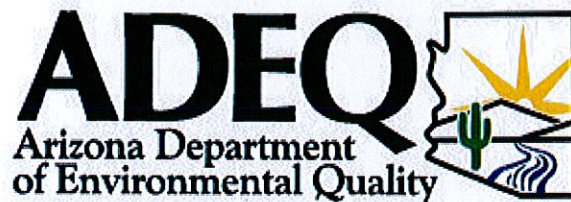


APPENDIX A
WATER USE STUDY
REMEDIAL INVESTIGATION REPORT
GROUNDWATER OPERABLE UNIT
Arizona Department of Environmental Quality
Broadway-Pantano Water Quality Assurance Revolving Fund Site
June 1, 2012

Water Use Study Report

Broadway-Pantano WQARF Site Tucson, Arizona



June 1, 2012

Prepared by:

Arizona Department of Environmental Quality
Southern Regional Office/Superfund Programs Unit
400 West Congress, Suite 433
Tucson, AZ 85701
(520) 628-6733 • www.azdeq.gov

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION.....	2
1.1 PROCESS OVERVIEW	2
1.2 WATER USE STUDY REPORT	2
1.3 SITE BACKGROUND	2
1.4 REGIONAL AQUIFER CHARACTERISTICS	3
2.0 USE EVALUATION.....	4
2.1 GROUNDWATER USES	4
2.1.1 MUNICIPAL WATER SUPPLY—CITY OF TUCSON WATER DEPARTMENT (TUCSON WATER).....	5
2.1.2 MUNICIPAL WATER SUPPLY WELL—CATALINA VILLAGE.....	7
2.1.3 COMMERCIAL WELLS.....	7
2.1.4 PRIVATE RESIDENTIAL WELLS	8
2.1.5 MONITOR AND REMEDIATION WELLS	8
2.1.6 INACTIVE WELLS	9
2.1.7 NON-EXTANT WELLS.....	9
2.2 SURFACE WATER USES.....	9
3.0 SUMMARY OF USES	9
3.1 GROUNDWATER USES	9
3.2 SURFACE WATER USES.....	10
4.0 REFERENCES.....	11

LIST OF FIGURES

Figure 1	Well Locations, Broadway-Pantano Site
Figure 2	Active Private and Municipal Well Locations, Broadway-Pantano Site

LIST OF TABLES

Table 1	Service Area Rights (56- Numbers)
Table 2	Grandfather Rights (58- Numbers)
Table 3	Withdrawal Permits (59- Numbers)
Table 4	Surface Water Filings (36- Numbers)
Table 5	Municipal Wells (55- Numbers)
Table 6	Commercial Wells (55- Numbers)
Table 7	Private Residential Wells (55- Numbers)
Table 8	Monitor Wells (55- Numbers)
Table 9	Remediation Wells (55- Numbers)
Table 10	Inactive Wells (55- Numbers)
Table 11	Non-Exant Wells (55- Numbers)
Table 12	Tucson Water Wells in the Vicinity of the Broadway-Pantano Groundwater Operable Unit—Annual Production

LIST OF ATTACHMENTS

Attachment 1	Documentation of Communication Between ADEQ and the Well Owners, Well Users, and Groundwater Rights Owners Regarding Groundwater Use
--------------	--

ACRONYMS AND ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AWQS	Arizona Aquifer Water Quality Standard
BNL	Broadway North Landfill
BSL	Broadway South Landfill
COC	Contaminants of concern
COT	City of Tucson
CWF	central well field
GAC	granular activated carbon
GOU	groundwater operable unit
PCE	tetrachloroethene or tetrachloroethylene
GRI	groundwater remedial investigation
GRO	groundwater remedial objective
LOFO	last-on/first-off or restricted-use
Site	Broadway-Pantano WQARF Site
TCE	trichloroethene or trichloroethylene
TW	Tucson Water (City of Tucson Water Department)
VOC	volatile organic compound
WQARF	Water Quality Assurance Revolving Fund

EXECUTIVE SUMMARY

This Water Use Study report has been prepared for the Broadway-Pantano Water Quality Assurance Revolving Fund Registry Site (Site) to meet the requirements established under Arizona Administrative Code R18-16-406 (D).

The purpose of the report is to gather information regarding current and foreseeable uses of waters that have been or are threatened to be impacted by the contaminant release to groundwater at the Site. This report will be used by the Arizona Department of Environmental Quality to determine the groundwater Remedial Objectives (cleanup goals).

The Site includes the Broadway North and South Landfills and the associated releases of tetrachloroethene, trichloroethene, and other volatile organic compounds to groundwater.

This Site is located within the City of Tucson's central well field. Within the vicinity of the Site, there are five water supply wells which already have been contaminated, and 21 active water supply wells which are threatened by the contamination. Of the 21 threatened active wells, ten are used for large municipal potable water supply, one is used for small municipal potable water supply, five are used for commercial potable/irrigation/industrial water supply, and five are used for private single-family home/irrigation water supply.

Of all of the groundwater users at the Site, Tucson Water (the City of Tucson's water department) is the largest water provider and groundwater user in the Site vicinity. In the Site vicinity, Tucson Water has had to shut down four wells contaminated by the Site and restrict the pumping of six wells immediately bordering the plumes. Tucson Water also has four wells downgradient of the Site which could be impacted by the Site. Tucson Water has indicated that the central well field will continue to be an integral part of its water resource base, even with increased utilization of recharged Central Arizona Project water. St. Joseph's Hospital's water supply well also has been impacted by the Site contamination and groundwater from this well is receiving wellhead treatment which removes the contaminants of concern. The hospital has indicated that its groundwater usage will need to expand in the future.

1.0 INTRODUCTION

This Water Use Study report has been prepared for the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) Registry Site (Site) for the Arizona Department of Environmental Quality (ADEQ) to meet the requirements established under Arizona Administrative Code (A.A.C.) R18-16-406(D). The purpose of the report is to gather information regarding current and foreseeable uses of waters that have been or are threatened to be impacted by a contaminant release from the Site. This report, mainly based on information collected through 2008, has been revised in response to public comments.

1.1 Process Overview

The process to complete the groundwater remedial investigation (GRI) and select groundwater remedial objectives (GROs) begins with the completion of the draft GRI report, which includes the Water Use Study report. The issuance of the draft GRI report is followed by a public comment period for the draft GRI report and a public meeting to solicit proposed GROs (cleanup goals) for the Site. The GRO public meeting must be held within 45 days to 90 days following the issuance of the draft GRI report. Following the GRO public meeting, ADEQ prepares the draft GROs report. The draft GRO report shall list the current and reasonably foreseeable beneficial uses of waters of the state. These uses shall be identified based upon information provided during the public meeting and any other information received by ADEQ. The draft GRO report shall state the GROs for each listed water use (e.g., potable, irrigation, etc.). The public will be provided an opportunity to comment on the draft GRO report. If there is significant public interest or additional information has been discovered, a second public meeting to discuss the GROs may be held. The final GROs report is then prepared and included in the final GRI report, along with responsiveness summaries to address public comments on the draft GRI and proposed GRO reports.

1.2 Water Use Study Report

The purpose of the report is to gather information regarding current and "foreseeable" uses of waters that have been or are threatened to be impacted by a contaminant release, and to project time frames for future changes in those uses. Information gathered from discussions with water providers and well owners are included in the report.

1.3 Site Background

In January 1983, an active City of Tucson (COT) Water Department (Tucson Water or TW) groundwater production well D-022A in the TW's main potable water supply well field (called the central well field, or CWF) was found by ADEQ to be contaminated with the volatile organic compound (VOC) fluorotrichloromethane, also known as Freon 11. This well is located immediately adjacent to and downgradient of the Broadway North Landfill (BNL). Between 1987 and 1991, TW took this well and two others, C-021A and D-021A, out of service due to detectable concentrations of tetrachloroethene (PCE) in samples of groundwater collected from the wells. Well C-021A (now abandoned) formerly was located approximately one mile downgradient of the BNL. Well D-021A is located approximately

one-half mile downgradient of the BNL and one mile downgradient of the Broadway South Landfill (BSL). In 1997, a wellhead granular activated carbon (GAC) treatment system was placed on the St. Joseph's Hospital water supply well, which also contained PCE from the Site; the GAC treatment removes PCE to non-detectable levels. The last water supply well to be impacted by the contamination was the TW C-026B well which was disconnected from the public water supply distribution network in 1998. In 1998, the Broadway-Pantano Site was placed on the WQARF Registry. These wells are listed in Tables 8, 9, and 11 and shown in Figure 1.

The Site has been divided into two operable units: (1) Landfill Operable Unit, which includes the closed 100+ acre BNL, the closed BSL, and the vadose zone directly beneath and in close proximity to the BNL and BSL; and (2) Groundwater Operable Unit (GOU), which includes the volume of the saturated zone containing VOC concentrations exceeding the State of Arizona Aquifer Water Quality Standards (AWQSs). The main contaminant of concern (COC) in groundwater is PCE. [The COCs in the GOU are those contaminants which have been detected with some consistency in Site groundwater above the AWQS.]

1.4 Regional Aquifer Characteristics

The five COCs in the GOU are the VOCs PCE, TCE, cis-1,2-dichloroethene, vinyl chloride, and methylene chloride; however, the extent of the GOU is defined solely by PCE since the four other VOCs have not exceeded the AWQS beyond a distance of one-third mile downgradient of the BNL. The lateral extent has been sufficiently defined by recent RI groundwater sampling events. Figure 1 depicts the areal extent of the GOU groundwater contamination interpreted from the results from 2004 through 2006 groundwater sampling events at the Site. All of the COCs have been present in shallow groundwater to depths less than 50 feet below the water table, but only two COCs (i.e., PCE and TCE) have been detected at concentrations above their respective ADEQ AWQSs at depths greater than 50 feet below the water table.

Groundwater within the GOU (with several exceptions) flows toward the west at a hydraulic gradient of approximately 0.003 feet/foot [Figure 1]. The notable exceptions are in the vicinities of the BSL (where groundwater flows to the northwest) and Western Containment System (where localized perturbations are caused by sustained pumpage of the two Western Containment System extraction wells and continual reinjection of treated water into two WCS injection wells). The regional aquifer is unconfined and the depth to groundwater in the vicinity of the Site ranges from approximately 315 to 370 feet below ground surface. The regional aquifer materials are relatively homogeneous consisting of primarily thick sequences of well-graded to poorly graded sands with discontinuous lenses of clayey sands, silty sands, and gravels.

2.0 USE EVALUATION

The following sections outline current and foreseeable water uses for the Site and the surrounding area. Reasonably foreseeable uses of water are those likely to occur within 100 years unless a longer time period is shown to be reasonable based on site-specific circumstances [A.A.C. R18-16-406 (D)].

2.1 Groundwater Uses

The Site lies within the Tucson Active Management Area created by the Arizona Groundwater Management Code passed in 1980. All groundwater legally withdrawn from any Active Management Area must occur under a groundwater right or permit, unless groundwater is being withdrawn from an exempt well. An "exempt well" is defined as a well equipped with a pump having a maximum capacity of 35 gallons per minute from which water is withdrawn for a use other than irrigation of two or more acres. All exempt wells must be registered with the Arizona Department of Water Resources (ADWR). Non-exempt wells have a discharge capacity greater than 35 gallons per minute. Owners of non-exempt wells located within Active Management Areas must report their annual groundwater withdrawals to ADWR whereas owners of exempt wells do not need to report withdrawals. Non-exempt wells are associated with one of the following types of rights or permits which require annual reporting of water withdrawals (ADWR, 2008):

- Grandfathered rights – Grandfathered rights are derived from past individual water use. There are three types of grandfathered rights: [1] Irrigation grandfathered rights, [2] Type 1 non-irrigation grandfathered rights (attached to the land), and [3] Type 2 non-irrigation grandfathered rights (not attached to the land);
- Service area right – Service area rights allow cities, towns, private water companies and irrigation districts to withdraw groundwater to serve their customers; or
- Withdrawal permits – Withdrawal permits allow new withdrawals of groundwater for non-irrigation uses within Active Management Areas. There are eight types of withdrawal permits covering various groundwater uses that are subject to different requirements. Examples of withdrawal permits include general industrial use permits, dewatering permits, and poor-quality groundwater-withdrawal permits.

Tables 1 through 3 summarize information concerning groundwater rights and permits in the Site area. Table 4 summarizes surface water filings in the Site area. Tables 5 through 11 list ADWR inventory groundwater wells located in the vicinity of the Site.

The following sections summarize the information received by ADEQ from well owners regarding specific current and future uses of groundwater wells in or near the Site that either have been impacted by a contaminant release or are threatened to be impacted by a contaminant release. Groundwater wells located within the GOU, located within approximately one-half mile cross gradient of the GOU (Figure 1), or located within approximately one mile downgradient of the GOU were evaluated and these wells are identified in the text below as being "in the GOU vicinity." This information was solicited by

ADEQ based on the groundwater flow direction in the regional aquifer, as well as proximity to the contaminant plumes in the regional aquifer.

Based on an ADWR well inventory conducted in 2005 and a review of ADWR on-line documents, 96 registered groundwater wells were identified within the vicinity of the Site. This universe of wells includes the following:

- 11 municipal water supply,
- five commercial potable/irrigation/cooling/etc. water supply,
- five private single-family home water supply,
- four groundwater remediation,
- 62 groundwater monitor,
- four not being used [three are dry, and one only partly constructed],
- five not existing [three were abandoned per ADWR regulations by the owners and two were not locatable by ADWR staff and said by the owners not to exist].

These wells are listed in Tables 5 through 11 and shown in Figure 1. Figure 2 shows only the active water supply wells. The correspondence and record of telephone conversations between ADEQ and the owners of groundwater rights and wells for the Water Use Study are contained in Attachment 1.

2.1.1 Municipal Water Supply—City of Tucson Water Department (Tucson Water)

TW is the water supplier for all of the residences and businesses in the vicinity of the GOU with just the few exceptions indicated in this Water Use Study report. TW currently relies on water supply production from five well fields within the Tucson Basin and Avra Valley to meet current municipal demand (TW, 2004). The most significant renewable source of potable supply is the Central Avra Valley Storage and Recovery Project (CAVSARP) Well Field located in Avra Valley, while the CWF is TW's largest groundwater supply source (TW, 2004). The CWF is located in the Tucson Basin and encompasses much of the urbanized footprint of the COT. The GOU is situated near the center of the CWF (TW, 2007).

