

**Before the Oklahoma Water Resources Board**

**State of Oklahoma**

IN THE MATTER of Determining the Maximum	)	
Annual Yield for the Arbuckle Simpson Groundwater	)	Preliminary Comments of the
Basin underlying parts of Murray, Pontotoc, Johnston,	)	National Park Service
Garvin, Coal and Carter Counties	)	

Comes now the National Park Service (NPS) and Chickasaw National Recreation Area (Chickasaw NRA) in accordance with the direction of the Hearing Officer and the Tentative Determination of Maximum Annual Yield of Groundwater from the Arbuckle-Simpson Basin (Tentative Determination) by the Oklahoma Water Resources Board (OWRB) and submits preliminary comments on the appropriateness of rulemaking in reply to the Posthearing Order, issued May 18, 2012.

A hearing was held in the above referenced matter on May 15 – 16, 2012 in Sulphur, Oklahoma. The NPS provided testimony describing the water resources contained within the park including springs and streams that are fundamental to the purpose for which the park was established. In addition, the NPS provided testimony and written evidence in support of the Tentative Determination with the caveat that additional groundwater management measures would be required to adequately protect the springs and streams within Chickasaw NRA.

In the issuance of the Tentative Determination, OWRB “tentatively determined that a rule should be promulgated to set out an established distance that new wells in the Arbuckle-Simpson Groundwater Basin must be from the location of springs and streams, and companion rules to adopt a methodology for estimating effects of pumping from the specific location of a proposed new well to analyze whether such pumping is likely to degrade or interfere with

specific springs or streams.”<sup>1</sup> OWRB invited the submission of preliminary comments as to the appropriateness of a rulemaking process to promulgate an established well spacing distance from springs and streams, and a companion methodology for estimating potential impacts of proposed wells on particular streams and springs.<sup>2</sup> OWRB noted in the Tentative Determination that the maximum annual yield determination is applicable on a regional basis, whereas limitations on degradation and interference of springs may be appropriate on a more site specific basis.<sup>3</sup>

During the hearing held May 15-16, 2012, NPS hydrologist Jennifer Back testified that the model developed by the United States Geological Survey for the Arbuckle-Simpson Groundwater Basin (the USGS model) is the best tool available to evaluate potential impacts to springs and streams that emanate from the Arbuckle Simpson aquifer within Chickasaw NRA. Model simulations of groundwater discharge in the northeast portion of the park compare favorably to measured discharge at the Rock Creek at Sulphur gage. Model simulations indicate that existing water use has a measureable impact on Travertine Creek and that both the magnitude and location of groundwater pumping affects groundwater discharge to springs and streams. Ms. Back testified that the model simulations demonstrated the appropriateness of a rulemaking process to promulgate an established well spacing distance from springs and streams.

A presentation, report, and model simulation prepared by Dr. Eileen Poeter was submitted on behalf of the Oklahoma Farm Bureau on May 16, 2012. These items were identified as Protestants Exhibits 10, 11, and 12 respectively. As stated in the introductory paragraph of Exhibit 11, the purpose of the report was to review the USGS model and evaluate

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<sup>1</sup> Tentative Determination of the Maximum Annual Yield for the Arbuckle- Simpson Groundwater Basin, Tentative Conclusion 9(d) (Oklahoma Water Resources Board – March 13, 2012).

<sup>2</sup> *Id.* at p. 13.

<sup>3</sup> *Id.* at p. 9 (Tentative Conclusion 7(e)).

its usefulness in determining acceptable volumes of groundwater withdrawals from the eastern Arbuckle- Simpson aquifer. As noted earlier, the NPS relied on the USGS model in its assessment of the appropriateness of a rulemaking process to promulgate an established well spacing distance from springs and streams. Because Dr. Poeter's critique of the USGS model raises issues regarding the soundness of NPS' reliance on the USGS model, a brief review and analysis of that critique is justifiably warranted.

Dr. Poeter's primary concern was the manner in which the storage coefficient (S) was assigned in the transient USGS model. This concern was based on the finding that the top model layer was represented as part of the confined aquifer in the USGS model when there is evidence to suggest that parts of the aquifer behave in an unconfined manner. Dr. Poeter asserts that the value for S used in the top model layer was too low and therefore, springs and streams were "too sensitive to pumping."

Dr. Poeter used the USGS model to determine the influence of a higher S on stream flow depletions due to groundwater withdrawals. Dr. Poeter modified the transient model by assigning higher values of specific storage to all layers of the model. The greatest difference was in Model Layer 1. The specific storage value used by Dr. Poeter in Model Layer 1 ( $3.75 \times 10^{-3} \text{ m}^{-1}$ ) was 500 times greater than that used in the USGS model ( $8.00 \times 10^{-6} \text{ m}^{-1}$ ) to represent an unconfined shallow zone.

The USGS Report (Christenson et al., 2011; Table 24, pg. 87) shows the 5 year average base flow for Blue River. The 5-year average base flow was 61.3 cfs. The USGS model simulations for an EPS = 0.392 (acre-ft/acre)/year produced a 5-year average base flow of 11.6 cfs, which is equivalent to a percent depletion in base flow of 81% (Table 1). In contrast, Dr.

