. This implies that the proposed well will be operated under a 100 percent duty cycle (i.e. pumped continuously) for the first five years. The volume of water withdrawn each year under a 100 percent duty cycle is calculated below:

$$\begin{aligned} \text{Volume Withdrawn} &= 2,250 \text{ gpm} * 60 \text{ min.} * 24 \text{ hr.} * 365 \text{ days} \\ \text{per Year} &= 1182.6 \text{ million gallons (or 3,629 acre-feet)} \end{aligned}$$

The operation of a well on a 100 percent duty cycle is not a practical assumption due to fluctuating municipal demand and well



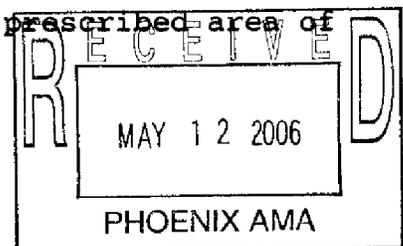
maintenance requirements. However, by evaluating projected water-level declines under this mode, the analysis more closely approximates a worst-case condition.

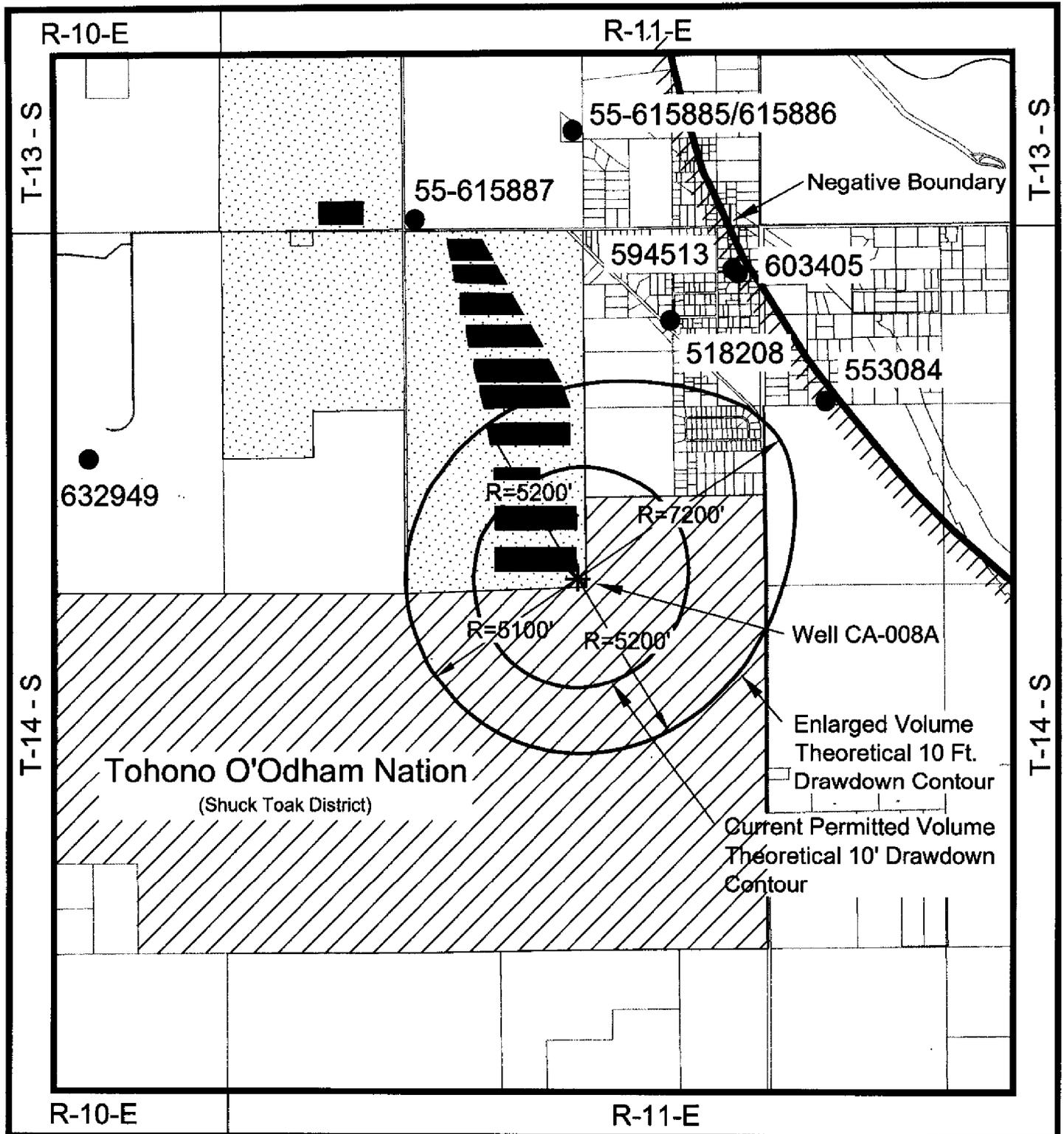
PROJECTED IMPACT

The model projected theoretical 10-foot drawdown contours are skewed from the effects of the eastern negative boundary after 1,825 days of pumping. The distance of the theoretical 10-foot drawdown contour based on currently permitted volumes ranges from a maximum about 3,350 feet to the northeast to a minimum of about 3,100 feet to the southwest. Based on the proposed enlarged volume the simulated 10-foot contour lines ranges from a maximum about 7,200 feet to the northeast to a minimum of about 5,100 feet to the southwest. The simulated 10-foot contour lines for drawdown are shown on Figure 2.

Based on a review of ADWR's well registry, wells 55-553084 and 55-518208 are the nearest non-City of Tucson/Tucson Water owned registered water-production wells closest to the simulated 10-foot drawdown contour. Both wells are located about 1,700 feet from the simulated 10-foot drawdown contour. The location of these wells with reference to the 10-foot drawdown contour is shown on Figure 2.

After reviewing ADWR's well registry list and accurately plotting well locations, Tucson Water staff determined there are no water production wells of record within the prescribed area of hydrologic impact.





**FIGURE 2**  
**PROJECTED HYDROLOGIC IMPACT MAP**

05/2006



- \* SUBJECT WELL SITE
- REGISTERED WELL LOCATION (Non-City of Tucson Well)
- ▨ CITY OF TUCSON PROPERTY
- ▨ RECHARGE BASIN (CAVSARP)

RECEIVED

MAY 12 2006

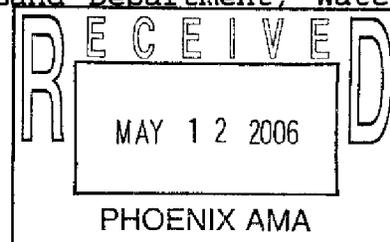
PHOENIX, AZ

0 2,000 4,000

Distance in Feet

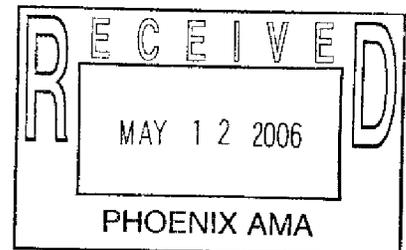
## REFERENCES

- Anderson, S.R., 1972. *Electrical-analog analysis of the hydrologic system, Tucson Basin Southeastern Arizona*, U.S. Geological Survey, Water-Supply Paper 1939-C.
- Errol L. Montgomery & Associates Inc., 1999. *Projection of drawdown impact for City Of Tucson proposed municipal supply well (D-14-11)8add[CA-B] Avra Valley sub-basin Tucson Active Management Area*, Report Prepared For City of Tucson Water Department, February 24, 1999.
- Freethey, G.W., Pool, D.R., Anderson, T.W. and Tucci, P., 1986. *Description and generalized distribution of aquifer materials in the alluvial basins of Arizona and adjacent parts of California and New Mexico*, U.S Geological Survey Hydrologic Investigations Atlas HA-663.
- McDonald, M.G., and Harbaugh, A.W., 1988. *A modular three-dimensional finite-difference ground-water flow model*, Techniques of Water-Resources Investigations of the U.S. Geological Survey, book6 chapter A1.
- Moosburner, O., 1972. *Analysis of the ground-water system by electrical-analog model, Avra Valley, Pima and Pinal Counties, Arizona*, U.S. Geological Survey: Hydrologic Investigation Atlas HA-215, 2 sheets.
- Tucson Water, 2000. *Annual Static Water Level Basic Data Report, Tucson Basin and Avra Valley, Pima County, Arizona, 1998*, Planning and Engineering Division, Research and Technical Support Section.
- Tucson Water, 2006. *2005 Annual Storage Report*, Planning and Engineering Division, Research and Technical Support Section.
- Whallon, A.J., 1988. *A geohydrological study of the regional ground-water system in Avra Valley, Pima and Pinal Counties, Arizona*, M.S. thesis University of Arizona.
- White, N.D., Matlock, W.G. and Schwalen, H.C., 1966. *An appraisal of the ground-water resources of Avra and Altar Valleys, Pima County, Arizona*, Arizona State Land Department, Water Resources Report 25.



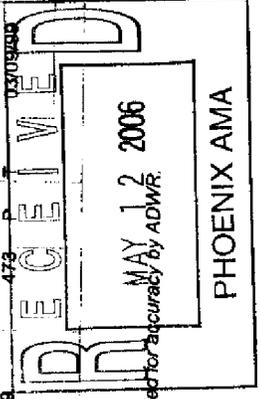
**APPENDIX A**

**LISTING OF REGISTERED WELLS IN THE STUDY AREA**



Arizona Department of Water Resources  
Wells-55 Registry\*

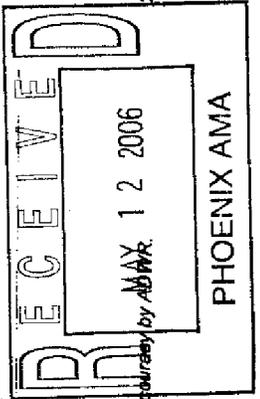
| Location       | Name                                    | Regist. No. | Type | GPM | DEPTH | WTR LVL | DIAM | COMMENTS                  | cx | App/Reg Date | Driller | WLL | H2O | Drill Date |
|----------------|---|-------------|------|-----|-------|---------|------|---------------------------|----|--------------|---------|-----|-----|------------|
| D-14-11 04 AAA | CENTRAL ARIZONA PROJECT                 | 569579      | C    |     | 490   | 130     | 2    |                           |    | 07/06/88     | 181     | N   | N   | 03/04/99   |
| D-14-11 04 ADB | SANDARIO WATER COMPANY                  | 594513      | N    |     | 547   | 445     | 9    |                           |    | 12/02/02     | 611     | N   | N   | 03/04/99   |
| D-14-11 04 BB  | SANDARIO WATER CO, EL PASO NATURAL GAS. | 603405      | N    | 49  | 590   | 434     | 8    |                           |    | 03/01/82     | 0       | W   | B   | 01/01/65   |
| D-14-11 04 CAA | SANDARIO WATER COMPANY                  | 502163      | Q    | 0   | 490   | 0       | 8    |                           |    | 10/13/89     | 317     | N   | N   | 11/14/89   |
| D-14-11 04 CBB | CITY OF TUCSON - TUCSON WATER           | 583989      | PZ   |     | 50    | 0       | 0    | CXL Q502183               | Y  | 03/30/82     | 0       | W   | B   |            |
|                | CITY OF TUCSON/TUCSON WATER             | 582809      | PZ   |     | 50    | 0       | 0    | CXL Q505442               | Y  | 07/07/83     | 0       | W   | D   |            |
|                | CITY OF TUCSON - TUCSON WATER           | 591502      | PZ   |     | 415   | 393     | 12   | E.H. LEWIS 56-193 S522437 |    | 10/28/88     | 0       | W   | E   | 01/06/89   |
| D-14-11 04 CDA | TUCSON, CITY OF, TUCSON WATER           | 591505      | MIN  |     | 205   |         |      |                           |    | 03/18/02     | 314     | Q   | T   |            |
| D-14-11 05 AAB | CITY OF TUCSON - TUCSON WATER           | 593606      | C    |     | 320   | 376     | 16   |                           |    | 08/09/82     | 0       | W   | E   | 12/01/52   |
| D-14-11 05 BAA | CITY OF TUCSON - TUCSON WATER           | 583981      | PZ   |     | 50    |         | 2    |                           |    | 10/19/00     | 7       | P   | T   | 12/01/00   |
| D-14-11 05 BAB | CITY OF TUCSON                          | 591503      | MIN  |     | 415   |         | 6    | WR-420A                   |    | 03/18/02     | 314     | Q   | T   |            |
| D-14-11 05 BAC | CITY OF TUCSON                          | 597056      | PZ   |     | 50    |         | 2    | WR-410A                   |    | 02/06/03     | 7       | P   | U   | 02/25/03   |
| D-14-11 05 BAD | CITY OF TUCSON/TUCSON WATER             | 573020      | PZ   |     | 205   |         | 2    | WR-409A                   |    | 02/06/03     | 7       | P   | U   | 02/25/03   |
|                |   |             |      |     |       |         |      |                           |    | 01/29/99     | 478     | P   | U   | 03/09/99   |



\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has generally not been verified for accuracy by ADWR.

Arizona Department of Water Resources  
Wells-55 Registry\*

| Location       | Name                          | Regist. Type | GPM  | DEPTH | WTR LVL | DIAM | COMMENTS    | cx | App/Reg Date | Driller | WLL | H2O | Drill Date |
|----------------|-------------------------------|--------------|------|-------|---------|------|-------------|----|--------------|---------|-----|-----|------------|
| D-14-11 05 BCB | CITY OF TUCSON - TUCSON WATER | 564715 T     | 1340 | 1000  | 356     | 20   |             |    | 01/11/01     | 388     | V   | E   | 03/14/02   |
| D-14-11 05 BDA | TUCSON WATER                  | 567934 PZ    |      | 201   | 130     |      |             |    | 03/28/98     | 388     | P   | T   | 05/08/98   |
|                | TUCSON, CITY OF               | 563470 X     | 0    | 0     |         | 2    | WATER DEPT  |    | 07/02/97     | 473     | P   | M   |            |
|                |                               | 563471 X     | 0    | 0     |         | 2    | WATER DEPT  |    | 07/02/97     | 473     | P   | M   |            |
|                |                               | 563472 X     | 0    | 150   | 0       | 2    | WATER DEPT  |    | 07/02/97     | 473     | P   | M   | 08/20/97   |
| D-14-11 05 BDS | TUCSON CITY OF-TUCSON WATER   | 562751 T     | 40   | 400   | 370     | 5    | BRUCE PRIOR |    | 05/20/97     | 52      | W   | D   | 11/03/97   |
| D-14-11 05 BDC | CITY OF TUCSON                | 567054 PZ    |      | 30    |         |      | WR-407A     |    | 02/06/03     | 7       | P   | U   | 02/26/03   |



\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has generally not been verified for accuracy by ADWR.



Arizona Department of Water Resources  
Wells-55 Registry\*

| Location       | Name                          | Regist. Type          | GPM  | DEPTH     | WTR LVL | DIAM    | COMMENTS | cx App/Reg Date      | Driller | WLL        | H2O | Drill Date                       |
|----------------|-------------------------------|-----------------------|------|-----------|---------|---------|----------|----------------------|---------|------------|-----|----------------------------------|
| D-14-11 05 CCD | CITY OF TUCSON/TUCSON WATER   | 571741 N              |      | 1000      | 375     | 20      |          | 11/16/98             | 7       | V E        |     | 04/11/01<br>09/07/01<br>04/05/99 |
| D-14-11 05 CDA | TUCSON CITY OF CITY OF TUCSON | 620256 N<br>587052 PZ | 2400 | 576<br>35 | 355     | 20<br>2 |          | 08/09/82<br>02/08/03 | 0<br>7  | W E<br>P U |     | 12/01/51<br>02/21/03             |
| D-14-11 05 DBA | CITY OF TUCSON/TUCSON WATER   | 576897 T              | 1700 | 1200      | 340     | 20      |          | 11/04/99             | 621     | R E        |     | 06/10/00                         |
| D-14-11 05 DDD | CITY OF TUCSON TUCSON WATER   | 576450 T              |      | 1000      |         |         |          | 08/05/99             | 388     | R E        |     | 03/28/00                         |
|                |                               |                       |      |           |         |         |          |                      |         |            |     | 05/10/00<br>05/10/00<br>05/10/00 |
|                |                               |                       |      |           |         |         |          |                      |         |            |     | 05/10/00<br>03/28/00<br>03/28/00 |

**RECEIVED**  
 MAY 12 2006  
 PHOENIX AMA

\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has generally not been verified for accuracy by ADWR.

Arizona Department of Water Resources  
Wells-55 Registry\*

| Location       | Name                        | Regist. Type | GPM  | DEPTH | WTR LVL | DIAM | COMMENTS | cx | App/Reg Date | Driller | WLL | H2O | Drill Date |
|----------------|-----------------------------|--------------|------|-------|---------|------|----------|----|--------------|---------|-----|-----|------------|
| D-14-11 06 ABD | CITY OF TUCSON/TUCSON WATER | T            |      |       |         |      |          | Y  | 03/23/99     |         | W E | F   | 03/28/00   |
|                | CITY OF TUCSON/TUCSON WATER | T            |      | 1000  | 357     | 20   |          |    | 04/22/04     | 388     | W E | F   | 01/03/05   |
| D-14-11 06 BCD | CITY OF TUCSON/TUCSON WATER | PZ           | 1200 | 1000  | 374     | 20   |          | Y  | 01/29/99     | 473     | P T | F   | 09/17/02   |
|                | CITY OF TUCSON/TUCSON WATER | T            |      |       |         |      |          |    | 08/22/01     | 388     | V E | F   | 09/17/02   |
| D-14-11 06 CBB | CITY OF TUCSON TUCSON WATER | PZ           |      | 50    |         | 2    |          |    | 10/19/00     | 7       | P T | F   | 12/01/00   |
|                | CITY OF TUCSON/TUCSON WATER | PZ           |      | 50    |         | 2    |          |    | 08/09/00     | 7       | Q T | F   | 09/14/00   |

**R E C E I V E D**  
 MAY 12 2006  
 PHOENIX DMA

\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has generally not been verified for accuracy by ADWR.

Arizona Department of Water Resources  
Wells-55 Registry\*

| Location       | Name   | Regist. Type     | GPM      | DEPTH        | WTR LVL | DIAM | COMMENTS       | ck | App/Reg Date         | Driller    | WELL   | H2O    | Drill Date                                   |
|----------------|--|------------------|----------|--------------|---------|------|----------------|----|----------------------|------------|--------|--------|--|
| D-14-11 06 CCD | CITY OF TUCSON/TUCSON WATER                            | 591504<br>574904 | MIN<br>N | 415<br>1000  | 367     | 32   | WR-418A        |    | 03/18/02<br>06/24/99 | 314<br>388 | Q<br>V | T<br>E | 01/17/00<br>01/17/00                         |
| D-14-11 06 DBA | TUCSON, CITY OF.<br>CITY OF TUCSON<br>WATER DEPARTMENT | 620257<br>585728 | N<br>T   | 635<br>1000  | 369     | 20   | TW WELL #AF37A |    | 06/09/82<br>03/22/01 | 0<br>388   | W<br>V | E<br>E | 01/01/52<br>08/17/02                         |
| D-14-11 06 DCC | CITY OF TUCSON/TUCSON WATER                            | 571742           | N        | 1400<br>1000 | 375     | 20   |                |    | 11/16/98             | 621        | V      | E      | 08/17/02<br>08/17/02<br>08/17/02<br>08/17/02 |

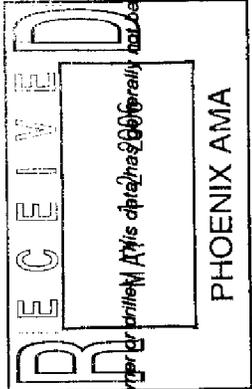
**RECEIVED**  
 This data has generally not been verified for accuracy by ADWR.  
 MAY 2 2006  
 PHOENIX AMA

\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has generally not been verified for accuracy by ADWR.



Arizona Department of Water Resources  
Wells-55 Registry\*

| Location       | Name                        | Regist Type | GPM  | DEPTH | WTR LVL | DIAM | COMMENTS    | cx | App/Reg Date | Driller | WLL | H2O | Drill Date |
|----------------|-----------------------------|-------------|------|-------|---------|------|-------------|----|--------------|---------|-----|-----|------------|
| D-14-11 08 ABB | CITY OF TUCSON              | PZ          |      | 35    |         |      | WR-404A     |    | 02/06/03     | 7       | P U |     | 02/21/03   |
|                | CITY OF TUCSON/TUCSON WATER | PZ          |      | 190   |         | 2    |             |    | 01/29/99     | 473     | P T |     | 03/03/99   |
| D-14-11 08 ABC | TUCSON WATER                | PZ          | 1800 |       |         |      |             | N  | 03/28/98     | 473     | P M |     |            |
| D-14-11 08 ACB | CITY OF TUCSON/TUCSON WATER | MN          |      |       |         |      |             | Y  | 01/17/03     | 7       | Q M |     |            |
|                | TUCSON CITY OF-TUCSON WATER | X           | 16   | 405   | 388     | 5    | BRUCE PRIOR |    | 05/20/97     | 7       | U M |     | 11/24/97   |
|                | TUCSON, CITY OF,            | X           | 0    | 145   | 0       | 2    | WATER DEPT  |    | 07/02/97     | 473     | P M |     | 08/21/97   |
|                | TUCSON, CTY OF,             | X           | 0    | 0     | 0       | 2    | WATER DEPT  |    | 07/02/97     | 473     | P M |     |            |
|                | CITY OF TUCSON/TUCSON WATER | PZ          |      | 29    |         | 2    |             |    | 08/09/00     | 7       |     |     | 09/18/00   |
| D-14-11 08 ADC | CITY OF TUCSON/TUCSON WATER | PZ          |      | 30    |         | 2    |             |    | 08/09/00     | 7       | Q T |     | 09/18/00   |
| D-14-11 08 ADD | CITY OF TUCSON/TUCSON WATER | T           |      |       |         |      |             | Y  | 03/23/99     |         | W E |     |            |
|                |                             | N           |      | 1000  | 345     | 32   |             | Y  | 05/27/99     | 388     | U E |     | 01/12/00   |
|                |                             |             |      |       |         |      |             |    |              |         | W E |     | 01/12/00   |



\*Information contained in Wells-55 Registry has been submitted by the well owner and is not necessarily verified for accuracy by ADWR.





Arizona Department of Water Resources  
Wells-55 Registry

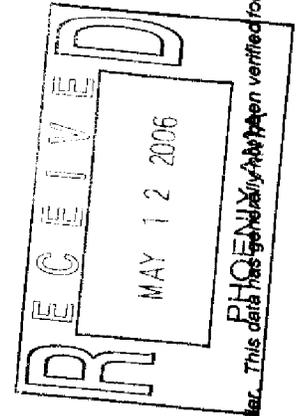
| Location       | Name   | Regist. No.      | Type     | GPM  | DEPTH       | WTR LVL    | DIAM     | COMMENTS             | cx | App/Reg Date         | Driller    | WLL               | H2O | Drill Date           |
|----------------|--|------------------|----------|------|-------------|------------|----------|----------------------|----|----------------------|------------|-------------------|-----|----------------------|
| D-14-11 08 CDD | TUCSON, CITY OF<br>CITY OF<br>TUCSON/TUCSON WATER                  | 620260<br>201430 | N<br>T   | 2400 | 580<br>1000 | 356<br>354 | 20<br>20 | Replaced by 571743   |    | 06/09/82<br>02/12/04 | 0<br>388   | W E<br>W E        |     | 12/01/51<br>12/01/51 |
| D-14-11 08 DBB | CITY OF TUCSON<br>CITY OF<br>TUCSON/TUCSON WATER                   | 597050<br>573018 | PZ<br>PZ |      | 30<br>180   |            | 2<br>2   | WELL NAME IS WR-402A | Y  | 02/06/03<br>01/29/89 | 621<br>388 | W E<br>P U<br>P T |     | 02/24/03<br>03/08/89 |
| D-14-11 08 DCB | CITY OF TUCSON   | 597049           | PZ       |      | 25          |            | 2        | well name is WR-401A |    | 02/06/03             | 7          | P O               |     | 02/24/03             |
| D-14-11 08 DCC | CITY OF TUCSON -<br>TUCSON WATER<br>CITY OF<br>TUCSON/TUCSON WATER | 583987<br>582807 | PZ<br>PZ |      | 50<br>50    |            | 2<br>2   |                      |    | 10/19/00<br>08/09/00 | 7<br>7     | P T<br>Q T        |     | 12/01/00<br>09/15/00 |
| D-14-11 08 DDD | CITY OF<br>TUCSON/TUCSON WATER                                     | 591507<br>579475 | MN<br>T  |      | 415<br>1000 |            | 6<br>32  | WR-412A              |    | 03/18/02<br>02/24/00 | 314<br>388 | Q T<br>R E        |     | 08/01/00<br>08/01/00 |
| D-14-11 09 ACC | TUCKER, THOMAS, J  | 534236           | D        | 0    | 450         | 0          | 9        |                      |    | 01/22/92             | 137        | U A               |     | 05/20/92             |

**RECEIVED**  
 MAY 12 2006  
 PHOENIX AMA

\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has generally not been verified for accuracy by ADWR.

Arizona Department of Water Resources  
Wells-55 Registry\*

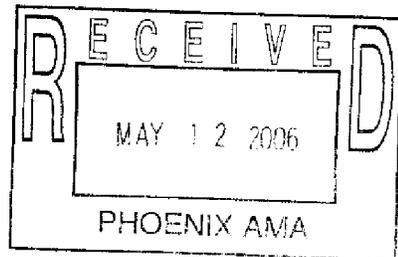
| Location       | Name                             | Regist Type | GPM | DEPTH | WTR LVL | DIAM | COMMENTS              | cx | App/Reg Date | Driller | WLL | H2O | Drill Date |
|----------------|----------------------------------|-------------|-----|-------|---------|------|-----------------------|----|--------------|---------|-----|-----|------------|
| D-14-11 08 BCA | CITY OF TUCSON -<br>TUCSON WATER | D           | 0   | 0     | 0       | 0    | RPLC-534236NO LOG CXL | Y  | 07/28/92     | 323     | W A | D   | 05/20/92   |
|                |                                  | PZ          |     | 50    |         | 2    |                       |    | 10/19/00     | 7       |     | D   | 12/01/00   |
|                | CITY OF<br>TUCSON/TUCSON WATER   | PZ          |     | 50    |         | 2    |                       |    | 09/09/00     | 7       | Q T |     | 09/19/00   |
|                |                                  | MN          |     | 415   |         | 6    | WR-414A               |    | 03/18/02     | 314     | Q T |     |            |



\*Information contained in Wells-55 Registry has been submitted by the well owner or driller. This data has been verified for accuracy by ADWR.