TW has numerous water supply wells in the vicinity of the GOU (Figure 5). Four wells (C-021A, C-026B, D-021A, and D-022A) have been removed from operation since the late 1980s and early 1990s due to the presence of VOCs. A fifth well, C-022A, was contaminated after it was removed from service in the mid-1970s because of water supply problems. In addition, four active water supply wells currently have restricted-use operational status ("last-on/first-off" or LOFO) because of their proximity to the GOU. LOFO wells are among the last wells to be brought into service and the first wells to be taken out of service when a period of increased water supply need arises. Since August 1999, TW voluntarily has designated two other wells (wells C-025B and D-018A), both situated immediately south of the GOU, as having LOFO status to limit the potential for the GOU groundwater contamination to migrate toward these wells and to ensure the availability of these wells for supply should a need arise. All of these six LOFO wells were pumped in 2006 to assess the viability of the well infrastructure to meet system demand. TW is continuing to maintain and sample these wells so that they will be available to meet system demand as may be required. Table 12 provides a summary of annual production (in millions of gallons) of CWF water supply wells located

within the vicinity of the GOU. The table presents full production data for 1957 through 2007 (TW, 2007).

TW currently has a policy to take wells out of service that have VOC concentrations that exceed half of the potable drinking water standards for any regulated compound [i.e., EPA Maximum Contaminant Levels (MCLs) or ADEQ AWQSSs]. The six LOFO wells in the immediate vicinity of the GOU are being monitored for VOCs at least semiannually, and at least monthly during those times when the wells are brought into service for more than seven days. This policy ensures the quality of potable water supplies drawn from this area (TW, 2007).

According to TW, the CWF has historically been, and will remain, an essential component of TW's water supply infrastructure. Current TW plans include continuing the recharge and recovery of Central Arizona Project (CAP) water at CAVSARP, an operating storage and recovery facility in the Avra Valley. Potable use of the recovered blend of CAP water and Avra Valley groundwater began in May 2001 and continues to the present. TW has expanded the recharge capacity of CAVSARP up to 80,000 acre-feet per year and has plans to expand its recovery capacity in the near term. TW is currently in the process of developing a project similar to CAVSARP several miles to the south; this facility is called the Southern Avra Valley Storage and Recovery Project (SAVSARP), and it will provide an additional source of renewable supply. The SAVSARP facility, which is permitted to recharge up to 60,000 acre-feet per year, became operational in October 2008; the recovery component of the project is expected to become operational in late 2012 (TW, 2007; Prior, 2012).

TW anticipates that use of both CAVSARP and SAVSARP facilities will further reduce its reliance on groundwater pumping in the CWF during most of each year; however TW will continue to needs the CWF and particularly the six LOFO wells in the near-term (5-10 years), mid-term (approximately 1 to 2 decades), and long-term (indefinitely) for the following reasons:

- To help meet peak water demand during the hottest months;
- To meet projected annual potable demand when it exceeds the TW's current annual CAP allocation—anticipated to occur within the next few years;
- To meet demand during partial system outages associated with lengthy planned maintenance activities;
- To provide emergency backup supply should there be a disruption in CAP supply due to problems with the CAP infrastructure or due to supply disruptions caused by system outages on TW's own system; and
- To provide potentially long-term backup potable supply should a shortage be declared on the Colorado River—the Secretary of Interior may make such a declaration within the next five years and it could be in place for an indeterminate period of time.

Therefore, TW places a high priority on maintaining its operational use of all CWF wells, including LOFO wells, as well as other available supply sources (TW, 2007; Marra, 2008).

According to TW pumpage data for the six LOFO wells for 2006 (Table 12), the pumpage rates (in millions of gallons) ranged from 4.1 (for well D-018A) to 25.5 (for well C-114A) and

totaled 90.7 for all six wells. By contrast, during 1992, these same six wells were pumped at rates (in millions of gallons) ranging from 128.9 (for well D-018A) to 221.8 (for well C-056B), and the total pumpage was 1022.8 (or approximately 1 billion gallons). According to TW, although TW has been able to temporarily reduce reliance on CWF wells in recent years, the AVRA Valley 26-inch main break in November 2006 resulted in the need to turn on CWF wells and the LOFO wells for two months, and emphasized the need to contain the western migration of the Broadway-Pantano plume (TW, 2007).

2.1.2 Municipal Water Supply Well—Catalina Village

Catalina Village at 5324 East 1st Street is an assisted living/retirement housing community. This small municipal provider has a non-exempt well supplying water to 107 apartments and 5 acres of landscaping/lawn [Tables 1 and 5]. Catalina Village has indicated that there are no plans for increasing water usage at the facility. According to ADWR records, Catalina Village's well water usage was 19.844, 17.362, and 21.161 acre-feet in 2005, 2006, and 2007, respectively.

2.1.3 Commercial Wells

There are four non-exempt wells and one exempt well in the GOU vicinity which are used for commercial potable, irrigation, or industrial water supply, or a combination of these uses.

The St. Joseph's Hospital (350 North Wilmot Road) and property is owned by Carondelet Health Network (CHN). The St. Joseph's Hospital complex has a well which provides water for steam production, building heating and cooling, landscape irrigation and potable use [Table 6]. According to ADWR records, this well supplied 47.87, 67.39, and 91.47 acre-feet of water in 2005, 2006, and 2007, respectively. CHN has a Type 2 grandfathered groundwater usage right to pump 205 acre-feet of groundwater annually [Table 2]. The hospital's facilities director has indicated that the complex has been expanding over the past few years (e.g., from 309 hospital beds to 494 hospital beds) and is continuing to expand; therefore, he expects that they will be withdrawing the entire 205 acre-foot annual allotment within the next five to ten years.

Granular activated carbon (GAC) wellhead treatment was installed on the hospital water supply well in 1997 because of PCE contamination from the Site. The GAC removes PCE and other VOCs to non-detectable levels. The hospital is also hooked up to the TW system and receives water from TW when its own well is off-line for maintenance or repairs.

St. Joseph's Hospital also has a second groundwater well, but this well is inactive because it is dry [Table 10]. The depth of this well is reported to be 350' below ground surface and the closest monitor well in the vicinity of this second well indicates the water table to be approximately 360' below ground surface. However, the hospital facilities director does not plan to abandon this well in order to keep open the option of using it in the future. The water table in this part of the CWF has risen several feet with TW's reduction in regular pumping from the CWF since the early 2000s, but most likely the hospital would need to deepen this well to make it usable.

Wash Depot XII, Inc. owns the Simoniz Car Wash at 6042 East Speedway Boulevard which has a well supplying water solely for the washing cars [Table 6]. Simoniz's well water at this location contains nitrate above the federal drinking water standard and is not used for potable use. Wash Depot XXII, Inc. withdraws water from this well under its Type 2 grandfathered groundwater usage right which allows an annual withdrawal of 10 acre-feet [Table 2]. According to ADWR records, this car wash withdrew 10 acre-feet of water from its well in 2005, 2006, and 2007. Wash Depot XII, Inc. has indicated that they do not foresee any changes in their water usage in the future.

HSL Dorado Place Office, L.L.C. owns the property 1181 North El Dorado Place which has a well which is used solely for landscape irrigation and filling a pond [Table 6]. (Humberto Lopez owns the Type 2 grandfathered groundwater usage right which allows an annual withdrawal of 300 acre-feet from this well [Table 2]). According to ADWR records, the annual well water usage was reported to be three acre-feet in 2005, 2006, and 2007. No changes in water usage are expected in the future.

Dorado C.C., Inc. has two non-exempt wells at its El Dorado Golf Course at 6601 East Speedway Boulevard. [Table 6]. (Omar Mireles owns the Type 2 grandfathered groundwater usage right which allows a combined annual withdrawal of 3 acre-feet [Table 2] from these two wells.) One well is located at the northern part of the golf course is used for irrigation. This well is considered unlikely to be impacted by the Site because of its distance from the GOU and the localized groundwater direction in the vicinity of the well (Figure 2). However, according to ADWR records, the annual well water usage was reported to be 222, 232, and 255 acre-feet in 2005, 2006, and 2007, respectively. The second well is located at the southern part of the golf course which is in the GOU vicinity but it is dry and capped and the owner does not plan to use it in the future.

Pima Alamo Heights LLC owns the property at 6074 East Pima Street which has an exempt well [Table 6]. This well water is used for nursery irrigation and potable water supply. The nursery at the property will be closing down in the latter part of 2008. After closure, the well will continue to be used for potable and watering the on-site vegetation. The owner indicated that in the future the land use may change to either a park or multi-family housing, with the well possibly continuing to be the on-site water source.

2.1.4 Private Residential Wells

There are five residences in the GOU vicinity that have exempt wells used for potable water supply, irrigation water supply, or both potable and irrigation water supply [Table 7]. Four of these wells were installed within the last five years. Owners of four of the wells indicated they plan to continue to use their well water and one well owner could not be reached.

2.1.5 Monitor and Remediation Wells

Presently there are 62 wells in the GOU vicinity being used by ADEQ for groundwater monitoring [Table 8]. ADEQ have no plans at this time to change this usage for these wells.

Four wells in the Site vicinity are being used by ADEQ as part of the remedial Western Containment System [Table 9]. This system includes two extraction wells and two injection wells which operate under an ADWR withdrawal permit [Table 3]. These wells are located at

the western end of the Site. The Western Containment System extracts, treats, and injects (back into the same aquifer) approximately 800 gallons of groundwater per minute.

2.1.6 Inactive Wells

Four wells in the GOU vicinity are not being used because they are dry [Table 10]. Three wells have gone dry because the water table in the CWF has dropped significantly since these wells were first installed. Two of these three well owners, 4-D Properties and Dorado C.C., Inc. have indicated that they have no plans to use the dry wells, and the third well owner, CHN, has indicated that it doesn't want to rule out using this well in the future (though deepening of the well would be needed). The fourth well, a residential exempt well, was constructed only to 20 feet below ground surface in 2005, and the owners indicated that they are uncertain as to when they will be able to complete construction on the well.

2.1.7 Non-Extant Wells

ADWR records indicate well registration for five wells in the GOU vicinity that no longer exist [Table 11]. Three of these wells have been abandoned pursuant to ADWR regulations. There also are two wells in the ADWR database which either were never installed, never installed at the properties indicated, or covered by a building, hardscape, or landscape in the distant past. The present property owners deny the existence of any wells on their properties and ADWR searched the properties and could not find any wells.

2.2 Surface Water Uses

Ronald Ray Tankersley

Mr. Tankersley filed a statement of claim for the use of public waters from the Pantano Wash in June of 1979 [Table 4]. The water was first used beneficially on June 11, 1919 for irrigation, domestic and recreational use. ADEQ attempted to contact the permit holder but the permit holder was not locatable.

3.0 SUMMARY OF USES

The water uses described in Section 2.0 that are most likely to be relevant to discussion of GROs are presented below.

3.1 Groundwater Uses

Current and future groundwater uses within the Site area include the following:

- TW will continue to use the CWF within the regional aquifer along with supplemental blended CAP water from the Avra Valley facility.

- Private domestic and commercial water users will continue to use their regional aquifer wells for drinking water and irrigation.
- ADEQ will continue to operate the Western Containment System and inject treated water back into the aquifer from which it was extracted as needed.

3.2 Surface Water Uses

There are no anticipated future surface water uses within the Site area.

4.0 REFERENCES

- Arizona Department of Water Resources, 2008. Overview of Arizona's Groundwater Management Code. <http://www.evwf.org/EVWF-ADWRgmasummary.pdf>
- Arizona Department of Water Resources, On-Line Imaged Records of Annual Withdrawal and Use Report—Groundwater Summary, years 2005, 2006, and 2007.
- Arizona Department of Water Resources, On-Line Imaged Records.
- Marra, R.P. 2008. Emailed communication from Ralph Marra, Tucson Water, Planning and Engineering Division, Water Resources Section. July 22.
- Prior, B, 2012. Personal communication with Bruce Prior, Tucson Water, Planning and Engineering Division, Water Resources Section. January 23.
- Tucson Water (City of Tucson, Water Department). 2004. Water Plan: 2000-2050 (Final Draft). November 22.
- Tucson Water (City of Tucson, Water Department). 2007. Transmittal of Tucson Water's Comments Regarding SECOR's Draft Remedial Investigation Report—Groundwater Operable Unit and Other Potential Source Areas. May 29.
- Tucson Water (City of Tucson, Water Department) 2008. Update to *Water Plan: 2000-2050*.
- URS Corporation, 2002. Remedial Investigation Report – Broadway- Pantano WQARF Site Groundwater Operable Unit for mid 1980's through 2000. June 30.

TABLES

Table 1	Service Area Rights (56- Numbers)
Table 2	Grandfather Rights (58- Numbers)
Table 3	Withdrawal Permits (59- Numbers)
Table 4	Surface Water Filings (36- Numbers)
Table 5	Municipal Wells (55- Numbers)
Table 6	Commercial Wells (55- Numbers)
Table 7	Private Residential Wells (55- Numbers)
Table 8	Monitor Wells (55- Numbers)
Table 9	Remediation Wells (55- Numbers)
Table 10	Inactive Wells (55- Numbers)
Table 11	Non-Extant Wells (55- Numbers)
Table 12	Tucson Water Wells in the Vicinity of the Broadway-Pantano Groundwater Operable Unit—Annual Production

NOTES: All existing wells are listed by reference number in Tables 5-11 and are shown in Figure 1.
All existing active wells are listed by reference number in Tables 5-7 and are shown in Figure 2.
The main sources for the information found in the tables are the Arizona Department of Water Resources and the well owners.

TABLE 1**SERVICE AREA RIGHTS (56- NUMBERS)**

Service Area Rights (56-'s): ADWR Explanation: Most Arizonans receive domestic water through service area rights. Service area rights allow cities, towns, private water companies and irrigation districts to withdraw groundwater to serve their customers.

Permit Number	Owner Name--Contact	Owner Address	Permit Use	Cadastral Location
56-000001	CITY OF TUCSON, WATER DEPT Ralph Marra	P.O. Box 27210, Tucson, Arizona 85726	WELLS - MULTIPLE WELLS	MULTIPLE WELLS
56-000151	CATALINA VILLAGE Ann Liska, Management Office	5324 East 1st Street, Tucson, Arizona 85711	WELL - 55-611851	D-14-0-14-0-11

Source: Arizona Department of Water Resources

TABLE 2**GRANDFATHERED RIGHTS (58- NUMBERS)**

Grandfathered Rights (58-'s): ADWR Explanation: These rights are comprised of [1] Irrigation grandfather rights [2] type 1 non-irrigation grandfathered rights (attached to the land) and [3] type 2 non-irrigation grandfathered rights (not attached to the land/well).

