

BALLEAU GROUNDWATER, INC.

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April 9, 2014

Mr. Darren Indyke, PLLC
575 Lexington Avenue, 4th Floor
New York, New York 10022

Subject: Water Supply at Zorro Ranch

Dear Mr. Indyke:

Last week (4/2/2014) you sent follow-up questions after our phone conversation regarding the stuck pump in the Zorro Ranch (Ranch) Dakota well. I understand the questions are related to the feasibility of drilling a replacement for the Dakota well in another (shallower) target if it cannot be salvaged, the need to further develop the water rights under the Dakota permit (OSE File No. E-7871), and the value of developing the rights. The permit allows the Ranch to "prove" the beneficial use of up to 68 acre feet per year (AFY) diversions for irrigation, domestic and ranch uses. So far, the Ranch has put 18 AFA to use under the permit and has an approved extension of time to file proof of beneficial use (PBU) by November 1, 2016. We understand the OSE will allow one more three-year extension for PBU if the Ranch puts 50 percent (34 AFY) of the water to use by the November 2016 deadline. The OSE administration of PBU has the purpose of preventing claims for water that cannot be put to practical beneficial use. I will address your questions in this letter and propose some alternative permitting options.

To put the questions into context, an overview of the Ranch's water infrastructure, permitting and demands may be helpful. The Dakota permit has three authorized wells (see attached summary table of Ranch wells): 1) E-7871 is the original Dakota well, with 10 AFY capacity limited by screen encrustation that occurs at higher diversion rates. Instantaneous capacity reached 60 gpm. The well presently has a stuck pump and may not be salvageable. 2) Well E-7871-S was moved in year 2012 from the original undrilled location on the east side of the Ranch to a location south of Ranch Central near Ranch wells 4 and B. The well is drilled but not cased, and is today an open borehole with an OSE-approved plugging plan. 3) Well E-7871-S-2 was moved in 2012 from the original undrilled location in the south part of the Ranch to a well drilled near wells 4 and B, nominated Ranch Well K. Well K has tested 25-AFY capacity with installed pump capacity up to 50 gpm. If the Dakota well can be salvaged, the combined capacity of completed wells under permit E-7871 is 35 AFY, which is less than the 68 AFY permitted diversion. Part of your question is how to add capacity to further develop the water right without impacting Well K and Well 6, but also without having to drill as deep as the Dakota well.

The Ranch also holds permit E-6478 for diversion of 15.5 AFY for irrigation and domestic use. Three wells are in use under that permit, Wells 4, 6 and B (see attached table). Wells 4 and B (along with Well K) share a common productive interval in the Mancos shale and have installed capacities of 25 gpm each. Testing indicates Well B can sustain a higher rate if a more powerful pump is installed. Well 6 was recently brought back online to make up for loss of production from the Dakota well. That well has been producing 25 gpm, but the sustainable yield has not been tested. We recommend such testing to determine if Well B will remain viable for ongoing use.

The combined capacity of Wells 4, 6 and B exceeds the permitted diversion limit of 15.5 AFA, whereas the capacity of the Dakota well and Well K are below the permit limit. An obvious issue is that the capacities of Ranch wells do not match the permitted diversions. To resolve the discrepancy, the Ranch may want to consider adding or moving one of the more-productive wells (e.g., Well B) to the Dakota permit. These options are discussed later in the letter.

Another question is about water required for a ranch of Zorro size. We have no specific information on ranch unit water-use rates. Brice G. indicates Zorro Ranch typically uses 25 AFY, mostly for irrigation and cooling purposes, and also for domestic and stock water. Prior to drilling Well K, the Dakota well furnished about 10 AFY and Wells 4 and B about 15 AFY. With 15.5 AFY in permit E-6478 and 18 AFY proven up under E-7871, totaling 33.5 AFY, the Ranch has more than adequate wellfield capacity and water rights for the current operation. I am aware there are infrastructure limitations that restrict conveyance of water from wells to water-use areas that need resolving if the Dakota well cannot be salvaged. We conclude that a new well or a change in permitting of the existing wells would be needed to fully develop the Dakota permit, but neither are needed to meet the Ranch's existing water demand.

In response to your questions last week regarding further developing the Dakota right, please see my responses below. For convenience, your questions are restated in italics.