**APPENDIX B**

AQUIFER TEST DATA AND PLOT FOR TUCSON WATER WELL AF-034A



**FIELD DATA**

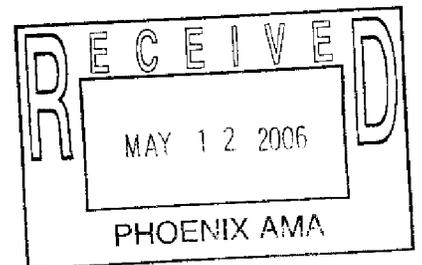
Observation Well AF-034A

July 24-26, 1996

**AQUIFER TEST DATA**

Water -Level Measurements Taken at the Well Head  
Depths Given with Reference to Measuring Point

| <u>Date/Time</u> | <u>Elapsed Time</u> | <u>Depth to Water Feet</u> | <u>Comments</u> |
|------------------|---------------------|----------------------------|-----------------|
| 7-24-96/07:16    | 0                   |                            |                 |
| 07:17            | 1                   | 371.44                     |                 |
|                  | 2                   | 371.39                     | Q ~ 1700 GPM    |
|                  | 3                   | 371.47                     |                 |
|                  | 4                   | 371.62                     |                 |
|                  | 5                   | 371.69                     |                 |
|                  | 6                   | 371.82                     |                 |
|                  | 7                   | 371.96                     |                 |
|                  | 8                   | 372.14                     |                 |
|                  | 9                   | 372.21                     |                 |
|                  | 10                  | 372.35                     |                 |
|                  | 11                  | 372.46                     |                 |
|                  | 12                  | 372.59                     |                 |
|                  | 13                  | 372.69                     |                 |
|                  | 14                  | 372.8                      |                 |
|                  | 15                  | 372.77                     |                 |
|                  | 16                  | 372.97                     |                 |
|                  | 18                  | 373.22                     |                 |
|                  | 20                  | 373.38                     |                 |
|                  | 22                  | 373.57                     |                 |
|                  | 24                  | 373.76                     |                 |
|                  | 26                  | 373.83                     |                 |
|                  | 28                  | 373.99                     |                 |
|                  | 30                  | 374.18                     |                 |
|                  | 32                  | 374.23                     |                 |
|                  | 34                  | 374.3                      |                 |
|                  | 39                  | 374.63                     |                 |
|                  | 44                  | 374.86                     |                 |
|                  | 49                  | 375.11                     |                 |
|                  | 54                  | 375.31                     |                 |
| 08:15            | 59                  | 375.49                     |                 |



**FIELD DATA**

Observation Well AF-034A

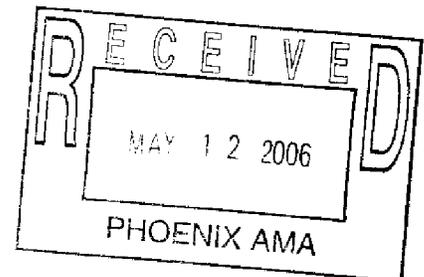
July 24-26, 1996

**AQUIFER TEST DATA**

Water -Level Measurements Taken at the Well Head  
Depths Given with Reference to Measuring Point

| <u>Date/Time</u> | <u>Elapsed Time</u> | <u>Depth to Water Feet</u> | <u>Comments</u> |
|------------------|---------------------|----------------------------|-----------------|
| 7-24-96/08:20    | 64                  | 375.65                     |                 |
|                  | 69                  | 375.84                     |                 |
|                  | 74                  | 375.97                     |                 |
|                  | 79                  | 376.1                      |                 |
|                  | 84                  | 376.23                     |                 |
|                  | 89                  | 376.31                     |                 |
|                  | 94                  | 376.46                     |                 |
|                  | 99                  | 376.58                     |                 |
|                  | 104                 | 376.65                     |                 |
|                  | 109                 | 376.72                     |                 |
|                  | 114                 | 376.82                     |                 |
|                  | 119                 | 376.9                      |                 |
|                  | 124                 | 376.97                     |                 |
|                  | 129                 | 377.05                     |                 |
|                  | 134                 | 377.13                     |                 |
|                  | 139                 | 377.22                     |                 |
|                  | 149                 | 377.36                     |                 |
|                  | 154                 | 377.39                     |                 |
|                  | 159                 | 377.47                     |                 |
|                  | 164                 | 377.5                      |                 |
|                  | 169                 | 377.57                     |                 |
|                  | 174                 | 377.58                     |                 |
|                  | 179                 | 377.67                     |                 |
|                  | 185                 | 377.75                     |                 |
|                  | 190                 | 377.77                     |                 |
|                  | 197                 | 377.85                     |                 |
|                  | 204                 | 377.89                     |                 |
|                  | 210                 | 377.94                     |                 |
|                  | 220                 | 377.99                     |                 |
|                  | 230                 | 378.07                     |                 |
|                  | 240                 | 378.12                     |                 |

11:16



**FIELD DATA**

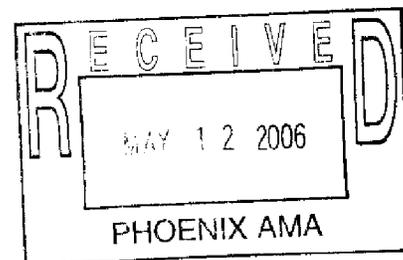
Observation Well AF-034A

July 24-26, 1996

**AQUIFER TEST DATA**

Water -Level Measurements Taken at the Well Head  
Depths Given with Reference to Measuring Point

| <u>Date/Time</u> | <u>Elapsed Time</u> | <u>Depth to Water Feet</u> | <u>Comments</u> |
|------------------|---------------------|----------------------------|-----------------|
| 7-24-96/11:26    | 250                 | 378.17                     |                 |
|                  | 260                 | 378.25                     |                 |
|                  | 270                 | 378.3                      |                 |
|                  | 280                 | 378.35                     |                 |
|                  | 290                 | 378.4                      |                 |
|                  | 300                 | 378.42                     |                 |
|                  | 313                 | 378.5                      |                 |
|                  | 320                 | 378.55                     |                 |
|                  | 340                 | 378.54                     |                 |
|                  | 360                 | 378.69                     |                 |
|                  | 380                 | 378.72                     |                 |
|                  | 400                 | 378.85                     |                 |
|                  | 420                 | 379.05                     |                 |
|                  | 440                 | 379.35                     |                 |
|                  | 460                 | 379.6                      |                 |
|                  | 480                 | 379.69                     |                 |
|                  | 500                 | 379.88                     |                 |
|                  | 520                 | 379.7                      |                 |
|                  | 540                 | 379.68                     |                 |
|                  | 560                 | 379.61                     |                 |
|                  | 580                 | 379.64                     |                 |
|                  | 600                 | 379.5                      |                 |
|                  | 620                 | 379.34                     |                 |
|                  | 640                 | 379.49                     |                 |
|                  | 660                 | 379.85                     |                 |
|                  | 680                 | 379.78                     |                 |
|                  | 700                 | 379.84                     |                 |
|                  | 730                 | 379.92                     |                 |
|                  | 760                 | 379.97                     |                 |
|                  | 790                 | 379.92                     |                 |
| 20:56            | 820                 | 379.98                     |                 |



**FIELD DATA**

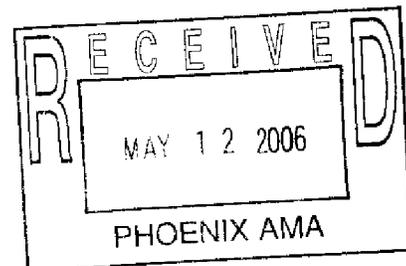
Observation Well AF-034A

July 24-26, 1996

**AQUIFER TEST DATA**

Water -Level Measurements Taken at the Well Head  
Depths Given with Reference to Measuring Point

| <u>Date/Time</u> | <u>Elapsed Time</u> | <u>Depth to Water Feet</u> | <u>Comments</u> |
|------------------|---------------------|----------------------------|-----------------|
| 7-24-96/21:56    | 880                 | 380.25                     |                 |
|                  | 910                 | 380.27                     |                 |
|                  | 975                 | 380.22                     |                 |
| 7-25-96/00:26    | 1030                | 380.27                     |                 |
|                  | 1090                | 380.27                     |                 |
|                  | 1150                | 380.3                      |                 |
|                  | 1210                | 380.35                     |                 |
|                  | 1270                | 380.41                     |                 |
|                  | 1330                | 380.47                     |                 |
|                  | 1390                | 380.46                     |                 |
|                  | 1432                | 380.5                      |                 |
| 7-25-96/07:16    | 1440                |                            | Pump off        |
|                  | 1441                | 380.52                     |                 |
|                  | 1442                | 380.52                     |                 |
|                  | 1443                | 380.43                     |                 |
|                  | 1444                | 380.26                     |                 |
|                  | 1445                | 380.14                     |                 |
|                  | 1446                | 380                        |                 |
|                  | 1447                | 379.85                     |                 |
|                  | 1448                | 379.68                     |                 |
|                  | 1449                | 379.63                     |                 |
|                  | 1450                | 379.4                      |                 |
|                  | 1451                | 379.23                     |                 |
|                  | 1452                | 379.15                     |                 |
|                  | 1453                | 379.24                     |                 |
|                  | 1454                | 378.95                     |                 |
| 1455             | 378.85              |                            |                 |
| 1456             | 378.82              |                            |                 |
| 1458             | 378.58              |                            |                 |
| 1460             | 378.5               |                            |                 |
| 07:38            | 1462                | 378.28                     |                 |



**FIELD DATA**

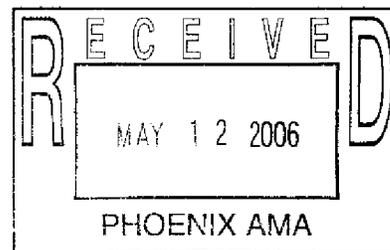
Observation Well AF-034A

July 24-26, 1996

**AQUIFER TEST DATA**

Water -Level Measurements Taken at the Well Head  
Depths Given with Reference to Measuring Point

| Date/Time     | Elapsed Time | Depth to Water Feet | Comments |
|---------------|--------------|---------------------|----------|
| 7-25-96/07:40 | 1464         | 378.13              |          |
|               | 1466         | 378.02              |          |
|               | 1468         | 377.97              |          |
|               | 1470         | 377.88              |          |
|               | 1472         | 377.7               |          |
|               | 1474         | 377.67              |          |
|               | 1476         | 377.64              |          |
|               | 1478         | 377.37              |          |
|               | 1480         | 377.28              |          |
|               | 1482         | 377.23              |          |
|               | 1484         | 377.07              |          |
|               | 1487         | 376.94              |          |
|               | 1490         | 376.9               |          |
|               | 1495         | 376.68              |          |
|               | 1501         | 376.59              |          |
|               | 1505         | 376.46              |          |
|               | 1510         | 376.45              |          |
|               | 1515         | 376.1               |          |
|               | 1520         | 375.98              |          |
|               | 1525         | 375.77              |          |
|               | 1540         | 375.49              |          |
|               | 1550         | 375.4               |          |
|               | 1560         | 375.16              |          |
|               | 1570         | 374.96              |          |
|               | 1590         | 374.75              |          |
|               | 1610         | 374.51              |          |
|               | 1640         | 374.33              |          |
|               | 1660         | 374.07              |          |
|               | 1675         | 373.92              |          |
|               | 1690         | 373.8               |          |
| 11:46         | 1710         | 373.68              |          |



**FIELD DATA**

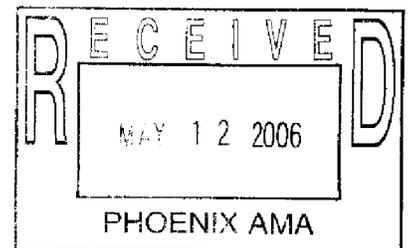
Observation Well AF-034A

July 24-26, 1996

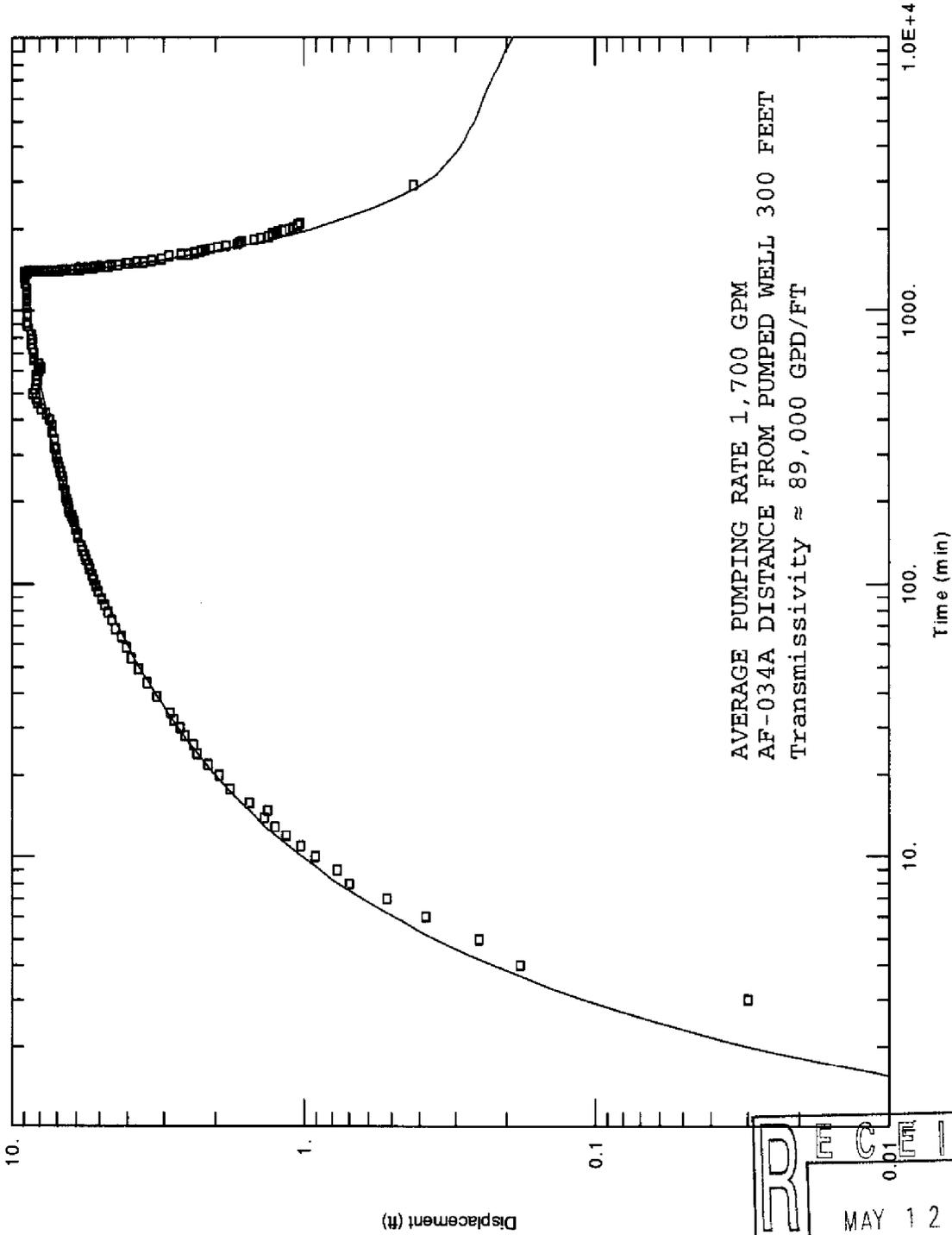
**AQUIFER TEST DATA**

Water -Level Measurements Taken at the Well Head  
Depths Given with Reference to Measuring Point

| <u>Date/Time</u> | <u>Elapsed Time</u> | <u>Depth to Water Feet</u> | <u>Comments</u> |
|------------------|---------------------|----------------------------|-----------------|
| 7-25-96/12:06    | 1730                | 373.6                      |                 |
|                  | 1750                | 373.52                     |                 |
|                  | 1770                | 373.4                      |                 |
|                  | 1795                | 373.28                     |                 |
|                  | 1815                | 373.12                     |                 |
|                  | 1835                | 373.09                     |                 |
|                  | 1855                | 373.07                     |                 |
|                  | 1885                | 372.91                     |                 |
|                  | 1915                | 372.84                     |                 |
|                  | 1945                | 372.76                     |                 |
|                  | 1975                | 372.72                     |                 |
|                  | 2005                | 372.67                     |                 |
|                  | 2035                | 372.62                     |                 |
|                  | 2065                | 372.56                     |                 |
|                  | 2095                | 372.52                     |                 |
| 19:11            | 2125                | 372.48                     |                 |
| 7-26-96/08:31    | 2155                | 372.46                     |                 |
|                  | 2955                | 371.86                     | End Recovery    |



LOG-LOG DRAWDOWN AND RECOVERY GRAPH FOR OBSERVATION WELL AF-034A  
 DURING 24-HOUR CONSTANT DISCHARGE PUMPING TEST AT WELL AF-034B  
 JULY 24-26, 1996



RECEIVED  
 MAY 12 2006  
 PHOENIX AMA

**Arizona Dept of Water Resources – Patty Curtis  
PHOENIX AMA - CHECK DEPOSIT REQUEST**

Date: May 15, 2006

Applicant: City of Tucson

Payment submitted by: City of Tucson..

Address on check: P.O. Box 27210 Tucson Arizona 85726-7210

Application No. T-212102 and 55-579475

| Code        | Type of Fee:  | Amount:  | Check No. |
|-------------|---|----------|-----------|
| 55          | Application for Well Permit<br><b>(\$150.00)</b>                                      | \$150.00 | 244423    |
| 55          | Well Permit Fee <b>(\$30.00)</b>  | \$30.00  | 244423    |
| 58          | Type I Conversion Request Flex<br>Account Transfers <b>(\$100.00)</b>                 |          |           |
| 59          | Application for Permit to<br>Withdraw<br><b>(\$50.00 or \$150.00)</b>                 |          |           |
| 59          | Withdrawal Permit Fee <b>(\$50.00)</b>  |          |           |
| 59          | Conveyance of Groundwater<br>Withdrawal Application and/or<br>Permit <b>(\$35.00)</b> |          |           |
| Gen<br>Fund | Legal Noticing Fees <b>(Various)</b>  |          |           |
| 55          | Notice of Intent for Non-Exempt<br>Wells <b>(\$150.00)</b>                            |          |           |

**CITY OF TUCSON**  
GENERAL REVOLVING ACCOUNT  
WELLS FARGO BANK - AZ

91-627  
1221

CHECK NUMBER  
**244423**

TO  
THE  
ORDER  
OF

STATE OF ARIZONA/DEPT OF WATER  
RESOURCES/WTR MGMT RESOURCES  
P.O. BOX 458  
PHOENIX, AZ 85001-0458

DATE **04/14/2006**

VOID AFTER 180 DAYS

PAY \*\*\*\*\*\$180.00

DAV One hundred eighty and 00/100 Dollars

**Arizona Dept of Water Resources – Patty Curtis  
PHOENIX AMA - CHECK DEPOSIT REQUEST**

Date: May 15, 2006

Applicant: City of Tucson

Payment submitted by: City of Tucson..

Address on check: P.O. Box 27210 Tucson Arizona 85726-7210

Application No. T-212102 and 55-579475

| Code        | Type of Fee:  | Amount:  | Check No. |
|-------------|---|----------|-----------|
| 55          | Application for Well Permit<br><b>(\$150.00)</b>                                      | \$150.00 | 244423    |
| 55          | Well Permit Fee <b>(\$30.00)</b>  | \$30.00  | 244423    |
| 58          | Type I Conversion Request Flex<br>Account Transfers <b>(\$100.00)</b>                 |          |           |
| 59          | Application for Permit to<br>Withdraw<br><b>(\$50.00 or \$150.00)</b>                 |          |           |
| 59          | Withdrawal Permit Fee <b>(\$50.00)</b>  |          |           |
| 59          | Conveyance of Groundwater<br>Withdrawal Application and/or<br>Permit <b>(\$35.00)</b> |          |           |
| Gen<br>Fund | Legal Noticing Fees <b>(Various)</b>  |          |           |
| 55          | Notice of Intent for Non-Exempt<br>Wells <b>(\$150.00)</b>                            |          |           |

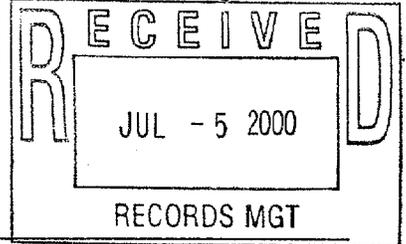
ARIZONA DEPARTMENT OF WATER RESOURCES

500 North Third Street  
Phoenix, Arizona 85004

WELL DRILLER REPORT

CA-008A

This report should be prepared by the driller in all detail and filed with the Department within 30 days following completion of the well.



1. Drilling Firm: AZCA Drilling  
P.O. Box 570  
Ehrenberg, AZ 85334

2. Owner Name: City of Tucson/Water Department

Address: P.O. Box 27210

Tucson      AZ      85726-7210      (520) 791-2689  
City                      State                      Zip                      Telephone Number

3. Location: 14 N/S      11      E.      08      SE 1/4      SE 1/4      SE 1/4  
Township      Range                      Section      10-acre      40-acre      160-acre

4. Well Registration No. 55-579475 (Required)

5. Permit No. T-579475 (If issued)

DESCRIPTION OF WELL

- 6. Total depth of hole 1000 ft.
- 7. Type of casing Steel
- 8. Diameter and length of casing 32 in. from 0 to 40, in from 0 to 1000
- 9. Method of sealing at reduction points cement grout
- 10. Perforated from 580 to 980, from \_\_\_\_\_ to \_\_\_\_\_, from \_\_\_\_\_ to \_\_\_\_\_
- 11. Size of cuts 0.080 Number of cuts per foot \_\_\_\_\_
- 12. If screen was installed: Length 400 ft. Diameter 200 in. Type Johnson Hi-Cap
- 13. Method of construction Reverse Rotary
- 14. Date started May 13, 2000
- 15. Date completed June 1, 2000
- 16. Depth to water 345 ft. (If flowing well, so state)
- 17. Describe point from which depth measurements were made, and give sea-level elevation if available: Edge of Casing

18. If flowing well, state method of flow regulation:

19. Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DO NOT WRITE IN THIS SPACE  
OFFICE RECORD

Registration No. \_\_\_\_\_  
File No. \_\_\_\_\_  
Received \_\_\_\_\_ By \_\_\_\_\_  
Entered \_\_\_\_\_ By \_\_\_\_\_

ANSWERED JUL 17 2000

ANSWERED FEB 21 2002





*AZCA Drilling & Pump, Inc.*

P.O. Box 570  
520-923-9118 Phone & Fax

AZ Lic. A, 135159, AZ Drilling Lic. 621, CA Lic. A, C57, HAZ - 753077

Ehrenberg, Arizona 85334  
Tucson Phone 520-290-8775

July 3, 2000

Arizona Department of Water Resources  
500 North Third Street  
Phoenix, Az 85004

Enclosed please find copies of Well Driller Reports for the City of Tucson/Tucson Water  
for Well #CA-005A and Well #CA-008A.

Thank you,



Larry Siddall

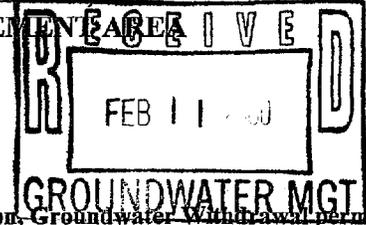
**ANSWERED JUL 17 2000**

**ANSWERED FEB 21 2002**

STATE OF ARIZONA  
 DEPARTMENT OF WATER RESOURCES  
 GROUNDWATER MANAGEMENT SUPPORT SECTION  
 MAIL TO: P.O. BOX 458, PHOENIX, ARIZONA 85001-0458  
 500 North Third Street, Phoenix, Arizona 85004-3903  
 Phone (602) 417-2470 Fax (602) 417-2422

CA-008A

APPLICATION FOR A PERMIT TO DRILL A NON-EXEMPT  
 NON-SERVICE AREA WELL WITHIN AN ACTIVE MANAGEMENT AREA  
 PURSUANT TO A.R.S. § 45-599



**I. INSTRUCTIONS:**

1. This application should be used to obtain a permit to:
  - (a) Drill a non-exempt well in conjunction with a General Industrial Use Permit Application, Groundwater Withdrawal permit or a Certificate of Grandfathered Right.
  - (b) Convert (enlarge) an existing well to a non-exempt use.
2. CITIES, TOWNS, PRIVATE WATER COMPANIES OR IRRIGATION DISTRICTS WISHING TO DRILL OR OPERATE A SERVICE AREA WELL SHOULD USE DWR FORM 599S (Rev 1/99).
3. Complete all appropriate items on this application, sign in the appropriate place and mail to P.O. Box 458, Phoenix, Arizona 85001-0458 or hand deliver to 500 North Third Street, Phoenix, Arizona 85004-3903.
4. Pursuant to A.R.S. § 45-113, the application fee is \$50.00 and the permit fee is \$30.00. You may submit both checks at the time of filing the application.
5. If multiple wells are involved or if the proposed design pump capacity is in excess of 500 gallons per minute, the applicant must attach a hydrological study which delineates projected declines in water levels due to the operation of the proposed well or wells as required by Department Rule R12-15-830.

**II. GENERAL DATA:**

1. Applicant City of Tucson Water Department  
 Mailing Address P. O. Box 27210  
Tucson AZ 85726-7210  
 City State Zip Code  
 Contact Person Joseph A. Babcock  
 Telephone Number (520) 791-2689

| FOR DEPARTMENT USE ONLY |                         |
|-------------------------|-------------------------|
| Application No.         | <u>55-579475</u>        |
| Registration No.        | <u>55-579475</u>        |
| File No.                | <u>D(14-11) 8 DDD</u>   |
| Date Received           | <u>02-11-2000</u>       |
| AMA                     | <u>TUCSON</u>           |
| W/S                     | <u>09</u> S/B <u>15</u> |

2. Name of Land Owner City of Tucson Water Department  
 Mailing Address P. O. Box 27210  
Tucson AZ 85726-7210 (520) 791-2689  
 City State Zip Telephone Number

3. Applicant is:  Owner  Lessee  
 4. Proposed well is:  New well  Conversion (enlargement) of existing well  Replacement well in a new location.

5. Claim of entitlement to withdraw groundwater is based upon:  
 Certificate of Grandfathered Right No: 58-110579.0000  
 Groundwater Withdrawal Permit No: \_\_\_\_\_  
 Application for General Industrial Use Permit No. 59- \_\_\_\_\_

6. The principal use(s) of groundwater will be (be specific) Municipal Supply

7. Well location: SE  $\frac{1}{4}$  SE  $\frac{1}{4}$  SE  $\frac{1}{4}$  Section 8 Township 14 N(S) Range 11 E(W)  
 10 Acre 40 Acre 160 Acre





**Tucson Water Department**

March 30, 2001

Arizona Department of Water Resources  
Groundwater Management Support Section  
ATTN: Mr. Al Ramsey  
P.O. Box 458  
Phoenix, Arizona 85001-0458

**Subject:** Pump Installation Completion Reports for CA-005A (55-579707) and  
CA-008A (55-579475).

Dear Mr. Ramsey:

Please find attached the Pump Installation Completion Reports for two City of Tucson wells CA-005A (55-579707) and CA-008A (55-579475).

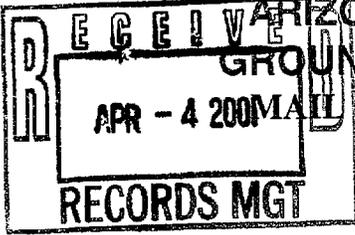
Please call Bruce M. Prior at (520) 791-5080 ext. 1403 if you have any questions regarding these Completion Reports.

Sincerely,

Ralph P. Marra  
Acting Chief Hydrologist

RM:BMP:adwr  
Attachments

cc: Nagieb Musa, Bruce Prior, Hydrology File



ARIZONA DEPARTMENT OF WATER RESOURCES  
GROUNDWATER MANAGEMENT SUPPORT SECTION

MAIL TO: P. O. BOX 458 - PHOENIX ARIZONA 85001-0458

Phone (602) 417-2470

COMPLETION REPORT

CA-008A

(Pump Installation Report)

- A. Per A.R.S. § 45-600.B, the Completion Report is to be filed with the Department within 30 days after installation of pump equipment by the registered well owner.
- B. Drawdown of the water level for a non-flowing well should be measured in feet after not less than 4 hours of continuous operations. For a flowing well the shut-in pressure should be measured in feet above the land surface or in pounds per square inch at the land surface.
- C. The static groundwater level should be measured in feet from the land surface immediately prior to the capacity test.
- D. The tested pumping capacity of the well in gallons per minute for a non-flowing well should be determined by measuring the discharge of the pump after continuous operation for at least 4 hours and for a flowing well be measuring the natural flow at the land surface.
- E. Items 1 and 2 are available from the Notice of Intent to Drill.
- F. Items 3 and 4 may be available from the driller.

