The Future of New Mexico's Deep Water

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John, New Mexico State Engineer, is a registered professional engineer in New Mexico and Colorado, and has experience in hydraulic design, acequia rehabilitation, water resource management, and water policy development. Before he was appointed by Governor Bill Richardson to the state's chief water post, John was Cabinet Secretary of the New Mexico Environment Department in 2002. He served as the Director of the Water Resource Allocation Program for the Office of the State Engineer from 2001 to 2002 and served as the District I Supervisor in Albuquerque from 1998 to 2001. For 15 years, John worked with the U.S. Army Corps of Engineers as a hydraulic design engineer, as the Chief of the Hydrology, Hydraulics, Sedimentation, and Floodplain Management Program, and was the project manager for the Acequia Rehabilitation Program. A native New Mexican, John received a bachelor's degree in civil engineering from the University of New Mexico in 1979. He has been a member of the Governor's Blue Ribbon Task Force on Water Issues from 1998 to the present. In his post as State Engineer, John is the Secretary of the Interstate Stream Commission, Chairman of the Water Trust Board, Governor's Water Infrastructure Investment Team, and the Governor's Drought Task Force. He is also the New Mexico Commissioner to the Rio Grande, Costilla, and Upper Colorado river compacts.

Good morning. This is the best conference that I attend on a year-to-year basis. I think I have been speaking since 1998 off and on and the last few years pretty consistently. Today I am going to talk about the future of New Mexico's deep water. I'll provide an introduction, history, legislation, talk a bit about the state engineer's administrative procedures, Notices of Intent that have been filed – and there have been a number of those – technical considerations, our deep basin boundaries, and where we go from here.

A nonpotable deep aquifer is defined in 72-12-25 NMSA that was revised and amended during the 2009 legislature: nonpotable water has total dissolved solids greater than 1,000 ppm; and it must be deep – the top of the aquifer has to be at a depth of 2,500 feet or greater at any location at which a well is drilled; and the aquifer can only contain nonpotable water.

Let's talk a little bit about its history. Nonpotable deep well statutes were signed into law in 1967. Back then the driving force for the passage of statutes 72-12-25 through 28 was the oil and gas industry. Oil and gas operators in the southeastern part of the state in the Capitan Reef were concerned that they would be pulled into the Pecos Compact and that's the reason the laws were passed. In 1997, the first deep well was drilled under the statutes by Midway Ranch Ltd. in the Rio Puerco area west of Albuquerque.

Just this past year House Bill 19 amended section 72-12-25 to extend the state engineer's jurisdiction to non-exempt uses within declared nonpotable deep basins; the exempt uses are oil and gas, prospecting, mining, road construction, agriculture, electrical generation, industrial process, and geothermal uses. The amended legislation is only a page and a half and I want to read from section 1: "Declaration of a Basin -- Nonpotable Deep Aquifers - an undeclared deep water basin having reasonably ascertainable boundaries" –

which is a key phrase – "that consists of an aquifer, the top of which has a depth of 2,500 ft or more below the ground surface at any location at which a well is drilled, and which aquifer contains only nonpotable water, is subject to state engineer administration in accordance with section 72-12-25 through 72-12-28" and part B of that is "if the state engineer declares the type of the groundwater basin described in subsection A of this section, all appropriations of nonpotable water for…" – and it goes on to list several exclusions that I just mentioned.

House Bill 19 was passed during the 2009 Legislature and amends Section 72-12-25 NMSU 1978, removing certain limitations in existing law for the state engineer to administer deep nonpotable groundwater; it requires the state engineer to declare the basin; requires that the aquifer top is 2,500 feet below the ground surface; requires a water quality TDS greater than 1,000 ppm; and it is limited to municipal use. We haven't decided how we are going to declare those underground deep water basins yet. The other issue concerns the TDS greater than 1000 ppm.

Concerning our procedures and Notices of Intent, Table 1 (see end of paper) is a spreadsheet tracking notices filed as of April 29 of this year. The table reports the Notices of Intent, the date filed, the file number, number of wells, application, quantity of water, depth, and the number of wells that actually have been drilled. The summary at the bottom of the table indicates that notices were filed for appropriating 1.7 million ac-ft of brackish water annually and that wells vary from 2,500 to 12,000 feet in depth. The table indicates that only seven wells have been drilled, two of them are actually oil and gas wells. You'll note from the table the well completion dates and the county in which they reside. The first filing was in 1997 by Midway Ranch, Ltd. Some were filed in 2006, one in 2007, many in 2008, and as we started the 2009 legislative session, there were many filings. You'll also note from the table that in some instances, like the one with a filing for a quantity of 110,000 ac-ft, many are very speculative; the intent was to put a claim in with respect to those deep water sources. By the time the session was over, the last day in March, there were 607 proposed wells for over 1.7 million ac-ft/yr.