Preliminary Comments of the National Park Service

Poeter’s simulations for an EPS = 0.392 (acre-feet/acre)/year with a much higher specific storage in Model Layer 1 produced a 5-year average base flow of 17.3 cfs. Although the value of 17.3 cfs is higher than the 11.6 cfs simulated using the USGS model, the value still represents an unacceptable depletion in base flow of 72% for Blue River.

Table 1. Comparison of USGS Model Simulations and Dr. Poeter Model Simulations

	Blue River	Mill Creek	Pennington Creek	Travertine Creek
<b>USGS Model</b>				
5-Year Average Base Flow	61.3	8.5	32.2	15.4
5-Year Average Base Flow with EPS = 0.392	11.6	1	8	2.6
% Depletion from Average Base Flow	81%	88%	75%	83%
<b>Protestants’ Exhibit 12</b>				
5-Year Average Base Flow	61.3	8.5	32.2	15.4
5-Year Average Base Flow with EPS = 0.392 and Unconfined Layer 1*	17.3	3*	12.3*	10.6*
% Depletion from Average Base Flow	72%	65%	62%	31%

*\*calculated from model output files submitted by Dr. Poeter*

It is important to note that Dr. Poeter’s simulation was performed without recalibrating the USGS model. It is likely that in order to calibrate the model to measured stream flow, other aquifer properties such as hydraulic conductivity would have to be readjusted at least in some areas of the model. In addition, as noted by Dr. Poeter, additional field data would be needed to better characterize the unconfined portions of the eastern Arbuckle-Simpson model. Therefore, there is not enough information at this time to determine whether the USGS model could be

adequately calibrated using higher storage properties. Therefore, the concerns raised by the NPS through the testimony and exhibits presented at the hearing are not diminished by changing the values of specific storage assigned to the USGS model layers.

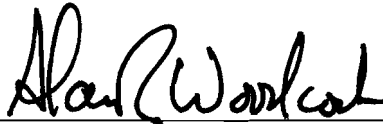
Once OWRB has made a final determination of the maximum annual yield for a groundwater basin, OWRB may in subsequent hearings and after additional hydrologic surveys, increase the amount of water allocated but shall not decrease the amount of water allocated (Title 82, Chapter 11, Section 1020.6). If future studies indicate that an additional amount of water is available, then the maximum annual yield determination can be revised upward. However, the maximum annual yield cannot be revised downward.

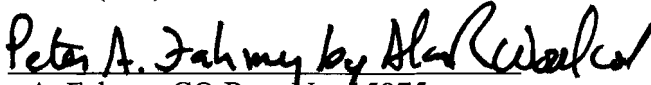
The effective management of the Arbuckle Simpson aquifer requires an understanding of the response of the system to withdrawal from wells. Additional studies in the future may improve our understanding of the aquifer response. At that time, an evaluation can be made to determine whether the maximum annual yield should be revised upward. However, the OWRB in making its initial determination of the maximum annual yield for the Arbuckle-Simpson aquifer should, where guided by certain environmental designations and legal considerations that require the protection of springs and streams, adopt an initial determination of maximum annual yield that is conservative in its approach and that protects the natural discharge of springs and streams emanating from the Arbuckle-Simpson aquifer. A lack of certainty regarding the storage properties of the top model layer should not be a reason for postponing measures that prevent degradation of the natural flow of springs and streams.

The NPS believes its preliminary comments and all testimony and evidence submitted at the hearing amply support the tentative conclusion of OWRB “that a rule should be promulgated to set out an established distance that new wells in the Arbuckle-Simpson Groundwater Basin

must be from the location of springs and streams.” Although an equal proportionate share of 0.20 (acre-feet/acre)/year may be appropriate on a regional scale, such an allocation could result in permanent adverse effects to springs and streams in Chickasaw NRA. Implementing a well set back distance could limit depletions of groundwater discharge to the springs and streams in Chickasaw NRA and could assure that the depletion in the average base flows of such springs and streams is not permanently impaired. A well set back distance could be determined through application of the USGS model as well as analytical methods that are publically available and incorporate site specific aquifer properties at locations where field data are available. Although the confirmation and implementation of the Tentative Order would represent a historic milestone in Oklahoma’s stewardship of its precious water resources, additional groundwater management measures will be necessary to achieve the protection that Senate Bill 288 envisioned for the irreplaceable springs and streams that flow from the Arbuckle-Simpson Aquifer.


Respectfully submitted this 30<sup>th</sup> day of May, 2012.

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**CERTIFICATE OF SERVICE**

I hereby certify that on the 31<sup>st</sup> day of May, 2012, a true and correct copy of the foregoing document was placed in the U.S. Postal Service, with proper postage thereon, to the attached mailing list. In addition, I certify that on the 31<sup>st</sup> day of May, 2012, a true and correct copy of the foregoing document was electronically forwarded to the e-mail addresses shown on the attached distribution list.

  
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