1. REGISTRATION NO: 55- 579475 FILE NO: D (14-11) 08 DDD

2. LOCATION OF THE WELL:

14 S Township 11 E Range 08 Section 1/4 SE 10-acre 1/4 SE 40-acre 1/4 SE 160-acre

3. EQUIPMENT INSTALLED:

Kind of pump turbine Kind of power electric  
Turbine, Submersible, Centrifugal, etc. Electric, natural gas, gasoline, etc.  
H.P. Rating of Motor 350 Pumping Capacity 2000 Date Pump Installed 11/30/00

4. WELL TEST:

Test pumping capacity 2000 Gallons per minute Date Well Tested 3/15/01  
Method of Discharge Measurement flowmeter Weir, orifice, current meter, etc.  
Static Groundwater Level 350 ft. Drawdown 77 ft.  
Total Pumping Lift 427 ft. Drawdown (Flowing Well)

I HEREBY CERTIFY that the above statements are true to the best of my knowledge and belief.

City of Tucson/Water Dept. P.O. Box 27210 Tucson AZ 85726  
Print Well Owner's Name Address City State Zip  
Signature of Well Owner (520) 791-2689 3/26/01  
Ralph Marra Phone Number Date

ARIZONA DEPARTMENT OF WATER RESOURCES  
GROUNDWATER MANAGEMENT SUPPORT SECTION  
500 North Third Street  
Phoenix, Arizona 85004-3903

REISSUE

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILL OPERATIONS

WELL REGISTRATION NO: 55-579475

PERMIT NO.: T- 579475

AUTHORIZED DRILLER: AZCA DRILLING & PUMP, INC.

LICENSE NO: 621

A PERMIT TO DRILL A NON-EXEMPT, NON-SERVICE AREA WELL INSIDE THE TUCSON ACTIVE MANAGEMENT AREA HAS BEEN GRANTED TO:

WELL OWNER: CITY OF TUCSON WATER DEPT.

P.O. BOX 27210

TUCSON, ARIZONA 85726-7210

The well(s) is/are to be located in the:

SE ¼ of the SE ¼ of the SE ¼ Section 8 Township 14 South Range 11 East

No. of well(s) in this project: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE 2nd DAY OF MARCH, 2002.

  
\_\_\_\_\_  
CHIEF, GROUNDWATER MANAGEMENT SUPPORT

THE DRILLER MUST FILE A LOG OF THE WELL  
WITHIN 30 DAYS OF COMPLETION OF DRILLING



ARIZONA DEPARTMENT OF WATER RESOURCES  
GROUNDWATER MANAGEMENT SUPPORT SECTION  
MAIL TO: P.O. BOX 458 - PHOENIX, ARIZONA 85001-0458  
FOR INFORMATION: CALL MONICA ORTIZ AT (602)417-2470

CA-008A

3. REQUEST TO CHANGE WELL DRILLER      \$10.00 FEE REQUIRED FOR EACH WELL

This request must be received by this Department and the Drill Authorization issued to the new drilling firm prior to the start of drilling or the completion of the well listed below.

Well Registration No. 55- 579475      File No. D(14-11)08DDD

Tucson Water--Water Operations      AZCA Drilling & Pump  
Original Well Driller      New Well Driller

P.O. Box 27210      P.O. Box 570  
Mailing Address      Mailing Address

Tucson      AZ      85726      Ehrenberg      AZ      85334  
City      State      Zip      City      State      Zip

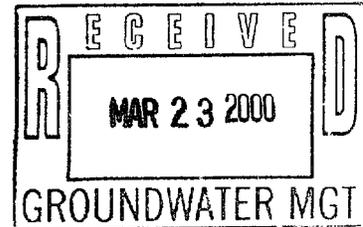
(520) 791-2689      (520) 923-9118  
Telephone Number      Telephone Number

388      621  
ADWR License Number      ADWR License Number      ROC License Category

City of Tucson/Tucson Water      Joseph A. Babcock      3-15-00  
Typed or Printed Name of Well Owner      Signature of Well Owner      Date

Joseph A. Babcock, Chief Hydrologist

The fee charged for a change of well ownership and/or reissue of a drill card is authorized by R12-15-151, effective June 30, 1994.



ARIZONA DEPARTMENT OF WATER RESOURCES  
GROUNDWATER MANAGEMENT SUPPORT SECTION  
MAIL TO: P.O. BOX 458 - PHOENIX, ARIZONA 85001- 0458  
FOR INFORMATION: CALL MONICA ORTIZ AT (602)417-2470

REQUEST FORM TO CHANGE WELL INFORMATION  
OWNERSHIP \* DRILLER

Please complete the appropriate section of this request form and return to P.O. Box 458, Phoenix, Arizona 85001-045. In accordance with A.R.S. § 45-113, please submit the applicable fee. **NOTE:** A.R.S. §45-593 (C) requires that the Department be notified of change of well ownership and that the new owner is required to keep the Department's Well Registration records current and accurate. Well data and ownership changes must be submitted within thirty days after changes take place.

**SAVE THIS FORM TO REPORT FUTURE CHANGES IN OWNERSHIP, CHANGES IN ADDRESS, OR CHANGE IN WELL DATA SUCH AS PUMP CAPACITY, CORRECTION OF LEGAL DESCRIPTION, CHANGE OF WELL DRILLER AND AMENDING INFORMATION PREVIOUSLY FILED.**

1. **CHANGE OF WELL INFORMATION: (NO FEE REQUIRED)**

**NOTE:** If the location of the proposed well changes after drilling authority has been issued, attach a \$10.00 reissue fee for each of the drilling authorities to be changed.

WELL REGISTRATION NO. 55- \_\_\_\_\_ FILE NO: \_\_\_\_\_

I/We request the following well information be changed: \_\_\_\_\_

Date \_\_\_\_\_ Signature of Current Well Owner \_\_\_\_\_

\*Note: This information is on your copy of the Notice of Intent to Drill.

2. **STATEMENT OF CHANGE OF WELL OWNERSHIP: (\$10.00 FEE REQUIRED)**

**NOTE:** If this change consists of more than one well and the names are common: attach a \$10.00 fee. Otherwise, each well requires a separate fee of \$10.00.

I, \_\_\_\_\_, state that I am the **Previous/New Owner** of the well described below:

\_\_\_\_\_ ¼ \_\_\_\_\_ ¼ \_\_\_\_\_ ¼ of Section \_\_\_\_\_ Township \_\_\_\_\_ N/S Range \_\_\_\_\_ E/W  
10 Acre 40 Acre 160 Acre

Assessor's tax parcel number of the parcel on which the well is located: Book \_\_\_\_\_ Map \_\_\_\_\_ Parcel \_\_\_\_\_

Well Registration No. 55- \_\_\_\_\_

File No. \_\_\_\_\_ (if known)

PRINT Previous Owner's Name \_\_\_\_\_

PRINT New Owner's Name \_\_\_\_\_

Mailing Address \_\_\_\_\_

Mailing Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone Number \_\_\_\_\_

Telephone Number \_\_\_\_\_

Signature of Previous/New Well Owner \_\_\_\_\_ Date \_\_\_\_\_

**ARIZONA DEPARTMENT OF WATER RESOURCES  
GROUNDWATER MANAGEMENT SUPPORT SECTION  
MAIL TO: P.O. BOX 458 - PHOENIX, ARIZONA 85001-0458  
FOR INFORMATION: CALL MONICA ORTIZ AT (602)417-2470**

CA-008A

**3. REQUEST TO CHANGE WELL DRILLER      \$10.00 FEE REQUIRED FOR EACH WELL**

This request must be received by this Department and the Drill Authorization issued to the new drilling firm prior to the start of drilling or the completion of the well listed below.

Well Registration No. 55- 579475      File No. D(14-11)08DDD

Tucson Water--Water Operations      AZCA Drilling & Pump  
**Original Well Driller**      **New Well Driller**

P.O. Box 27210      P.O. Box 570  
**Mailing Address**      **Mailing Address**

Tucson      AZ      85726      Ehrenberg      AZ      85334  
**City**      **State**      **Zip**      **City**      **State**      **Zip**

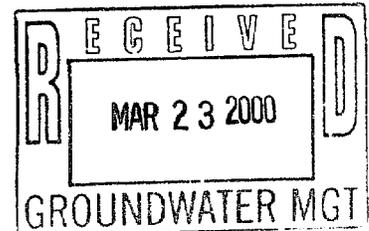
(520) 791-2689      (520) 923-9118  
**Telephone Number**      **Telephone Number**

388      621  
**ADWR License Number**      **ADWR License Number**      **ROC License Category**

City of Tucson/Tucson Water      Joseph A. Babcock      3-15-00  
**Typed or Printed Name of Well Owner**      **Signature of Well Owner**      **Date**

Joseph A. Babcock, Chief Hydrologist

The fee charged for a change of well ownership and/or reissue of a drill card is authorized by R12-15-151, effective June 30, 1994.



3747

**RALPH P. MARRA JR.**  
2511 E. 8TH STREET 520-321-1673  
TUCSON, AZ 85716-4707

Date 3-15-00      50-947/219

Pay to the Order of ARIZONA DEPARTMENT OF WATER RESOURCES \$ 20.00

TWO      00/100 Dollars  Security features included. Details on back.

**TUCSON OLD PUEBLO CREDIT UNION**      EFT# 322174957      50649-71

**TUCSON OLD PUEBLO CREDIT UNION**

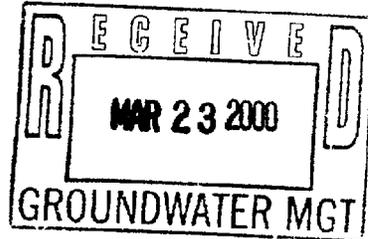
For ADWR - CHANGE OF WELL DRILLER



Tucson Water Department

March 16, 2000

Ms. Darlene Sumpter-King  
Groundwater Management Support Section  
Arizona Department of Water Resources  
P.O. Box 458  
Phoenix, AZ 85001-0458



**SUBJECT: Filing Two "Requests to Change Well Driller" for Tucson Water Wells CA-004A and CA-008A**

Dear Ms. Sumpter-King:

Please find attached two "Requests to Change Well Driller" forms for the two wells listed below and a check (#3747) for twenty dollars (\$20.00) to cover the requested fees:

| <u>Well Name</u> | <u>Well Location</u> | <u>Registration No.</u> |
|------------------|----------------------|-------------------------|
| CA-004A          | D(14-11)05dba        | 55-576697               |
| CA-008A          | D(14-11)08ddd        | 55-579475               |

Please send a receipt acknowledging payment of the fees to Mr. Ralph Marra at Tucson Water. If you have any questions regarding these requested changes, contact Ralph Marra at (520) 791-2689.

Sincerely,

Joseph A. Babcock  
Chief Hydrologist

JB:RM:adwrdrillchangece-4&8.doc

Attachments

cc: Ralph Marra, Joe Huerstel, Hydrology File

ARIZONA DEPARTMENT OF WATER RESOURCES

Tucson Active Management Area Office
400 West Congress Street
Suite #518
Tucson, Arizona 85701
Telephone 520-770-3800
Fax 520-628-6759



ENTERED MAR 22 2000

JANE DEE HULL
Governor
RITA P. PEARSON
Director

March 17, 2000

FIELD VERIFICATION REPORT
NEW OR REPLACEMENT WELL

File Number: D (14-11) 08 D D D
Quadrant Tns & Rng Section 160ac 40ac 10ac

Registration Number: 55-579475

Type of Permit & Number: T X S Number: T-579475

Location of Permit: SE 1/4 SE 1/4 SE 1/4 Section 08, T14S, R11E
10 Acre 40 Acre 160 Acre

Verified Location: SE 1/4 SE 1/4 SE 1/4 Section 08, T 14S, R11E
10 Acre 40 Acre 160 Acre

Latitude: N (example N 32E 09' 27.0") 32° 13' 11.28"

Longitude: W (example W 111E 12' 18.3") 111° 14' 6.48"

Latitude/Longitude Determined By: GPS: X Topo Map Other

Drill Card in possession of: Driller: Owner: X Consultant: Other:

Card given to: Nagieb Musa, Tucson Water
Name, Company, Address

Date and time of inspection: March 17, 2000 9:00am

Driller on card? YES X NO

Comments:

Well/s in Radius: Yes: No: X

Report filed by: (ADWR Employee Name) Kelly Kessler

**ARIZONA DEPARTMENT OF WATER RESOURCES**

500 North Third Street, Phoenix, Arizona 85004  
Telephone 602 417-2440  
Fax 602 417-2415



JANE DEE HULL  
Governor

RITA P. PEARSON  
Director

March 3, 2000

Joseph A. Babcock  
City of Tucson/Tucson Water  
P.O. Box 27210  
Tucson, Arizona 85726-7210

RE: Non-Exempt Well Permit No. T-579475  
Well Registration No. 55-579475; File No. D (14-11) 8 DDD

Dear Mr. Babcock:

The purpose of my letter is to discuss the land subsidence and earth fissure concerns that have been reviewed relative to the issuance of permit number T-579475 D(14-11)08 ddd. The Department has researched the potential for the proposed new well to cause an unreasonable and adverse impact from additional regional land subsidence. Based on our examination of the data, we have reached the conclusion that the potential for this well to cause significant impacts is low. Although we believe the likely impacts of this particular well would be negligible, we will be watching this area and other areas for possible future subsidence. In appropriate cases, the Department may require monitoring on future well permits applications, and groundwater recharge project permits.

In order to minimize the possibility of future monitoring requirements it is essential to maintain a proper level of regional monitoring throughout the AMA. The Department believes that the cooperative aquifer storage and land subsidence monitoring program can meet this need. However, the long-term commitment and participation in this program by the City of Tucson, Pima County the U.S.G.S. and the ADWR is crucial to insure its success. Since all parties concerned share a mutual interest in keeping informed and avoiding the potential problems of land subsidence and earth fissuring we hope that this partnership will be maintained well into the future.

If you have any questions concerning your permit, please call Jeff Tannler of the Tucson AMA office, at 520-770-3800.

Sincerely,

A handwritten signature in cursive script that reads "Jim Holway".

Jim Holway  
Assistant Director

Jeff Tannler/dsk  
cc: Jeff Tannler, TAMA

Applicant: City of Tucson Water Dept.

Application Number: 55-579475 Type: T. App

Associated Files: \_\_\_\_\_

| Process Step  | Date              |
|---|-------------------|
| Application received <u>App. &amp; Permit Fees Paid</u> | <u>02-11-2000</u> |
| Application returned and/or letter mailed to applicant  |                   |
| Application copies routed                               | <u>2-11-00</u>    |
| AMA sign off received                                   | <u>2/24/00</u>    |
| Hydrology sign off received                             | <u>2-16-00</u>    |
| Water Quality sign off received                         | <u>2-17-00</u>    |
| Recharge/Recovery Unit sign off received                |                   |
| Well Impact Study completed                             | <u>2-18-00</u>    |
| Well Impact Letter                                      | <u>N/A</u>        |
| Publication requested and faxed to newspaper            |                   |
| Publication request dates                               |                   |
| End of objection period                                 |                   |
| Affidavit of publication & publication costs received   |                   |
| IPR Scheduled (if necessary)                            | <u>2/24/00</u>    |
| Legal sign off received through IPR                     |                   |
| Permit and/or publication fees requested                |                   |
| Permit and/or publication costs received                |                   |
| Permit drafted for AMA's review                         | <u>3-1-00</u>     |
| Permit prepared for AD's signature                      | <u>3-2-00</u>     |
| Permit mailed to permittee                              | <u>3-3-00</u>     |
| Permit copies to AMA                                    | <u>3-3-00</u>     |
| Permit input  | <u>3-15-00</u>    |

**ARIZONA DEPARTMENT OF WATER RESOURCES**

500 North Third Street, Phoenix, Arizona 85004  
Telephone 602 417-2460  
Fax 602 417-2423



**JANE DEE HULL**  
Governor

**RITA P. PEARSON**  
Director

March 3, 2000

Joseph A. Babcock  
City of Tucson/Tucson Water  
P.O. Box 27210  
Tucson, Arizona 85726-7210

RE: Non-Exempt Well Permit No. T-579475  
Well Registration No. 55-579475; File No. D (14-11) 8 DDD

Dear Permittee:

Your permit for the construction of the above referenced well is enclosed. However, drilling of the well may not proceed until a site inspection has been completed and the drill card released to the driller.

The drill card for the proposed well has been delivered to the Tucson Active Management Area (AMA) office. The well owner or representative of the driller must make an appointment with personnel of the AMA office for a site inspection. AMA personnel must be shown, on-site, the location of the proposed well. After the location of the proposed well has been verified, the drill card will be released and drilling may begin. It is suggested that arrangements for a site inspection be made at least 96 hours in advance of the time you intend to have drilling begin.

In the event the location of the proposed well changes, you must notify the Department of Water Resources of the change in writing. A drill card with the correct proposed well location must be in the possession of the driller before drilling may commence.

Within 30 days of completion of the well, the well driller is required to furnish this Department with a complete and accurate log of the well. In addition, the well owner is required to submit the enclosed Completion Report within 30 days of the installation of pump equipment.

Pursuant to the provisions of A.R.S. § 45-604, any person withdrawing groundwater from a well is required to use a water measuring device to record rates of withdrawal in order to provide or allow the computation of an annual volume of pumpage from the well. The total volume of pumpage from the well shall be reported on your Annual Water Withdrawal and Use Report for this calendar year.

Under A.R.S. § 45-593, the person to whom a well is registered must notify this Department of any changes in ownership, status or physical characteristics to keep the Well Registry records current and accurate. This would include notifying the Department of abandonment or capping of a well. For such future use, a Change of Well Information form is also enclosed.

City of Tucson  
March 3, 2000  
Page Two

Your permit has been issued by this Department without a hearing. As such, it is an appealable agency action. You are entitled to appeal and your rights are described in the enclosed notice of right to appeal.

If you have any questions concerning your permit, please call Jeff Tannler of the Tucson AMA office at 520-770-3800.

Sincerely,



Darlene Sumpter-King  
Water Resource Specialist

Enclosure

cc: Jeff Tannler, Tucson AMA



**ARIZONA DEPARTMENT OF WATER RESOURCES**

**NON-EXEMPT WELL PERMIT**

PERMIT NO. T-579475

STATE OF ARIZONA                    )  
  ) ss.  
County of Maricopa                    )

This is to certify that Application No. 55-579475 meets the requirements of A.R.S. §§ 45-598 and 45-599 for the construction and/or conversion (enlargement) of an existing well, a new well or a replacement well in a new location. The Director hereby grants authority to the Permittee to construct and operate a non-exempt well, subject to the following limitations and conditions:

**Permit Limitations**

Permittee:                               City of Tucson / Tucson Water  
  PO Box 27210  
  Tucson, AZ 85726-7210

Well Registration Number:       55-579475                   File No. D (14-11) 8 DDD

Active Management Area:       Tucson                   Subbasin: Avra Valley

PERMIT NO. T-579475

Well Location: SE $\frac{1}{4}$  of the SE $\frac{1}{4}$  of the SE $\frac{1}{4}$ , Section 8, Township 14 South, Range 11 East, GSRB&M

Depth: 1000 ft. Diameter: 20 inches Type of Casing: Steel

Maximum Pumping Capacity: 2000 gallons per minute.

Maximum Annual Volume: 2800-acre feet.

Authorized Place of Use for Groundwater Withdrawn: As authorized by Certificate of Type 1 Non-Irrigation Grandfathered Right Number 58-110579.0000.

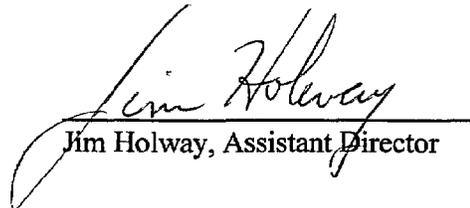
Authorized Use of Groundwater: As authorized by Certificate of Type 1 Non-Irrigation Grandfathered Right Number 58-110579.0000.

Latest Date for Completing Well: March 2, 2002.

**Permit Conditions**

1. If the permitted well is not completed on or before March 2, 2002, the Permittee will be required to file a new application, and secure a new permit before proceeding with construction.
2. The proposed well shall be constructed in accordance with the minimum well construction standards, A.A.C. R12-15-811.

WITNESS my hand and seal of office this 3rd day of March, 2000.

  
Jim Holway, Assistant Director

**IPR OVERSIGHT MEMORANDUM**

*Prepared by Matt Weber, Tucson AMA  
February 24, 2000*

**APPLICANT:** Tucson Water  
**APPLICATION NO:** 55-579475 (TW Well CA-008A)  
**APPLICATION TYPE:** Non-Service Area Well Application

**Background Summary:** Tucson Water has submitted a non-exempt, non-service area well application for cadastral location D-(14-11) 08 DDD. The proposed well site is approximately 2 miles south of Mile Wide Road, 1 mile east of Avra Road, and 1 mile west of Sandario Road.

The proposed well would be drilled to 1,200 feet with a 20 inch casing. The yearly withdrawal would be 2,000 gallons per minute, with an annual volume of 2,800 acre-feet per year. The Hydrology review found the maximum 10 foot drawdown radius after 5 years of pumpage to be 3,902 feet. Two wells not owned by Tucson Water are intercepted by this radius; however, both wells are canceled. The registration numbers of the canceled wells are 55-534236 and 55-536170. The Hydrology review found the 25 foot drawdown radius after 5 years of pumpage to be only 200 feet.

Hydrology and Water Quality divisions both recommend approval of the application. Hydrology does recommend inclusion of certain language in a letter, signed by Jim Holway, stressing our concerns about subsidence but not requiring additional monitoring at this time.

**Issues:** Tucson Water requests 2 years from issuance of the permit to complete well construction.

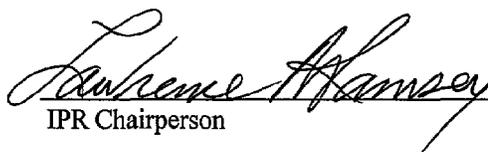
**Recommendations:** The Tucson AMA recommends approval to permit the well as requested (2,000 gpm, 2,800 af/yr).

IPR Committee Comments:

IPR Committee Recommendations:

- Approve
- Deny
- Other (explanation) \_\_\_\_\_

Special Conditions to be included in permit:

 \_\_\_\_\_  
IPR Chairperson

 \_\_\_\_\_  
Date

**From:** Jeff Tannler  
**To:** Darlene Sumpter-King  
**Date:** 2/29/00 9:55AM  
**Subject:** As a reminder

When you get to the point of doing up the drill card and permit for 55-579475, it will be for 2 years allowed well construction time.

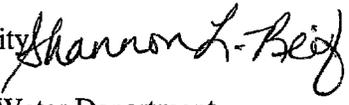
See ya! JT

**ARIZONA DEPARTMENT OF WATER RESOURCES**  
**Office of the Water Quality Assurance Revolving Fund**

**MEMORANDUM**

DATE: February 17, 2000

TO: Darlene Sumpter-King, Groundwater Management Support  
Jeff Tannler, Tucson AMA  
Carol Norton, Hydrology

FROM: Shannon L. Reif, Water Quality 

SUBJECT: 55-579475 – City of Tucson Water Department

1. The proposed municipal supply well is not located within any contaminated groundwater areas. According to the ADEQ Groundwater Database, sample results from wells located within one mile of the proposed municipal supply well indicate parameter concentrations exceeding the Secondary Maximum Contaminant Level (MCL2) standards for pH. See attached map and supporting information.
2. References: Water Quality Information Maps Program (attached), The Groundwater Code (Arizona Revised Statutes, Title 45, Chapter 2), and the rules adopted thereunder.
3. The proposed municipal supply well does not appear to create damaging migration of poor quality water. Therefore, the Water Quality Section recommends issuance of the permit.
4. If more information is needed, contact me at (602) 417-2400, ext. 7270. Thank you.

attachments: as stated

not in any WQARF site  
Township 14.0s Range 11.0e Section 08 DDD (D14011008DDD)  
is in Tucson AMA\* E  
is in PIMA county 10  
is in TUCSON AMA basin AVRA VALLEYsubbasin 15  
\* Asterisk after the subbasin indicates groundwater basins or subbasins  
that contain a Superfund or WQARF site  
is in SANTA CRUZ RIVER watershed 09  
is not in any WQARF site 00

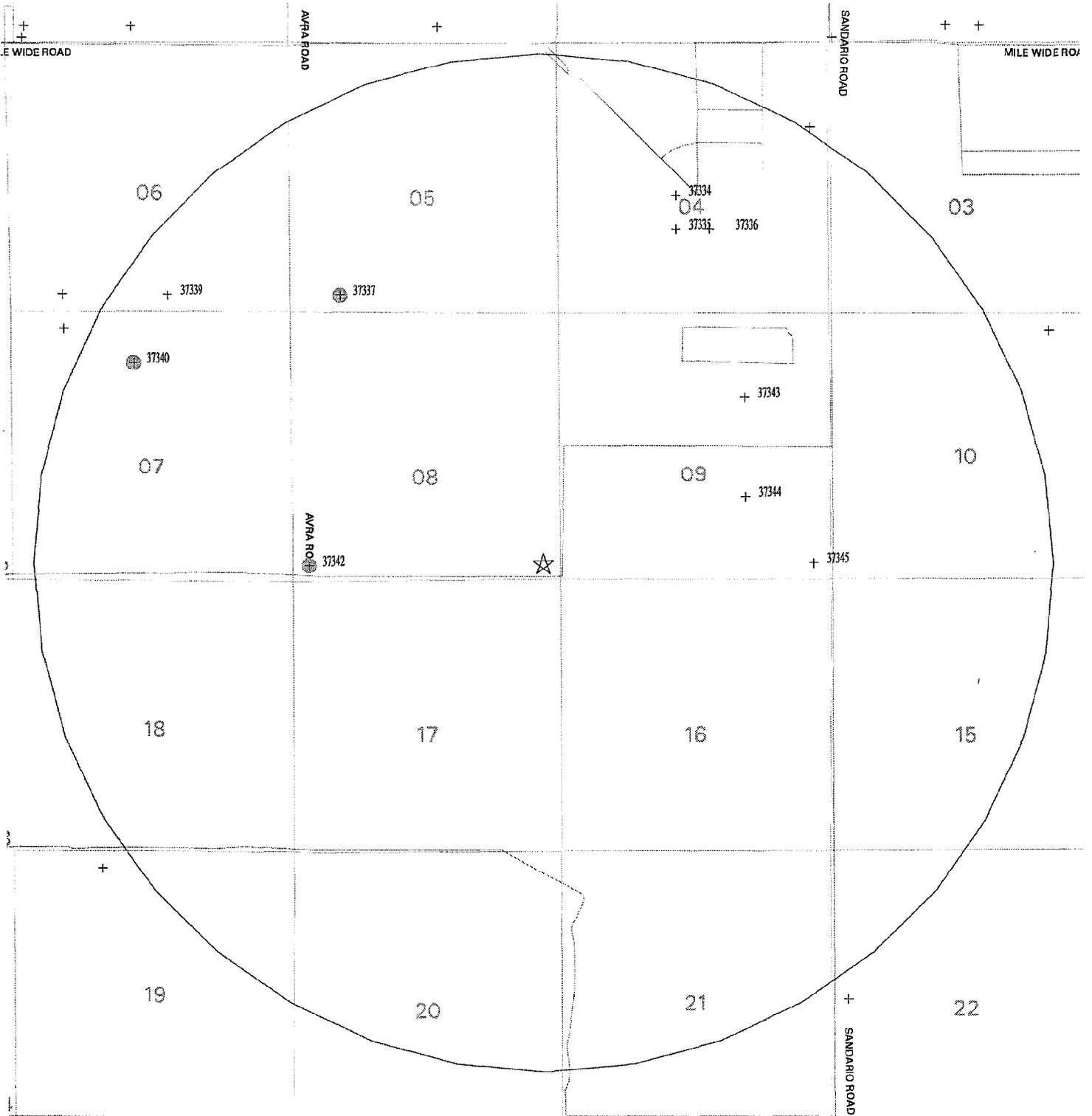
Click Back to return to the form.



