



April 23, 2015

**HAND-DELIVERED**

Arizona Department of Water Resources  
Deputy Assistant Director  
Water Management Division  
3550 North Central Avenue  
Phoenix, AZ 85012

RE: City of Phoenix Underground Storage Facility (USF) Permit 71-220047.0000  
Aquifer Storage and Recovery Well (ASR): 9A-Well 300  
Groundwater Quality Monitoring at 9A-Well 281

To Whom It May Concern:

The City of Phoenix (City) is requesting a modification of USF permit 71-220047.0000 for ASR Well 9A-W300 (Well 300).

The City requests the removal of the turbidity operation prohibition limit (OPL) of 1 NTU from Table 5 "Groundwater Quality Monitoring" at Monitoring Well 9A-Well 281 (MW 281) and replace it with Not Applicable (N/A). Recharge was initiated at Well 300 on April 1, 2015. The City demonstrated that the source water sampled at Well had a turbidity result of 0.48 NTU. Per Table 6 "Source Water Quality Monitoring", turbidity is required as a field read at Well 300, but the OPL is not applicable (N/A). However, the turbidity result for the sample collected at MW 281 on April 1, 2015 was 1.96 NTU. The verification sample result collected on April 3, 2015 was 3.16 NTU.

There are several potential causes for turbidity results higher than 1 NTU in groundwater wells: high concentrations of dissolved air in groundwater (both local and regional), insufficient techniques to develop the monitoring well, or combination of the two.

During the construction of Well 300, Clear Creek Associates sampled and documented high percentages of dissolved oxygen in the groundwater ranging from 135 to 176%. We suspect that this high percentage of dissolved oxygen is caused by the inflow of new groundwater supplies (e.g., mountain front recharge). See attached aquifer test data from Well 300. There are two declining trends followed by a flattening trend (11-12 hours) during continuous pumping. The flattening trend suggests that the cone of depression from the well has intersected a recharge boundary (inflow of groundwater). This inflow of groundwater is a likely cause for high percentages of dissolved oxygen in groundwater ([http://www.epa.gov/caddis/ssr\\_do\\_int.html](http://www.epa.gov/caddis/ssr_do_int.html)).

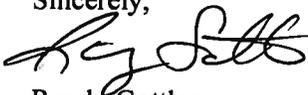
Due to the locations of well screen interval and pump intake for MW 281 and Well 300, dissolved oxygen will always be in the groundwater since the pumps are dewatering the upper portion of the aquifer and exposing the top of the well screens resulting in groundwater cascading down the well screen (this cascading effect entrains oxygen into the groundwater).

Sampling MW 281 turbidity has documented values greater than 1 NTU. Based on historical water quality data and the Rossum Sand test result of 0.05 ppb, we conclude that the groundwater is clear. We suspect that the dissolved oxygen in groundwater is degassing at atmosphere causing turbidity readings to be greater than 1. It is important to note that the technology of the turbidity meter cannot differential between suspended particulates or degassing air bubbles while sampling.

The other possibility would be insufficient development of MW 281. According to the 1991 Environmental Protection Agency Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells "collecting non-turbid sample may not be possible because there are monitoring wells that cannot be sufficiently developed by any available technique. This may be the consequence of the existence of turbid water in the formation or the inability to design and construct a well that will yield water in satisfactory quantity without exceeding acceptable flow velocities in the natural formation;"

In summary, the City is requesting a modification of the turbidity standard for USF permit 71-220047.0000 since we have documented that the recharged source water is less than 1 NTU, we have documented minor sand during pumping via Rossum Sand Tester (0.05 ppb), we have documented high percentages of dissolved oxygen due to both local and regional conditions, and the current technology of the turbidity meter cannot differentiate the difference between suspended particulates and the degassing air bubbles. The City is available to meet with you in person to discuss our request if more information is needed. If you have any questions, please call me at 602-534-2921 or Clarissa Chung at 602-534-9377.

Sincerely,



Randy Gottler  
Deputy Water Services Director

CC: Tito Comparan, ADWR  
Nathan Nutter, Carollo Engineering (electronic pdf)  
Kathryn Sorensen (electronic pdf)  
Randy Gottler (electronic pdf)  
Susan Kinkade (electronic pdf)  
Gary Gin (electronic pdf)  
Heather Finden (electronic pdf)  
Clarissa Chung (electronic pdf)  
File: Well 300 / USF 2015