Water Right #-- Permit Type-- Annual Pumpage Under Permit	Owner Name/Contact Name	Well Location	Well Number/Use	Cadastral Location
58-114521 Type 2 10 acre-feet/year	WASH DEPOT XII, Inc. Harry Andersen 14 Summer Street, Suite 302 Malden, MA 02148	Simoniz Car Wash 6042 East Speedway Tucson, AZ	WELL 55-801196 Commercial	D-14-0-14-0-12ABA
58-108946 Type 2 300 acre-feet/year	HUMBERTO LOPEZ (+ two other individuals) CONTACT--Max Geffer HSL Properties, Inc. 3901 East Broadway Boulevard Tucson, AZ 85711 [NOTE: Land owner is Dorado C.C., Inc. at same address.]	Dorado Golf Course 6601 East Speedway Tucson, AZ 85710	WELL 55-612397 + [WELL 55-612396 (but this well is dry)] Irrigation	D-14-0-15-0-06
58-100441 Type 2 3 acre-feet/year	OMAR MIRELES 3901 East Broadway Boulevard Tucson, AZ 85711 [NOTE--Land Owner is HSL Dorado Place Office, L.L.C. at same address.]	1181 North El Dorado Place Tucson, AZ 85715	WELL 55-602755 Irrigation	D-14-0-15-0-06
58-104143 Type 2 205 acre-feet/year	CARONDELET HEALTH NETWORK Kevin Nelson St. Joseph's Hospital 350 North Wilmot Road Tucson, AZ 85712	same as owner	WELL 55-603227 Commercial	D-14-0-15-0-07

Sources: Arizona Department of Water Resources and well owners

TABLE 3**WITHDRAWAL PERMITS (59- NUMBERS)**

Withdrawal Permits (59-'s): ADWR Explanation: Withdrawal permits allow new withdrawals of groundwater for non-irrigation uses such as dewatering, mineral extraction and metallurgical processing, general industrial use, and poor quality groundwater withdrawal.

Permit Number	Owner Name/Contact	Owner Address	Permit Use	Cadastral Location
59-586193	AZ DEPT OF ENV QUALITY Gretchen Wagenseller	400 West Congress, Suite 433, Tucson, Arizona 85701	INJECTION WELL - (55-587017)	D-14-0-14-0-12
59-586193	AZ DEPT OF ENV QUALITY Gretchen Wagenseller	400 West Congress, Suite 433, Tucson, Arizona 85701	INJECTION WELL - (55-587018)	D-14-0-14-0-12
59-586193	AZ DEPT OF ENV QUALITY Gretchen Wagenseller	400 West Congress, Suite 433, Tucson, Arizona 85701	EXTRACTION WELL - (55-587019)	D-14-0-15-0-7
59-586193	AZ DEPT OF ENV QUALITY Gretchen Wagenseller	400 West Congress, Suite 433, Tucson, Arizona 85701	EXTRACTION WELL - (55-620028)	D-14-0-14-0-12

Sources: Arizona Department of Water Resources and well owners

TABLE 4**SURFACE WATER FILINGS (36- NUMBERS)**

Surface waters, according to ADWR: appropriate, or public, waters include: A) the waters of all natural sources, flowing in streams, canyons, ravines or other natural channels, whether perennial or intermittent, flood, waste, or surplus water, and of lakes.

Permit Number	Owner Name/Contact	Owner Address	Permit Use	Cadastral Location
36-24369	TANKERSLEY, RONALD R	8350 East Tanque Verde Road, Tucson, Arizona 85749	Domestic, Irrigation, Recreation	D-14-0-15-0-08
36-46641	ST JOSEPHS HOSPITAL	350 North Wilmot Road, Tucson, Arizona 85711	Domestic, Irrigation-- Wells	D-14-0-15-0-07
36-46643	ST JOSEPHS HOSPITAL	350 North Wilmot Road, Tucson, Arizona 85711	Domestic, Irrigation-- Wells	D-14-0-15-0-07

Source: Arizona Department of Water Resources

TABLE 5
MUNICIPAL WELLS [active]

Figures 1 & 2 Reference #	ADWR Registry ID #	WELL NAME	PERMIT TYPE	WELL USE	WATER USE	WELL DEPTH	CASING DIAMETER	OWNER
1	55-620021	C-020B	Non-Exempt	Water Production	Large Municipal Provider	500'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
2	55-620026	C-025B	Non-Exempt	Water Production	Large Municipal Provider	0 - 375' 375' - 585'	16" 12"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
3	55-619980	C-046B	Non-Exempt	Water Production	Large Municipal Provider	644'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
4	55-619983	C-048B	Non-Exempt	Water Production	Large Municipal Provider	520'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
5	55-619985	C-049B	Non-Exempt	Water Production	Large Municipal Provider	520'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
6	55-619989	C-051B	Non-Exempt	Water Production	Large Municipal Provider	780'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
7	55-619993	C-056B	Non-Exempt	Water Production	Large Municipal Provider	614'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
8	55-619995	C-058B	Non-Exempt	Water Production	Large Municipal Provider	664'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
9	55-619959	C-114A	Non-Exempt	Water Production	Large Municipal Provider	534' 0 - 328' 328' - 465'	16" 16" 12"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
10	55-620057	D-018A	Non-Exempt	Water Production	Large Municipal Provider	465' - 700'	10"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
11	55-611851	None	Non-Exempt	Water Production	Small Municipal Provider	455'	8"	CATALINA VILLAGE 5324 East 1st Street Tucson, AZ 85711

Sources: Arizona Department of Water Resources and well owners

TABLE 6
COMMERCIAL WELLS [active]

Figures 1 & 2 Reference #	ADWR Registry ID #	WELL NAME	PERMIT TYPE	WELL USE	WATER USE	WELL DEPTH	CASING DIAMETER	OWNER	WELL LOCATION
12	55-603227	411-P	Non-Exempt	Water Production	Commercial-RECEIVING WELLHEAD TREATMENT BECAUSE OF SITE CONTAMINATION	530'	12"	CARONDELET HEALTH NETWORK St. Joseph's Hospital 350 North Wilcox Road Tucson, AZ 85711	same as owner
13	55-801196	416-P	Non-Exempt	Water Production	Commercial	400'	8"	WASH DEPOT XII, Inc. 14 Summer Street, Suite 302 Malden, MA 02148	Simoniz 6042 East Speedway Boulevard Tucson, AZ 85712
14	55-602755	not applicable	Non-Exempt	Water Production	Irrigation	358'	8"	HSL DORADO PLACE OFFICE, L.L.C. 3901 East Broadway Tucson, AZ 85711	1181 North El Dorado Place Tucson, AZ 85715
15	55-610399	not applicable	Exempt	Water Production	Irrigation/Commercial	350'	8"	PIMA ALAMO HEIGHTS, L.L.C. 3333 East Speedway Boulevard Tucson, AZ 85716	Catalina Heights Nursery 6074 East Pima Street Tucson, AZ 85712
15A	55-612397	not applicable	Non-Exempt	Water Production	Irrigation	475'	16"	DORADO CC, INC. HSL Properties, Inc. 3901 East Broadway Boulevard Tucson, AZ 85711 Contact-Humberto Lopez	Dorado Golf Course 6601 East Speedway Tucson, AZ 85710

Sources: Arizona Department of Water Resources and well owners/users

TABLE 7
PRIVATE RESIDENTIAL WELLS [active]

Figures 1 & 2 Reference #	ADWR Registry ID #	WELL NAME	PERMIT TYPE	WELL USE	WATER USE	WELL DEPTH	CASING DIAMETER	OWNER	WELL LOCATION
16	55-206760	not applicable	Exempt	Water Production	Domestic	460'	7"	ALBERTS RESIDENCE 250 North Indian House Road Tucson, AZ 85711	same as owner
17	55-594986	not applicable	Exempt	Water Production	Domestic	460'	5"	MAYO RESIDENCE 5362 East 3rd Street Tucson, AZ 85711	same as owner
18	55-202261	not applicable	Exempt	Water Production	Domestic	470'	7"	NEWELL RESIDENCE 330 North Indian House Road Tucson, AZ 85711	same as owner
19	55-208987	not applicable	Exempt	Water Production	Domestic	460' (unconfirmed)	7"	REILLY RESIDENCE 365 North Indian House Road Tucson, AZ 85711	same as owner
20	55-210048	not applicable	Exempt	Water Production	Domestic	460'	9"	SWAIN RESIDENCE 431 North Indian House Road Tucson, AZ 85711	same as owner

Sources: Arizona Department of Water Resources and well owners/users

TABLE 8

MONITOR WELLS [AND FORMER WATER SUPPLY WELLS USED AS MONITOR WELLS]

Figure 1 Reference #	ADWR Registry ID #	WELL NAME	WELL TYPE	WELL DEPTH	CASING DIAMETER	OWNER
21	55-589345	BP-01	Monitor	456'	5"	ADEQ 400 West Congress Suite 433 Tucson, AZ 85701
22	55-589349	BP-02	Monitor	460'	5"	
23	55-589348	BP-03	Monitor	450'	5"	
24	55-589347	BP-04	Monitor	455'	5"	
25	55-589346	BP-05	Monitor	475'	5"	
26	55-589343	BP-07	Monitor	476'	5"	
27	55-587095	BP-08	Monitor	492'	5"	
28	55-589342	BP-09	Monitor	476'	5"	
29	55-589341	BP-10	Monitor	480'	5"	
30	55-588207	BP-11	Monitor	500'	5"	
31	55-589338	BP-15	Monitor	489'	5"	
32	55-589337	BP-16	Monitor	490'	5"	
33	55-596237	BP-19	Monitor	445'	5"	
34	55-208705	BP-20	Monitor	468'	6"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
35	55-208704	BP-21	Monitor	468'	6"	ADEQ 400 West Congress Suite 433 Tucson, AZ 85701
36	55-211472	BP-22	Monitor	438'	5"	
37	55-211653	BP-23	Monitor	440'	5"	
38	55-908056	BP-24A	Monitor	355'	5"	
39	55-908057	BP-24B	Monitor	405'	5"	
40	55-908058	BP-24C	Monitor	460'	5"	
41	55-908951	BP-25	Monitor	375'	5"	
42	55-620020	C-020A	Former Production Well	338'	8"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
43	55-620023	C-022A	Former Production Well	0 - 338' 338' - 398'	12"	
44	55-620026	C-025A	Former Production Well	0 - 333'	16"	
45	55-620027	C-026A	Former Production Well	0 - 336' 336' - 596'	12"	
46	55-619979	C-046A	Former Production Well	0-294' 294' - 575'	12"	
47	55-619982	C-048A	Former Production Well	0 - 195' 195' - 595'	12"	
48	55-619985	C-049A	Former Production Well	0 - 520'	16"	
49	55-619988	C-051A	Former Production Well	0 - 336'	12"	
50	55-619992	C-056A	Former Production Well	0 - 334' 334' - 500'	12"	
51	55-619994	C-058A	Former Production Well	0 - 252' 252' - 506'	16"	
52	55-620059	D-021A	Former Production Well--DISCONNECTED FROM MUNICIPAL WATER DISTRIBUTION SYSTEM BECAUSE IT WAS CONTAMINATED BY THE SITE	0 - 328' 328' - 550'	16"	
53	55-620060	D-022A	Former Production Well--DISCONNECTED FROM MUNICIPAL WATER DISTRIBUTION SYSTEM BECAUSE IT WAS CONTAMINATED BY THE SITE	0 - 310' 310' - 460'	12"	
54	55-620074	D-039A	Former Production Well	435'	12"	
55	55-620075	D-040A	Former Production Well	0 - 402' 402' - 556'	12"	
56	55-620076	D-041A	Former Production Well	0 - 335' 335' - 702'	12"	
57	55-578599	R-068A	Former Soil Vapor Extraction Well	370'	6"	
58	55-578601	R-069B	Monitor	380'	6"	
59	55-204041	R-124A	Monitor	410'	5"	
60	55-204042	R-125A	Monitor	395'	5"	
61	55-568641	SE-001	Monitor	375'	5"	ADEQ 400 West Congress, Suite 433 Tucson, AZ 85701
62	55-568639	SJ-001	Monitor	395'	5"	
63	55-568640	SJ-002	Monitor	400'	5"	
64	55-522726	WR-155A	Monitor	615'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726
65	55-527410	WR-177A	Monitor	470'	6"	
66	55-527412	WR-178A	Monitor	460'	6"	
67	55-527409	WR-179A	Monitor	490'	6"	
68	55-527411	WR-180A	Monitor	465'	6"	
69	55-527406	WR-181A	Monitor	440'	6"	
70	55-527407	WR-186A	Monitor	410'	6"	
71	55-592443	WR-207B	Monitor	500'	16"	
72	55-558356	WR-273A	Monitor	347'	5"	
73	55-558355	WR-274A	Monitor	346'	5"	
74	55-558354	WR-275A	Monitor	360'	5"	
75	55-575473	WR-352A	Monitor	458'	5"	
76	55-575474	WR-353A	Monitor	462'	5"	
77	55-576420	WR-354A	Monitor	370'	5"	
78	55-577633	WR-358A	Monitor	371'	5"	
79	55-581353	WR-367A	Monitor	408'	5"	
80	55-587406	WR-435A	Monitor	420'	6"	
81	55-205404	WR-458A	Monitor	425'	6"	
82	55-205405	WR-459A	Monitor	410'	6"	

Sources: Arizona Department of Water Resources and well owners/users

**TABLE 9
REMEDIATION WELLS**

Figure 1 Reference #	ADWR Registry ID #	WELL NAME	PERMIT TYPE	WELL DEPTH	CASING DIAMETER	OWNER
83	55-587018	R-091A	Withdrawal Permit (but well is used for injection)	500'	12"	ADEQ 400 West Congress, Suite 433 Tucson, AZ 85701
84	55-587017	R-090A	Withdrawal Permit (but well is used for injection)	500'	12"	ADEQ 400 West Congress, Suite 433 Tucson, AZ 85701
85	55-587019	R-092A	Withdrawal Permit (well is used for extraction)	500'	16"	ADEQ 400 West Congress, Suite 433 Tucson, AZ 85701
86	55-620028	C-026B	Withdrawal Permit (well is used for extraction)--FORMER MUNICIPAL WATER SUPPLY WELL--DISCONNECTED FROM MUNICIPAL WATER DISTRIBUTION SYSTEM	544'	16"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726