Arizona  
Department  
of Environmental  
Quality



ARIZONA  
DEPARTMENT  
OF WATER  
RESOURCES



- 0 points > HBGL shown
- 3 points > Secondary MCL shown
- ★ 0 points > MCL shown
- + No Exceedences or Outside Radius

Water Quality Sample Test Results for  
ADEQ Wells within 10000 Feet of  
T 14.0 S R 11.0 E S 08 DDD  
Printed 02/16/00 Scale 1:auto  
Map Number 000216164611

- One Mile Buffer Around WQARF Site
- ▨ WQARF Sites
- ~ Specified Radius
- ★ Specified Center Point

request id is WQAHPL5Q-964 (1 file) Your map 000216164611 will be printed on WQAHPL5Q

**Arizona Department of Environmental Quality  
Groundwater Database**

**For Map 000216164611**

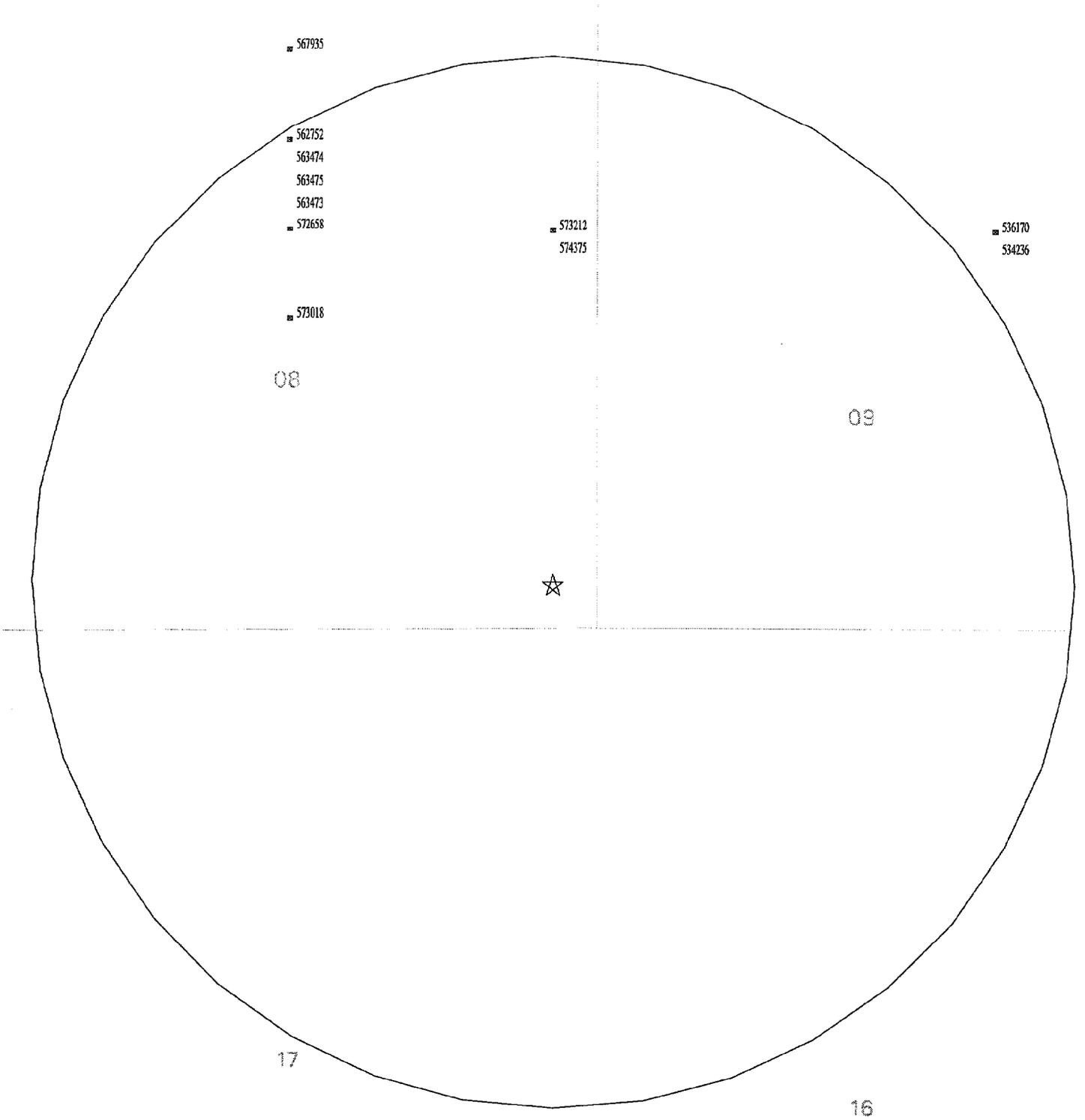
Only those test results that **exceed** either a Maximum Contaminant Level (MCL), secondary MCL (if there is no MCL) or Health Based Guidance Level (HBGL - if there is no MCL or secondary MCL) standard are shown. For more information about the Groundwater Database contact ADEQ at (602) 207-4563.

Oracle8i Enterprise Edition Release 8.1.5.0.0 - Production With the Partitioning and Java options

| ADEQ Well | Date        | Results | MCL | MCL2 | HBGL | Parameter Name      |
|-----------|-------------|---------|-----|------|------|---------------------|
| 37337     | MAY 07 1971 | 7.50    |     | 6.5  |      | PH (STANDARD UNITS) |
| 37340     | MAY 07 1971 | 7.70    |     | 6.5  |      | PH (STANDARD UNITS) |
| 37342     | MAY 07 1971 | 7.90    |     | 6.5  |      | PH (STANDARD UNITS) |

With the Partitioning and Java options Wed Feb 16 16:49:17 MST 2000

[Go back to the WAQUIMAP page](#)



Registered Wells within 3902 Feet of  
Cadastral Location D14011008DDD

02/18/00

Scale 1:auto



ARIZONA  
DEPARTMENT  
OF WATER  
RESOURCES

WellFinder

# MEMO

**To:** Al Ramsey  
**From:** Carol E. Norton  
**Subject:** City of Tucson 55-579475 D(14-11)08 ddd  
**Date:** February 16, 2000

Attached you will find the Hydrology Division's image well impact study for a single well for the City of Tucson.

The analysis was non-standard for one reason: a negative boundary exists approximately 9,600 feet northeast of the proposed well. The software application, THWells was used for an image well analysis to determine the five-year, 10 and 25 foot drawdown radii. These points were then exported to another software application, WinSurf, and then traced onto the Brown Mtn. And Cocoraque Butte U.S.G.S. 7.5 minute quadrangle maps.

The results of the study indicated that the five-year, 10-foot drawdown contour radius would vary from approximately 3,023 feet to 3,902 feet (see attached figures). The five-year, 25-foot drawdown contour would be less than 200 feet, and therefore, negligible. The five-year impact analysis also projected the drawdown at the well to be about 53 feet, which is greater than 10% of the saturated thickness.

The Hydrology Division recommends the following language be included in the cover letter, to be signed by Jim Holway:

Dear (XXX):

The purpose of my letter is to discuss the land subsidence and earth fissure concerns that have been reviewed relative to the issuance of permit number S-579475 D(14-11)08 ddd. The Department has researched the potential for the proposed new well to cause an unreasonable and adverse impact from additional regional land subsidence. Based on our examination of the data, we have reached the conclusion that the potential for this well to cause significant impacts is low.

Although we believe the likely impacts of this particular well would be negligible, we will be watching this area and other areas for possible future subsidence. In appropriate cases, the Department may require monitoring on future well permits applications, and groundwater recharge project permits.

In order to minimize the possibility of future monitoring requirements it is essential to maintain a proper level of regional monitoring throughout the AMA. The Department believes that the cooperative aquifer storage and land subsidence monitoring program can meet this need.

Al Ramsey  
Page 2  
February 24, 2000

However, the long-term commitment and participation in this program by the City of Tucson, Pima County the U.S.G.S. and the ADWR is crucial to insure its success. Since all parties concerned share a mutual interest in keeping informed and avoiding the potential problems of land subsidence and earth fissuring we hope that this partnership will be maintained well into the future.

Sincerely,

Jim Holway

# MEMO

**To:** Al Ramsey  
**From:** Carol E. Norton  
**Subject:** City of Tucson 55-579475 D(14-11)08 ddd  
**Date:** February 16, 2000

Attached you will find the Hydrology Division's image well impact study for a single well for the City of Tucson.

The analysis was non-standard for one reason: a negative boundary exists approximately 9,600 feet northeast of the proposed well. The software application, THWells was used for an image well analysis to determine the five-year, 10 and 25 foot drawdown radii. These points were then exported to another software application, WinSurf, and then traced onto the Brown Mtn. And Cocoraque Butte U.S.G.S. 7.5 minute quadrangle maps.

The results of the study indicated that the five-year, 10-foot drawdown contour radius would vary from approximately 3,023 feet to 3,902 feet (see attached figures). The five-year, 25-foot drawdown contour would be less than 200 feet, and therefore, negligible. The five-year impact analysis also projected the drawdown at the well to be about 53 feet, which is greater than 10% of the saturated thickness.

The Hydrology Division recommends the following language be included in the cover letter, to be signed by Jim Holway:

Dear (XXX):

The purpose of my letter is to discuss the land subsidence and earth fissure concerns that have been reviewed relative to the issuance of permit number S-576697 D(14-11)05 dba. The Department has researched the potential for the proposed new well to cause an unreasonable and adverse impact from additional regional land subsidence. Based on our examination of the data, we have reached the conclusion that the potential for this well to cause significant impacts is low.

Although we believe the likely impacts of this particular well would be negligible, we will be watching this area and other areas for possible future subsidence. In appropriate cases, the Department may require monitoring on future well permits applications, and groundwater recharge project permits.

In order to minimize the possibility of future monitoring requirements it is essential to maintain a proper level of regional monitoring throughout the AMA. The Department believes that the cooperative aquifer storage and land subsidence monitoring program can meet this need.

Al Ramsey

Page 2

February 16, 2000

However, the long-term commitment and participation in this program by the City of Tucson, Pima County the U.S.G.S. and the ADWR is crucial to insure its success. Since all parties concerned share a mutual interest in keeping informed and avoiding the potential problems of land subsidence and earth fissuring we hope that this partnership will be maintained well into the future.

Sincerely,

Jim Holway

WELL SPACING REVIEW SHEET  
(Distance Drawdown Analysis)

Applicant: *City of Tucson*

Regional Decline Rate

Well Location: *TWN 14S, RGE 11E*  
*SEC 08, se, se, se*

Rate (ft/yr): *1.6 ft/yr*  
Period: *1980-1995, 16 yrs.*

Depth of Well (ft): *1,200 ft.*

Source of Data: *Hammett & Sicard 1995*

Diameter (in): *20 in.*

Analyzed by: *C.E. Norton*  
Date: *02/16/00*

Pumping Rate (gpm): *1,736 gpm = 2,800 aft/yr*

Proposed  Existing

Estimated Transmissivity (gpd/ft): *90,000 gpd/ft*  
*inverse distance squared method using aquifer test data from eight wells and s.c. data from one well.*

Data Source: *COT using*

Estimated Specific Yield (%): *.10*

Data Source: *Hanson, Anderson and Pool*

DRAWDOWN CAUSED BY PUMPED WELL AFTER 5 YEARS

Radius of 10 foot drawdown contour: *Varies from 3,023 feet along SW axis to 3,902 feet along NE axis.*

Radius of 25 foot drawdown contour: *Less than 200 feet.*

Drawdown at the well site: *53 feet*

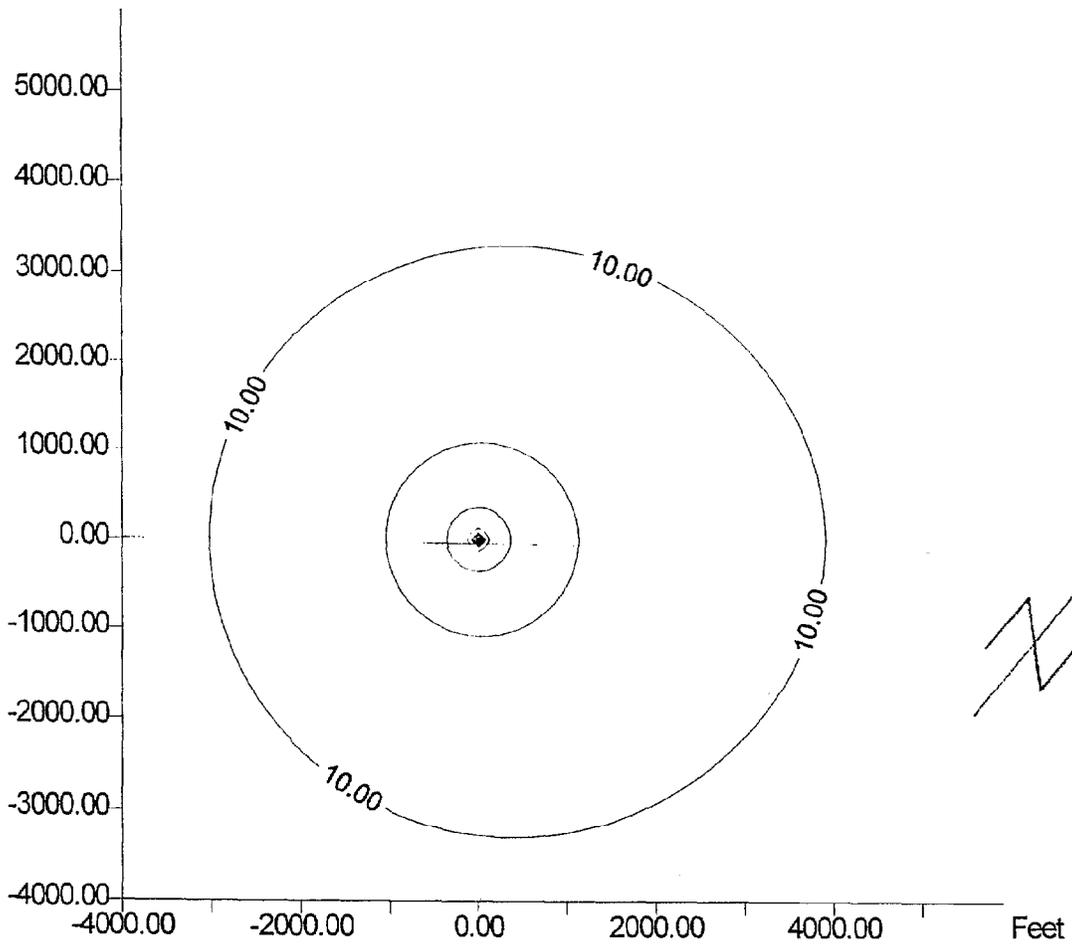
Remarks (land subsidence, etc.): *See attached letter for recommendations.*

Analyzed by: *Carol E. Norton*  
Date: *02/16/00*

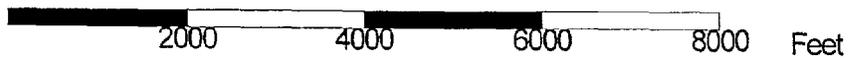
Checked by: *Bruce A. Hammett*  
Date: *2-16-00*

City of Tucson Image Well Analysis for a Single Well No. 55-579475

D(14-11)08 ddd



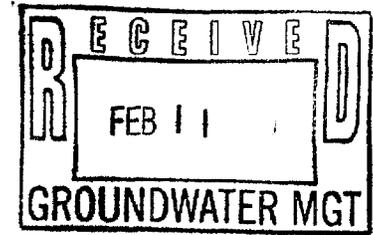
Scale 1:24,000







Tucson Water Department



February 10, 2000

ATTN: Mr. Al Ramsey  
Groundwater Management Support Section  
Arizona Department of Water Resources  
P.O. Box 458  
Phoenix, Arizona 85001-0458

**SUBJECT:** Filing of Application for a Permit to Drill/Operate a Non-Exempt, Non-Service Area well Within the Tucson AMA—Proposed Tucson Water Well CA-008A

Dear Mr. Ramsey:

Please find attached the above mentioned application, a check (#18041) for fifty dollars (\$50.00) to cover the application fee, a check (#18042) for thirty dollars (\$30.00) to cover the permit fee, and a hydrologic impact report for the proposed well.

The attached February 8, 2000 report, prepared by Errol L. Montgomery & Associates for the City of Tucson Water Department, is titled *Projection of Drawdown Impact for City of Tucson Proposed Municipal Supply Well (D-14-11)8ddd[CA-008A], Avra Valley Sub-basin, Tucson Active Management Area.*

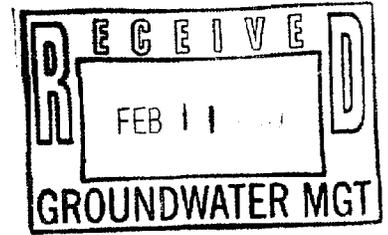
Given the possibility that a construction delay may occur, Tucson Water requests that the permit to be issued allow up to two years (from the date of issuance) to construct this well. If you have any questions regarding the permit application or the hydrologic impact report for the proposed well, please direct your inquiry to Ralph Marra at (520) 791-5080 x 1412.

Sincerely,

Joseph A. Babcock  
Chief Hydrologist

JB:RM:adwr\_CA-008A.doc  
Attachments

cc: Mike Sanders, Ralph Marra, Marie Light, Mark Cross (Errol L. Montgomery & Associates), George Maseeh (Malcolm Pirnie), Cindy Shimokusu (ADWR/TAMA), Hydrology File



February 8, 2000  
REPORT

**PROJECTION OF DRAWDOWN IMPACT FOR CITY OF TUCSON  
PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]  
AVRA VALLEY SUB-BASIN  
TUCSON ACTIVE MANAGEMENT AREA**

Prepared for  
City of Tucson Water Department  
Tucson, Arizona

**ERROL L. MONTGOMERY & ASSOCIATES, INC.**  
CONSULTANTS IN HYDROGEOLOGY



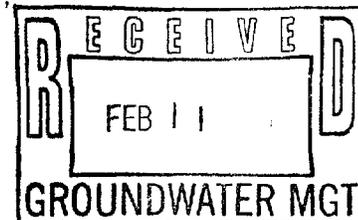
1550 EAST PRINCE ROAD  
TUCSON, ARIZONA 85719 (520) 881-4912



TUCSON • PHOENIX • FLAGSTAFF • SANTIAGO de CHILE



ERROL L. MONTGOMERY & ASSOCIATES, INC.



February 8, 2000  
REPORT

**PROJECTION OF DRAWDOWN IMPACT FOR CITY OF TUCSON  
PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]  
AVRA VALLEY SUB-BASIN  
TUCSON ACTIVE MANAGEMENT AREA**

Prepared for  
City of Tucson Water Department  
Tucson, Arizona



CONTENTS

|  | Page |
|--|------|
| <b>SUMMARY AND CONCLUSIONS</b> .....               | 1    |
| <b>INTRODUCTION</b> .....                          | 4    |
| <b>HYDROGEOLOGIC CONDITIONS</b> .....              | 6    |
| HYDROGEOLOGIC FEATURES .....                       | 6    |
| HISTORIC GROUNDWATER LEVELS .....                  | 7    |
| TRANSMISSIVITY AND HYDRAULIC CONDUCTIVITY .....    | 8    |
| SPECIFIC YIELD.....                                | 9    |
| <b>EXISTING NON-CITY WELLS</b> .....               | 11   |
| <b>DESCRIPTION OF GROUNDWATER FLOW MODEL</b> ..... | 12   |
| MODEL GRID AND BOUNDARY CONDITIONS.....            | 12   |
| AQUIFER PARAMETERS .....                           | 13   |
| <b>PROJECTED DRAWDOWN IMPACT</b> .....             | 14   |
| <b>REFERENCES CITED</b> .....                      | 15   |

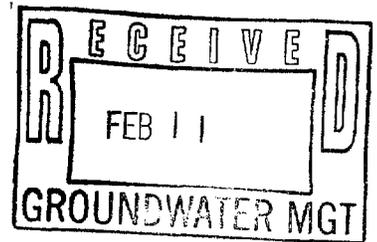
TABLES

**Table**

|   |  |
|---|--|
| 1 | SUMMARY OF PUMPING TEST RESULTS FOR SELECTED CITY OF TUCSON WELLS, AVRA VALLEY, PIMA COUNTY, ARIZONA   |
| 2 | RECORDS FOR CITY OF TUCSON WELLS, AVRA VALLEY, PIMA COUNTY, ARIZONA  |
| 3 | SUMMARY OF WATER LEVEL DRAWDOWN MEASUREMENTS FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B], PIMA COUNTY, ARIZONA |
| 4 | RECORDS FOR REGISTERED NON-CITY WELLS IN THE VICINITY OF PROPOSED MUNICIPAL SUPPLY WELL CA-008A, AVRA VALLEY, PIMA COUNTY, ARIZONA   |



CONTENTS – continued



ILLUSTRATIONS

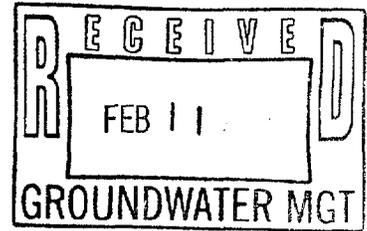
Figure

- 1 WELL LOCATION MAP AND PROJECTED DRAWDOWN IMPACT FOR CITY OF TUCSON PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A], 5 YEARS AFTER START OF PUMPING
- 2 SCHEMATIC DIAGRAM OF CONSTRUCTION DETAILS FOR CITY OF TUCSON PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]
- 3 WATER LEVEL HYDROGRAPH FOR WELL (D-14-11)7bad[AF-039A]
- 4 AQUIFER TRANSMISSIVITY, AVRA VALLEY AREA
- 5 LOG-LOG DRAWDOWN AND RECOVERY GRAPH FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B]
- 6 FINITE-DIFFERENCE GRID CELL SPACING FOR GROUNDWATER FLOW MODEL USED TO PROJECT DRAWDOWN IMPACT FOR CITY OF TUCSON PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]



ERROL L. MONTGOMERY & ASSOCIATES, INC.

February 8, 2000  
REPORT



**PROJECTION OF DRAWDOWN IMPACT FOR CITY OF TUCSON  
PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]  
AVRA VALLEY SUB-BASIN  
TUCSON ACTIVE MANAGEMENT AREA**

Prepared for  
City of Tucson Water Department  
Tucson, Arizona

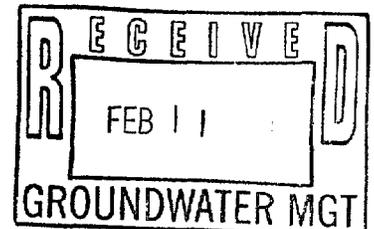
**SUMMARY AND CONCLUSIONS**

The following summary and conclusions are based on results of hydrogeologic investigations for projection of drawdown impact from groundwater withdrawals at City of Tucson Water Department (Tucson Water) proposed municipal supply well (D-14-11)8ddd[CA-008A].

1. Maximum annual volume of groundwater withdrawal for proposed municipal supply well CA-008A is projected to be 2,800 acre-feet, which corresponds to a continuous average pumping rate of 1,735 gallons per minute. Well CA-008A will be constructed outside the present boundaries of the Tucson Water service area. Water pumped from proposed well CA-008A will be used inside the Tucson Water service area.

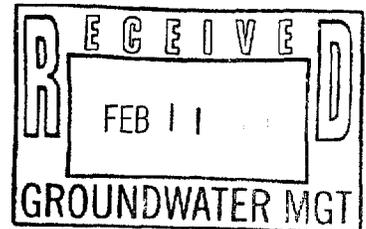


2. The regional aquifer in the area of proposed well CA-008A consists of a heterogeneous sequence of alluvial sediments. Depth to groundwater level is about 350 feet below land surface. Groundwater occurs under unconfined conditions to a depth of approximately 1,000 feet below land surface; saturated thickness of the unconfined aquifer is more than 600 feet. The regional aquifer is bounded to the east and west by the Tucson Mountains and Roskrige Mountains, respectively.
3. Average transmissivity of the unconfined aquifer in the area of proposed well CA-008A is estimated to be about 90,000 gallons per day per foot width of aquifer at 1:1 hydraulic gradient. Specific yield is about 0.1 (dimensionless; ratio of volume of water released per unit surface area of aquifer per unit decline in head).
4. Based on reported data for chemical quality of groundwater in central Avra Valley, the chemical quality of groundwater to be withdrawn at proposed well CA-008A is projected to be satisfactory for public water supply.
5. As reported in the Arizona Department of Water Resources "55" well registry, the registered water supply wells nearest to proposed well CA-008A, and not owned by City of Tucson, are wells (D-14-11)9acc1 {55-534236} and 9acc2 {55-536170}. These wells are located about 4,000 feet northeast from proposed well CA-008A.





6. A drawdown impact analysis for proposed well CA-008A was conducted using MODFLOW, a numerical groundwater flow model code. Results indicate that after 5 years of continuous pumping at a rate of 1,735 gallons per minute, projected drawdown at the nearest water supply wells not owned by Tucson Water would be less than 10 feet.





February 8, 2000  
REPORT

**PROJECTION OF DRAWDOWN IMPACT FOR CITY OF TUCSON  
PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]  
AVRA VALLEY SUB-BASIN  
TUCSON ACTIVE MANAGEMENT AREA**

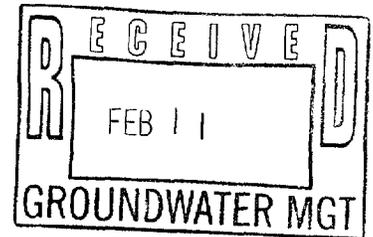
**INTRODUCTION**

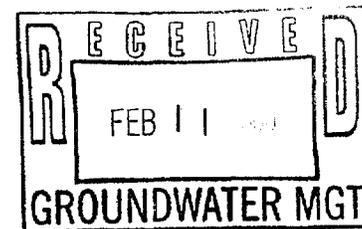
The City of Tucson Water Department (Tucson Water) proposes to drill and operate municipal supply well CA-008A in the Avra Valley Sub-basin of the Tucson Active Management Area. Location of the proposed well is the SE 1/4, SE 1/4, SE 1/4 of Section 8, Township 14 South, Range 11 East, which is outside the present boundaries of the Tucson Water service area. The well number is (D-14-11)8ddd in accordance with the Bureau of Land Management's system of land subdivision and the land survey in Arizona. Locations of proposed municipal supply well CA-008A and existing water supply wells in the area are shown on **Figure 1**. A schematic diagram of construction for proposed well CA-008A is shown on **Figure 2**.

Maximum annual volume of groundwater withdrawal for proposed municipal supply well CA-008A is projected to be 2,800 acre-feet, which corresponds to a continuous average pumping rate of 1,735 gallons per minute (gpm). Water pumped from proposed well CA-008A will be used inside the Tucson Water service area.



This report contains a summary of hydrogeologic conditions in central Avra Valley and gives projections for drawdown impact which would result from continuous pumping of the proposed municipal supply well at the projected maximum continuous average pumping rate. The drawdown impact analysis is required by Arizona Department of Water Resources (ADWR) in support of the application for a well drilling permit.





## HYDROGEOLOGIC CONDITIONS

Proposed well CA-008A is located in the central part of Avra Valley, in the Basin and Range Physiographic Province of southern Arizona (Fenneman, 1931). This province is characterized by alluvial valleys and basins separated by isolated mountain ranges. Avra Valley comprises a tectonically depressed trough that has been filled with several thousand feet of materials eroded from the mountain blocks. Detailed descriptions of the stratigraphy, hydrogeologic conditions, and groundwater resources for Avra Valley are given by Allen (1980), Anderson (1989), Johnson (1980), Whallon (1983), and White and others (1966). A summary of hydrogeologic conditions in central Avra Valley is given below.