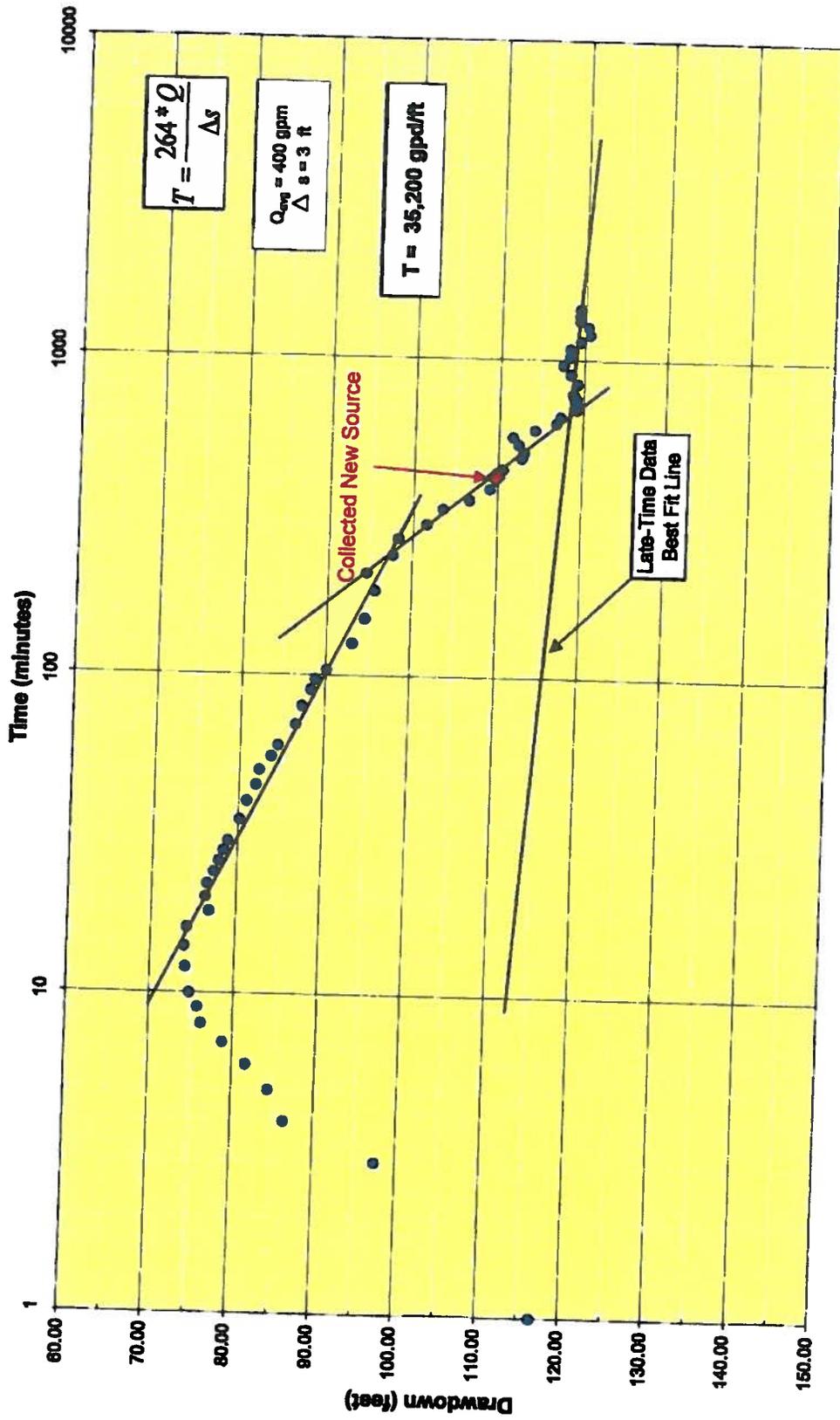


Figure 7  
 COOPER-JACOB PLOT  
 CONSTANT RATE AQUIFER TEST  
 COP 9A-300  
 Phoenix, Arizona



5. Legal description of the location of the facility: SW<sup>1</sup>/<sub>4</sub> of the SW<sup>1</sup>/<sub>4</sub>, of the SE<sup>1</sup>/<sub>4</sub> of Sec. 8,  
Township 5 North, Range 4 East  
*(quarter/quarter/quarter/section, township and range – see Appendix C of USF Application Guide)*

6. Does the applicant own the land where the facility is to be located?  Yes  No

7. The total design capacity of the facility: 12,200 acre feet  
*(acre-feet to be stored over the duration of the USF permit)*

8. The maximum annual amount of water proposed for storage at this facility: 1,060  
*(acre-feet per year)*

9. Proposed duration of permit: 20 years  
*(years)*

10. Type of source water to be stored:

CAP Water

Effluent

Decreed and Appropriative  
Surface Water

If Decreed and Appropriative Surface Water, list river(s): \_\_\_\_\_

11. I agree under penalty of law to obtain any required floodplain use permit from the county flood control district before beginning any construction activities, as required by A.R.S. § 45-811.01(C)(4).  Agree  Disagree

12. **For managed USFs where effluent will be stored only:** Are you requesting that this facility be designated as a facility that could add value to a national park, national monument or state park, as described in A.R.S. § 45-811.01(D)?

Yes  No

If yes, please submit a completed USF Permit Application Supplement to designate a Managed Underground Storage Facility as one that could add value to a national park, national monument, or state park and all additional information as described on the USF Permit Application Supplement.

13. **For permit modifications only,** give a brief description of the modification(s) requested by this application: \_\_\_\_\_  
The City is requesting the Operation Prohibition Limit (OPL) for turbidity to be removed  
from the groundwater compliance point: Monitoring Well 9A-Well281

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#### SUPPORTING EVIDENCE

**Check the following items that have been included with this submittal.** For a new USF application, all items **must** be submitted prior to receiving a complete and correct determination by the Department. For a modification to an existing USF permit, submit only those items that apply to the modification. For a full description of these requirements refer to the USF Application Report in the USF Application Guide.

14. USF Site and Facility Characteristics:

Site Characteristics

Geology

Facility Characteristics

Hydrogeology