Sources: Arizona Department of Water Resources and well owners/users

**TABLE 10
INACTIVE WELLS**

Figure 1 Reference #	ADWR Registry ID #	PERMIT TYPE	REASON FOR INACTIVITY	WELL DEPTH	CASING DIAMETER	OWNER	WELL LOCATION
87	55-700690	UNKNOWN	Well is capped.	220' (unconfirmed)	8"	4-D PROPERTIES 2525 East Broadway Boulevard Tucson, AZ 85716	Batteries Plus 1031 North Wilmot Tucson, AZ 85711
88	55-700682	Non-Exempt	Well is likely to be dry because depth to groundwater in the vicinity is 360'.	350' (unconfirmed)	16"	CARONDELET HEALTH NETWORK St. Joseph's Hospital 350 North Wilmot Road Tucson, AZ 85711	same as owner
89	55-210351	Exempt	Well constructed thus far only to 20' below ground surface and well owners indicate well construction may not be completed for some time.	20'	10"	RECKART RESIDENCE 410 North Sahuara Avenue Tucson, AZ 85711	same as owner
90	55-612396	Non-Exempt	Well is closed down and likely dry because depth to groundwater in the vicinity is 314'.	303'	12"	HUMBERTO LOPEZ [Dorado CC Inc.] HSL Properties, Inc. 3901 East Broadway Boulevard Tucson, AZ 85711	Dorado Golf Course 6601 East Speedway Tucson, AZ 85710

Sources: Arizona Department of Water Resources and well owners/users

**TABLE 11
NON-EXTANT WELLS**

Figure 1 Reference #	ADWR Registry ID #	WELL NAME	FORMER WATER USE STATUS	WELL DEPTH	CASING DIAMETER	OWNER	WELL LOCATION
91 ⁽¹⁾	55-620022	C-21A	Former Production Well--DISCONNECTED FROM MUNICIPAL WATER DISTRIBUTION SYSTEM BECAUSE OF SITE CONTAMINATION/ Former Monitor Well--ABANDONED	200' - 370' 357' - 505'	12" 10"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726	
not applicable	55-603226	not applicable	UNKNOWN--ABANDONED--Well was abandoned per ADWR regulations--spring 2008.	350'	12"	CARONDELET HEALTH NETWORK Kevin Nelson St. Joseph's Hospital 350 North Wilmot Road Tucson, AZ 85711	same as owner
not applicable	55-531208	WR-207A	Former monitor well (WR-207A)--ABANDONED.	450'	6"	CITY OF TUCSON PO Box 27210 Tucson, AZ 85726	
not applicable	55-640187	not applicable	UNKNOWN--Cannot verify that well ever existed since present property owner denies that there is a well on the property and ADWR staff searched for the well and could not find it.	No drillers report	No drillers report	BEAL RESIDENCE 310 North Indian House Road Tucson, AZ 85711	not applicable
not applicable	55-635545	not applicable	UNKNOWN--Cannot verify that well ever existed since present property owner denies that there is a well on the property and ADWR staff searched for the well and could not find it.	No drillers report	No drillers report	GRACE TO THE NATIONS 6180 East Pima Street Tucson, AZ 85712	not applicable

(1) This well is being shown on the figures because it was an active water supply well before it was impacted by the Site contamination and had to be shut down; thus, the Site Remedial Objectives will address the loss of this well water.

Sources: Arizona Department of Water Resources and well owners/users

TABLE 12--Tucson Water Wells in the Vicinity of the Broadway-Pantano Groundwater Operable Unit--Annual Production (millions of gallons)

Year	C-020A	C-020B	C-021A	C-022A	C-025A	C-025B	C-026A	C-026B	C-046B	C-048B	C-049B	C-051B	C-056A	C-056B	C-058A	C-058B	C-114A	D-018A	D-021A	D-022A	D-039A	D-040A	D-041A	Total Pumpage (Million Gallons)
1957	12.9		25.9																					39
1958	13.7		27.3																					41
1959	17.4	34.8																						60
1960	19.6		36.0	56.7	43.9		24.6																	293
1961	13.6	16.5	65.3	41.5	39.5		82.7																	60
1962	38.2		106.7	53.9	23.5		92.7																	293
1963	20.0		18.9	65.5	13.5		55.8																	549
1964	0.3		14.7	67.6	4.0		48.8																	501
1965			8.3	74.1			2.6																	656
1966			53.0	43.6			37.4																	519
1967	9.7		57.3				8.6																	382
1968		112.2	63.4	11.0		8.3																		522
1969	100.4		46.0	52.5		46.5																		838
1970	93.6		57.1	60.7		80.2																		1020
1971	111.3		33.9	52.9		105.5																		1089
1972	109.5		40.1	53.4		117.0																		1169
1973	143.7		76.5	52.5		155.7																		1305
1974	145.3		94.6	50.1		175.2																		1284
1975	125.6		77.7	45.6		158.3																		1380
1976	131.5		64.7	0.6		124.3																		1085
1977	72.2		57.4			108.9																		1007
1978	110.8		49.1			175.5																		816
1979	70.9		38.4			158.7																		1375
1980	66.8		37.8			194.1																		1827
1981						71.3																		2429
1982						64.5																		2784
1983			5.2			104.7																		2959
1984						85.1																		3279
1985	58.1	28.3				67.8																		2983
1986	79.3	18.5				76.6																		3377
1987	64.3	44.0				192.4																		3138
1988	77.7	42.0				193.8																		2825
1989	92.3					128.9																		2593
1990	157.0					84.2																		2453
1991	240.0					3.3																		2268
1992	192.3					138.3																		16
1993																								1721
1994	52.6					170.1																		1806
1995	10.1					262.0																		1670
1996	0.9					256.2																		1725
1997						220.2																		1593
1998	6.2					172.1																		1173
1999	0.9					42.9																		940
2000	0.2					76.6																		62
2001	0.2					0.2																		135
2002	0.0					0.0																		136
2003	0.1					0.0																		43
2004	0.0					0.0																		85
2005						0.0																		391
2006	24.4					9.3																		102
2007	0.0					0.0																		

NOTES:

(1) Modified from Table 2-3 of URS (2002a). Data for calendar year 2007 added from electronic mail supplied to ADEQ by Bruce Prior of Tucson Water, delivered on January 19, 2012. All volumes are rounded to the nearest tenth of a MG. The supplied data includes the 6 last-on/first-off Tucson Water production wells that are within the Broadway-Pantano VQARF Site GOU plus C-046B, C-048B, C-049B and C-051B located west of Craycroft Road.

(2) C-022A well was shut down in 1978 for groundwater supply reasons--not for Broadway-Pantano Site contamination reasons.

Purple highlighting indicates the year the well was put on restricted usage because of well's proximity to the Site groundwater contamination.

Yellow highlighting indicates the year the well was disconnected from the water distribution system because of contamination of the well by the Site.

Green highlighting indicates the first year of reduced pumping of the well because of Tucson Water's replacement of Central Well Field water with Central Arizona Project water.

Pink highlighting indicates the maximum annual pumpage during the five years prior to the first year of pumping restrictions OR shutdown because of the contamination OR pumping reduction because of introduction of CAP water.

The purpose of the color coding is to help determine what pumping capacity the well has or had prior to pumping restrictions. This information will be needed for the Remedial Objectives and Feasibility Study. The year 1993 was not counted because pumping of this well was down that year because of introduction of direct-serve CAP water.

FIGURES

- Figure 1** **Groundwater Well Locations, Broadway-Pantano Site**
Figure 2 **Active Private and Municipal Well Locations, Broadway-Pantano Site**

NOTE: Figure 1 shows all existing wells identified by a reference number. The name, owner, and other information for these wells are provided in Tables 5-11 by reference number. Figure 2 shows all existing active wells also identified by a reference number. The name, owner, and other information for these wells are provided in Tables 5-7.

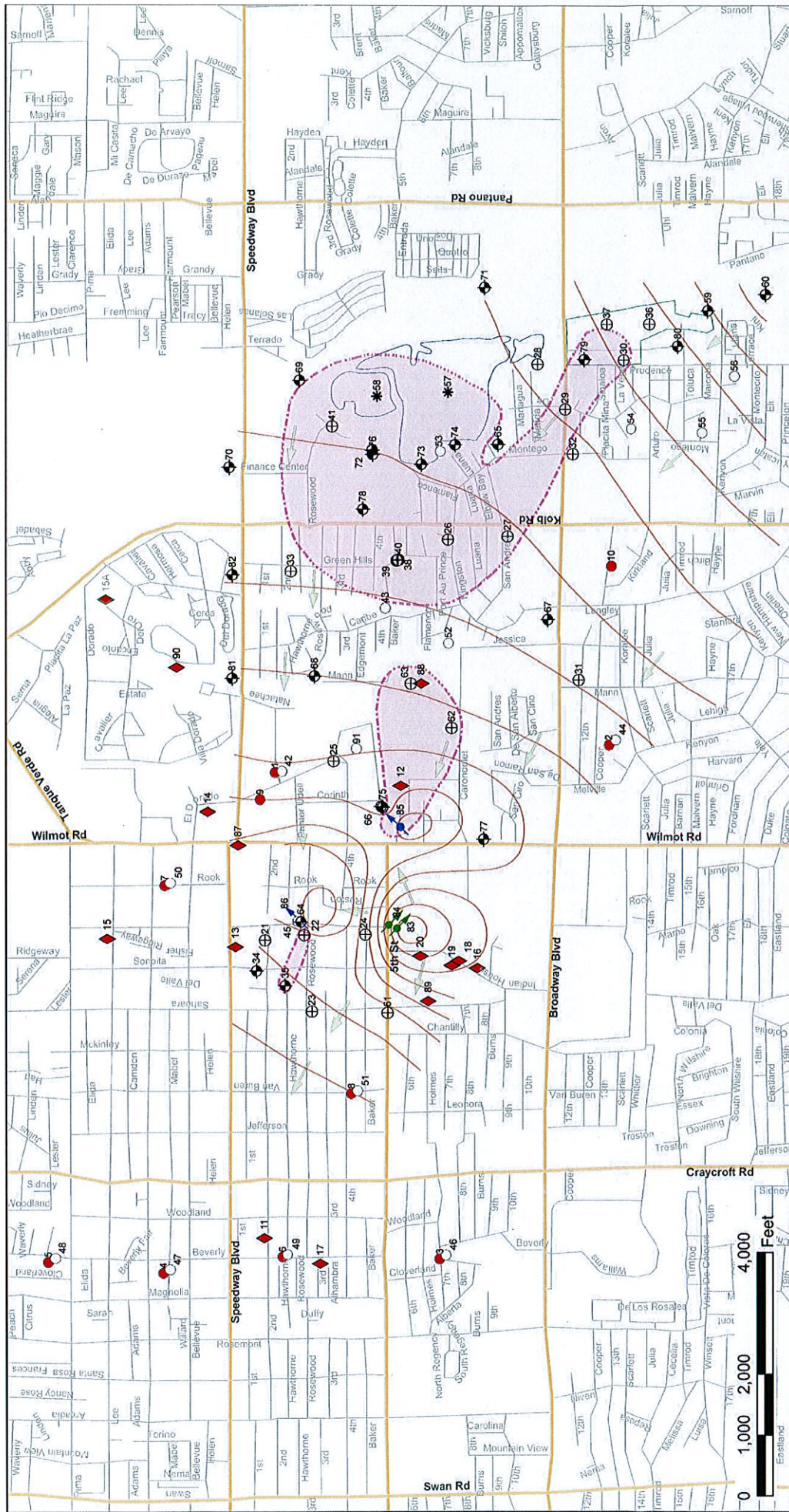


Figure 1

WELL LOCATIONS

BROADWAY - PANTANO SITE

PREPARED FOR:

ARIZONA DEPARTMENT OF
ENVIRONMENTAL QUALITY

PREPARED BY:

 **Stanlec**

8211 S. 48th Street
Phoenix, Arizona 85044
Phone: 602-435-2200 Fax: 602-431-9562

Drawn By: CMG

Checked: TAK

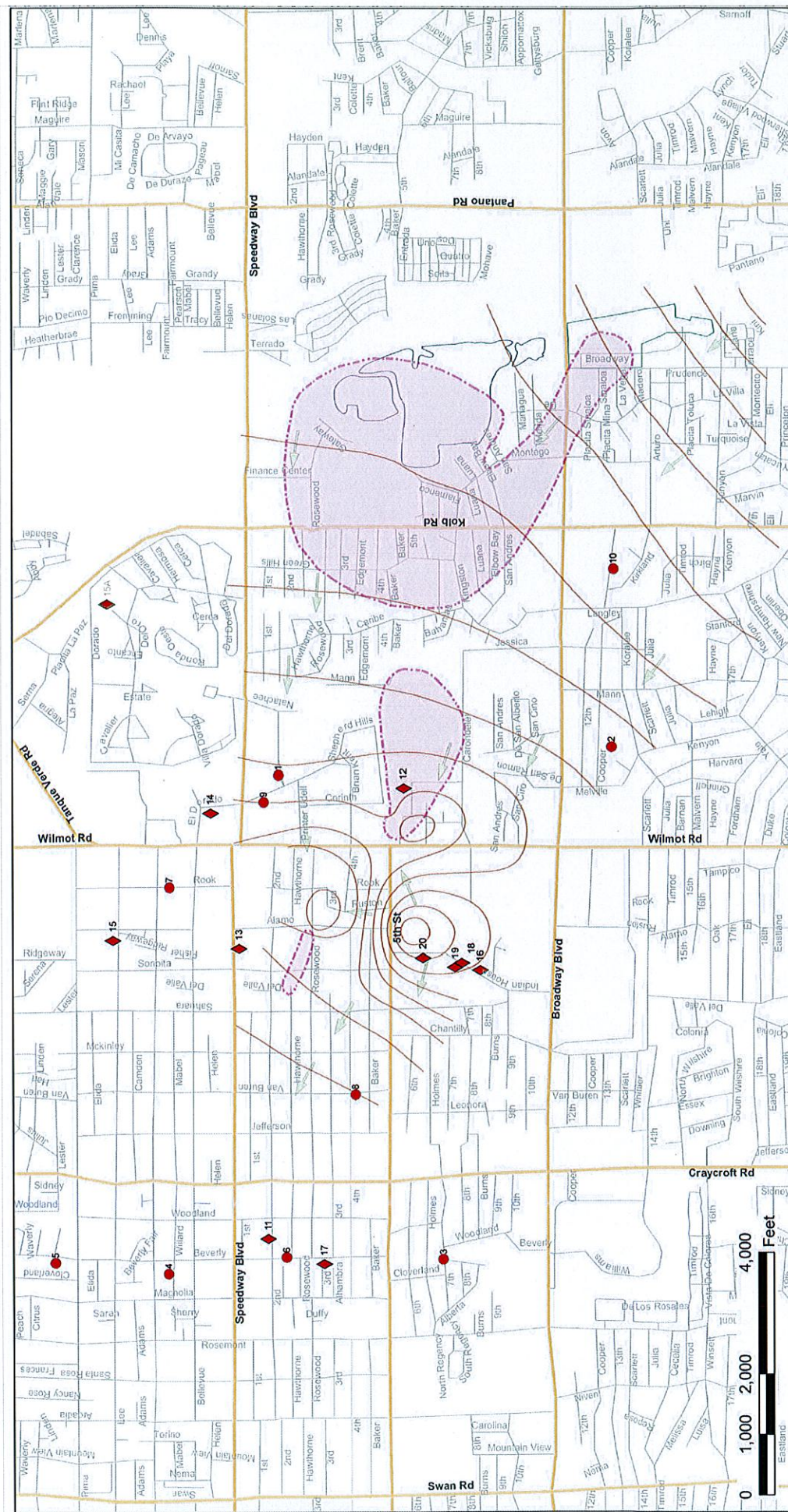
Approved: TAK

Job No.: 180T20401.09

UTM ZONE 12_NAD83

LEGEND

-  COT Active
-  AREG Monitor
-  COT Inactive
-  GW Flow Direction (Estimated)
-  Injection Well
-  Pit
-  Extraction Well