Are there other areas at Zorro that could be drilled to yield water to meet any projected increased demand which would not require such deep drilling as at the Dakota and which will not interfere with the water able to be pulled from the existing new well and well 6?

There are aquifer targets above the Dakota Formation at the Ranch, including the valley fill alluvium, which may be saturated only in the southwest part of the Ranch, and productive intervals in Mancos shale, such as those supplying Ranch Wells 4, B and K (the Mancos wells). The top of the Dakota Formation ranges 1000 to over 2000 feet deep below the Ranch, being generally shallower south and deeper north. The productive Mancos interval is about 400 feet above top of Dakota.

Saturated alluvium thickens southward, so the best location for an alluvial well may be at the south part of the Ranch. However, adding a valley-fill alluvium well (either drilling a new well or adding an existing well) to the Dakota permit will have some administrative permitting barriers. The Estancia Basin Administrative Guidelines that the State Engineer uses to guide permitting on water transfers in that basin define the valley fill aquifer at Zorro Ranch as a

Critical Management Area (CMA). Generally, the State Engineer will deny applications that cause additional depletion or drawdown to aquifers designated as CMA. Because the E-7871 water was appropriated in the deeper and separate Dakota Formation, shifting part or all of that permit to a well in the valley fill would be considered a new depletion to the valley fill aquifer and would be denied under the guidelines.

The productive Mancos beds that serve Wells 4, B and K may exist at other locations on the Ranch. A site distant from the existing Mancos wells could be developed to reduce mutual interference. Because the Mancos is unexplored elsewhere on the Ranch, exploratory drilling to depths of about 1000 ft would be needed, with no certainty of the outcome in terms of yield or quality. Permitting such a well, if productive, appears to have minimal administrative barriers, since two Dakota wells (-S and S-2) already are permitted for Mancos completions.

If the objective is to avoid focusing all of the Ranch productive capacity on only the existing Mancos wells, I recommend testing Well 6 to quantify the sustainable yield. Water quality is good (conductivity 1000 μ mhos, similar to the Mancos wells) and the well could be tied to the Dakota well infrastructure with a half mile of new pipe. The well is already permitted to divert up to 15.5 AF. At two miles away and with hundreds of feet of vertical stratigraphic separation, there will be little interference with the Mancos wells.

What are total water rights typically associated with ranches of the size of Zorro? How many acre feet do ranches of this size typically have and how much do they typically require? Is there a rule of thumb X acre feet for every y acres?

We have no information on a typical quantity of water for a ranch, as it depends on land use and ranch operations. Livestock water alone is a small factor at Zorro Ranch. A ranch covering thousands of acres involved in cattle grazing may use a few acre feet per year from windmills and dirt tanks (small dams that catch storm runoff). Cattle need about 0.01 AFY per cow, so one AFY plus an allowance for seepage and evaporation would serve about 100 head. Cattle need water points about every two miles in radius. A ranch that irrigates for stock forage or other crops would use a lot more water. For example, a ranch with a center pivot irrigating a crop circle inside a quarter section (about 125 acres) may use 250 to 375 AFY depending on climate and crop type. Permit E-7871 provides for up to 60 AFY of irrigation on 24 acres, or 2.5 acre feet per acre, but Zorro Ranch has only needed part of this for its operations to date. Giving up the opportunity to use 68 AFY is essentially giving up the opportunity to irrigate more acreage.

Although we have been talking about the 68 Acre feet right as if it is a thing of substantial value (particularly in light of the moratorium), if we don't really need that much water and won't likely need it, what is the actual monetary value of that right. How much is it really worth?

We understand potable water rights in Estancia Valley today are informally reported to sell for around \$5,000 per AFY. Saline water requiring treatment has lesser value. We have no reference for any specific sale. The unit price may increase if the housing market picks up in the basin and developers start seeking water rights to support new subdivisions. The yet-to-be proven 50 AF on the Dakota permit might be valued today at \$250,000, and perhaps more in

the future, but the feasibility of transferring the water to another well and place of use is not certain. The water could be piped to a new place of use, but pipelines over one mile exceed that value. OSE may deny any application to transfer the permit to a well in a CMA.

A fully-developed and proven water right, licensed by OSE at the Zorro Ranch place of use would increase the value of the property. The value would be in on-site uses due to the difficulties in moving water or permits offsite. The on-site value may depend on a prospective buyer's plan for land use, whether they continue irrigating the 24 permitted acres or change to a higher-value use such as a subdivision.