Figure 1 is our Notices of Intent map. The map is interesting as you can see that most notices for wells filed are near New Mexico population centers with the majority of the activity in the Middle Rio Grande. As you go up to the San Juan Basin there have been some filings, some around the Santa Fe area, Curry County, and Portales. The map's legend lists all the particular basins and the notices that have been filed. We have a few down in the Salt Basin, some around Tularosa and the Las Cruces area, and some in Lea County. So there is a statewide dispersion of filings but the vast majority are in the Middle Rio Grande area.

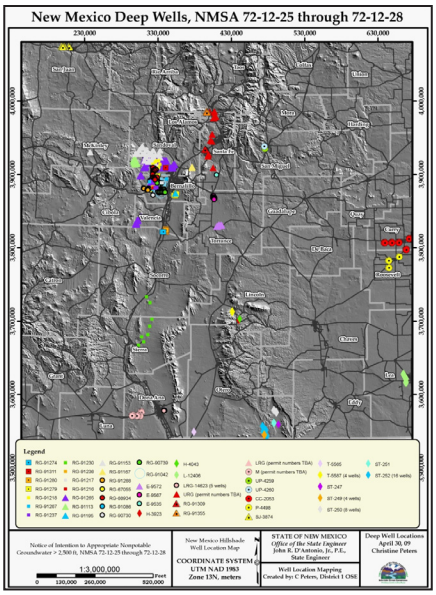

Figure 1. New Mexico Deep Wells, NMSA 72-12-25 through 72-12-28

For comparison and so that you can understand the magnitude of the numbers: the City of Albuquerque uses about 100,000 ac-ft/yr of groundwater, Las Cruces uses 18,500 ac-ft/yr, Rio Rancho uses 11,000 ac-ft/yr, City of Santa Fe uses about 10,000 ac-ft/yr, and statewide we use about 4 million ac-ft/yr, of which about 47 percent is groundwater, which is about 1.9 million ac-ft of water. The Rio Grande flow at Otowi is about 1 million ac-ft/yr. You can see the magnitude of these notices if they were all to come to fruition.

The challenges of deep well legislation include the many Notices of Intent filed for a lot of water. What is the legal significance of these Notices of Intent? Are they Notices of Intent to drill or to appropriate? Regarding the requirement for the state engineer to declare a basin – do we look at those of which there are about 39 or 40 existing basins or do we consider fewer basins defined as structural basins, and based on hydrogeologic knowledge? We have those concerns and we must develop a strategy for proceeding.

Current OSE administrative procedures require interested parties to submit a Notice of Intent before you drill, an exploratory permit application – and all wells need to be completed to artesian well specifications – and publication of a notice in the newspaper with an affidavit. After drilling, you must submit well records, water quality results, and meter readings on a quarterly basis. Although these are not permits with conditions, there are still requirements.

Looking at administrative procedures in the future, within the OSE Declared Deep Groundwater Basins, unless you qualify as an exempt party, you file a normal application to appropriate under the 72-12-3 statute, which is the statute you use for a water right appropriation. The exempt uses as mentioned earlier include: oil and gas exploration and production, prospecting, mining, road construction, agriculture, generation of electricity, use in industrial processes, or geothermal use. Which basically leaves municipal use as the only non-exempted use.

Concerning technical considerations; right now to be qualified under nonpotable deep well statutes, certain aquifer criteria must be met for depth, nonpotability, and hydraulic separation from the overlying aquifers. Statute 72-12-27 allows the New Mexico OSE to require submittal of pertinent data, and ongoing submittal on a quarterly basis for metered withdrawals and water chemistry. Wells must be constructed by New Mexico licensed well drillers from the surface to a depth that is appreciably into the first confining layer encountered below 2,500 ft. Figure 2 shows a geolograph on one of the Rio West rigs capable of recording penetration rate, weight of drill string, depth, and time. This machine helps indicate when the bit is worn and when to make replacement decisions.