### HYDROGEOLOGIC FEATURES

The principal hydrogeologic units of interest in central Avra Valley are recent alluvium related to modern streams and washes, Fort Lowell Formation of Quaternary age, and Tinaja beds of Tertiary age. The Tinaja beds are informally classified into the upper, middle, and lower Tinaja beds. These units are underlain by older sedimentary rocks of the Pantano Formation and by a basement complex. Substantial data for lithology and aquifer hydraulic properties have been obtained from wells and exploration boreholes completed in the Fort Lowell Formation and Tinaja beds. Records for water wells and exploration boreholes in the area, and hydrogeologic sections, are provided in the permit application for continuation of expanded pilot recharge operations for the Central Avra Valley Storage and Recovery Project (CAVSARP) (City of Tucson and Montgomery & Associates, 1998).

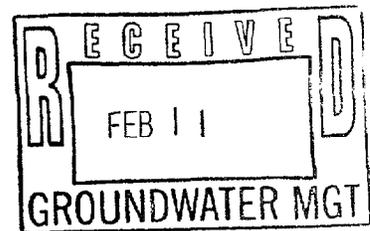


The Tinaja beds comprise the principal aquifer in central Avra Valley. The overlying recent alluvium and Fort Lowell Formation are not saturated. Lithology of the upper Tinaja beds is characterized as a heterogeneous sequence of unconsolidated to poorly-indurated deposits of gravel to clayey silt. The middle Tinaja beds are not believed to be present in the central and south parts of Avra Valley. Lithology of the lower Tinaja beds is characterized as a thick sequence of moderately-indurated deposits of chiefly silty sand, gravel, and conglomerate (Anderson, 1989).

Groundwater level occurs below the top of the upper Tinaja beds and the unit is not fully saturated. In vicinity of proposed well CA-008A, the base of the upper Tinaja beds occurs at a depth of about 425 feet and depth to groundwater level is about 350 feet; saturated thickness of the upper Tinaja beds is about 75 feet. Saturated thickness of the lower Tinaja beds is more than 1,000 feet. The aquifer system is generally unconfined to a depth of about 1,000 feet (Hanson and others, 1990).

Based on reported data for chemical quality of groundwater in central Avra Valley, the chemical quality of groundwater to be withdrawn at proposed municipal supply well CA-008A is projected to be satisfactory for public water supply.

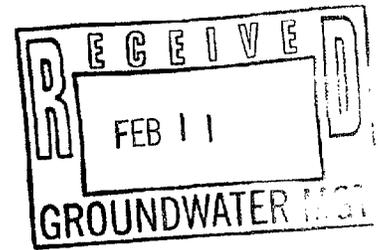
#### HISTORIC GROUNDWATER LEVELS



Groundwater levels in central Avra Valley declined as much as 200 feet from the late 1940s through the mid-1970s due to groundwater withdrawals for agricultural irrigation. Reduced groundwater withdrawals beginning in the mid-1970s resulted in reduction in rates of groundwater level decline, stabilization of water levels, or rising water levels. A water level hydrograph for well (D-14-11)7bad[AF-039A], located 8,600 feet northwest from the location of proposed well CA-008A, is shown on



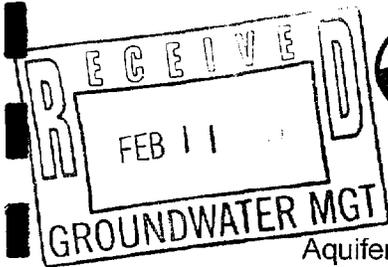
Figure 3. Inspection of the data shown on **Figure 3** indicates net groundwater level decline of 12 feet for the 29-year period 1968 through 1997; average rate of water level decline was approximately 0.4 feet per year. For the present investigation, background groundwater level trends were not included in the drawdown impact projections.



### TRANSMISSIVITY AND HYDRAULIC CONDUCTIVITY

Selected representative estimates of aquifer transmissivity and hydraulic conductivity in the Tucson basin and Avra Valley were calculated previously by Montgomery & Associates based on results of pumping tests at City of Tucson wells (CH2M Hill and others, 1988). Previously reported aquifer hydraulic parameters for wells located in Avra Valley are summarized in **Table 1** and are shown on **Figure 4**. Reported transmissivity ranges from less than 60,000 gallons per day per foot width of aquifer at 1:1 hydraulic gradient (gpd/ft) west from the location of proposed well CA-008A to more than 100,000 gpd/ft to the south-southeast and north-northwest (**Figure 4**). Well construction details for City of Tucson wells in Avra Valley are summarized in **Table 2**.

Transmissivity specified in the U.S. Geological Survey (USGS) numerical groundwater flow model for Avra Valley (Hanson and others, 1990) ranges from 90,000 gpd/ft to 127,000 gpd/ft for the vicinity of the CAVSARP site, and ranges from less than 82,000 gpd/ft to more than 314,000 gpd/ft for Avra Valley. Transmissivity specified in the ADWR numerical groundwater flow model (Travers and Mock, 1984) ranges from 90,000 gpd/ft to 120,000 gpd/ft for the vicinity of the proposed well CA-008A, and ranges from 4,000 gpd/ft to 201,000 gpd/ft for Avra Valley.



Aquifer hydraulic conductivity reported based on results of pumping tests at City of Tucson wells ranges from 17 gallons per day per square foot of aquifer at 1:1 hydraulic gradient (gpd/ft<sup>2</sup>) to 1,500 gpd/ft<sup>2</sup> (**Table 1**). For the 26 values given in **Table 1**, the arithmetic mean value of hydraulic conductivity is 309 gpd/ft<sup>2</sup> and the median value is 230 gpd/ft<sup>2</sup>. The geometric mean value of hydraulic conductivity is 214 gpd/ft<sup>2</sup>.

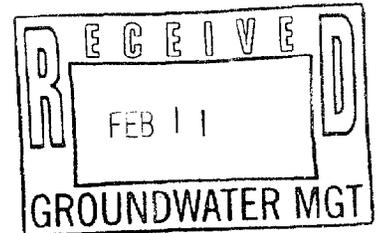
Aquifer transmissivity and hydraulic conductivity were computed by analysis of drawdown and recovery data obtained during a 24-hour constant-discharge pumping test conducted by City of Tucson personnel at well (D-13-11)31cdd2 [AF-034B]. Pumped well AF-034B is completed with well screen in the lower part of the unconfined aquifer, in the depth interval from 680 to 980 feet below land surface (bls) (**Table 2**). The Neuman (1975) log-log graphical method is applicable to analysis of water level response in an unconfined aquifer due to pumping a partially penetrating well, and was selected for analysis of the pumping test data. Transmissivity computed from analysis of drawdown and recovery data for observation well (D-13-11)31cdd1[AF-034A], using the Neuman method, was 89,000 gpd/ft. Based on a prepumping saturated thickness of 628 feet, the transmissivity of 89,000 gpd/ft corresponds to an average hydraulic conductivity of approximately 140 gpd/ft<sup>2</sup>. Water level drawdown measurements for observation well AF-034A during the pumping test are summarized in **Table 3** and a log-log drawdown and recovery graph for observation well AF-034A is shown on **Figure 5**.

**SPECIFIC YIELD**

Specific yield can be defined as the volume of water released from storage per unit horizontal area of unconfined aquifer per unit decrease in head. Estimates

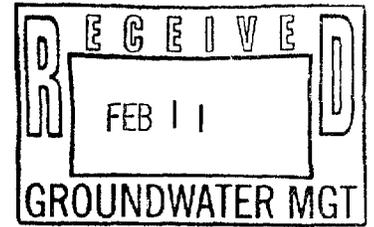


of specific yield in the alluvial aquifer above a depth of 1,000 feet in Avra Valley range from 0.10 to 0.18 and average about 0.15 (White and others, 1966; Moosburner, 1972; Anderson, 1972; Whallon, 1983). Whallon (1983) computed a specific yield of 0.12 based on the ratio of volume of groundwater withdrawn to the volume of aquifer dewatered in Avra Valley during the period 1940 through 1965. Specific yield in the vicinity of the proposed well CA-008A was specified as 0.09 for the ADWR numerical model (Travers and Mock, 1984). Hanson and others (1990) utilized three zones of specific yield in their model. A zone extending across Avra Valley from about 9.0 miles north of the proposed well CA-008A to about 4.0 miles south was assigned a specific yield of 0.10.

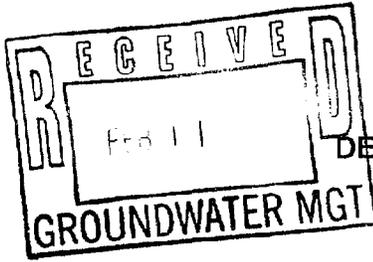




EXISTING NON-CITY WELLS



A summary of records for registered non-City wells in the vicinity of proposed municipal supply well CA-008A is given in **Table 4**. Well records for non-City wells were compiled from the ADWR "55" well registry and Groundwater Site Inventory databases. As reported in the "55" well registry, the registered water supply wells nearest to proposed well CA-008A, and not owned by City of Tucson, are wells (D-14-11)9acc1 {55-534236} and 9acc2 {55-536170}. These wells are located about 4,000 feet northeast from proposed well CA-008A (**Figure 1**).



## DESCRIPTION OF GROUNDWATER FLOW MODEL

A groundwater flow model was used to project drawdown impacts associated with groundwater withdrawals from the proposed well CA-008A. The groundwater flow model was constructed using MODFLOW, a numerical finite-difference code developed by the USGS (McDonald and Harbaugh, 1988).

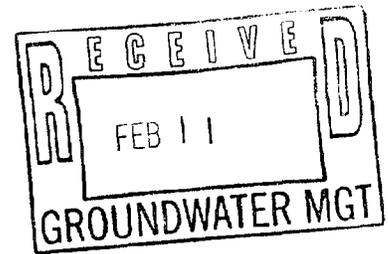
### MODEL GRID AND BOUNDARY CONDITIONS

The active area of the groundwater flow model encompasses approximately 1,387 square miles. The model grid consists of one layer of 237 rows and 140 columns. Each model grid cell in the central part of the model area, in the vicinity of the CAVSARP site, has dimensions of 660 by 660 feet. The dimensions of the grid cells increase to a maximum column width of 6,200 feet by a maximum row width of 6,600 feet near the north and south boundaries of the model grid. The finite-difference grid cell spacing and locations of model boundaries are shown on **Figure 6**.

The regional aquifer in Avra Valley is bounded to the east and west by hydro-geologic barrier boundaries corresponding to the bedrock complex. No-flow boundaries were specified in the groundwater flow model to represent these aquifer boundaries (**Figure 6**). Locations of aquifer boundaries in the model are based on aquifer system boundaries defined by Hanson and others (1990). Hydraulic communication between aquifers in Tucson basin and Avra Valley is believed to be poor. Therefore, no-flow boundaries were specified between the Tucson Mountains and Tortolita Mountains, and between the Tucson Mountains and Sierrita Mountains.

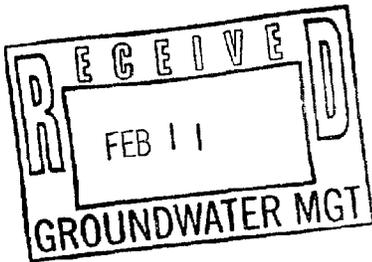


No-flow boundaries were also specified along the edges of the model grid north and west of the Picacho Mountains (**Figure 6**). The model grid extends a sufficiently large distance beyond the area of hydrologic influence from proposed well CA-008A to avoid artificial interference effects from the no-flow boundaries specified along the edges of the model grid.



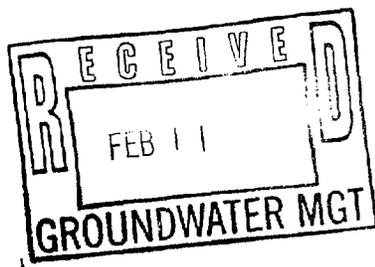
### AQUIFER PARAMETERS

Aquifer parameters required for the groundwater flow model are hydraulic conductivity and specific yield. Aquifer hydraulic conductivity was calculated using saturated thickness and transmissivity obtained from pumping tests conducted at retired irrigation wells owned by City of Tucson in the vicinity of the potential wellfield. Transmissivity and hydraulic conductivity from the pumping tests are summarized in **Table 1** and construction details for the pumped wells are summarized in **Table 2**. Transmissivity values determined at locations of pumping tests are shown on **Figure 4**. Transmissivity in central Avra Valley ranges from 31,000 to 200,000 gpd/ft. Calculated hydraulic conductivity ranges from 74 to 1,100 gpd/ft<sup>2</sup>. For the model, hydraulic conductivity was specified at 143 gpd/ft<sup>2</sup> and initial saturated thickness was specified as 630 feet, corresponding to a transmissivity of 90,000 gpd/ft. These model input parameters are consistent with aquifer parameters obtained from a pumping test conducted in 1996 at well (D-13-11)31cdd2[AF-034B], located northwest from the location of proposed well CA-008A (**Figure 1**). Aquifer parameters obtained from the pumping test at well AF-034B are transmissivity of 89,000 gpd/ft, and calculated hydraulic conductivity of 140 gpd/ft<sup>2</sup>. Specific yield of 0.10 was selected as representative for the regional aquifer, and was specified in the model for the present investigation.



### PROJECTED DRAWDOWN IMPACT

Groundwater withdrawal from proposed well CA-008A was simulated at a constant rate of 2,800 acre-feet per year or 1,735 gpm for a 5-year simulation period. The 10-foot contour of projected groundwater level drawdown 5 years after the start of pumping is shown on **Figure 1**. Results indicate that less than 10 feet of drawdown would occur at the water supply wells nearest to proposed well CA-008A (**Figure 1**).



## REFERENCES CITED

- Allen, T.J., 1980, **The subsurface stratigraphy of the northern Avra Valley, Pima County, Arizona**: M.S. thesis, Kent State University.
- Anderson, S.R., 1989, **Potential for aquifer compaction, land subsidence, and earth fissures in Avra Valley, Pima and Pinal Counties, Arizona**: U.S. Geological Survey Hydrologic Investigations Atlas HA-718, 3 sheets.
- Anderson, T.W., 1972, **Electrical-analog analysis of the hydrologic system, Tucson basin, southeastern Arizona**: U.S. Geological Survey Water-Supply Paper 1939-C.
- CH2M Hill, Errol L. Montgomery & Associates, Inc., and Wilson, Dr. L.G. 1988, **Assessment of potential recharge sites for long-term storage and recovery**: Prepared for Tucson Water Planning Division, Hydrology Section, March 18, 1988.
- City of Tucson and Errol L. Montgomery & Associates, Inc., 1998, **Application for underground storage facility permit and water storage permit for continuation of expanded pilot recharge operations, Central Avra Valley Storage and Recovery Project**: Prepared by City of Tucson and Errol L. Montgomery & Associates, Inc., June 23, 1998.
- Fenneman, N.M., 1931, **Physiography of western United States**: McGraw-Hill, New York, 534 p.
- Freethy, G.W., and Anderson, T.W., 1986, **Predevelopment hydrologic conditions in the alluvial basins of Arizona and adjacent parts of California and New Mexico**: U.S. Geological Survey Hydrologic Investigations Atlas HA-664, 3 sheets.
- Hanson, R.T., Anderson, S.R., and Pool, D.R., 1990, **Simulation of ground-water flow and potential land subsidence, Avra Valley Arizona**: U.S. Geological Survey Water-Resources Investigations Report 90-4178.
- Johnson, R.B., 1980, **Proposed water supply augmentation for Tucson, Arizona**: M.S. thesis, University of Arizona.



- McDonald, M.G., and Harbaugh, A.W., 1988, **A modular three-dimensional finite-difference ground-water flow model**: Techniques of Water-Resources Investigations of the U.S. Geological Survey, book 6, chapter A1.
- Moosburner, O., 1972, **Analysis of the ground-water system by electrical-analog model, Avra Valley, Pima and Pinal Counties, Arizona**: U.S. Geological Survey Hydrologic Investigations Atlas HA-215, 2 sheets.
- Neuman, S.P., 1975, **Analysis of pumping test data from anisotropic unconfined aquifers considering delayed water table response**: Water Resources Research, Vol. 2, No. 2, April 1975.
- Reynolds, S.J., 1988, **Geologic map of Arizona**: U.S. Geological Survey Map 26.
- Travers, B.C., and Mock, P.A., 1984, **Groundwater modeling study of the upper Santa Cruz basin and Avra Valley in Pima, Pinal, and Santa Cruz Counties, southeastern Arizona**: Arizona Department of Water Resources, August 1984.
- Whallon, A.J., 1983, **A geohydrologic study of the regional ground-water system in Avra Valley, Pima and Pinal counties, Arizona**: M.S. thesis, University of Arizona.
- White, N.D., Matlock, W.G., and Schwalen, H.C., 1966, **An appraisal of the ground-water resources of Avra and Altar Valleys, Pima County, Arizona**: Arizona State Land Department, Water Resources Report 25.

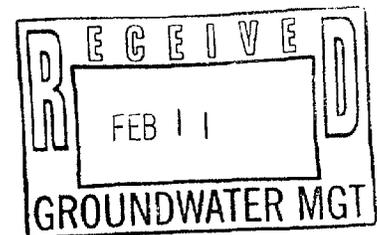
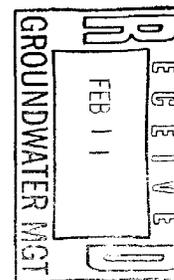


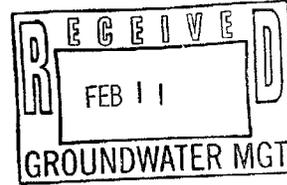
TABLE 1. SUMMARY OF PUMPING TEST RESULTS FOR SELECTED CITY OF TUCSON WELLS  
AVRA VALLEY, PIMA COUNTY, ARIZONA

| STATE<br>WELL NUMBER | WELL<br>NAME | TRANSMISSIVITY<br>(gpd/ft) <sup>a</sup> | HYDRAULIC<br>CONDUCTIVITY<br>(gpd/ft <sup>2</sup> ) <sup>b</sup> | SPECIFIC<br>CAPACITY<br>(gpm/ft) <sup>c</sup> | DATE OF<br>TEST | DISCHARGE<br>RATE<br>(gpm) <sup>d</sup> |
|----------------------|--------------|---|--|---|-----------------|---|
| (D-11-10)15ddd       | AF-058A      | 400,000                                 | 1,500  | ---   | 10-86           | ---                                     |
| (D-12-11)20dda       | AF-048A      | 40,000                                  | 120  | 17  | 10-86           | 952                                     |
| (D-13-10)4cdd        | AF-053A      | 80,000                                  | 350  | 19  | 10-85           | 1,972                                   |
| 4cdd                 | AF-054A      | 65,000                                  | 120  | ---   | 08-85           | ---                                     |
| 5cdd1                | AF-023A      | 56,000                                  | 260  | 9.2   | 05-79           | 1,001                                   |
| 14cdd                | AF-044A      | 55,000                                  | 270  | 25  | 08-85           | 1,850                                   |
| 15ddd                | AF-050A      | 31,000                                  | 74   | 17  | 10-85           | 1,310                                   |
| 22ddd                | AF-049A      | 100,000                                 | 490  | ---   | 04-84           | ---                                     |
| 23dcc                | AF-027A      | 100,000                                 | 380  | ---   | 04-84           | ---                                     |
| 24abb                | AF-045A      | 120,000                                 | 200  | 31  | 08-85           | 1,790                                   |
| 24dcc                | AF-046A      | 200,000                                 | 1,100  | 170   | 08-85           | 1,930                                   |
| 25acd                | AF-041A      | 180,000                                 | 230  | 36  | 03-85           | 1,720                                   |
| 25bdc                | AF-042A      | 100,000                                 | 160  | ---   | 08-85           | ---                                     |
| (D-13-11)31cdd2      | AF-034B      | 89,000                                  | 140  | 6.9   | 07-96           | 1,700                                   |
| (D-14-11)7bad        | AF-039A      | 46,000                                  | 140  | 26  | 03-79           | 1,007                                   |
| 8ccc1                | AF-040A      | 53,000                                  | 240  | 24  | 03-77           | 1,620                                   |
| 22cbb                | AV-018A      | 360,000                                 | 430  | 36  | 02-79           | 1,012                                   |
| 28bca                | AV-020A      | 180,000                                 | 260  | 59  | 12-73           | 1,613                                   |
| 28dcc                | AV-014A      | 84,000                                  | 480  | 38  | 12-73           | 1,308                                   |
| (D-14-12)30ccc2      | A-059A       | 80,000                                  | 220  | 6.3   | 03-87           | 670                                     |
| 30dcc1               | A-058A       | 58,000                                  | 340  | 11  | 03-87           | 610                                     |



ERROL L. MONTGOMERY & ASSOCIATES, INC.

TABLE 1. SUMMARY OF PUMPING TEST RESULTS FOR SELECTED CITY OF TUCSON WELLS  
 AVRA VALLEY, PIMA COUNTY, ARIZONA  
 Page 2 of 2



| STATE<br>WELL NUMBER | WELL<br>NAME | TRANSMISSIVITY<br>(gpd/ft) <sup>a</sup> | HYDRAULIC<br>CONDUCTIVITY<br>(gpd/ft <sup>2</sup> ) <sup>b</sup> | SPECIFIC<br>CAPACITY<br>(gpm/ft) <sup>c</sup> | DATE OF<br>TEST | DISCHARGE<br>RATE<br>(gpm) <sup>d</sup> |
|----------------------|--------------|---|--|---|-----------------|---|
| (D-15-10)28cdc       | AF-055A      | 60,000                                  | 150  | ---   | 08-85           | ---                                     |
| 33bcc                | AF-056A      | 41,000                                  | 84   | ---   | 08-85           | ---                                     |
| (D-15-11)15bbb       | AV-005A      | 100,000                                 | 200  | 18  | 04-67           | 1,350                                   |
| 15ccc                | AV-001A      | 51,000                                  | 84   | 19  | 11-65           | 2,409                                   |
| 22ccc                | AV-004A      | 13,000                                  | 17   | 6.4   | 08-66           | 950                                     |

<sup>a</sup> gpd/ft = gallons per day per foot width of aquifer at 1:1 hydraulic gradient

<sup>b</sup> gpd/ft<sup>2</sup> = gallons per day per square foot of aquifer at 1:1 hydraulic gradient

<sup>c</sup> gpm/ft = gallons per minute per foot of drawdown

<sup>d</sup> gpm = gallons per minute

--- = No data available



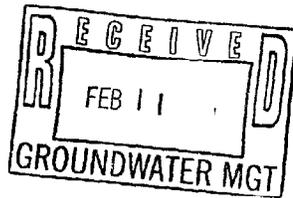


TABLE 2. RECORDS FOR CITY OF TUCSON WELLS  
AVRA VALLEY, PIMA COUNTY, ARIZONA

| STATE<br>WELL NUMBER | WELL<br>NAME | DATE<br>COMPLETED | .....CASING.....                           |                      |                    |                                     | .....NON-PUMPING WATER LEVEL.....                    |                    |                  |                      | LOG <sup>c</sup> | CHEMICAL <sup>d</sup><br>ANALYSIS | STATUS <sup>e</sup> |
|----------------------|--------------|-------------------|--|----------------------|--------------------|-------------------------------------|--|--------------------|------------------|----------------------|------------------|-----------------------------------|---------------------|
|                      |              |                   | DEPTH<br>DRILLED<br>(ft, bls) <sup>a</sup> | DIAMETER<br>(inches) | DEPTH<br>(ft, bls) | PERFORATED<br>INTERVAL<br>(ft, bls) | ALTITUDE OF<br>LAND SURFACE<br>(ft, ms) <sup>b</sup> | DEPTH<br>(ft, bls) | DATE<br>MEASURED | ALTITUDE<br>(ft, ms) |                  |                                   |                     |
| (D-11-10)15aaa       | WR-020A      | 11- -79           | 1,291                                      | 2                    | 1,291              | 210 - 1,291                         | 1,903  | 205                | 01- -95          | 1,698                | D,L,G            | ---                               | M                   |
| 15aad                | AF-001A      | 01- -52           | 396  | 16                   | 396                | 160 - 394                           | 1,906  | 206                | 12- -94          | 1,700                | D                | R,T                               | M                   |
| 15ddd                | AF-058A      | 03- -52           | 515  | 20                   | ---                | 165 -                               | 1,909  | 215                | 12- -94          | 1,694                | D                | ---                               | E                   |
| 20dcc                | W-002A       | ---               | 358  | 16                   | 320                | ---                                 | 1,922  | 269                | 12- -94          | 1,653                | ---              | R,T,O                             | A                   |
|                      |              |                   | 485  |                      |                    |                                     |  |                    |                  |                      |                  |                                   |                     |
| 20ddd                | W-003A       | 11- -52           | 529  | 20                   | 473                | 170 - 473                           | 1,905  | 250                | 12- -94          | 1,655                | D                | R,T                               | M                   |
|                      |              |                   |  | 18                   | 473-529            | 473 - 529                           |  |                    |                  |                      |                  |                                   |                     |
| 22ddd1               | AF-002A      | 01- -51           | 326  | 20                   | 326                | 165 - 322                           | 1,923  | 222                | 12- -94          | 1,701                | D,G              | R,T                               | M                   |
| 22ddd2               | WR-038A      | 01- -80           | 1,097                                      | 6                    | 640                | 280 - 620                           | 1,918  | 220                | 12- -94          | 1,699                | D,L              | ---                               | M                   |
| 27bac                | AF-003A      | 01- -51           | 326  | 20                   | 326                | 165 - 322                           | 1,916  | 213                | 12- -94          | 1,702                | ---              | R                                 | M                   |
| 27cdc1               | AF-004A      | 01- -47           | 310  | 16                   | 310                | 160 - 285                           | 1,923  | 233                | 12- -94          | 1,690                | D                | R                                 | M                   |
| 27cdc2               | AF-005A      | 03- -57           | 1,295                                      | 20                   | 510                | 220 - 500                           | 1,923  | 233                | 12- -94          | 1,691                | D                | R,T                               | M                   |
| 29acc                | AF-006A      | 03- -57           | 510  | 20                   | 510                | 220 - 500                           | 1,935  | 273                | 12- -94          | 1,892                | ---              | ---                               | M                   |
| (D-11-11)31cbc       | W-001A       | 05- -73           | 650  | 16                   | 650                | 310 - 640                           | 1,969  | 257                | 12- -94          | 1,712                | D,L              | R,T                               | A                   |
| (D-12-10)4acd        | W-004A       | 1960              | 1,190                                      | 20                   | 830                | 500 - 830                           | 1,964  | 289                | 12- -94          | 1,675                | L,G              | R,T,O                             | A                   |
| 4dcc                 | AF-009A      | 12- -51           | 402  | 20                   | 402                | 175 - 398                           | 1,967  | 276                | 12- -94          | 1,691                | ---              | ---                               | M                   |
| 9ddd                 | W-005A       | 11- -51           | 508  | 20                   | 508                | 180 - 504                           | 1,967  | 280                | 12- -94          | 1,707                | D,G              | R,T,O                             | A                   |
| 12ccd1               | AF-014A      | 1951              | 870  | 20                   | 870                | ---                                 | 1,994  | 269                | 12- -94          | 1,725                | ---              | ---                               | S                   |
| 12ccd2               | AF-013A      | 05- -51           | 344  | 20                   | 336                | 185 - 335                           | 1,998  | 270                | 12- -94          | 1,727                | D                | R,T                               | M                   |
|                      |              |                   | 878  | ---                  | 878                | ---                                 |  |                    |                  |                      |                  |                                   |                     |
| 12cdd                | ---          | 07- -79           | 1,295                                      | 25                   | ---                | 1,000 -                             | 1,994  | 286                | 12-16-85         | 1,708                | ---              | ---                               | ---                 |
| 14dcc                | WR-046A      | 03- -80           | 1,295                                      | 2                    | 840                | 240 - 840                           | 2,009  | 223                | 12- -94          | 1,786                | ---              | ---                               | M                   |
| 26add                | AF-043A      | 02- -57           | 600  | 20                   | 600                | 225 - 590                           | 2,044  | 312                | 12- -94          | 1,732                | D                | ---                               | E                   |
| 31bda                | AF-015A      | 09- -51           | 528  | 16                   | 526                | 256 - 454                           | 2,067  | 363                | 12- -94          | 1,704                | D                | R                                 | M                   |
| 31dcc                | WR-018A      | 07- -79           | 757  | 2                    | 757                | ---                                 | 2,061  | 340                | 12- -94          | 1,721                | L,G              | ---                               | M                   |
| 33cdc                | AF-016A      | 1962              | 1,900                                      | 20                   | 1,900              | ---                                 | 2,069  | 351                | 12- -94          | 1,718                | ---              | R                                 | M                   |
| 33cdd                | WR-017A      | 04- -79           | 1,256                                      | 2                    | 1,000              | 400 - 1,000                         | 2,062  | 358                | 12- -94          | 1,704                | D,L,G            | T                                 | M                   |
| 33ddd                | AF-017A      | 03- -51           | 1,020                                      | 20                   | 600                | 260 - 535                           | 2,068  | 339                | 12- -94          | 1,729                | ---              | R,T                               | S                   |
| (D-12-11)18dcc       | AF-018A      | 06- -51           | 385  | 16                   | 385                | 212 -                               | 2,009  | 245                | 12- -94          | 1,764                | D                | R,T                               | M                   |
|                      |              |                   |  | 12                   | ---                | 371 -                               |  |                    |                  |                      |                  |                                   |                     |
| 18ddc                | AF-019A      | 07- -41           | 474  | 12                   | 474                | 190 - 400                           | 2,011  | 246.4              | 11- -78          | 1,765                | D                | ---                               | E                   |
| 20dda                | AF-048A      | 08- -52           | 695  | 16                   | 677                | 200 - 677                           | 2,048  | 318                | 12- -94          | 1,730                | ---              | ---                               | M                   |
| 30dcc                | AF-020A      | 12- -51           | 639  | 20                   | 639                | 187 - 639                           | 2,054  | 301                | 12- -94          | 1,753                | D                | R,T                               | M                   |
| 30dcd1               | WR-018A      | 04- -79           | 300  | 2                    | 300                | ---                                 | 2,052  | 267                | 01- -95          | 1,785                | ---              | ---                               | M                   |
| 30dcd2               | WR-018B      | 04- -79           | 1,295                                      | 2                    | 1,000              | 400 - 1,000                         | 2,053  | 284                | 12- -94          | 1,769                | D,L,G            | ---                               | M                   |
| 30ddd1               | AF-021A      | 10- -53           | 686  | 16                   | 686                | 250 - 676                           | 2,056  | 304                | 12- -94          | 1,752                | D                | R                                 | M                   |



ERROL L. MONTGOMERY & ASSOCIATES, INC.