LEGEND

- COT Monitor
- ADEQ Monitor
- COT Inactive
- GW Flow Direction (Estimated)
- COT Active
- Air Injection/Monitor
- Extraction Well
- Injection Well
- Private
- 5 gpc FCE 2004 - 2006
- Mar 2005 GW Contours



Drawn By: CMG
 Checked: TAK
 Approved: TAK
 Job No.: 18OT-20401.09

PREPARED BY:



8211 S. 48th Street
 Phoenix, Arizona 85044
 Phone: 602-438-2200 Fax: 602-431-9582

PREPARED FOR:
 ARIZONA DEPARTMENT OF
 ENVIRONMENTAL QUALITY

Figure 2
ACTIVE PRIVATE AND MUNICIPAL
WELL LOCATIONS
BROADWAY - PANTANO SITE

Data: UTM ZONE 12, NAD83

ATTACHMENT 1

**Documentation of Communication
Between ADEQ and Well Owners, Well Users, and
Groundwater Rights Owners
Regarding Current and Future Groundwater Use**

Attachment 1

Broadway-Pantano Site Water Use Study Information Obtained from Groundwater Right Owners, Well Owners, and Well Users

Well Owner	Well Address	ADWR Well #55- + Groundwater Right #58-	Information Obtained from Telephone Conversation
4-D Properties	1031 North Wilmot	55-700690	On January 15, 2004, Terri Pearson, Property Manager, indicated that Batteries Plus is the lessee at the property and they have no intention of installing any wells. [ADWR field survey confirms existence of a capped well at the property--ADWR info also indicates the well is screened only to 220 feet (over 100 feet above the water table).] On June 25, 2008, Delores Cathy Welch-Mount, Property Manager, indicated that the tenants are on Tucson Water and they have no intention of bringing the well on line.
Alberts residence	250 North Indian House Road	55-206760	On November 16, 2006, Ms. Knox (property manager for Dave and Heather Alberts) confirmed that the well has been installed. On June 20, 2008, Heather Albert indicated that their well is used for irrigation and only Tucson Water is used for the potable water supply.
Any Travel, Inc.	1181 North El Dorado Place	55-602755 + 58-100441	On January 15, 2004, Arizona Department of Environmental Quality (ADEQ) sent a Water Use Study inquiry letter to Nina Dmetruk, contact for Any Travel, Inc., owner of the building/property at 1181 North El Dorado Place in Tucson, Arizona. ADEQ did not receive a response to this letter so ADEQ called Ms. Dmetruk on May 26, 2004; she indicated that they had no plans for changing the water usage at this property.
Any Travel, Inc.	1181 North El Dorado Place	55-602755 + 58-100441	On August 25, 2006, ADEQ spoke with David Bacon, Director of Facilities Management, Misys Health Care Systems (Misys), the lessee of the facility at 1181 North El Dorado Place in Tucson, via telephone to update information received in 2004 regarding Misys' present and future planned uses for groundwater at the property. This well is used for landscape irrigation and pond filling. He said that they use approximately 180,000-190,000 gallons/year and have no plans to change this usage. He also indicated that Misys may be moving their company to another building/property in two years.
Any Travel, Inc. then HSL Dorado Place Office	1181 North El Dorado Place	55-602755 + 58-100441	On February 28, 2007, David Bacon (speaking for the property owners) called ADEQ in response to an ADEQ telephone inquiry to Any Travel, Inc. regarding an update to the information they had provided previously regarding the groundwater well located at 1181 North El Dorado Place in Tucson, Arizona. The purpose of this telephone call was to confirm that the well water usage was still landscape irrigation. David Bacon, speaking on behalf of Nina Dmetruk of Any Travel, Inc. confirmed that the well water is still being used solely for landscape irrigation and filling of an on-site pond. David Bacon is the former Director of Facilities for Misys, which leased this property until recently.
			On March 23, 2007, David Bacon left a phone message with ADEQ indicating that the well usage is determined by Any Travel, Inc. and Any Travel, Inc. will allow the new lessee to use the on-site well only for landscape irrigation and filling of the on-site pond.
			On June 16, 2008, Omar Mireles, HSL, confirmed that they had purchased the property and the well and the well's usage has not changed from previous.
Dorado CC, Inc. (HSL)	6601 East Speedway Boulevard	55-612396 and 55-612397 + 58-108946	On June 25, 2008, Omar Mireles confirmed that the water right should have been put in the name of the property owner, which is HSL Dorado Place Office L.L.C. but mistakenly was put in his name. He indicated that they will be correcting this in the future.
			El Dorado County Club supervisor signed 2007 ADWR annual water use report indicating use of just the 55-352697 well. Used just the one well--the northern well.
			On June 20, 2008, Max Gelfer of HSL confirmed that they are using only one of the two wells and it is being used solely for irrigation.
			On June 26, 2008, Mr. Gelfer indicated they have no plans to use the 55-352696 well, which is capped (welded shut).
			On July 18, 2008--Mr. Gelfer indicated that they have no plans for increasing water usage [if anything, conserving--using less water].
Beal residence	310 North Indian House Road	55-640187	On February 27, 2007, Mr. Beal indicated that they do not have an on-site well.
Carondelet Health Network	350 North Wilmot Road	55-603227, 55-603226, 55-700682 + 58-104143	On January 15, 2004, ADEQ sent a Water Use Study inquiry letter to Jackie Olson, Director of Property Management & Development, Carondelet Health Network, which owns the St. Joseph's Hospital at 350 North Wilmot, Tucson, Arizona. Ms. Olson referred ADEQ to Kevin Nelson, Director of Facilities, St. Joseph's Hospital. On May 18, 2004, Mr. Nelson indicated the following: They use approximately 31 million gallons/year and the well is 400 feet deep. Over the next five years, management is planning on making capital improvements that are likely to result in a 40% increase in water usage. There are no plans for installing a new well. On February 26, 2007, Mr. Nelson confirmed that the 55-603226 well was capped [in spring 2008, this well was abandoned per ADWR requirements]. On June 13, 2008, Mr. Nelson confirmed that the previously-indicated [in 2004] capital improvements have already been implemented and the hospital continues to rely on their well for its potable water supply. At this time there are no plans for installing additional wells.
			On June 25, 2008, Mr. Nelson indicated that even though there are no plans to use the 55-700682 well for potable water supply during the next 10 years, he did not want to close off the possibility of this well being used in the future. [NOTE: The bottom of this well's screening is reported (but not confirmed) to be approximately 15' above the present water table.]
			On July 17, 2008, Mr. Nelson indicated that they recently completed construction on a new medical office and a new 185-bed building, thus bringing St. Joseph's Hospital hospital bed capacity to over 485. He indicated that their well has been off line almost half of the year due to pump problems but they are getting it fixed [since it's costing them \$20,000/month to pay for City water]. He expects that the hospital will be pumping their ADWR-permitted maximum of 205 acre-feet in the next 5 years or so.
Catalina Village	5324 East 1st Street	55-611851	On January 15, 2004, ADEQ sent a Water Use Study inquiry letter to Ron Rhoads, Maintenance Director, Catalina Village, the facility at 5324 East 1st Street, Tucson, Arizona. Mr. Rhoads did not respond to the letter so ADEQ contacted him by telephone on May 18, 2004. Mr. Rhoads said that they have no plans to increase water usage or install additional wells. Catalina Vista uses the water for 107 apartments and 5 acres of grounds. Their water usage last year was 18,995 acre-feet. On June 12, 2008, Ann Lisika, managers office, indicated that they still use the well water for 107 apartments and 5 acres of grounds.

Well Owner	Well Address	ADWR Well #55- + Groundwater Right #58-	Information Obtained from Telephone Conversation
City of Tucson Water Department--Tucson Water	Numerous wells.	Multiple wells	Ralph Marra, Chief Hydrologist for the City of Tucson (City), Water Department, was asked by Superfund Programs Unit (SPU) to provide an update to the City's October 27, 2003 letter to ADEQ regarding the City's "Present and 'Reasonably Foreseeable Uses' of Groundwater in the Vicinity of the Broadway-Pantano WQARF Site. ADEQ spoke with Mr. Marra via telephone on October 6, 2006, and he indicated that the City's October 27, 2003 letter does not require updating. [NOTE: Ralph Marra and Bruce Prior of Tucson Water provided updated information via letter and e-mail in 2007 and 2008.]
Grace Full Gospel Church/Grace to the Nations	6180 East Pima Street	55-635545	On February 27, 2007, Ms. Peavy, church administration, indicated that they are on City water and do not know of an on-site well.
Mayo residence	5362 East 3rd Street	55-594986	On June 13, 2008, Ms. Peavy confirmed that they are still on City water. On July 3, Ginger Middleton, Operations Pastor, indicated that they know of no well on the site and they are on City water. NOTE: ADWR WQARF docs indicate search of the site by their staff did not result in discovery of a well.
Newell residence	330 North Indian House Road	55-202261	On January 15, 2004, ADEQ sent a Water Use Study inquiry letter to Dr. Michael Mayo, the owner of the well/property at 5362 East 3rd Street in Tucson, Arizona.
Pima Alamo Heights LLC	6074 East Pima Street	55-610399	On January 29, 2004, Dr. Mayo indicated that the well was used solely for his residence and he had no plans to install a second well. Left message on June 12. Did not return message. Neighbor, Ms. Alberts, said that Mr. Newell is away for the entire summer and indicated that he has a well. On February 27, 2007, ADEQ spoke with Mr. Eddie McPheeters regarding the groundwater well located at 6074 East Pima Street in Tucson, Arizona. This property was previously owned by the McPheeters. The property is presently owned by Pima Alamo Heights LLC but the McPheeters are still operating their nursery there. Mr. McPheeter indicated that they are using the well there for plant irrigation and potable water supply. [ADWR TAMA office confirmed that this well is no longer non-exempt (it is exempt now).] On June 12, 2008, Mr. Eddie McPheeter, owner of Catalina Heights Nursery which is leasing the land/well, indicated that the on-site well is still being used for irrigation and potable water supply. Nursery will be closing--7/18/08 AZ Daily Star article indicate closing newspaper-- July 17, 2008. Some plants still on site. Possible residential--unknown--still irrigation. Annette McPheeters. On July 18, 2008, William Di Vito of Pima Alamo Heights LLC, indicated that the land could be used for either a park or multi-family residences, but, either way, the water use is likely to continue to be irrigation/potable residential.
Ralph McPheeters (at that time--now it is owned by Pima Alamo Heights LLC)	6074 East Pima Street	55-610399	On January 15, 2004, ADEQ sent a Water Use Study inquiry letter to the Ralph D. McPheeters, owner of the facility [Catalina Heights Nursery] and property at 6074 East Pima Street in Tucson, Arizona. ADEQ did not receive a response to this letter so ADEQ contacted him via telephone on May 20, 2004. Mr. Eddie McPheeters, son of the owner, indicated that they use the water for the nursery business and the residence there. Their well pump doesn't produce enough for their water usage to be regulated [35 gpm, per Arizona Department of Water Resources], so they aren't required to have a meter and do not know how much water they use. He indicated that the water level has dropped greatly over the past several decades. Also, he indicated that City water department installation of a large pumping well a few blocks away has reduced the amount of water that they are able to get out of the well--even with the pump set at the bottom of the well. He said that they are only able to pressurize two hoses at a time now and also indicated that when the water pressure drops below 45 psig that they supplement their water system with City water.
Reckart residence	410 North Sahuara Avenue	55-210351	On June 13, 2008, Jane Reckart indicated that only the first 20 feet of drilling has been performed on their well and they may not finish the drilling the well for some time; therefore, they are still on City water.
Reilly residence	365 North Indian House Road	55-208987	On November 16, 2006, Mr. Robert Reilly confirmed that the well has been installed. On June 13, 2008, Mr. Reilly indicated that the well is used irrigation and they rely on City water for their potable household water supply; however, he also indicated that in the future they may switch their household over to the on-site well.
Simoniz/Wash Depot	6042 East Speedway	55-801196	On January 16, 2004, ADEQ sent a Water Use Study inquiry letter to Wash Depot, the owner of the well/property at 6042 East Speedway Boulevard in Tucson, Arizona. On January 29, 2004, Theresa Raphanella of Wash Depot responded via telephone, indicating that Wash Depot did not plan to change their well water usage in the future. She stated that this facility uses the well water solely for non-potable uses. She also stated that the facility used approximately 63,000 gallons in October 2004 and 95,000 gallons in November 2004. On June 12, 2008, Cathy Tompson, Administrative Assistant, confirmed via telephone that they plan to continue using this well water for car washing and not for drinking water.
Swain residence	431 North Indian House road	55-210048	On November 16, 2006, Mr. John Swain indicated that only the first 20' of the well has been installed. On June 12, 2008, Mr. Swain indicated that their well was installed and they plan to use the well for their household for the foreseeable future.

NOTE: This is a record of phone conversations held between Gretchen Wagenseller, Project Manager, Superfund Programs Unit, Southern Regional Office, ADEQ and well owners, well owner's contact person, or the well user. The "DATE" is the date of the phone conversation.



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

August 25, 2003

SROSPU124,03

Mr. Ralph Marra, Chief Hydrologist
Tucson Water
P.O. Box 27210
Tucson, AZ 85726

Re: Water Use Studies Relating to Tucson Metropolitan Area Water Quality Assurance
Revolving Fund (WQARF) Registry Sites; Information Request

Dear Mr. Marra:

ADEQ is in the process of developing draft Remedial Investigation (RI) reports for several WQARF registry sites in the Tucson area. As you may be aware, each draft RI report will include information regarding impacts to water resources at each site collected in consultation with water providers and well owners within each area. We are currently working to draft RI reports for the following Tucson area WQARF registry sites:

- Broadway-Pantano
- El Camino del Cerro
- Miracle Mile
- Park-Euclid
- Shannon Road-Rillito Creek

As described in the attached WQARF Remedy Selection rules [R18-16-406 (D)], we are requesting information you possess regarding current and reasonably foreseeable uses¹ of water resources that have been or are threatened to be impacted by releases at each of the above sites and projected time frames for future changes in those uses. Specifically:

- information regarding current and reasonably foreseeable uses of water for each aquifer that is impacted or threatened to be impacted by the release at the site, considering any hydraulic connection between aquifers;
- the locations and uses of existing wells, including all wells already impaired due to contamination, the location and uses, if known, of any planned wells;
- any written water management plans used by Tucson Water for areas at and near the above listed WQARF registry sites.