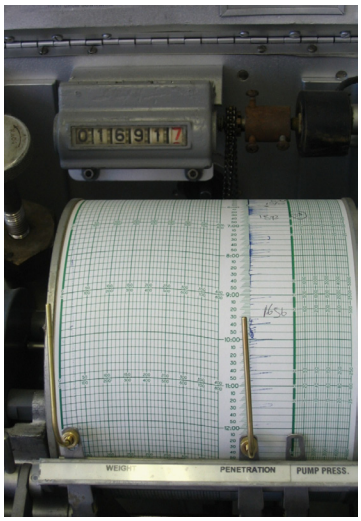

Figure 2. Technical Considerations for Deep Wells

The definition of an aquifer is a geologic formation, part of a formation, or group of formations capable of storing and transmitting water in economic quantities to wells. The information from previous deep drilling is important; we look at the logs of oil tests and sometimes that is the only information that is available. We also look at geologic maps and cross-sections. During and after deep well drilling, information obtained from various logs is used to determine top of aquifer and casing set depth. Logs are typically used in concert to interpret lithostratigraphic relationships. Hydrogeology at depth is typically unknown, so top of aquifer must be defined by stratigraphic contact. Well logs are required to demonstrate depth at which the casing is set and that a confining layer extending to below 2,500 ft overlies the deep aquifer.

Figure 3 is a cross section using information from oil test wells. This example is a plan view of the Rio West wells. We are looking down on the west basin and you will see the A to A' line, which is represented by this cross-sectional phase. We have information from some oil wells in the area that have been drilled about 10 miles apart but the information is still pretty sparse. With the distance being so far apart between data points, we have a lot of unknowns as we proceed forward.

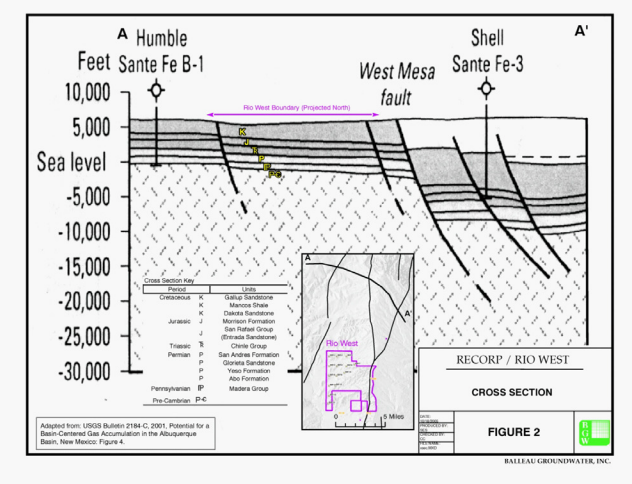

Figure 3. Information from Other Wells

Geologic maps and subsurface pre-drilling information is generally scanty and uncertain as to geology and depth, and the drilling process becomes a "wildcat" operation when trying to determine where the best place is to drill.

Figure 4 shows sample pages from a mud log with lithological cuttings and descriptions from Rio West Exploratory Well No. 6. This log showed a 1,500 ft shale confining sequence above the top of the sandstone/limestone aquifer starting at about 3,500 ft below ground. You can see the depth of 3,500 ft and as you go down, (referring to graph) the depth is increasing and you have a water producing zone in that particular area. Figure 5 is the last page of the mud log for that exploratory well and it also illustrates a well completion diagram. You can see where the cement goes down and cases the well; this is the well screen area, which is where the water would essentially come from after well completion.