TABLE 2. RECORDS FOR CITY OF TUCSON WELLS  
 AVRA VALLEY, PIMA COUNTY, ARIZONA  
 Page 2 of 5

| STATE<br>WELL NUMBER | WELL<br>NAME | DATE<br>COMPLETED | DEPTH<br>DRILLED<br>(ft. bls) <sup>a</sup> | CASING               |                    |                                     | ALTITUDE OF<br>LAND SURFACE<br>(ft. msl) <sup>b</sup> | NON-PUMPING WATER LEVEL |                  |                       | LOG <sup>c</sup> | CHEMICAL <sup>d</sup><br>ANALYSIS | STATUS <sup>e</sup> |
|----------------------|--------------|-------------------|--|----------------------|--------------------|-------------------------------------|---|-------------------------|------------------|-----------------------|------------------|-----------------------------------|---------------------|
|                      |              |                   |  | DIAMETER<br>(inches) | DEPTH<br>(ft. bls) | PERFORATED<br>INTERVAL<br>(ft. bls) |   | DEPTH<br>(ft. bls)      | DATE<br>MEASURED | ALTITUDE<br>(ft. msl) |                  |                                   |                     |
| (D-12-11)30ddd2      | AF-022A      | 10- -51           | 629  | 16<br>10             | 350<br>340-369     | 200 - 350<br>340 - 629              | 2,058   | 302                     | 12- -94          | 1,756                 | D                | ---                               | M                   |
| (D-13-10)4cdd        | AF-053A      | 07- -51           | 601  | 20                   | 600                | ---                                 | 2,088   | 360                     | 12- -94          | 1,728                 | D                | ---                               | E                   |
| 4ddd                 | AF-054A      | 02- -51           | 600  | 20                   | 600                | 250 - 592                           | 2,090   | 359                     | 12- -94          | 1,731                 | D                | R                                 | E                   |
|                      |              | 1957              | 855  | 16                   | 555-855            | 555 - 802                           |   |                         |                  |                       |                  |                                   |                     |
| 5ddd1                | AF-023A      | 05- -57           | 587  | 20                   | 587                | 237 - 587                           | 2,090   | 362                     | 12- -94          | 1,728                 | D                | R,T                               | M                   |
| 5ddd2                | WR-042A      | 07- -79           | 1,000                                      | 2                    | 1,000              | ---                                 | 2,087   | 360                     | 01- -95          | 1,727                 | L,G              | ---                               | M                   |
| 6ddd                 | AF-024A      | 10- -51           | 420  | 20                   | 420                | 207 - 415                           | 2,086   | 362                     | 12- -94          | 1,725                 | D                | ---                               | M                   |
|                      |              | 02- -75           | 646  | ---                  | 420-646            | ---                                 |   |                         |                  |                       |                  |                                   |                     |
| 8ddd                 | WR-039A      | 08- -79           | 810  | 2                    | 810                | ---                                 | 2,110   | 371                     | 12- -94          | 1,739                 | L,G              | ---                               | M                   |
| 14cdd                | AF-044A      | 02- -50           | 596  | 20                   | 586                | 290 - 586                           | 2,143   | 366                     | 12- -94          | 1,777                 | D                | ---                               | E                   |
| 15ddd                | AF-050A      | 01- -51           | 814  | 20                   | 805                | 285 - 805                           | 2,143   | 372                     | 12- -94          | 1,771                 | D                | R                                 | E                   |
| 20cab                | WR-019A      | 07- -79           | 626  | 25                   | 600                | 400 - 600                           | 2,127   | 391                     | 12- -94          | 1,736                 | D,L,G            | ---                               | M                   |
| 20ccd                | AF-025A      | 03- -52           | 494  | 20                   | 494                | 200 - 475                           | 2,147   | 410                     | 12- -94          | 1,738                 | D                | R                                 | M                   |
| 22ccc                | IL-001A      | ---               | ---  | ---                  | ---                | ---                                 | 2,160   | 415                     | 01- -95          | 1,745                 | ---              | ---                               | M                   |
| 22cdd                | AF-026A      | 02- -52           | 600  | 20                   | 600                | 300 - 588                           | 2,169   | 409                     | 12- -94          | 1,780                 | D                | R,T                               | M                   |
|                      |              | 1954              | 1,100                                      | ---                  | 600-1,100          | ---                                 |   |                         |                  |                       |                  |                                   |                     |
| 22ddd                | AF 049A      | 09- -52           | 590  | 20                   | 590                | ---                                 | 2,169   | 392                     | 12- -94          | 1,777                 | ---              | ---                               | E                   |
| 23dcd                | AF-027A      | 03- -52           | 700  | 20                   | 700                | 255 - 650                           | 2,169   | 375                     | 12- -94          | 1,794                 | D                | R,T                               | E                   |
| 24abb                | AF-045A      | 08- -73           | 1,000                                      | 20                   | 691                | 381 - 691                           | 2,143   | 365                     | 12- -94          | 1,788                 | D                | R                                 | E                   |
|                      |              |                   |  | 16                   | 678-1,000          | ---                                 |   |                         |                  |                       |                  |                                   |                     |
| 24dcd                | AF-046A      | 02- -53           | 575  | 20                   | 575                | 247 - 564                           | 2,165   | 364                     | 12- -94          | 1,801                 | D                | R                                 | E                   |
| 25acd                | AF-041A      | 09- -51           | 662  | 20                   | 662                | 300 - 645                           | 2,180   | 369                     | 12- -94          | 1,811                 | D                | ---                               | E                   |
|                      |              | 12- -58           | 1,140                                      | 16                   | 652-1,047          | 660 - 1,040                         |   |                         |                  |                       |                  |                                   |                     |
| 25bcd                | AF-042A      | 12- -58           | 1,090                                      | 20                   | 1,028              | 350 - 1,017                         | 2,177   | 372                     | 12- -94          | 1,805                 | D                | R                                 | E                   |
| 25dcd                | AF-028A      | 10- -50           | 685  | 20                   | 600                | 200 - 600                           | 2,192   | 376                     | 12- -94          | 1,816                 | ---              | R                                 | E                   |
| 26ccd                | AF-029A      | 05- -51           | 1,000                                      | 20                   | 700                | 310 - 665                           | 2,190   | 389                     | 12- -94          | 1,802                 | D                | R,T                               | M                   |
|                      |              |                   |  | ---                  | 1,000              | ---                                 |   |                         |                  |                       |                  |                                   |                     |
| 26dcd                | AF-030A      | 02- -53           | 705  | 20                   | 705                | 319 - 695                           | 2,190   | 380                     | 12- -94          | 1,811                 | D                | R,T                               | M                   |
| (D-13-11)8bcc        |              | 04- -72           | 605  | 12                   | 600                | ---                                 | 2,127   | 358                     | 01- -95          | 1,769                 | D,L              | ---                               | ---                 |
| 11acd                |              | 03- -66           | 458  | 8                    | ---                | 308 - 597                           | 2,393   | 309                     | 12-05-85         | 2,084                 | D,L              | ---                               | ---                 |
| 16dba                |              | 07- -69           | 598  | 8                    | 598                | 478 - 597                           | 2,280   | 480                     | 1969             | 1,800                 | D,L              | ---                               | ---                 |
| 30ccc                | AF-031A      | 05- -52           | 600  | 20                   | 600                | 200 - 600                           | 2,168   | 365                     | 12- -97          | 1,823                 | D                | R                                 | M                   |
| 31abd                | WR-262A      | 09-17-96          | 425  | 5                    | 420                | 360 - 420                           | 2,194   | 364                     | 12-24-97         | 1,831                 | L                | R,T                               | M                   |
| 31aca                | WR-263A      | 10-24-96          | 980  | 5                    | 980                | 880 - 980                           | 2,195   | ---                     | ---              | ---                   | L                | R,T                               | M                   |
| 31ccc1               | AF-032A      | 11- -52           | 680  | 20                   | 680                | 100 - 680                           | 2,214   | 375                     | 12- -94          | 1,839                 | D                | R,T                               | M                   |
| 31ccc2               | AF-033A      | 11- -52           | 680  | 20                   | 680                | 100 - 680                           | 2,214   | 373                     | 12- -94          | 1,841                 | ---              | ---                               | M                   |
| 31cdb                | WR-264A      | 09-10-96          | 425  | 5                    | 420                | 360 - 420                           | 2,204   | 369                     | 12-24-97         | 1,836                 | L                | R,T                               | M                   |
| 31cdb                | WR-265A      | 10-12-96          | 985  | 5                    | 980                | 680 - 980                           | 2,206   | ---                     | ---              | ---                   | L                | R,T                               | M                   |

166/07/03/FEB2000RPT/CityWellRec-tbl.doc/08Feb2000



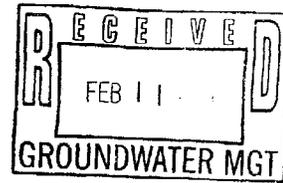


TABLE 2. RECORDS FOR CITY OF TUCSON WELLS  
AVRA VALLEY, PIMA COUNTY, ARIZONA  
Page 3 of 5

| STATE<br>WELL NUMBER | WELL<br>NAME | DATE<br>COMPLETED | DEPTH<br>DRILLED<br>(ft. bls) <sup>2</sup> | CASING.....          |                    |                                     | ALTITUDE OF<br>LAND SURFACE<br>(ft. msl) <sup>2</sup> | .....NON-PUMPING WATER LEVEL..... |                  |                       |                  |                                   | STATUS <sup>6</sup> |     |
|----------------------|--------------|-------------------|--|----------------------|--------------------|-------------------------------------|---|-----------------------------------|------------------|-----------------------|------------------|-----------------------------------|---------------------|-----|
|                      |              |                   |  | DIAMETER<br>(inches) | DEPTH<br>(ft. bls) | PERFORATED<br>INTERVAL<br>(ft. bls) |   | DEPTH<br>(ft. bls)                | DATE<br>MEASURED | ALTITUDE<br>(ft. msl) | LOG <sup>c</sup> | CHEMICAL <sup>d</sup><br>ANALYSIS |                     |     |
| (D-13-1)31cda        | WR-266A      | 09-04-96          | 425  | 5                    | 420                | 360 - 420                           | 2,205   | 367                               | 12-24-97         | 1,838                 | L                | R,T                               | M                   |     |
|                      | WR-267A      | 10-04-96          | 990  | 5                    | 980                | 680 - 900                           | 2,207   | ---                               | ---              | ---                   | L                | R,T                               | M                   |     |
|                      | AF-034A      | 05- -51           | 705  | 20                   | 705                | 270 - 705                           | 2,212   | 368                               | 12- -94          | 1,844                 | D                | R,T                               | M                   |     |
| 31cdd1               |              | 11- -57           | 1,090                                      | 16                   | ---                | ---                                 | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 |     |
|                      |              |                   | 15   | 567- 666             | ---                | ---                                 | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 |     |
|                      |              |                   | 12   | 668-1,050            | 666 -1,050         | ---                                 | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 |     |
|                      |              |                   | 16   | 1,000                | 680 - 980          | ---                                 | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 |     |
| 31cdd2               | AF-038B      | 08- -96           | 1,000                                      | 16                   | 1,000              | 680 - 980                           | ---   | 372                               | 07-24-96         | ---                   | ---              | R,T,O                             | E                   |     |
| 31dca                | WR-314A      | 10-29-97          | 410  | 5                    | 395                | 365 - 395                           | 2,206   | 366                               | 12-24-97         | 1,840                 | L                | R,T                               | M                   |     |
| (D-14-10)2ddd        | WR-029A      | 03- -79           | 1,017                                      | 2                    | 1,000              | 400 -1,000                          | 2,245   | 400                               | 12- -94          | 1,845                 | D,L,G            | ---                               | M                   |     |
| (D-14-11)2ccc        |              | 03- -58           | 582  | 6                    | 453                | ---                                 | 2,417   | 517                               | 03-05-75         | 1,900                 | D                | ---                               | S                   |     |
|                      |              | 12- -52           | 561  | 16                   | 561                | 200 - 561                           | 2,263   | 388                               | 12- -94          | 1,875                 | D                | R,T                               | M                   |     |
|                      |              | 11-03-97          | 415  | 5                    | 400                | 360 - 400                           | 2,218   | 363                               | 12-24-97         | 1,855                 | L                | R,T                               | M                   |     |
|                      |              | 12- -51           | 576  | 20                   | 576                | 300 - 566                           | 2,236   | 365                               | 12- -94          | 1,871                 | D                | R,T                               | M                   |     |
|                      |              | 01- -52           | 635  | 20                   | 635                | 280 - 635                           | 2,234   | 376                               | 12- -94          | 1,858                 | D                | R,T                               | M                   |     |
|                      |              | 12- -52           | 641  | 20                   | 0- 641             | 240 - 641                           | 2,235   | 374                               | 12- -94          | 1,861                 | D                | R,T                               | M                   |     |
|                      |              | 04- -55           | 1,165                                      | 16                   | 0-1,165            | 848 -1,128                          | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 | --- |
|                      |              | 11- -51           | 700  | 20                   | 700                | 300 - 700                           | 2,241   | 375                               | 12- -94          | 1,866                 | D                | R,T                               | M                   |     |
|                      |              | 03- -79           | 1,260                                      | 2                    | 1,000              | 400 - 1,000                         | 2,234   | 366                               | 07- -81          | 1,868                 | D,L,G            | ---                               | M                   |     |
|                      |              | 11-24-97          | 400  | 5                    | 400                | 360 - 400                           | 2,241   | 368                               | 12-24-97         | 1,873                 | L                | R,T                               | M                   |     |
|                      |              | 12- -51           | 590  | 20                   | 590                | 300 - 580                           | 2,258   | 369                               | 12- -94          | 1,889                 | D                | R                                 | M                   |     |
|                      |              | 01- -75           | 1,230                                      | 16                   | 600                | 400 - 600                           | 2,283   | 360                               | 12- -94          | 1,923                 | L,G              | R,T,O                             | A                   |     |
|                      |              | 02- -54           | 516  | 20                   | 500                | 280 - 495                           | 2,308   | 371                               | 12- -94          | 1,937                 | D,G              | R,T,O                             | A                   |     |
|                      |              | 01- -74           | 1,145                                      | 16                   | 1,123              | 411 - 890                           | 2,301   | 363                               | 12- -94          | 1,938                 | L,G              | R,T,O                             | A                   |     |
|                      |              |                   |  |                      |                    | 1,035 - 1,115                       | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 | --- |
|                      |              | 03- -75           | 1,275                                      | 16                   | 680                | 400 - 680                           | 2,303   | 360                               | 12- -94          | 1,943                 | L,G              | R,T                               | A                   |     |
|                      |              | 11- -73           | 1,063                                      | 16                   | 1,063              | 364 -1,063                          | 2,308   | 340                               | 12- -80          | 1,968                 | G                | R,T                               | A                   |     |
|                      |              | 04- -51           | 495  | 20                   | 495                | 285 - 490                           | 2,316   | 370                               | 12- -94          | 1,946                 | D,G              | R,T,O                             | A                   |     |
|                      |              | 12- -52           | 542  | 20                   | 542                | 350 - 527                           | 2,318   | 370                               | 12- -94          | 1,948                 | D,G              | R                                 | R                   |     |
|                      |              | 04- -75           | 1,332                                      | 16                   | 700                | 420 - 700                           | 2,323   | 366                               | 12- -94          | 1,957                 | L,G              | R                                 | M                   |     |
|                      |              | 01- -53           | 712  | 20                   | 697                | 240 - 697                           | 2,336   | 369                               | 01- -95          | 1,967                 | D                | ---                               | M                   |     |
|                      |              | 01- -53           | 670  | 20                   | 670                | 350 - 650                           | 2,329   | 367                               | 12- -94          | 1,962                 | D,G              | R                                 | M                   |     |
| 07- -52              | 512          | 20                | 512  | 285 - 510            | 2,318              | 361                                 | 12- -94   | 1,957                             | ---              | ---                   | A                |                                   |                     |     |
| 06- -51              | 535          | 20                | 535  | 280 - 530            | 2,312              | 362                                 | 12- -94   | 1,950                             | D                | R                     | M                |                                   |                     |     |
| 02- -75              | 1,266        | 16                | 680  | 400 - 680            | 2,312              | 361                                 | 12- -94   | 1,951                             | L,G              | R,T                   | A                |                                   |                     |     |
| 34ccc                | AV-025A      | 03- -53           | 625  | 20                   | 0-622              | 350 - 600                           | 2,322   | 359                               | 12- -94          | 1,963                 | L,G              | R                                 | S                   |     |
|                      |              | 02- -84           | 780  | 12                   | 622-780            | 622 - 780                           | ---   | ---                               | ---              | ---                   | ---              | ---                               | ---                 |     |



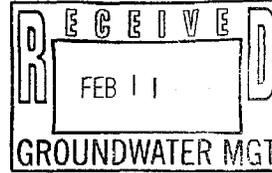


TABLE 2. RECORDS FOR CITY OF TUCSON WELLS  
AVRA VALLEY, PIMA COUNTY, ARIZONA  
Page 4 of 5

| STATE<br>WELL NUMBER  | WELL<br>NAME | DATE<br>COMPLETED | DEPTH<br>DRILLED<br>(ft. bls) <sup>a</sup> | CASING               |                    |                    | PERFORATED<br>INTERVAL<br>(ft. bls) | ALTITUDE OF<br>LAND SURFACE<br>(ft. msl) <sup>b</sup> | NON-PUMPING WATER LEVEL |                  |                       | LOG <sup>c</sup> | CHEMICAL <sup>d</sup><br>ANALYSIS | STATUS <sup>e</sup> |
|---|--------------|-------------------|--|----------------------|--------------------|--------------------|-------------------------------------|---|-------------------------|------------------|-----------------------|------------------|-----------------------------------|---------------------|
|   |              |                   |  | DIAMETER<br>(inches) | DEPTH<br>(ft. bls) | DEPTH<br>(ft. bls) |                                     |   | DEPTH<br>(ft. bls)      | DATE<br>MEASURED | ALTITUDE<br>(ft. msl) |                  |                                   |                     |
| (D-14-12)30ccc<br>30dcc   | A-059A       | 12- -85           | 1,000                                      | 16                   | 1,000              | 615 - 980          | 2,393                               | 428   | 01- -95                 | 1,965            | D,L                   | R,T,O            | E                                 |                     |
|   | A-058A       | 07- -73           | 720  | 16                   | 720                | 550 - 720          | 2,415                               | 441   | 01- -95                 | 1,974            | D                     | R,T,O            | E                                 |                     |
| (D-15-10)28cdc<br>33bcc   | AF-055A      | 06- -52           | 640  | 18                   | 640                | 240 - 640          | 2,528                               | 158   | 12- -93                 | 2,370            | D                     | R,O              | E                                 |                     |
|   | AF-056A      | 04- -51           | 710  | 16                   | 710                | 220 - 710          | 2,531                               | 159   | 12- -94                 | 2,372            | D                     | R,O              | E                                 |                     |
| (D-15-11)9aaa<br>11add<br>11bbb<br>12ccc<br>15aaa<br>15bbb<br>15ccc<br>15ddd<br>20aaa<br>22ccc<br>22ddd | AV-012A      | 12- -74           | 1,472                                      | 16                   | 660                | 400 - 660          | 2,348                               | 370   | 12- -94                 | 1,978            | L,G                   | R,T              | A                                 |                     |
|   | AV-008A      | 01- -53           | 588  | 20                   | 588                | 330 - 585          | 2,388                               | 408   | 12- -94                 | 1,979            | D                     | R,T,O            | A                                 |                     |
|   | AV-011A      | 10- -73           | 1,120                                      | 18                   | 980                | 540 - 980          | 2,361                               | 386   | 12- -94                 | 1,975            | D,G                   | R,T,O            | A                                 |                     |
|   | AV-009A      | 06- -75           | 1,475                                      | 16                   | 700                | 480 - 700          | 2,412                               | 428   | 12- -94                 | 1,984            | L,G                   | R                | A                                 |                     |
|   | AV-006A      | 08- -66           | 800  | 16                   | 0 606              | 365 - 606          | 2,405                               | 410   | 12- 94                  | 1,995            | D                     | R,T,O            | A                                 |                     |
|   |              |                   |  | 12                   | 590-800            | 590 - 800          |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   |  | 16                   | 0-609              | 348 - 609          |                                     | 2,392   | 380                     | 01- -94          | 2,012                 | D,L              | R,T,O                             | A                   |
|   |              |                   |  | 12                   | 559-861            | 559 - 961          |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   |  | 16                   | 0-600              | 400 - 600          |                                     | 2,437   | 382                     | 12- 94           | 2,055                 | D                | R,T,O                             | A                   |
|   |              |                   |  | 12                   | 600-1,005          | 603 - 1,003        |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   |  | 16                   | 0-608              | 370 - 608          |                                     | 2,452   | 408                     | 12- 94           | 2,044                 | D                | R,T,O                             | A                   |
|   |              |                   |  | 12                   | 588-900            | 588 - 900          |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   |  | 16                   | 0-597              | 141 - 577          |                                     | 2,432   | 373                     | 12- 94           | 2,059                 | ---              | R,T,O                             | A                   |
|   |              |                   |  | 14                   | 575-727            | 577 - 685          |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   |  | 10                   | 685-895            | 727 - 895          |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   | 16   | 1,000                | 382 - 610          |                    | 2,502                               | 394   | 12- 94                  | 2,108            | D                     | R,T              | R                                 |                     |
|   |              |                   | 12   | 1,000                | 386 - 1,000        |                    |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   | 10   | 1,000-1,130          | 1,000 - 1,120      |                    |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   | 16   | 0-597                | 402 - 597          |                    | 2,515                               | 418   | 12- 94                  | 2,097            | D                     | R,T,O            | A                                 |                     |
|   |              |                   | 13   | 597-997              | 597 - 997          |                    |                                     |   |                         |                  |                       |                  |                                   |                     |
| (D-16-10)18bdc1<br>19cab<br>28ddd   | AF-066A      | 06- -75           | 510  | 16                   | 220                | ---                | 2,610                               | 148   | 01- -95                 | 2,462            | D                     | R                | R                                 |                     |
|   |              |                   |  | 14                   | 192-492            | 220 - 452          |                                     |   |                         |                  |                       |                  |                                   |                     |
|   |              |                   |  | ---                  | ---                | ---                | 2,643                               | 151   | 12- 94                  | 2,492            | ---                   | ---              | M                                 |                     |
|   |              |                   | 16   | 1,000                | 417 - 997          |                    | 2,918                               | 414   | 12- 94                  | 2,504            | D                     | R,T              | A                                 |                     |
| (D-16-11)8bdb<br>9aca   | F-001A       | 05- -65           | 802  | 8                    | 802                | 612 - 797          | 2,823                               | 626   | 12- 94                  | 2,197            | D                     | R,T,O            | A                                 |                     |
|   | F-003A       | 05- -71           | 1,200                                      | 12                   | 1,000              | 417 - 997          | 2,900                               | 728   | 12- 94                  | 2,172            | D                     | R,T              | A                                 |                     |



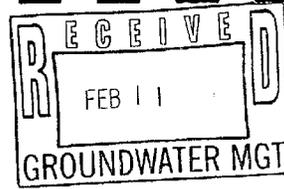


TABLE 2. RECORDS FOR CITY OF TUCSON WELLS  
AVRA VALLEY, PIMA COUNTY, ARIZONA  
Page 5 of 5

<sup>a</sup> ft. bls = feet below land surface

<sup>b</sup> ft. msl = feet above mean sea level

<sup>c</sup> Logs available:

D = Drillers log

L = Lithologic log

G = Borehole geophysical logs

<sup>d</sup> Water chemistry available:

R = Routine constituents

T = Trace elements

O = Organic compounds

<sup>e</sup> Status of well:

M = Monitor well

E = Equipped but not in service

A = Active or in service

S = Subsidence monitor well

R = Water level recorder well

--- = Data not available



TABLE 3. SUMMARY OF WATER LEVEL DRAWDOWN MEASUREMENTS  
 FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE  
 PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B], PIMA COUNTY, ARIZONA