The attached WQARF Remedy Selection rules describe how water use information that you and others provide will be used by ADEQ to establish remedial objectives and to select final remedies for these sites. A summary of that process has also been attached for your information.

¹Reasonably foreseeable uses of water are those likely to occur within 100 years unless a longer time period is shown to be reasonable based on site specific circumstances.

Mr. Ralph Marra
Page 2 of 2

As part of our preparation for this study, we have assembled existing information from our files regarding Tucson Water and other City of Tucson owned wells of record at and near the above listed sites as represented on the attached maps. We are also in possession of the following Tucson Water/City of Tucson documents:

- *Operations Map with Wells*; Tucson Water, updated August 2002.
- *The General Plan (Element 8: Water Resources)*; City of Tucson, December 6, 2001.
- *Present and 'Reasonably Foreseeable Uses' of Groundwater in the Vicinity of the Broadway-Pantano WQARF Site*; Letter to Steven L. Vaughn from Ralph P. Marra, February 29, 2000 (reference RM:cwf_current&futureuses.doc) (attached).
- *Table 2, Central Well Field Wells*; listing "last date in regular service," April 26, 2002 (attached).

We request you supplement this information as you feel appropriate for ADEQ to understand Tucson Water's current and future uses of groundwater at each of the above sites.

As we are working to issue the draft RI reports for public comment by the end of this calendar year, please forward to me any supplemental information you may wish to provide by October 31, 2003. Should you wish to discuss this request for information, feel free to give me a call at 628-6740.

Sincerely,

Mike Fulton, Supervisor
Superfund Programs Unit
Southern Regional Office

c: Karen Masbruch, Deputy Director, City of Tucson Environmental Services (w/o attachments)

attachments:

Remedy Selection Rules [R18-16-406]
Remedy Selection Process Summary
Site Maps

Present and 'Reasonably Foreseeable Uses' of Groundwater in the Vicinity of the Broadway-Pantano WQARF Site; Letter from Steven L. Vaughn to Ralph P. Marra, February 29, 2000 (reference RM:cwf_current&futureuses.doc)

Table 2, Central Well Field Wells; listing "last date in regular service," April 26, 2002.



**CITY OF
TUCSON**

TUCSON WATER
DEPARTMENT

October 27, 2003

Mr. Mike Fulton
Southern Regional Office
Arizona Department of Environmental Quality
400 West Congress Street, Suite 433
Tucson, Arizona 85701

**SUBJECT: Present and 'Reasonably Foreseeable Uses' of Ground Water in the Vicinity
of Specified WQARF Sites in the Tucson Water Service Area**

M. Fulton
Dear Mr. Fulton:

In your letter dated 25 August 2003, you requested information regarding current and anticipated uses of ground water in the vicinity of the following WQARF sites: Broadway-Pantano, El Camino del Cerro, Miracle Mile, Park-Euclid, and Shannon Road-Rillito Creek. I understand that this information is needed to complete remedial investigation reports and that it should conform to specifications in ADEQ's Remedy Selection Rules (R18-16-406 (D)).

The Remedy Selection Rules specify that the information provided should address both present and "reasonably foreseeable uses" of water which are likely to occur within a "reasonable time period." This time period is recognized to be the next 100 years unless a longer period can be shown to be reasonable. Because of the inherent uncertainties associated with long-term water resources planning, any comments or discussion regarding the future use of ground water in the vicinity of the above noted WQARF sites is subject to change. Nonetheless, it is critical that the regional aquifer be managed to ensure that it will be available to satisfy the community's current and future needs. Our community will rely on the regional aquifer in the vicinity of these WQARF sites to satisfy projected water demands. Contaminated ground-water sites in the vicinity of the Central Well Field must be remediated as soon as possible to ensure that both potable and non-potable water supply operations will not be unduly hampered.

Current Use of Ground Water

The City of Tucson Water Department (Tucson Water) and other water providers/users in the Tucson basin primarily rely on ground water or groundwater-derived effluent to meet their respective demands. Because the overall area relies on ground water for more than 50 percent of its drinking water supply, the regional aquifer has been designated by the Environmental Protection Agency as a "sole source" aquifer.



RESEARCH AND TECHNICAL SUPPORT • PO BOX 27210 • TUCSON, AZ 85726-7210
(520) 791-2649 • FAX (520) 791-3293 • TTY (520) 791-2639 • www.cityoftucson.org

Tucson Water currently relies on the productive capacity of five well fields to meet current municipal demand. Of the five, the Central Well Field is the largest and encompasses most of the developed parts of the City of Tucson as well as some outlying areas. Until recently, this well field annually supplied about 60 percent of the water required by Tucson Water to meet municipal potable demand. However, a major shift was initiated in 2001 when the Central Avra Valley Storage and Recovery Project (CAVSARP) began delivering Central Arizona Project water, a renewable water source, to Tucson Water customers. As a result, groundwater withdrawals in the Central Well Field have been reduced since CAVSARP will annually provide about 60,000 acre-feet (54 million gallons per day) of base load supply. Although the total volume of aquifer withdrawals in the Central Well Field area will decrease over time, it will remain a significant source of supply and will continue to be an essential element within the City of Tucson's water-supply infrastructure. Hence, the five WQARF sites referenced in your letter continue to be causes of concern since they are all located within or immediately adjacent to the Central Well Field and to some degree constrain the use of ground water for potable supply.

In addition to potable concerns in and around the Central Well Field, one or more of the listed WQARF sites are located in the vicinity of Tucson Water's effluent underground storage and recovery facilities. The presence of these WQARF sites has impacted the development and potential future expansion of these facilities which in turn constrains the community's ability to reuse effluent—the only other renewable water resource available for supply. The impacts associated with these WQARF sites on both the Central Well Field and Tucson Water's effluent recharge and recovery facilities will be discussed more fully below.

Tucson Water has a number of water supply wells in the immediate vicinity of the Broadway-Pantano WQARF Site. Since the late 1980s, four Tucson Water supply wells have been taken off line because of the occurrence of VOCs in well water samples. These wells include C-021A, D-021A, D-022A and most recently C-026B. The City currently has a policy to take out of service wells which have VOC concentrations which exceed half of the potable drinking water standards for such substances. The City also has four production wells with restricted-use ("Last-On/First Off") status because of their proximity to the Broadway-Pantano VOC plume. These four wells located north and west of the Broadway North Landfill are C-020B, C-056B, C-058B, and C-114A. These wells have been needed to help meet peak demand between May and October. Because of their restricted use status, they have been among the last wells brought into service and among the first taken off line. Results of modeling studies have indicated that unrestricted use of well C-056B would have little if any effect on the VOC plume. Because of the critical need for additional pumping capacity in the Central Well Field, Tucson Water may recommend to City management that this well be dropped from the "Last-On/First-Off" list. Two other active wells, C-025B and D-018A, lie south of the VOC plume. Because these two wells have not been needed to meet peak- and off-peak demand since August 1999, they have for the time being been taken off line but this could change. Modeling analysis has indicated that if these wells were used

continuously, they could have an impact on the existing western containment of the plume and hence could necessitate additional remedial action. All six of these wells are considered available to meet municipal demand should they be required. Many other active wells are also in the general area but they are located farther away from the Broadway-Pantano WQARF Site.

The El Camino del Cerro, the Shannon Road-Rillito Creek, and the Miracle Mile WQARF Sites are all in close proximity to one another; hence, the water resource impacts associated with each are collectively addressed. To date, Z-006A is the only Tucson Water water-supply well that has been taken off line because of the presence of contaminants associated with one or more of these WQARF sites. Expansion of the Sweetwater Recharge Facilities and the planning and siting of recovery facilities associated with the Santa Cruz Managed Underground Storage Facility have been constrained by the existence of the ground-water contamination associated with the El Camino del Cerro WQARF Site. In addition, many of the existing wells in the vicinity of El Camino del Cerro and the Shannon Road-Rillito Creek WQARF Sites could be used as effluent recovery wells if it were not for issues associated with the VOC contamination of ground water. Also, the siting of constructed in-channel recharge facilities has been similarly constrained by ground-water contamination at the El Camino del Cerro WQARF Site. As points of correction, well Z-001A is not an active production well and should instead be shown on the provided map as a "partially equipped, not operational" well. Also, the map does not show EW-007A (55-582679), an "active production, but not connected" (to the potable system) well located on the west bank of the Santa Cruz River between WR-200A and PK-001A.

There are currently no active Tucson Water production wells in the WQARF Community Involvement Area associated with the Park-Euclid WQARF Site. The absence of currently active production wells is partially due to the reported presence of VOCs and/or diesel in ground water. For instance, well B-003B was converted from an active production well to a "monitor" well partially due to its proximity to the VOC ground-water contamination associated with the Park-Euclid WQARF Site. On the map provided, wells B-003A and B-003B are shown as "unknown" when in fact the location and status of both are known. Well B-003B is located at 127 North Campbell Avenue (parcel 124-09-067A) while B-003A, formerly located on the same parcel, was abandoned and should be shown as such. Well A-033A, located adjacent to railroad tracks, was abandoned due to the detection of diesel fuel in the well. Ground water in this area has been significantly impacted by local land uses.

Future Use of Ground Water

Tucson Water is currently ramping up its full-scale implementation of the Central Avra Valley Storage & Recovery Project and as noted previously, will soon be annually delivering up to 60,000 acre-feet of renewable supply. The utility goal is to utilize its full annual CAP allotment in the next 15 to 20 years. One of the key goals of Tucson Water will be to continue

reducing the amount of ground water that will be needed for municipal supply from its Central Well Field as well as from the other well fields. When reducing ground-water pumping in the Central Well Field and surrounding areas, the goal is to keep off line those wells located in that part of the Central Well Field where the largest historical water level declines have occurred. This area includes wells located near the Broadway-Pantano WQARF Site. In addition, other wells with a history of operational problems will also be among the first taken off line and this will apply throughout the Central Well Field as well as surrounding areas. By taking a large number of wells off line much of the year, water levels are generally expected to rise in the Central Well Field area. During times when peak demand will exceed the base supply provided by CAVSARF and other envisioned facilities, some Central Well Field wells will be brought back on line. The wells to be pumped to meet peak demand are selected based on operational need. It is anticipated that wells in the immediate vicinity of WQARF sites will be given a lower priority and hence kept off line as much as possible.

It is critical to recognize, however, that all available wells may be needed in both the near and long terms in order to respond to scheduled/unplanned CAP outages or supply shortfalls. Similarly, if potable drinking water standards become more stringent with regard to radon for instance or some other constituent, it may be necessary to rely on wells in the vicinity of WQARF sites for supply. Whatever remedial action approaches ADEQ elects to pursue, be it for interim plume containment or final remedy for all WQARF sites, they should be developed and implemented with two purposes in mind: 1) to achieve the specified remedial objectives, and 2) to preserve Tucson Water's flexibility in being able to operationally respond to a range of potential near- and long-term water-supply scenarios.

In the longer term, the community's water demand will at some point exceed the City of Tucson's current annual CAP allotment. The City may elect to obtain additional CAP water if it is available and/or treat wastewater effluent to a potable standard. Within the next fifty years or so, Tucson Water will probably find it necessary to resume the year-around pumping of ground water in the Central Well Field. This pumping will likely have an impact on ground-water conditions in the vicinity of the five WQARF sites.

In general, significant water supply changes will occur in the vicinity of the five WQARF sites over the next 100 years. It is imperative that the regional aquifer be managed to ensure that it will be available to satisfy the community's future needs. Anticipated operational changes in the Central Well Field and the increasing importance of aquifer management in the vicinity of existing and future effluent recharge and recovery projects during this period have been summarized. Water-resources planning has to respond to constantly changing circumstances; however, it is certain that the community will rely on the regional aquifer in the vicinity of these WQARF sites to satisfy current and projected water demands. It is imperative that contaminated ground-water sites in the vicinity of the Central Well Field be

remediated to ensure that both potable and non-potable supply operations will not be unduly hampered. If you have any questions regarding the information provided, please feel free to give me a call at (520) 791-2689.

Sincerely,



Ralph P. Marra
Chief Hydrologist

RM:cwf_current&futureuses_wqarf_oct2003.doc

cc: Marie Pearthree
Bruce Johnson
Joe Babcock
Jeff Biggs
Ted Sroka
Larry Mulhern,
Sandy Elder
Marie Light
Tim Thomure
Karen Masbruch (Environmental Services)
Ray Murray (Environmental Services)
Blake Ashley (City Attorney's Office)
Chris Avery (City Attorney's Office)
Hydrology File

Gretchen A. Wagenseller

From: Ralph Marra [Ralph.Marra@tucsonaz.gov]
Sent: Friday, February 23, 2007 11:21 AM
To: Gretchen A. Wagenseller
Subject: Re: Broadway--RI text re Tucson Water water use--TucsonWater's Response

Attachments: Six Restricted Use Wells_Pumpage 2000 to 2006.xls; TW Revision_Draft RI--Water Use_BP WQARF Site_022307.doc



Six Restricted Use Wells_Pumpage 2000 to 2006.xls
TW Revision_Draft RI--Water Use_BP WQARF Site_022307.doc

Hi Gretchen,

Thanks for sending the draft over for review. The narrative needed significant updating given the changes that have occurred. There are a number of imbedded comments in the draft which will light up when you place your cursor on them. If you want to compare the new draft with the old, you can run a compare documents in Word.

I've also attached a spreadsheet showing well production at the six restricted use wells from 2000 through 2006. It clearly shows that the wells were operated in 2006. I provided this information so that you can update Table 4 accordingly.

If you have any questions or comments regarding the attached, please give me a call. And again, thanks for the look.

RM

>>> "Gretchen A. Wagenseller" <Wagenseller.Gretchen@azdeq.gov>
2/22/2007 11:18 AM >>>

I got behind schedule. Attached is the draft RI text section on the water use study that pertains to Tucson Water. Let me know if there is anything that is incorrect or anything that should be added (or should be reworded for better clarity). THANK YOU.

The Water Use Study itself, which will be an appendix, I'm still finishing up. I'll e-mail you that section for TW as soon as it's finished-I hope tomorrow.