Discussion

If proving Dakota permit use above 18 AFY remains a Ranch objective, the recommended approach is to add one of the existing Mancos wells to the E-7871 permit. Well B has installed capacity of 25 gpm, and can produce in excess of 25 AFY, but is only permitted for 15.5 AF. Well K (E-7871-S-2) can produce 25 AFY. With re-permitting the two wells pumping together could produce over 50 AFY under the Dakota permit, although there are details to work out with OSE on how to account water from one well that is produced under two permits. We have calculated¹ that the Mancos wellfield can produce over 50 AFY for many decades with reasonable levels of mutual well interference. However, we understand the supporting infrastructure (booster pumps, pipes and tanks) would need to be upgraded to accommodate additional production above about 35 gpm.

From a permitting standpoint, no major barriers are foreseen in adding Well B to the Dakota permit, although agency administration is often surprising. In approving the change of location of E-7871-S-2 to Well K, OSE calculated the effects of pumping the Dakota permit from this location and apparently found they would fall within the administrative guidelines. Adding nearby Well B to the permit would not change the effects picture, but may or may not be hydrologically acceptable to OSE. I recommend a discussion with Water Rights Division (Nancy Cunningham) prior to filing an application to propose the approach and find out if she foresees any administrative issues.

Summarizing the above information:

1. The Ranch has 33.5 AFY of proven rights in two permits. An additional 50 AFY is permitted but not proven as a "right".
2. The Ranch has over 100 gpm of instantaneous pumping capacity in four equipped wells (not including Dakota well). Sustainable yield from the three Mancos wells (Wells 4, B and K) has been projected to be in excess of 50 AFY. Well 6 adds to the total in an amount that should be determined by testing.

¹ Balleau Groundwater, Inc., October 2012, Drilling and Testing of Ranch Well K (E-7871-POD4): Technical Memorandum.

3. Zorro Ranch uses about 25 AFY for irrigation, cooling and other Ranch purposes. Existing well capacity and permits are adequate for the current demand, even if the Dakota well cannot be salvaged.
4. Aquifers above the Dakota Formation that may be prospective for completing a new well include shallow alluvium and Mancos productive intervals. Developing shallow alluvium has obvious OSE administrative barriers. The yield and quality of Mancos intervals outside the existing wellfield is unknown and requires exploratory drilling.
5. Water demand at New Mexico ranches is variable and depends on land use and ranch operations. Livestock water is not often the largest use.
6. Water rights cost about \$5,000 per AFY in Estancia basin, but transferring to a new place of use has administrative barriers. Licensed water rights add value to the land on which they are appurtenant.
7. If Zorro Ranch wants to develop the Dakota right beyond 18 AFY, we recommend approaching OSE to discuss the feasibility of adding existing Well B to the E-7871 permit. We understand the existing infrastructure needs to be upgraded to support additional pumping.

Please call with any questions you may have, or if you wish to discuss this in further detail.

Very truly yours,

BALLEAU GROUNDWATER, INC.



Casey W. Cook, [REDACTED].
Vice President

CWC/tb

Attachments: Table 1

cc: Brice Gordon
Richard Kahn

ZORRO RANCH

WELLFIELD SUPPORT

TABLE 1. SUMMARY OF ZORRO RANCH WELLS

Ranch Well Name	Date Drilled	OSE Permit No.	Total Depth (ft)	Completed Formation	Installed Capacity (gpm)	Permitted Diversion (AFY)	2014 Status
Dakota	2000	E-7871	1700	Dakota	N/A ¹	68	Stuck pump
Well K	2012	E-7871-S-2	765	Mancos	50 ²	↓	Operating
Well 4	1984	E-6478	615	Mancos	25	15.5	Equipped but off line
Well B	2005	E-6478-S-2	600	Mancos	25	↓	Operating
Well 6	1994	E-6478-S-2	215	Alluvium/Mancos	25+	↓	Operating
Totals					145-185	83.5	

¹ The Dakota well can be pumped safely up to 20 gpm. The installed pump (now stuck) could produce 60 gpm, but was valved back to prevent screen encrustation.

² Installed capacity is 50 gpm, but operated at lesser rates near 25 gpm.