PUMPING STARTED 07:16 JULY 24, 1996  
 PUMPING STOPPED 07:16 JULY 25, 1996  
 AVERAGE PUMPING RATE 1,700 GALLONS PER MINUTE  
 AF-034A PRE-PUMPING WATER LEVEL 371.39 FEET BELOW LAND SURFACE  
 AF-034A DISTANCE FROM PUMPED WELL 300 FEET

| TIME AFTER<br>PUMPING<br>STARTED<br>(minutes) | TIME AFTER<br>PUMPING<br>STOPPED<br>(minutes) | DEPTH<br>TO WATER<br>(feet bls) <sup>a</sup> | DRAWDOWN<br>(feet) |
|---|---|--|--------------------|
| 1   | ---   | 371.44                                       | 0.05               |
| 2   | ---   | 371.39                                       | 0                  |
| 3   | ---   | 371.47                                       | 0.08               |
| 4   | ---   | 371.62                                       | 0.23               |
| 5   | ---   | 371.69                                       | 0.3                |
| 6   | ---   | 371.82                                       | 0.43               |
| 7   | ---   | 371.96                                       | 0.57               |
| 8   | ---   | 372.14                                       | 0.75               |
| 9   | ---   | 372.21                                       | 0.82               |
| 10  | ---   | 372.35                                       | 0.96               |
| 11  | ---   | 372.46                                       | 1.07               |
| 12  | ---   | 372.59                                       | 1.2                |
| 13  | ---   | 372.69                                       | 1.3                |
| 14  | ---   | 372.8  | 1.41               |
| 15  | ---   | 372.77                                       | 1.38               |
| 16  | ---   | 372.97                                       | 1.58               |
| 18  | ---   | 373.22                                       | 1.83               |
| 20  | ---   | 373.38                                       | 1.99               |
| 22  | ---   | 373.57                                       | 2.18               |
| 24  | ---   | 373.76                                       | 2.37               |
| 26  | ---   | 373.83                                       | 2.44               |
| 28  | ---   | 373.99                                       | 2.6                |
| 30  | ---   | 374.08                                       | 2.69               |
| 32  | ---   | 374.23                                       | 2.84               |
| 34  | ---   | 374.3  | 2.91               |
| 39  | ---   | 374.63                                       | 3.24               |
| 44  | ---   | 374.86                                       | 3.47               |
| 49  | ---   | 375.11                                       | 3.72               |
| 54  | ---   | 375.31                                       | 3.92               |
| 59  | ---   | 375.49                                       | 4.1                |
| 64  | ---   | 375.65                                       | 4.26               |
| 69  | ---   | 375.84                                       | 4.45               |
| 74  | ---   | 375.97                                       | 4.58               |
| 79  | ---   | 376.1  | 4.71               |
| 84  | ---   | 376.23                                       | 4.84               |
| 89  | ---   | 376.31                                       | 4.92               |
| 94  | ---   | 376.46                                       | 5.07               |
| 99  | ---   | 376.58                                       | 5.19               |

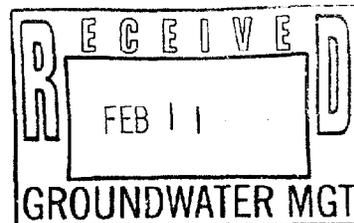


TABLE 3. SUMMARY OF WATER LEVEL DRAWDOWN MEASUREMENTS  
 FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE  
 PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B], PIMA COUNTY, ARIZONA  
 Page 2 of 4

| TIME AFTER<br>PUMPING<br>STARTED<br>(minutes) | TIME AFTER<br>PUMPING<br>STOPPED<br>(minutes) | DEPTH<br>TO WATER<br>(feet bls) <sup>a</sup> | DRAWDOWN<br>(feet) |
|---|---|--|--------------------|
| 104   | ---   | 376.65                                       | 5.26               |
| 109   | ---   | 376.72                                       | 5.33               |
| 114   | ---   | 376.82                                       | 5.43               |
| 119   | ---   | 376.9  | 5.51               |
| 124   | ---   | 376.97                                       | 5.58               |
| 129   | ---   | 377.05                                       | 5.66               |
| 134   | ---   | 377.13                                       | 5.74               |
| 139   | ---   | 377.22                                       | 5.83               |
| 149   | ---   | 377.36                                       | 5.97               |
| 154   | ---   | 377.39                                       | 6                  |
| 159   | ---   | 377.47                                       | 6.08               |
| 164   | ---   | 377.5  | 6.11               |
| 169   | ---   | 377.57                                       | 6.18               |
| 174   | ---   | 377.58                                       | 6.19               |
| 179   | ---   | 377.67                                       | 6.28               |
| 185   | ---   | 377.75                                       | 6.36               |
| 190   | ---   | 377.77                                       | 6.38               |
| 197   | ---   | 377.85                                       | 6.46               |
| 204   | ---   | 377.89                                       | 6.5                |
| 210   | ---   | 377.94                                       | 6.55               |
| 220   | ---   | 377.99                                       | 6.6                |
| 230   | ---   | 378.07                                       | 6.68               |
| 240   | ---   | 378.12                                       | 6.73               |
| 250   | ---   | 378.17                                       | 6.78               |
| 260   | ---   | 378.25                                       | 6.86               |
| 270   | ---   | 378.3  | 6.91               |
| 280   | ---   | 378.35                                       | 6.96               |
| 290   | ---   | 378.4  | 7.01               |
| 300   | ---   | 378.42                                       | 7.03               |
| 313   | ---   | 378.5  | 7.11               |
| 320   | ---   | 378.55                                       | 7.16               |
| 340   | ---   | 378.54                                       | 7.15               |
| 360   | ---   | 378.69                                       | 7.3                |
| 380   | ---   | 378.72                                       | 7.33               |
| 400   | ---   | 378.85                                       | 7.46               |
| 420   | ---   | 379.05                                       | 7.66               |
| 440   | ---   | 379.35                                       | 7.96               |
| 460   | ---   | 379.6  | 8.21               |
| 480   | ---   | 379.69                                       | 8.3                |
| 500   | ---   | 379.88                                       | 8.49               |
| 520   | ---   | 379.7  | 8.31               |
| 540   | ---   | 379.68                                       | 8.29               |
| 560   | ---   | 379.61                                       | 8.22               |
| 580   | ---   | 379.64                                       | 8.25               |
| 600   | ---   | 379.5  | 8.11               |
| 620   | ---   | 379.34                                       | 7.95               |
| 640   | ---   | 379.49                                       | 8.1                |
| 660   | ---   | 379.85                                       | 8.46               |

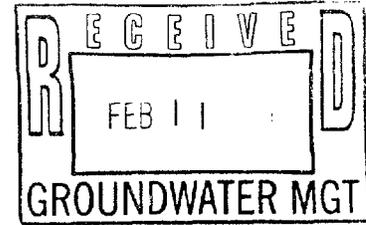
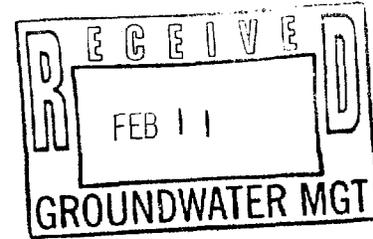


TABLE 3. SUMMARY OF WATER LEVEL DRAWDOWN MEASUREMENTS  
 FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE  
 PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B], PIMA COUNTY, ARIZONA  
 Page 3 of 4

| TIME AFTER<br>PUMPING<br>STARTED<br>(minutes) | TIME AFTER<br>PUMPING<br>STOPPED<br>(minutes) | DEPTH<br>TO WATER<br>(feet bls) <sup>a</sup> | DRAWDOWN<br>(feet) |
|---|---|--|--------------------|
| 680   | ---   | 379.78                                       | 8.39               |
| 700   | ---   | 379.84                                       | 8.45               |
| 730   | ---   | 379.92                                       | 8.53               |
| 760   | ---   | 379.97                                       | 8.58               |
| 790   | ---   | 379.92                                       | 8.53               |
| 820   | ---   | 379.98                                       | 8.59               |
| 880   | ---   | 380.25                                       | 8.86               |
| 910   | ---   | 380.27                                       | 8.88               |
| 975   | ---   | 380.22                                       | 8.83               |
| 1030  | ---   | 380.27                                       | 8.88               |
| 1090  | ---   | 380.27                                       | 8.88               |
| 1150  | ---   | 380.3  | 8.91               |
| 1210  | ---   | 380.35                                       | 8.96               |
| 1270  | ---   | 380.41                                       | 9.02               |
| 1330  | ---   | 380.47                                       | 9.08               |
| 1390  | ---   | 380.46                                       | 9.07               |
| 1432  | ---   | 380.5  | 9.11               |
| 1440  | 0   | ---  | ---                |
| 1441  | 1   | 380.52                                       | 9.13               |
| 1442  | 2   | 380.52                                       | 9.13               |
| 1443  | 3   | 380.43                                       | 9.04               |
| 1444  | 4   | 380.26                                       | 8.87               |
| 1445  | 5   | 380.14                                       | 8.75               |
| 1446  | 6   | 380  | 8.61               |
| 1447  | 7   | 379.85                                       | 8.46               |
| 1448  | 8   | 379.68                                       | 8.29               |
| 1449  | 9   | 379.63                                       | 8.24               |
| 1450  | 10  | 379.4  | 8.01               |
| 1451  | 11  | 379.23                                       | 7.84               |
| 1452  | 12  | 379.15                                       | 7.76               |
| 1453  | 13  | 379.24                                       | 7.85               |
| 1454  | 14  | 378.95                                       | 7.56               |
| 1455  | 15  | 378.85                                       | 7.46               |
| 1456  | 16  | 378.82                                       | 7.43               |
| 1458  | 18  | 378.58                                       | 7.19               |
| 1460  | 20  | 378.5  | 7.11               |
| 1462  | 22  | 378.28                                       | 6.89               |
| 1464  | 24  | 378.13                                       | 6.74               |
| 1466  | 26  | 378.02                                       | 6.63               |
| 1468  | 28  | 377.97                                       | 6.58               |
| 1470  | 30  | 377.88                                       | 6.49               |
| 1472  | 32  | 377.7  | 6.31               |
| 1474  | 34  | 377.67                                       | 6.28               |
| 1476  | 36  | 377.64                                       | 6.25               |
| 1478  | 38  | 377.37                                       | 5.98               |
| 1480  | 40  | 377.28                                       | 5.89               |
| 1482  | 42  | 377.23                                       | 5.84               |
| 1484  | 44  | 377.07                                       | 5.68               |

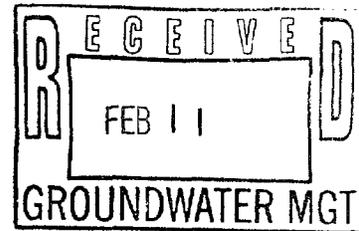


Pumping Stopped



TABLE 3. SUMMARY OF WATER LEVEL DRAWDOWN MEASUREMENTS  
 FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE  
 PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B], PIMA COUNTY, ARIZONA  
 Page 4 of 4

| TIME AFTER<br>PUMPING<br>STARTED<br>(minutes) | TIME AFTER<br>PUMPING<br>STOPPED<br>(minutes) | DEPTH<br>TO WATER<br>(feet bls) <sup>a</sup> | DRAWDOWN<br>(feet) |
|---|---|--|--------------------|
| 1487  | 47  | 376.94                                       | 5.55               |
| 1490  | 50  | 376.9  | 5.51               |
| 1495  | 55  | 376.68                                       | 5.29               |
| 1501  | 61  | 376.59                                       | 5.2                |
| 1505  | 65  | 376.46                                       | 5.07               |
| 1510  | 70  | 376.45                                       | 5.06               |
| 1515  | 75  | 376.1  | 4.71               |
| 1520  | 80  | 375.98                                       | 4.59               |
| 1525  | 85  | 375.77                                       | 4.38               |
| 1540  | 100   | 375.49                                       | 4.1                |
| 1550  | 110   | 375.4  | 4.01               |
| 1560  | 120   | 375.16                                       | 3.77               |
| 1570  | 130   | 374.96                                       | 3.57               |
| 1590  | 150   | 374.75                                       | 3.36               |
| 1610  | 170   | 374.51                                       | 3.12               |
| 1640  | 200   | 374.33                                       | 2.94               |
| 1660  | 220   | 374.07                                       | 2.68               |
| 1675  | 235   | 373.92                                       | 2.53               |
| 1690  | 250   | 373.8  | 2.41               |
| 1710  | 270   | 373.68                                       | 2.29               |
| 1730  | 290   | 373.6  | 2.21               |
| 1750  | 310   | 373.52                                       | 2.13               |
| 1770  | 330   | 373.4  | 2.01               |
| 1795  | 355   | 373.28                                       | 1.89               |
| 1815  | 375   | 373.12                                       | 1.73               |
| 1835  | 395   | 373.09                                       | 1.7                |
| 1855  | 415   | 373.07                                       | 1.68               |
| 1885  | 445   | 372.91                                       | 1.52               |
| 1915  | 475   | 372.84                                       | 1.45               |
| 1945  | 505   | 372.76                                       | 1.37               |
| 1975  | 535   | 372.72                                       | 1.33               |
| 2005  | 565   | 372.67                                       | 1.28               |
| 2035  | 595   | 372.62                                       | 1.23               |
| 2065  | 625   | 372.56                                       | 1.17               |
| 2095  | 655   | 372.52                                       | 1.13               |
| 2125  | 685   | 372.48                                       | 1.09               |
| 2155  | 715   | 372.46                                       | 1.07               |
| 2955  | 1515  | 371.86                                       | 0.47               |



<sup>a</sup> feet bls = feet below land surface

--- = not applicable or data not available



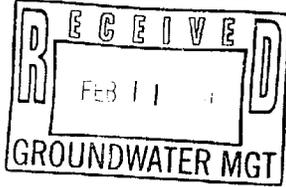


TABLE 4. RECORDS FOR REGISTERED NON-CITY WELLS IN THE VICINITY OF PROPOSED MUNICIPAL SUPPLY WELL CA-008A AVRA VALLEY, PIMA COUNTY ARIZONA

| STATE WELL NUMBER | WELL REGISTRY NUMBER | WELL OWNER                    | DATE COMPLETED | CASING                               |                   |                 |                               | NON-PUMPING WATER LEVEL                         |                 |               |                    |                   | WELL USE <sup>e</sup> |                                |     |
|-------------------|----------------------|-------------------------------|----------------|--------------------------------------|-------------------|-----------------|-------------------------------|---|-----------------|---------------|--------------------|-------------------|-----------------------|--------------------------------|-----|
|                   |                      |                               |                | DEPTH DRILLED (ft. bls) <sup>a</sup> | DIAMETER (inches) | DEPTH (ft. bls) | PERFORATED INTERVAL (ft. bls) | ALTITUDE OF LAND SURFACE (ft. msl) <sup>b</sup> | DEPTH (ft. bls) | DATE MEASURED | ALTITUDE (ft. msl) | LOGS <sup>c</sup> |                       | CHEMICAL ANALYSES <sup>d</sup> |     |
| (D-13-11)19ddd    | 55-550318            | GARCIA, O.                    | 09-24-95       | 550                                  | 4                 | 550             | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D   |
| 20dcc             | 55-628905            | AVRA WATER CO-OP              | 03-24-72       | 605                                  | 12                | —               | 495- 600                      | 2,195   | 378             | 01-23-95      | 1,817              | D,L               | EC,T,pH,F,TDS         | —                              | P   |
| 20dcd             | 55-610123            | U.S. BUREAU OF RERECLAMATION  | —              | 1,035                                | 6                 | 20              | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | T,M |
| 28aaa             | 55-833494            | CARLTON, G.A.                 | 09-24-79       | 240                                  | 6                 | 220             | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D   |
| 29ucc             | 55-833670            | GARCIA, F.                    | —              | 245                                  | —                 | —               | —                             | 2,188   | 240             | 11- -41       | 1,948              | —                 | —                     | —                              | S   |
| 29daa             | 55-524847            | LOWE, DONALD                  | —              | —                                    | —                 | —               | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D,S |
| 29dad             | 55-639790            | COLEMAN, E.                   | 09-20-67       | 530                                  | 8                 | 530             | 390- 520                      | —   | —               | —             | —                  | D,L               | —                     | —                              | D   |
| 29dac             | 55-521006            | ABBOTT, F.                    | 08-12-85       | 534                                  | 5                 | 534             | —                             | —   | —               | —             | —                  | D                 | —                     | —                              | D   |
| 29dba             | 55-633670            | NEWMAN, J.W., JR.             | 05-10-73       | 500                                  | 6                 | 500             | 380- 500                      | 2,240   | 132             | 04-30-73      | 2,108              | D                 | —                     | —                              | D   |
| 29dc              | 55-800614            | ORSTEDT                       | 10- -74        | 550                                  | 8                 | 550             | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D   |
| 29dcc             | 55-635051            | ORSTEDT, J.                   | 10- -74        | 550                                  | 8                 | 550             | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D   |
| 29ddd             | 55-855009            | DOIDGE, J.A.                  | 1980           | 509                                  | 8                 | 509             | —                             | —   | —               | —             | —                  | D                 | —                     | —                              | D   |
| 32ada             | 55-506749            | U.S. BUREAU OF RECLAMATION    | 09-17-84       | 796                                  | 11                | 763             | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | M   |
| 32add1            | 55-615885            | ARIZONA STATE LAND DEPARTMENT | —              | —                                    | 8                 | —               | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D   |
| 32add2            | 55-615886            | MATSON, HARRISON              | —              | —                                    | 8                 | —               | —                             | —   | —               | —             | —                  | —                 | —                     | —                              | D   |
| 32ccc             | 55-615887            | WONG, B.                      | 04-25-78       | 993                                  | 16                | —               | 500- 993                      | 2,211   | 440             | 06-19-90      | 1,771              | D                 | —                     | —                              | Irr |



ERROL L. MONTGOMERY & ASSOCIATES, INC.

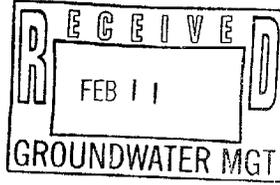


TABLE 4. RECORDS FOR REGISTERED NON-CITY WELLS IN THE VICINITY OF PROPOSED MUNICIPAL SUPPLY WELL CA-008A AVRA VALLEY, PIMA COUNTY, ARIZONA  
Page 2 of 3

| STATE WELL NUMBER | WELL REGISTRY NUMBER | WELL OWNER           | .....CASING..... |                                      |                   |                 |                               | .....NON-PUMPING WATER LEVEL.....               |                 |               |                    |    | LOGS <sup>c</sup> | CHEMICAL ANALYSES <sup>d</sup> | WELL USE <sup>e</sup> |
|-------------------|----------------------|----------------------|------------------|--------------------------------------|-------------------|-----------------|-------------------------------|---|-----------------|---------------|--------------------|----|-------------------|--------------------------------|-----------------------|
|                   |                      |                      | DATE COMPLETED   | DEPTH DRILLED (ft, bls) <sup>a</sup> | DIAMETER (inches) | DEPTH (ft, bls) | PERFORATED INTERVAL (ft, bls) | ALTITUDE OF LAND SURFACE (ft, msl) <sup>b</sup> | DEPTH (ft, bls) | DATE MEASURED | ALTITUDE (ft, msl) |    |                   |                                |                       |
| (D-13-11)33abd    | 55-802151            | LARSON, M.W.         | 1970             | 550                                  | 12                | 550             | --                            | --  | --              | --            | --                 | -- | --                | --                             | D                     |
| 33daa1            | 55-639980            | ZAGONA, S.V.         | 01-04-74         | 520                                  | 8                 | 520             | --                            | --  | --              | --            | --                 | -- | --                | --                             | D                     |
| 33daa2            | 55-627473            | McFARLAND, GEORGE L. | 01-04-74         | 520                                  | --                | --              | 400- 510                      | 2,330   | 458             | 01-04-74      | 1,872              | D  | --                | D                              |                       |
| 34ccc             | 55-629094            | NPS                  | 1964             | 555                                  | 6                 | 555             | --                            | 2,336   | 474             | 01-18-66      | 1,862              | L  | EC,T,pH,F,TDS     | P                              |                       |
| (D-14-10)12ac     | 55-633627            | BLM-PHOENIX DISTRICT | 05-21-62         | 420                                  | 4                 | 420             | --                            | --  | --              | --            | --                 | -- | --                | S                              |                       |
| 12ba              | 55-632949            | BLM-PHOENIX DISTRICT | --               | --                                   | --                | --              | --                            | --  | --              | --            | --                 | -- | --                | S                              |                       |
| (D-14-11)03abb    | 55-640230            | MATHESON, H.M.       | --               | 710                                  | --                | --              | --                            | --  | --              | --            | --                 | -- | --                | D                              |                       |
| 03abc             | 55-565097            | MATHESON             | --               | --                                   | --                | --              | --                            | --  | --              | --            | --                 | -- | --                | D                              |                       |
| 03ada             | 55-524479            | COLLEY, MARSHALL     | 04-03-90         | 745                                  | 8                 | 745             | --                            | --  | --              | --            | --                 | D  | --                | D                              |                       |
| 03adc             | 55-553084            | CARPENTER, D.        | 02-22-96         | 580                                  | 8                 | 580             | --                            | --  | 515             | 02-22-96      | --                 | -- | --                | D                              |                       |
| 03daa1            | 55-537814            | LARSEN, VIVIAN       | 03-18-93         | 695                                  | 8                 | 695             | --                            | --  | --              | --            | --                 | D  | --                | D                              |                       |
| 03daa2            | 55-538141            | BARRATT, TIMOTHY     | 03-20-93         | 745                                  | 8                 | 745             | --                            | --  | --              | --            | --                 | D  | --                | D                              |                       |
| 03dab             | 55-523996            | THOMPSON, LYLE-HOMER | 04-29-89         | 710                                  | 8                 | 710             | --                            | --  | --              | --            | --                 | D  | --                | D                              |                       |
| 03dac             | 55-551685            | KAY, KEN             | 10-03-95         | 663                                  | 8                 | 663             | --                            | --  | --              | --            | --                 | D  | --                | D                              |                       |
| 03dbc             | 55-561077            | WITTHROW, LES        | --               | --                                   | --                | --              | --                            | --  | --              | --            | --                 | -- | --                | D,S                            |                       |



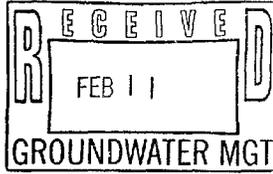


TABLE 4. RECORDS FOR REGISTERED NON-CITY WELLS IN THE VICINITY OF PROPOSED MUNICIPAL SUPPLY WELL CA-008A AVRA VALLEY, PIMA COUNTY, ARIZONA  
Page 3 of 3

| STATE WELL NUMBER | WELL REGISTRY NUMBER | WELL OWNER                | DATE COMPLETED | DEPTH DRILLED (ft. bls) <sup>a</sup> | DIAMETER (inches) | CASING          |                 | PERFORATED INTERVAL (ft. bls) | ALTITUDE OF LAND SURFACE (ft. msl) <sup>b</sup> | NON-PUMPING WATER LEVEL |               |                    | LOGS <sup>c</sup> | CHEMICAL ANALYSES <sup>d</sup> | WELL USE <sup>e</sup> |
|-------------------|----------------------|---------------------------|----------------|--------------------------------------|-------------------|-----------------|-----------------|-------------------------------|---|-------------------------|---------------|--------------------|-------------------|--------------------------------|-----------------------|
|                   |                      |                           |                |                                      |                   | DEPTH (ft. bls) | DEPTH (ft. bls) |                               |   | DEPTH (ft. bls)         | DATE MEASURED | ALTITUDE (ft. msl) |                   |                                |                       |
| (D-14-11)03ddd    | 55-544007            | DARIMONT                  | 07-16-94       | 880                                  | 6                 | 680             | ---             | ---                           | ---   | ---                     | ---           | ---                | ---               | ---                            | D                     |
| 04adb             | 55-603405            | SANDARIO WATER CO.        | 1965           | 590                                  | 8                 | 590             | ---             | ---                           | 2,305   | ---                     | ---           | ---                | ---               | ---                            | P                     |
| 04bb              | 55-526168            | EL PASO NATURAL GAS       | 11-14-89       | 490                                  | 8                 | 250             | ---             | ---                           | ---   | ---                     | ---           | ---                | ---               | ---                            | C                     |
| 04caa1            | 55-502183            | ---                       | 01-01-52       | 581                                  | 16                | 561             | 0- 561          | 2,261                         | 388   | 12-20-94                | 1,873         | ---                | ---               | ---                            | Irr                   |
| 04caa2            | 55-518208            | SANDARIO WATER CO.        | 01-05-89       | 600                                  | 12                | 600             | 400- 600        | 2,258                         | ---   | ---                     | ---           | D                  | ---               | ---                            | P                     |
| 04caa3            | 55-505442            | ---                       | ---            | ---                                  | ---               | ---             | ---             | ---                           | ---   | ---                     | ---           | ---                | ---               | ---                            | D                     |
| 09acc1            | 55-534236            | TUCKER, THOMAS            | 05-20-92       | 450                                  | 9                 | 20              | ---             | ---                           | ---   | ---                     | ---           | ---                | ---               | ---                            | D,Irr                 |
| 09acc2            | 55-536170            | TUCKER                    | ---            | ---                                  | ---               | ---             | ---             | ---                           | ---   | ---                     | ---           | ---                | ---               | ---                            | D,Irr                 |
| 10aab             | 55-509591            | U.S BUREAU OF RECLAMATION | 12-21-84       | 1,000                                | 1.25 (PZ-1)       | 942             | 800- 900        | 2,380                         | 484   | 06-08-93                | 1,896         | D,L,G              | ---               | ---                            | T,M                   |
|                   |                      |                           |                |                                      | 1.25(PZ-2)        | 853             | 560- 580        | 2,380                         | 485   | 06-08-93                | 1,896         |                    |                   |                                |                       |

<sup>a</sup> ft, bls = feet below land surface

<sup>b</sup> ft, msl = feet above mean sea level

<sup>c</sup> Logs reportedly available:  
D = Drillers log  
L = Lithologic log  
G = Borehole geophysical log

<sup>d</sup> Water chemistry reportedly available:  
EC = Electrical Conductance  
T = Temperature  
F = Fluoride  
TDS = Total dissolved solids

<sup>e</sup> Reported well use:

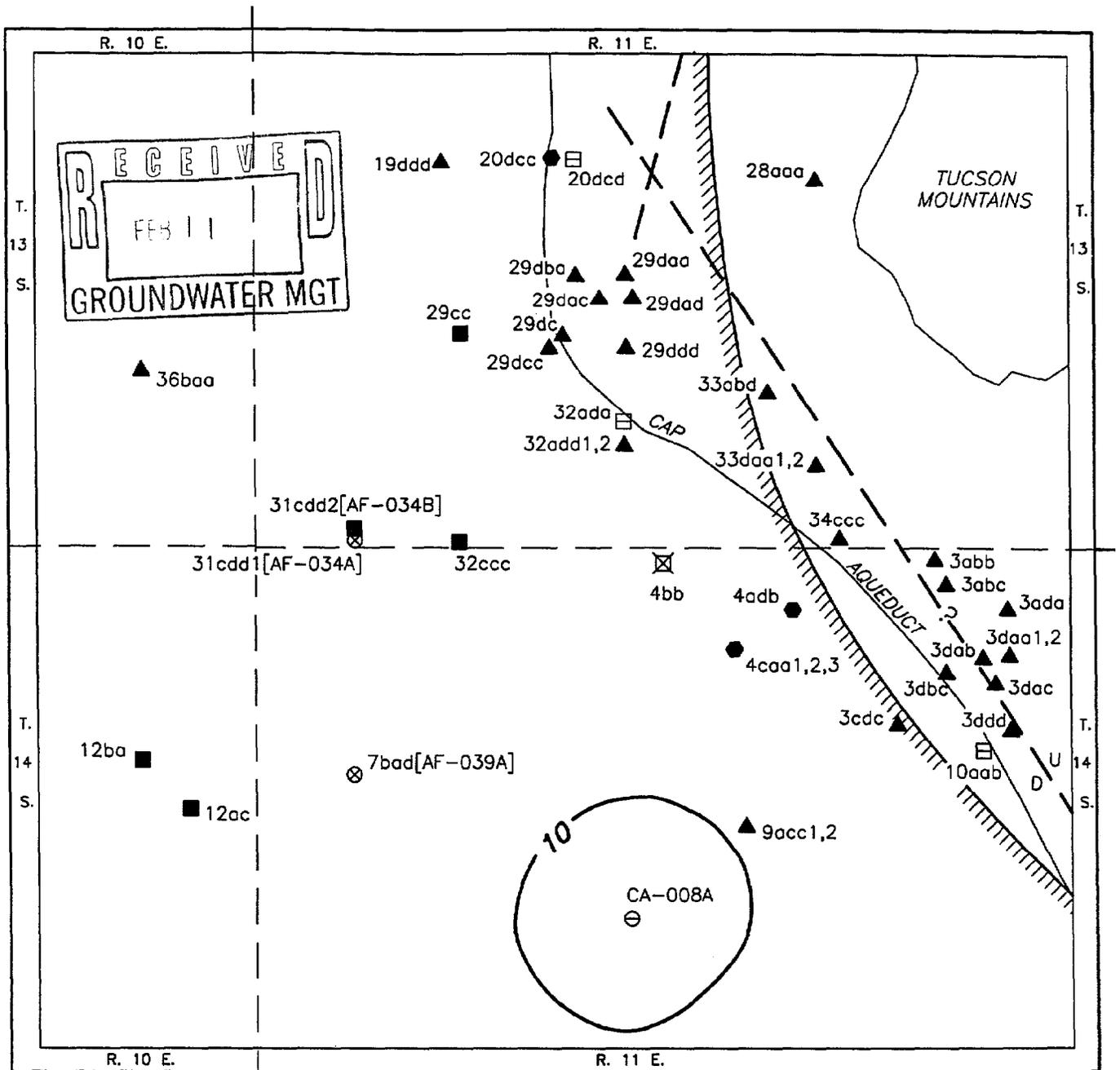
D = Domestic supply  
P = Public supply  
T = Exploration borehole  
M = Monitor well  
S = Stock supply  
Irr = Irrigation supply