Gretchen Wagenseller

Project Manager

Superfund Programs Unit

Arizona Department of Environmental Quality

Tucson, Arizona

gaw@azdeq.gov

520-628-6708 (phone)

520-628-6745 (fax)

Ralph Marra, Chief Hydrologist
City of Tucson, Water Department (Tucson Water)

TW, which is the COT's water department, currently relies on water supply production from five well fields located within the Tucson Basin and Avra Valley to meet current municipal demand (TW, 2004). The most significant renewable source of potable supply is the Central Avra Valley Storage and Recovery Project (CAVSARP) Well Field located in Avra Valley while the CWF is TW's largest groundwater supply source (TW, 2004). The CWF is located in the Tucson Basin and encompasses much of the urbanized footprint of the COT. The GOU is situated near the center of the CWF.

TW has numerous water supply wells in the vicinity of the GOU (Figure 5). Four wells (C-021A, C-026B, D-021A, and D-022A) have been removed from operation since the late 1980s and early 1990s due to the presence of VOCs. A fifth well, C-022A, was contaminated after it was removed from service in October 1975. In addition, four active water supply wells currently have restricted use status ("last on/first off", or LOFO) because of their proximity to the GOU. "Last on/first off" wells are among the last wells to be brought into service and the first wells to be taken out of service when a period of increased water supply need arises. Since August 1999, COT voluntarily has placed two other wells (wells C-025B and D-018A; Figure 5), both situated immediately south of the GOU, on restricted use to limit the potential for the GOU groundwater contamination to migrate toward these wells and to ensure the availability of these wells for supply should a need arise. All of these restricted use wells were pumped in 2006 to assess the viability of the well infrastructure to meet system demand. TW is continuing to maintain and sample these wells so that they will remain available to meet system demand as may be required. Table 4 provides a summary of annual production (in millions of gallons) of CWF water supply wells located within the vicinity of the GOU. The table presents full production data for 1957 through 2000, as well as partial data (for only the six restricted use wells) for 2001 through 2006.

COT currently has a policy to take wells out of service that have VOC concentrations that exceed half of the potable drinking water standards for any regulated compound (i.e., EPA Maximum Contaminant Levels [MCLs] or ADEQ AWQSSs). The six municipal wells in the immediate vicinity of the GOU are being monitored for VOCs at least semi-annually, and at least monthly during those times when the wells are brought into service for more than seven days. This policy ensures the quality of potable water supplies drawn from this area.

According to TW, the CWF has historically been and will remain an essential component of COT's water supply infrastructure. Current TW plans include continuing the recharge and recovery of Central Arizona Project (CAP) water at CAVSARP, an operating storage and recovery facility in the Avra Valley. Potable use of the recovered blend of CAP water and Avra Valley groundwater began in May 2001 and continues to the present. TW has expanded the recharge capacity of CAVSARP up to 80,000 acre-feet per year and has plans to expand its recovery capacity in the near term. TW is currently in the process of developing a project similar to CAVSARP several miles to the south; this facility is called the Southern Avra Valley Storage and Recovery Project (SAVSARP) and it will provide an additional source of renewable supply. The SAVSARP facility will be permitted to recharge up to 80,000 acre-feet per year and is expected to become

Comment [COT1]: Use Tucson Water's Water Plan: 2000-2010 as your citation. It was issued on November 22, 2004. If you would like a copy, one can be sent to you or you can access it online at <http://www.tucsonaz.gov/water/waterplan.htm>

Comment [COT2]: Gretchen: The citation here is TW's Water Plan: 2000-2010 which was issued in November 2004.

Comment [COT3]: Gretchen: All the remaining LOFO wells (C-026B used to be one) as well as C-025B and D-018A were put on line in 2006 to evaluate their operational availability should a peak demand need or a system need arise later on.

Comment [COT4]: Gretchen: Why not use updated pumping data through 2006. An EXCEL spreadsheet with updated numbers will accompany the email transmittal.

operational in 2008. TW anticipates that use of both CAVSARP and SAVSARP will further reduce its reliance on groundwater pumping in the CWF during most of each year as long as current CAP supply availability continues and/or until water demand exceeds renewable supplies.

As the use of blended groundwater/CAP water from these facilities in Avra Valley increases and assuming normal operating conditions will prevail, the need for the LOFO wells in the CWF as potable water supply wells will likely be reduced in the near and mid terms. However, as TW achieves maximum renewable resource utilization and as potable demand grows, the availability of these LOFO wells (and the aquifer from which they pump) will increase in importance as COT sources of supply. Also, most if not all of the wells in the CWF will be needed in both the short and long terms as backup sources of supply. For instance, the CWF will be a critical source of supply if there are disruptions to CAP supply due to infrastructure failure of CAP's deliver system or because of a declaration of shortage on the Colorado River, power outages, major potable system emergencies. Therefore, COT believes that it is extremely important to maintain operational use of the CWF as well as other available supply sources (URS, 2002a).

According to TW pumpage data for the six restricted-use wells for 2008 (Table 4), the pumpage rates (in millions of gallons) ranged from 12.6 (for well D-018A) to 78.2 (for well C-114A) and totaled 278.6 for all six wells. By contrast, during 1992 these same six wells were pumped at rates (in millions of gallons) ranging from 3.311 (for well C-025B) to 240.014 (for well C-020B), and the total pumpage was 1,165.649 (or approximately 1.17 billion gallons). The reduced reliance on these wells (albeit temporary) in recent years is a function of TW's increasing utilization of renewable supplies to meet potable water demand, the absence of any major potable system emergencies, and the restricted use status of these wells.

Comment [COTS]: Need to update Table 4 showing information through 2006. Note that these wells were used in 2006.



CITY OF
TUCSON
TUCSON WATER
DEPARTMENT

May 29, 2007

Ms. Gretchen A Wagenseller
Arizona Department of Environmental Quality
Southern Regional Office
400 W Congress; Suite 433
Tucson, AZ 85701



**SUBJECT: Transmittal of Tucson Water's Comments Regarding SECOR's
Draft Remedial Investigation Report—Groundwater Operable Unit
and Other Potential Source Areas**

Dear Ms. Wagenseller:

Please find tabulated in Attachment A Tucson Water's comments to SECOR's Draft Remedial Investigation Report Groundwater Operable Unit and Other Potential Source Areas. Included as Attachment B a suggested revision of the "Present and Future Water Use" section based on recently updated information which has become available. An electronic copy of the latter can be made available to you at your request.

Tucson Water appreciates your attention to these comments. If you should have any further questions or inquiries, please give me a call at (520) 791-5080 x1412.

Sincerely,

Ralph P Marra
Water Administrator

WW:RM P:\R\SRT\Correspondence\2007\URS_RI_Response_052307.doc

Attachments

cc: David Modeer; Marie Pearthree, Bruce Johnson, John Kmiec, Bruce Pripr,
Joe Huerstel, and Dan Stanton of Tucson Water;
Allison Jones and Jeff Drumm of COT's Environmental Services Department



RESEARCH AND TECHNICAL SUPPORT • P.O. BOX 27210 • TUCSON, AZ 85726-7210
(520) 791-2689 • FAX (520) 791-3293 • TTY (520) 791-2639 • www.cityoftucson.org



ATTACHMENT B

2.8 PRESENT AND FUTURE GROUNDWATER USES

TW, which is COT's water department, currently relies on water supply production from five well fields within the Tucson Basin and Avra Valley to meet current municipal demand (COT Water Department, 2004). The most significant renewable source of potable supply is the Central Avra Valley Storage and Recovery Project (CAVSARP) Well Field located in Avra Valley, while the CWF is TW's largest groundwater supply source (COT Water Department, 2004). The CWF is located in the Tucson Basin and encompasses much of the urbanized footprint of the COT. The GOU is situated near the center of the CWF.

TW has numerous water supply wells in the vicinity of the GOU (Figure 5). Four wells (C-021A, C-026B, D-021A, and D-022A) have been removed from operation since the late 1980s and early 1990s due to the presence of VOCs. A fifth well, C-022A, was contaminated after it was removed from service in October 1975. In addition, four active water supply wells currently have restricted use status ("last on/first off", or LOFO) because of their proximity to the GOU. LOFO wells are among the last wells to be brought into service and the first wells to be taken out of service when a period of increased water supply need arises. Since August 1999, COT voluntarily has placed two other wells (wells C-025B and D-018A; Figure 5), both situated immediately south of the GOU, on restricted use to limit the potential for the GOU groundwater contamination to migrate toward these wells and to ensure the availability of these wells for supply when they are needed. All of these restricted use wells were pumped in the Summer of 2006 to assess the viability of the well infrastructure to meet system demand. In late 2006, four of the original LOFO wells were again put into service to provide potable supply due to a system outage in TW's groundwater supply infrastructure in Avra Valley. TW is continuing to maintain and sample these wells so that they will be available to meet system demand as may be required in future years. Table 4 provides a summary of annual production (in millions of gallons) of CWF water supply wells located within the vicinity of the GOU. The table presents full production data for 1957 through 2000, as well as partial data (for only the six restricted use wells) for 2001 through 2006.

COT currently has had a policy to take wells out of service that have VOC concentrations that exceed half of the potable drinking water standards for any regulated compound (i.e., EPA Maximum Contaminant Levels [MCLs] or ADEQ AWQSS). The six municipal wells in the immediate vicinity of the GOU are being monitored for VOCs at least semiannually, and at least monthly during those times when the wells are brought into service for more than seven days. This policy ensures the quality of potable water supplies drawn from this area (Marra, written communication, 2007).

According to TW, the CWF has historically been and will remain an essential component of COT's water supply infrastructure. Current TW plans include continuing the recharge and recovery of Central Arizona Project (CAP) water at CAVSARP, an operating storage

and recovery facility in the Avra Valley. Potable use of the recovered blend of CAP water and Avra Valley groundwater began in May 2001 and continues to the present. TW has expanded the recharge capacity of CAVSARP up to 80,000 acre-feet per year and is in the process of expanding its recovery capacity in the near term (Marra, written communication, 2007). TW is currently in the process of developing a project similar to CAVSARP several miles to the south; this facility is called the Southern Avra Valley Storage and Recovery Project (SAVSARP) and it will provide an additional source of renewable supply. The SAVSARP facility will be permitted to recharge up to 60,000 acre-feet per year and is expected to become operational in 2008; the recovery component of the project is expected to become operational in 2011. TW anticipates that use of both CAVSARP and SAVSARP facilities will further reduce its reliance on groundwater pumping in the CWF during most of each year. However, TW will continue to need its CWF, and in particular the six restricted use wells, in the near, mid, and long terms for the following reasons:

- To help meet peak water demand during the hottest months;
- To meet projected annual potable demand when it exceeds the COT's current annual CAP allocation—anticipated to occur within the next few years;
- To provide emergency backup supply should there be a disruption in CAP supply due to problems with the CAP infrastructure or due to supply disruptions caused by system outages on TW's own system;
- To provide potentially long-term backup potable supply should a shortage be declared on the Colorado River—the Secretary of Interior may make such a declaration within the next five years and it could be in place for an indeterminate period of time.

To summarize, as the use of blended groundwater/CAP water from these facilities in Avra Valley increases, and assuming normal operating conditions will prevail, the need for the LOFO wells in the CWF as potable water supply wells will likely be reduced in the near-term and mid-term except to meet peak potable demand. However, as TW achieves maximum renewable resource utilization, and as potable demand grows, the availability of these LOFO wells (and the aquifer from which they pump) will increase in importance as COT sources of supply. Also, most, if not all, of the wells in the CWF will be needed in both the short-term and long-term as backup sources of supply. For instance, the CWF will be a critical source of supply if there are disruptions to CAP supply due to infrastructure failure of CAP's delivery system or because of a declaration of shortage on the Colorado River, power outages, system outages associated with lengthy planned maintenance activities, or major potable system emergencies (Marra, written communication, 2007). Therefore, COT places a high priority on maintaining its operational use of the CWF, as well as other available supply sources (URS, 2002a)

According to TW pumpage data for the six restricted-use wells for 2006 (Table 4), the pumpage rates (in millions of gallons) ranged from 12.6 (for well D-Q18A) to 78.2 (for

well C-114A) and totaled 278.6 for all six wells. By contrast, during 1992, these same six wells were pumped at rates (in millions of gallons) ranging from 3.311 (for well C-025B) to 240.014 (for well C-020B), and the total pumpage was 1,165,649 (or approximately 1.17 billion gallons). The reduced reliance on these wells (albeit temporarily) in recent years is a function of TW's increasing utilization of renewable supplies to meet potable water demand (making them less necessary for year around use), the absence of any major potable system emergencies, and the restricted use status of these wells (Marra, written communication, 2007).

The vast majority of Tucson residences and businesses receive their water from TW, but there are some private water supply wells in the vicinity of the Site. The only private wells within the GOU groundwater plume are the previously shut-down TW production wells and the St. Joseph's Hospital well which is receiving wellhead treatment that removes the PCB (Section 1.4). There are two small municipal water providers -- Far Horizons, which provides water to the mobile homes and travel trailers in its residential park; and Catalina Village, which provides water to its assisted living residents. Also, there are two non-exempt (more than 35 gpm capacity well pump) wells that are used solely for irrigation and a non-exempt well used by a commercial car wash. There are also six private exempt (less than 35 gpm well pump) commercial wells used for irrigation/potable supply. For more information on groundwater users at the Site, see the Water Use Study Report in Appendix A.

Gretchen A. Wagenseller

From: Ralph Marra [Ralph.Marra@tucsonaz.gov]
Sent: Wednesday, July 16, 2008 5:07 PM
To: Gretchen A. Wagenseller
Subject: Re: Broadway site--Water Use Study

Hi Gretchen,

The "A" wells only matter if there is no "B" well at a given potable well site. So the wells listed check out.

Thanks for following up.

RM

.....
Ralph P. Marra
Water Administrator
Water Resources Management
City of Tucson -- Tucson Water
P.O. Box 27210
Tucson, AZ 85726-7210

Tele: (520) 837-2237
Email: ralph.marra@tucsonaz.gov

>>> "Gretchen A. Wagenseller" <Wagenseller.Gretchen@azdeq.gov> 7/16/2008
>>> 12:14 PM >>>
RALPH-

C-025B, C-046B, C-048B, C-049B, and C-051B were included in the universe of wells included in the Broadway-Pantano Water Use Study for the Groundwater Remedial Investigation Report. I realize that I did not include the "A" wells for these five wells in the Study. The Study will be an attachment to the draft groundwater Remedial Objectives report which will be put out for public comment, I hope within the next few months. If you have any questions/concerns re this, please let me know.

BRUCE-

I see now that we already had included the C-049B well in the Study, but not the "A" well for this well.

Thank you for providing the information on these wells.

Gretchen Wagenseller

Project Manager

Superfund Programs Unit

Arizona Department of Environmental Quality

Tucson, Arizona

gaw@azdeq.gov

520-628-6708 (phone)

520-628-6745 (fax)

NOTICE: This e-mail (and any attachments) may contain PRIVILEGED OR CONFIDENTIAL information and is intended only for the use of the specific individual(s) to whom it is addressed. It may contain information that is privileged and confidential under state and federal law. This information may be used or disclosed only in accordance with law, and you may be subject to penalties under law for improper use or further disclosure of the information in this e-mail and its attachments. If you have received this e-mail in error, please immediately notify the person named above by reply e-mail, and then delete the original e-mail. Thank you.

Gretchen A. Wagenseller

From: Ralph Marra [Ralph.Marra@tucsonaz.gov]
Sent: Tuesday, July 22, 2008 9:27 AM
To: Gretchen A. Wagenseller
Cc: Bruce PRIOR; Joe Huerstel; Wally Wilson
Subject: Re: Question--clarification re "near-term", "mid-term", "long-term" in your comments on Broadway water use study

Gretchen,

I can appreciate your wanting to have greater clarity given the seemingly imprecise language. The reference to near term was meant to give a sense of immediacy which for us is often within the next five to ten years. The mid term meant to give a sense that our concern isn't immediate but it isn't too far out either (a decade or two?). The long term meant to indicate a sense of indefinite time beyond the mid term; for the longer term, we also try to prepare for the unforeseeable by keeping our options open to maintain our resource/supply flexibility so that we can respond to anything.

Does this help? If there is a problem with the language, we can discuss this further.

RM

>>> "Gretchen A. Wagenseller" <Wagenseller.Gretchen@azdeq.gov> 7/21/2008
>>> 5:08 PM >>>

In your attached comments on the Broadway-Pantano groundwater RI, you included an Attachment B (thank you) for revisions/improvements to the section in the water use study on Tucson Water. On page 2, at the end of the first (incomplete) paragraph, there is a reference to "near, mid, and long terms". Can you clarify? Is this another way for saying "from now until the foreseeable future"?

Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Arizona Department of Environmental Quality Tucson, Arizona gaw@azdeq.gov
520-628-6708 (phone)
520-628-6745 (fax)

NOTICE: This e-mail (and any attachments) may contain PRIVILEGED OR CONFIDENTIAL information and is intended only for the use of the specific individual(s) to whom it is addressed. It may contain information that is privileged and confidential under state and federal law. This information may be used or disclosed only in accordance with law, and you may be subject to penalties under law for improper use or further disclosure of the information in this e-mail and its attachments. If you have received this e-mail in error, please immediately notify the person named above by reply e-mail, and then delete the original e-mail. Thank you.

Gretchen A. Wagenseller

From: Bruce PRIOR (Bruce.PRIOR@tucsonaz.gov)
Sent: Wednesday, July 23, 2008 9:54 AM
To: Gretchen A. Wagenseller
Cc: Bruce PRIOR
Subject: Four Well Pumpage and Sampling Frequency

Attachments: C-051B Pumpage.pdf; C-046B Pumpage.pdf; C-048B Pumpage.pdf; C-049B Pumpage.pdf



C-051B



C-046B



C-048B



C-049B

umpage.pdf (25 KB)umpage.pdf (23 KB)umpage.pdf (22 KB)umpage.pdf (22 KB)

Gretchen,

1) C-046B is sample for Drinking Water Compliance every three years. That of course is a large set of constituents and contaminants. Additionally, until this past quarter, it was sampled annually for VOCs on a discretionary basis. It is now sampled for VOCs quarterly on a discretionary basis.

2) C-048B same as above.

3) C-051B was sampled for DWC every three years. It too is now sampled quarterly on a discretionary basis.

4) C-049B is unequipped and capped. It has not produced significant water since Oct 2002 (see attached). It was last sampled for Drinking Water Compliance (DWC) in 2004 and, since then, there have been no additional discretionary samples. The pump shaft broke at the well and, during maintenance operations, it was determined that the well produces significant sand. Although it remains unequipped, it is still considered a production well. TW staff will eventually install a liner to attenuate the sand production prior to re-equipping this well and putting it back into service.

Hope this helps. bmp

Bruce M. Prior
Hydrologist
City of Tucson/Water Dept.
Planning & Engineering Div.
Water Resource Management Sec.
P.O. Box 27210
Tucson, AZ 85726-7210

office (520) 791-2689
voice mail (520) 837-2230
cell (520) 349-5492
fax (520) 791-3293
Bruce.Prior@tucsonaz.gov

Gretchen A. Wagenseller

From: Bruce PRIOR [Bruce.PRIOR@tucsonaz.gov]
Sent: Wednesday, July 23, 2008 10:04 AM
To: Gretchen A. Wagenseller
Subject: Point to remember

Gretchen,

The "zeros" for C-0498 are real zeros since it is not equipped.

Remember that for the three wells still actively producing water, whenever you see a "zero" for a monthly total, there may have been water pumped that was too small of a volume to register due to rounding. For instance during special sampling or well testing.

25 # 04 - 2

January 20, 2004

Ms. Gretchen Wagenseller, Project Manager
Superfund Programs Unit
Southern Regional Office
Arizona Department of Environmental Quality
400 West Congress Street, Suite 433
Tucson, AZ 85701

RE: Letter of January 15th, 2004 (attached)

Dear Ms. Wagenseller,

Thank you for the phone call addressing my questions. I hope the following addresses yours. If not, please let know at your earliest convenience.

Locations - I believe the attached map (the one that Darril sent) gives you the location of the wells.


Uses - they are used to irrigate the golf courses' fairways and greens

Planned wells - none for the future.

Again, should these not answer your questions in full, please let me know.

It has been a pleasure working with you.

Sincerely,


Ed Foster
Vice President Hotel Operations



BCC: Mr. H.S. Lopez



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04, 17
January 15, 2004

E-5460.7.42.1

Any Travel, Inc.
136 3rd Street
Pittsburgh, Pennsylvania 15215

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 1181
North El Dorado Place, Tucson, Arizona

Dear Sirs/Mesdames:

Arizona Department of Environmental Quality (ADEQ) records indicate that Any Travel, Inc. is the owner of a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from your existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at your property.

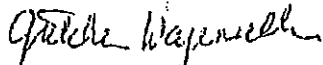
Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ 86004
(928) 779-0313

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ 85701
(520) 628-6733

Any Travel, Inc.
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,



Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,20

January 15, 2004

E-5460.7.42.1

Ms. Jackie Olson
Director of Property Management and Development
Carondelet Health Network
2202 North Forbes
Tucson, AZ 85711

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; St. Joseph's
Hospital, 350 North Wilmot Road, Tucson, Arizona

Dear Ms. Olson:

The Arizona Department of Environmental Quality (ADEQ) is in the process of developing a draft Remedial Investigation (RI) report for the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) Site. The RI Report will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources. Therefore, we are requesting information Carondelet Health Network (Carondelet), as the owner, may have regarding the current and future planned uses of the water supply well at St. Joseph's Hospital at 350 North Wilmot, Tucson, Arizona, and potential uses of water from other wells Carondelet may plan on installing there in the future. Specifically we are requesting information Carondelet may have regarding:

- location, uses, depth, and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- locations and uses, if known, of any planned wells.

We are also requesting that Carondelet include any additional information as you feel appropriate so that ADEQ may better understand current and future planned uses of groundwater pumped from well(s) at Carondelet's property.

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

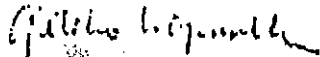
Ms. Jackie Olson

January 15, 2004

Page 2

We are working to issue the draft RI report for public comment in spring 2004. Please forward to me any information Carondelet may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,



Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Site Map (well(s) of interest highlighted)



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,14
January 15, 2004

E-5460.7.42.1

Mr. Ron Rhoads
Maintenance Director
Catalina Village
5324 East 1st Street
Tucson, Arizona 85711

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 5324
East 1st Street, Tucson, Arizona

Dear Mr. Rhoads:

Arizona Department of Environmental Quality (ADEQ) records indicate that Catalina Village owns a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from this existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at this property.

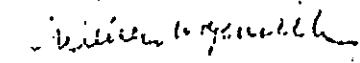
Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Mr. Ron Rhoads
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,



Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,25
January 15, 2004

E-5460.7.42.1

Dr. Michael T. Mayo
5362 East 3rd Street
Tucson, Arizona 85711

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 5362
East 3rd Street, Tucson, Arizona

Dear Dr. Mayo:

Arizona Department of Environmental Quality (ADEQ) records indicate that you own a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from this existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at this property.

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Dr. Michael T. Mayo

January 15, 2004

Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,



Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,15
January 15, 2004

E-5460.7.42.1

Mr. Ed Byrd
Far Horizons
7570 East Speedway Boulevard
Tucson, Arizona 85710

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 7570
East Speedway Boulevard, Tucson, Arizona

Dear Mr. Byrd:

Arizona Department of Environmental Quality (ADEQ) records indicate that Far Horizons is the owner of a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from this existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at your property.

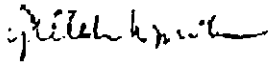
Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Mr. Ed Byrd
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,



Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,19
January 15, 2004

E-5460.7.42.1

Mr. Humberto Lopez
HSL Properties
3901 East Broadway Boulevard
Tucson, Arizona 85711

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Dorado Country
Club Estates/Golf Course, 6601 East Speedway Boulevard, Tucson, Arizona

Dear Mr. Lopez:

Arizona Department of Environmental Quality (ADEQ) records indicate that HSL Properties is the owner of two wells at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from your existing wells or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- locations, uses, depths and screened intervals of existing wells, including all wells already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are also requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at your property.

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,24
January 15, 2004

E-5460.7.42.1

Mr. Thomas Martin
841 North Pantano Road
Tucson, Arizona 85710

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 841
North Pantano Road, Tucson, Arizona

Dear Mr. Martin:

Arizona Department of Environmental Quality (ADEQ) records indicate that you own a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from this existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at this property.

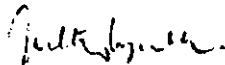
Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Mr. Thomas Martin
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,


Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04,26
January 15, 2004

E-5460.7.42.1

Mr. Ralph D. McPheeters
6074 East Pima Street
Tucson, Arizona 85712

SENT CERTIFIED MAIL

**Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 6074
East Pima Street, Tucson, Arizona**

Dear Mr. McPheeters:

Arizona Department of Environmental Quality (ADEQ) records indicate that you own a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from this existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at this property.

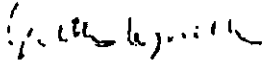
Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Mr. McPheeters
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,



Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04, 18
January 15, 2004

E-5460.7.42.1

Mr. David Bacon
Misys Health Care Systems
4801 East Broadway
Tucson, Arizona 85711

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Site; Information Request; Property at 1181
North El Dorado Place, Tucson, Arizona

Dear Mr. Bacon:

Arizona Department of Environmental Quality (ADEQ) records indicate that Misys Health Care Systems is the lessee of a well at the referenced property which is located near the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [see attached Fact Sheet and Site Map]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from this existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth, and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are also requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at your property.

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Mr. David Bacon
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,

Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

SROSPU04, 16
January 15, 2004

E-5460.7.42.1

Ms. Carol Singer
Director of Corporate Services
Wash Depot
435 Eastern Avenue
Malden, Massachusetts 02148

SENT CERTIFIED MAIL

Re: Water Use Studies Relating to Broadway-Pantano Water Quality Assurance
Revolving Fund (WQARF) Registry Sites; Information Request; Simoniz
Facility, 6042 East Speedway Boulevard, Tucson, Arizona

Dear Ms. Singer:

Arizona Department of Environmental Quality (ADEQ) records indicate that Wash Depot is the owner of a well at the Simoniz car wash facility at 6042 East Speedway Boulevard in Tucson, Arizona. This is the well that ADEQ has been periodically sampling since fall 2002 to help delineate the extent of the tetrachloroethene groundwater contamination at the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) site [Fact Sheet and Site Map attached]. ADEQ is in the process of developing a draft Remedial Investigation (RI) report that will describe the extent of known contamination at the site and will also identify (in consultation with well owners) impacts to water resources.

We are requesting information you may have regarding the current and future uses of water from your existing well or from wells you may plan on installing in the future. Specifically we are requesting information you may have regarding:

- location, uses, depth and screened interval of the existing well(s), including any well(s) already impaired due to contamination; and
- location and uses, if known, of any planned wells.

We are also requesting that you supplement this information as you feel appropriate for ADEQ to better understand current and future planned uses of groundwater pumped from wells at your property.

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ
86004

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ
85701

Ms. Carol Singer
January 15, 2004
Page 2

We are working to issue the draft RI report for public comment by spring 2004. Please forward to me any information you may wish to provide by February 16, 2004. If you have any questions regarding this request, please call me at 520-628-6708.

Sincerely,

Gretchen Wagenseller
Project Manager
Superfund Programs Unit
Southern Regional Office

Attachments: Fact Sheet
Site Map

Gretchen A. Wagenseller

From: anewell@math.arizona.edu
Sent: Tuesday, December 09, 2008 10:43 AM
To: Gretchen A. Wagenseller
Cc: tish.newell@cox.net
Subject: Well at 330 Indian House Road

Hi Gretchen,

We received your CD and am trying to figure out what the messages are. We put in our well in April 2004 and have used the water for domestic consumption, including drinking, and for irrigation (on a drip system). At the time, the only contaminant reported was an excess of iron which I figured was probably due to the new pipes. I am concerned, however, that your sampling has shown an unsafe amount of PCE. Is that correct? We may also be the folk that you did not contact. I do not recall speaking with you but we are sometimes away for lengthy periods in the summer and so may have missed you. I believe that we are either well #18 or 19 on your chart. I was not able to get to the Table listing names.

In any event, I would very much enjoy chatting with you either by email or by phone 514 8182. The water tastes great!

Best, Alan Newell.

Gretchen A. Wagenseller

Alan Newell

From: anewell@math.arizona.edu
Sent: Tuesday, December 09, 2008 10:43 AM
To: Gretchen A. Wagenseller
Cc: tish.newell@cox.net
Subject: Well at 330 Indian House Road

*ARSA - Comm Involvement
Water Use Study
RI*

Hi Gretchen,

We received your CD and am trying to figure out what the messages are.

We put in our well in April 2004 and have used the water for domestic consumption, including drinking, and for irrigation (on a drip system). At the time, the only contaminant reported was an excess of iron which I figured was probably due to the new pipes. I am concerned, however, that your sampling has shown an unsafe amount of PCE. Is that correct? We may also be the folk that you did not contact. I do not recall speaking with you but we are sometimes away for lengthy periods in the summer and so may have missed you. I believe that we are either well #18 or 19 on your chart. I was not able to get to the Table listing names.

In any event, I would very much enjoy chatting with you either by email or by phone 514 8182. The water tastes great!

Best, Alan Newell.