<sup>f</sup> Well is identified as (D-13-11)29dda in ADWR "55" well registry database

--- = Data not available

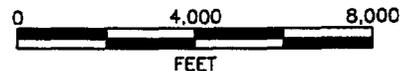
C = Cathodic protection





**EXPLANATION**

- PUBLIC SUPPLY WELL
- 4adb STATE WELL NUMBER
- ▲ DOMESTIC SUPPLY WELL
- OTHER SUPPLY WELL
- ⊗ RETIRED IRRIGATION SUPPLY WELL
- ⊖ PROPOSED MUNICIPAL SUPPLY WELL
- MONITOR WELL OR PIEZOMETER
- ⊗ CATHODIC PROTECTION WELL
- $\frac{U}{D}$  FAULT; approximately located, dashed where inferred or concealed; U, upthrown side; D, downthrown side
- ////// APPROXIMATE BOUNDARY OF BASIN-FILL DEPOSITS AQUIFER
- 10- CONTOUR OF PROJECTED DRAWDOWN, in feet



**FIGURE 1. WELL LOCATION MAP AND PROJECTED DRAWDOWN IMPACT FOR CITY OF TUCSON PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A], 5 YEARS AFTER START OF PUMPING**



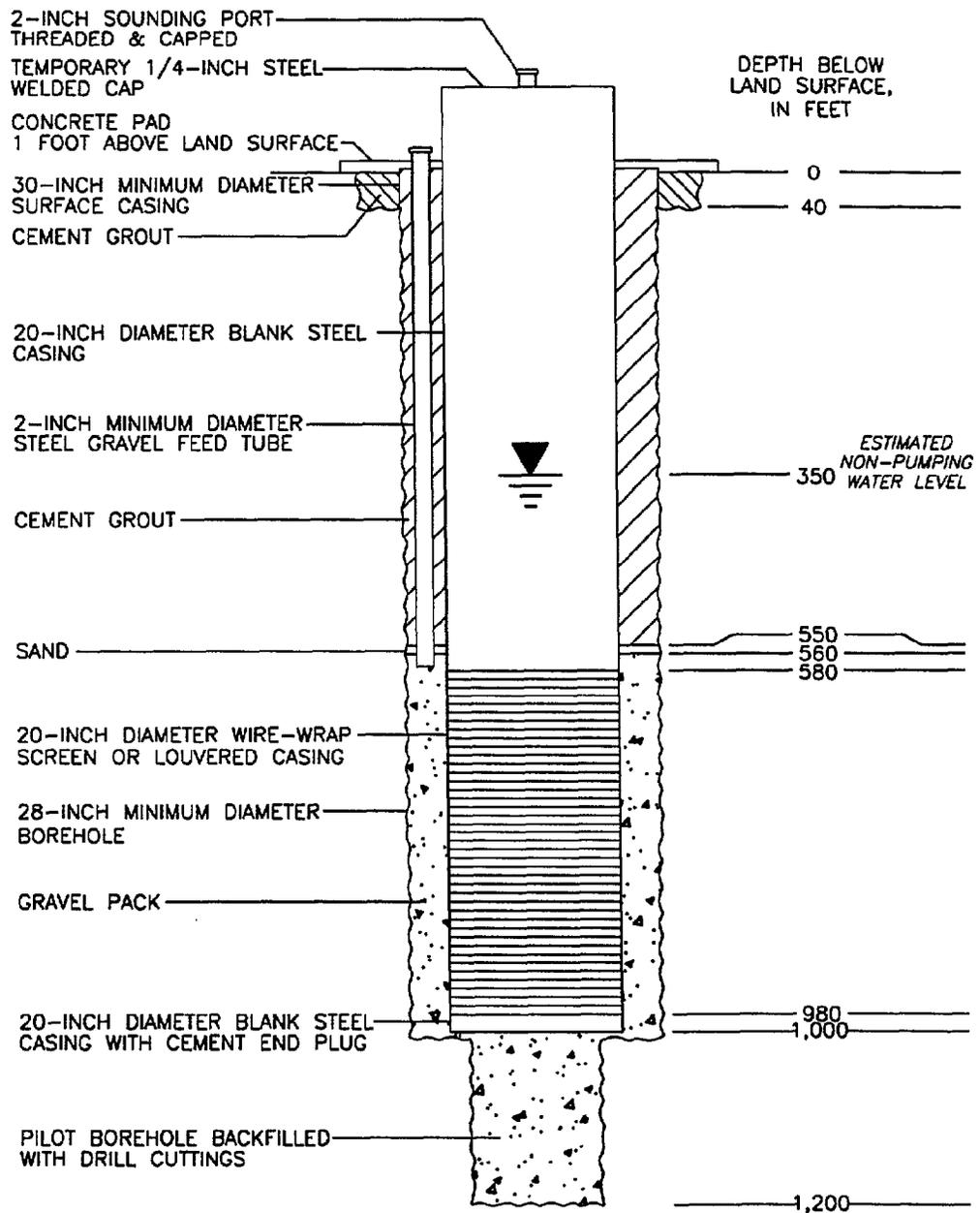
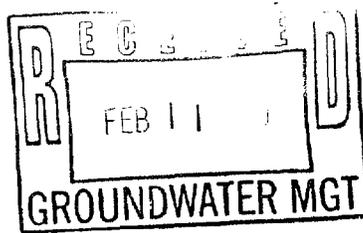


FIGURE 2. SCHEMATIC DIAGRAM OF CONSTRUCTION DETAILS FOR CITY OF TUCSON PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]

166.0704/CA-008a-WS\07 FEB 2000



ERROL L. MONTGOMERY & ASSOCIATES, INC.

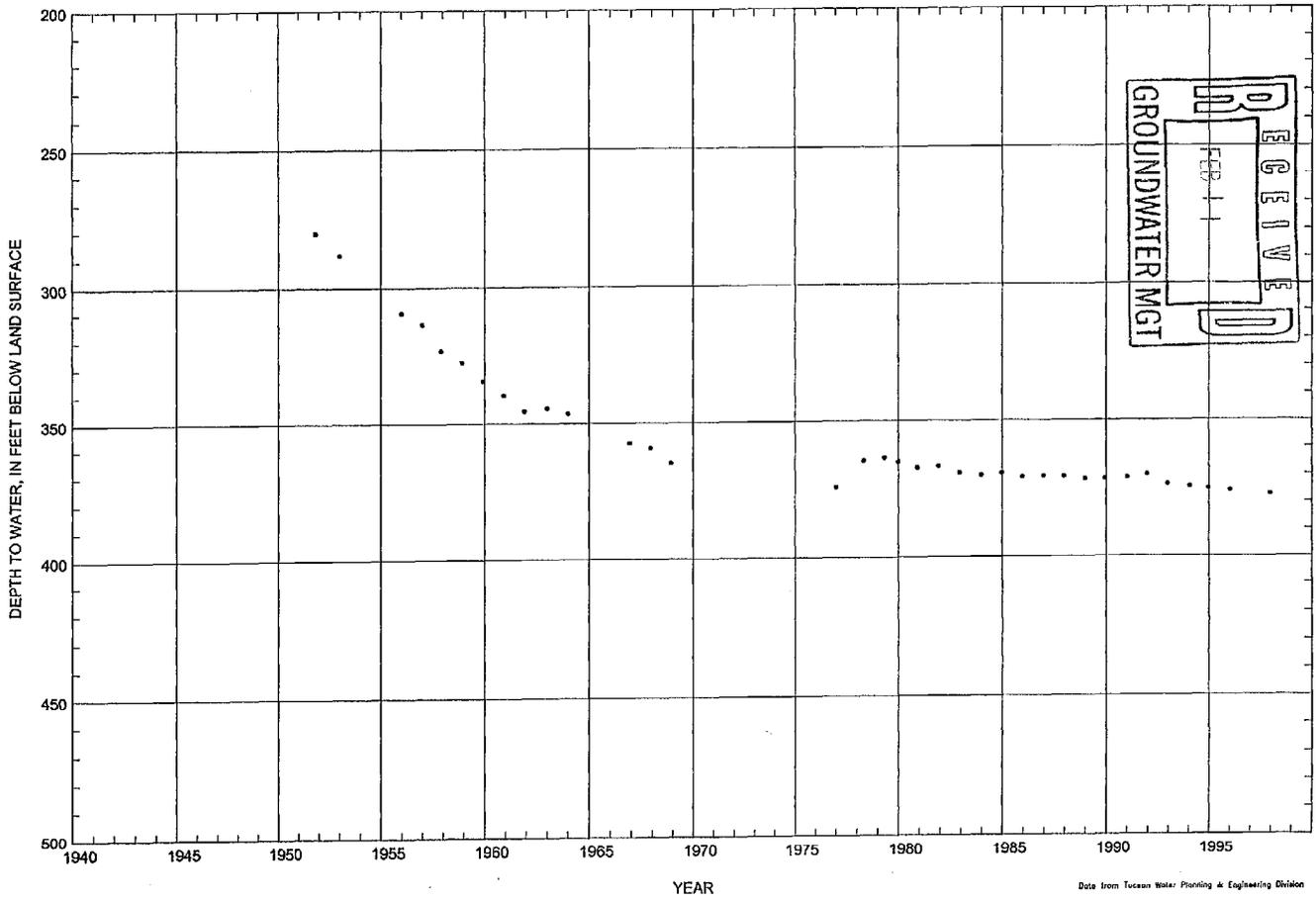
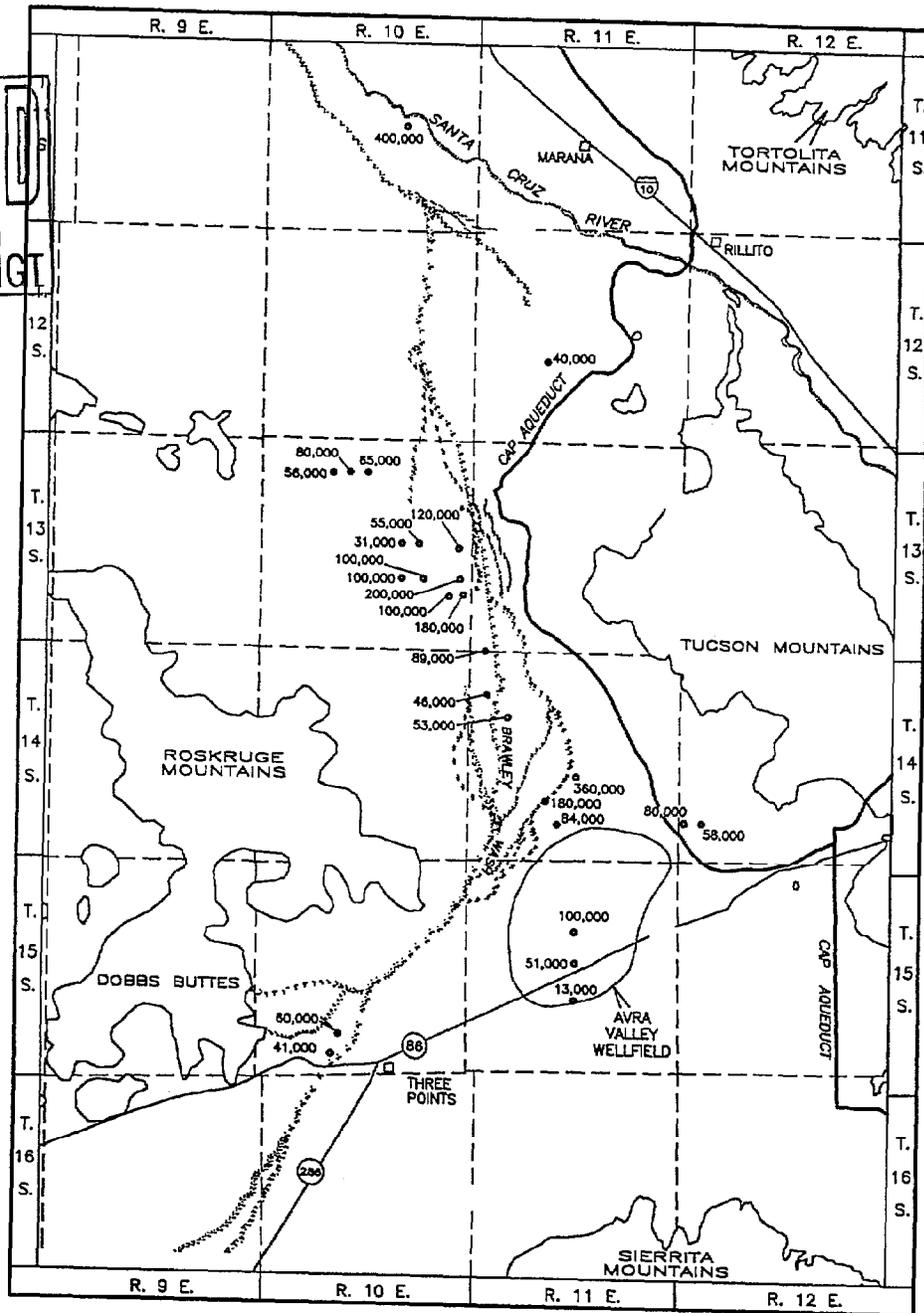


FIGURE 3. WATER LEVEL HYDROGRAPH FOR WELL (D-14-11)7bad[AF-039A]



RECEIVED  
 FEB 11  
 GROUNDWATER MGT



EXPLANATION

100,000  
 ● REPRESENTATIVE TRANSMISSIVITY FROM PUMPING TEST, in gpd/ft

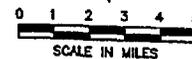


FIGURE 4. AQUIFER TRANSMISSIVITY, AVRA VALLEY AREA

166.0703\TRNSMIS3\01-20-98



ERROL L. MONTGOMERY & ASSOCIATES, INC.

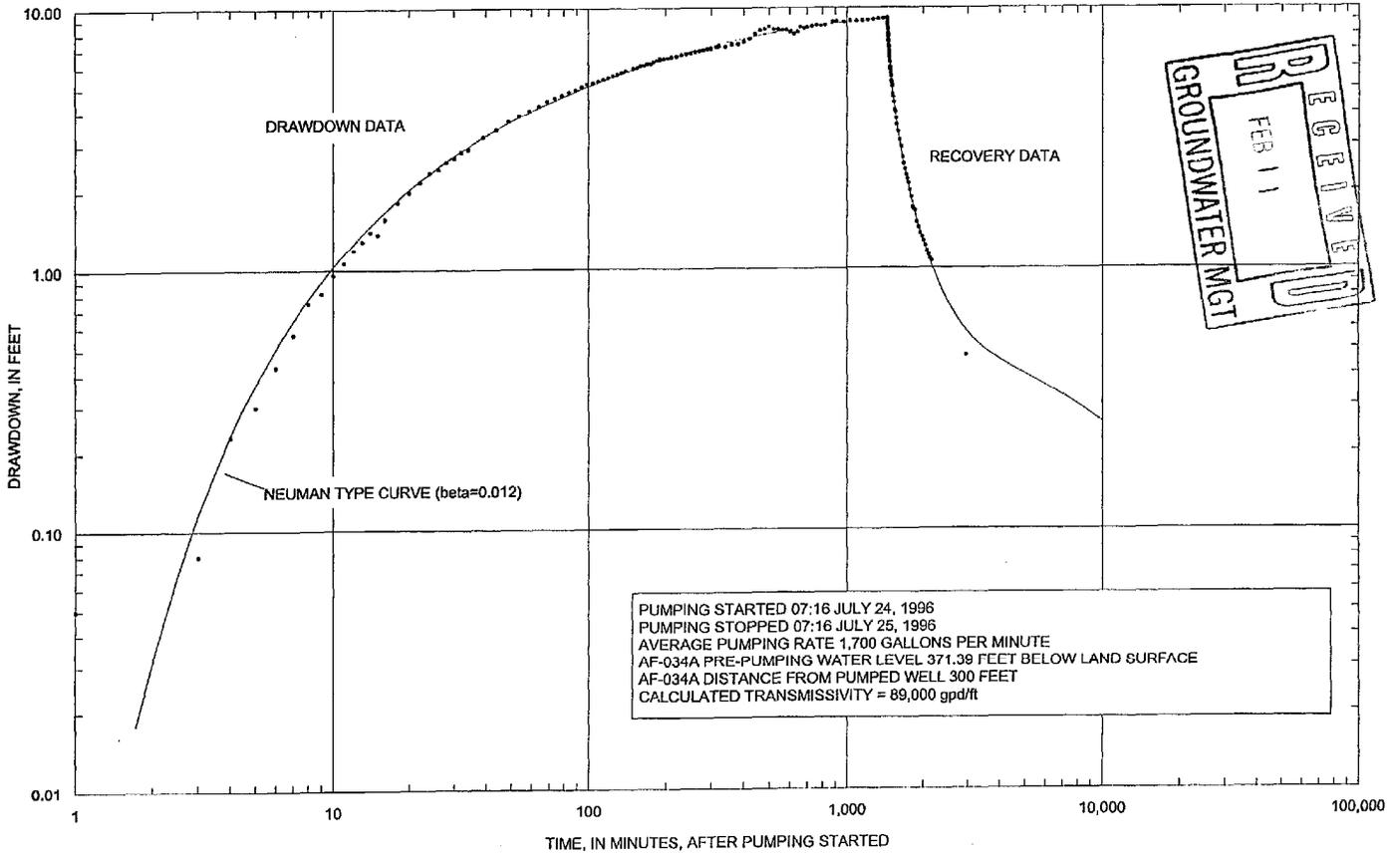
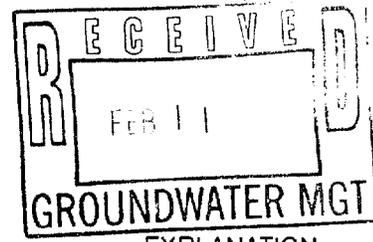


FIGURE 5. LOG-LOG DRAWDOWN AND RECOVERY GRAPH FOR OBSERVATION WELL (D-13-11)31cdd1[AF-034A] DURING 24-HOUR CONSTANT-DISCHARGE PUMPING TEST AT WELL (D-13-11)31cdd2[AF-034B]

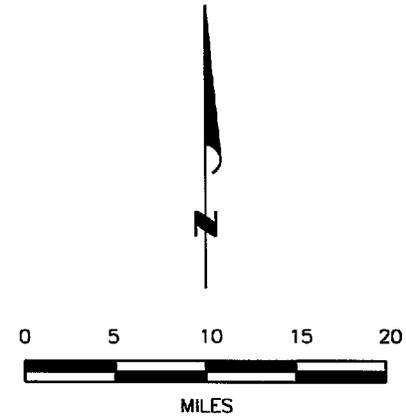


ERROL L. MONTGOMERY & ASSOCIATES, INC.



EXPLANATION

- BASIN-FILL DEPOSITS
- BEDROCK COMPLEX
- APPROXIMATE BOUNDARY OF ACTIVE GRID CELLS IN GROUNDWATER FLOW MODEL
- PROPOSED MUNICIPAL SUPPLY WELL AND IDENTIFIER  
CA-008A



Geologic units adapted from Reynolds (1988). Approximate boundary of basin-fill deposits aquifer adapted from Hanson, Anderson, and Pool (1990) and Freethy and Anderson (1986).

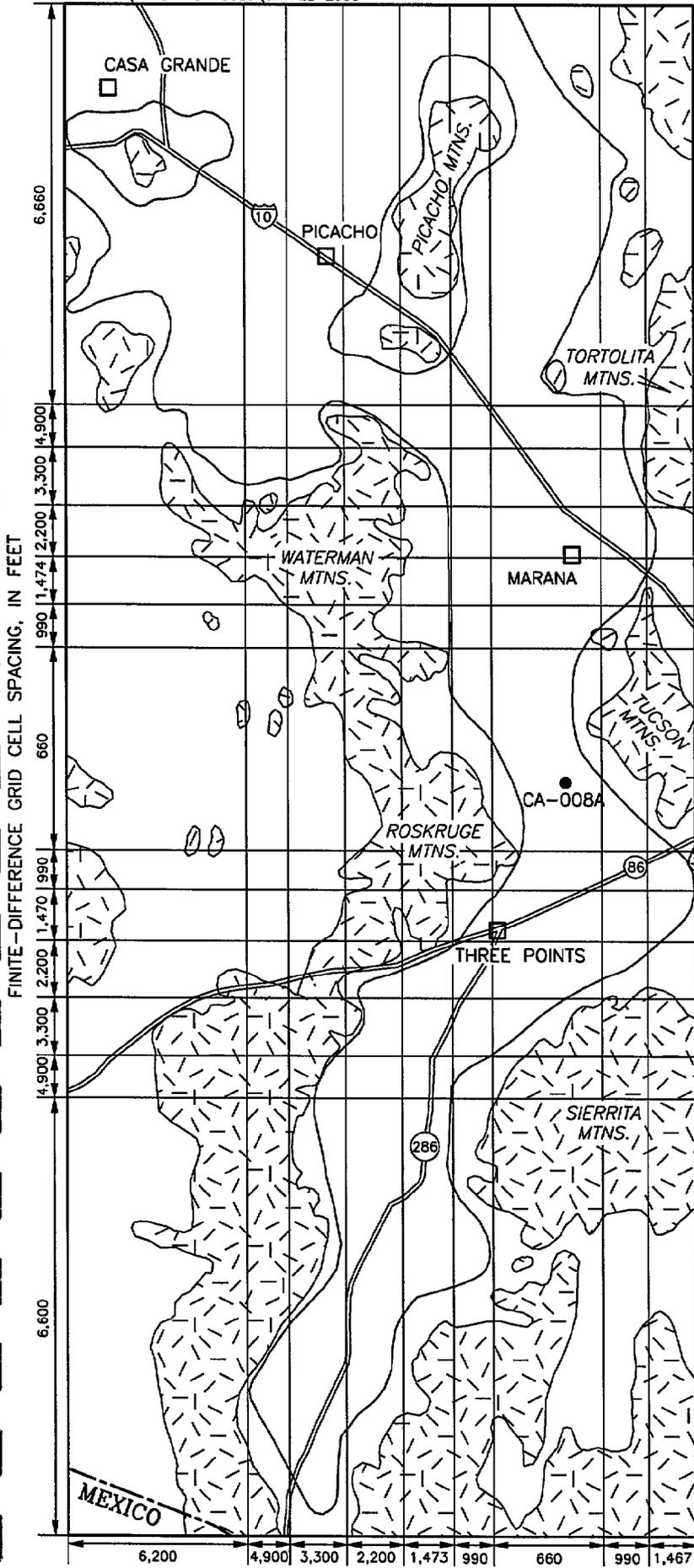


FIGURE 6.  
FINITE-DIFFERENCE GRID CELL SPACING FOR GROUNDWATER FLOW MODEL USED TO PROJECT DRAWDOWN IMPACT FOR CITY OF TUCSON PROPOSED MUNICIPAL SUPPLY WELL (D-14-11)8ddd[CA-008A]

not in any WQARF site  
Township 14.0s Range 11.0e Section 08 DDD (D14011008DDD)  
is in Tucson AMA\* E  
is in PIMA county 10  
is in TUCSON AMA basin AVRA VALLEYsubbasin 15  
\* Asterisk after the subbasin indicates groundwater basins or subbasins  
that contain a Superfund or WQARF site  
is in SANTA CRUZ RIVER watershed 09  
is not in any WQARF site 00

Click Back to return to the form.

ARIZONA DEPARTMENT OF WATER RESOURCES  
GROUNDWATER MANAGEMENT SUPPORT SECTION  
500 North Third Street  
Phoenix, Arizona 85004-3903

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILL OPERATIONS

WELL REGISTRATION NO: 55-579475

PERMIT NO.: T- 579475

AUTHORIZED DRILLER: TUCSON WATER DEPARTMENT

LICENSE NO: 388

A PERMIT TO DRILL A NON-EXEMPT, NON-SERVICE AREA WELL INSIDE THE TUCSON ACTIVE MANAGEMENT AREA HAS BEEN GRANTED TO:

WELL OWNER: CITY OF TUCSON WATER DEPT.

P.O. BOX 27210

TUCSON, ARIZONA 85726-7210

The well(s) is/are to be located in the:

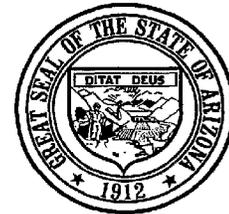
SE ¼ of the SE ¼ of the SE ¼ Section 8 Township 14 South Range 11 East

No. of well(s) in this project: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE 2ND DAY OF MARCH, 2002.

  
\_\_\_\_\_  
CHIEF, GROUNDWATER MANAGEMENT SUPPORT

THE DRILLER MUST FILE A LOG OF THE WELL  
WITHIN 30 DAYS OF COMPLETION OF DRILLING



**WELL AND WITHDRAWAL PERMIT  
CHECK DEPOSIT REQUEST**

Submitted by: Darlene Sumpter-King

Date: February 11, 2000

Applicant: City of Tucson/Water Dept.

Check submitted by: Errol Montgomery and Associates

Application No. 55-579475

| Code | Type of Fee:                | Amount: | Check No. |
|------|-----------------------------|---------|-----------|
| 55   | Application for Well Permit | \$50.00 | 18041     |
| 55   | Well Permit Fee             | \$30.00 | 18042     |

Security enhanced document. See back for details.

**ERROL L. MONTGOMERY & ASSOCIATES, INC.** 18041  
 PH. 520-881-4912  
 1550 E. PRINCE RD.  
 TUCSON, AZ 85719 91-170/1221

DATE 08 Feb 00

PAY TO THE ORDER OF Arizona Department of Water Resources \$ 50<sup>00</sup>  
Sixty and 00/100 DOLLARS Security features are included. Details on back.

**Bank of America**  
 Casas Adobes Branch 09654  
 7130 N. Oracle Rd.  
 Tucson, AZ 85704  
 257-0001 In Phoenix, 1-800-284-8491 Nationwide

FOR [Signature]

6-84

Security enhanced document. See back for details.

**ERROL L. MONTGOMERY & ASSOCIATES, INC.** 18042  
 PH. 520-881-4912  
 1550 E. PRINCE RD.  
 TUCSON, AZ 85719 91-170/1221

DATE 08 Feb 00

PAY TO THE ORDER OF Arizona Department of Water Resources \$ 30<sup>00</sup>  
Thirty and 00/100 DOLLARS Security features are included. Details on back.

**Bank of America**  
 Casas Adobes Branch 09654  
 7130 N. Oracle Rd.  
 Tucson, AZ 85704  
 257-0001 In Phoenix, 1-800-284-8491 Nationwide

FOR [Signature]

6-84