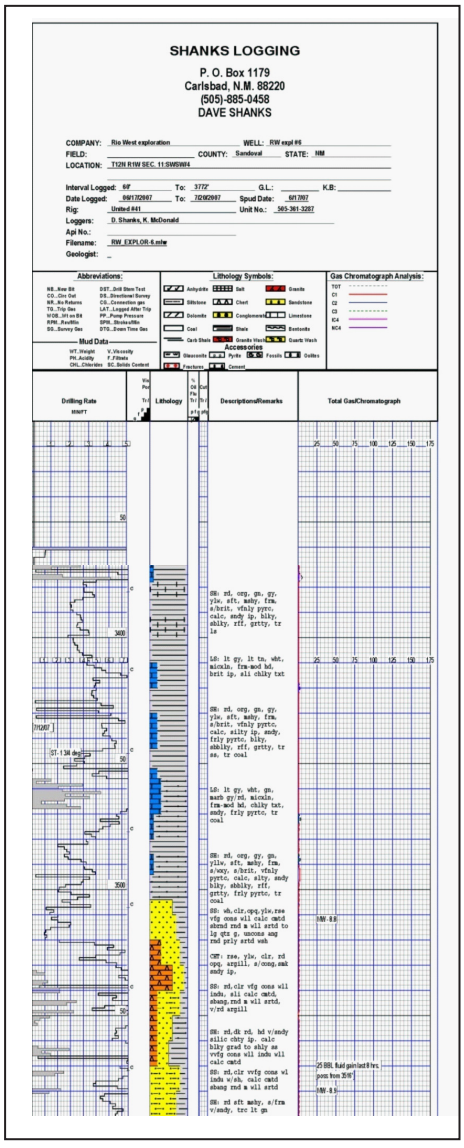

Figure 4. Drilling Mud Log & Lithologic Log

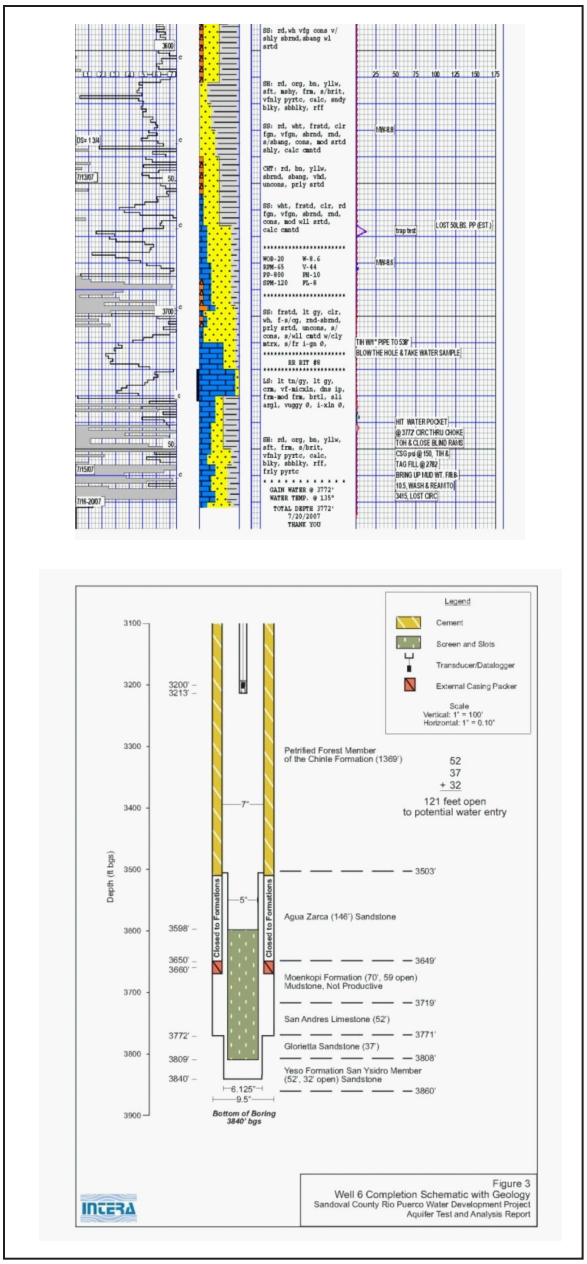

Figure 5. Well Completion Tapping Deep Aquifer

Water chemistry is important. Sampling typically follows completion of well construction, development, and test-pumping. Samples are analyzed by a certified laboratory for common cations and anions as part of a complete water chemistry analysis. This helps to identify the gross chemical make-up of the deep water. Specific analyses are done for radionuclides, arsenic, and other parameters of interest that may be requested in anticipation of cooperative agency concerns regarding use and treatment of well water as well as disposition of waste streams. The additional

analysis may also aid in establishing the hydraulic separation of the aquifer. Quarterly sampling and reporting of total dissolved solid levels as specified in statute 72-12-27 will be required once appropriations from the well actually start.

Brackish and saline water is defined as mildly brackish if the quality of water, the TDS level, is between 1,000 to 5,000 ml/L. The El Paso plant is using water with a TDS level between 1,000 and 4,000 ppm, which is pretty good quality water. We are seeing moderately brackish water wells on the west side of Albuquerque, those with 5,000 to 15,000 mg/L. Heavily brackish water contains 15,000 to 35,000 mg/L, while seawater and brine water contains greater than 35,000 mg/L.

In order to demonstrate that the deep aquifer contains only nonpotable water as required by 72-12-25, two things are necessary: 1) demonstration that representative samples of water from the aquifer at the location of the constructed deep well have TDS levels greater than 1,000 ppm and 2) demonstration that the aquifer is hydraulically disconnected from the overlying aquifers or surface water. Hydraulic separation means that the aquifer cannot have a hydraulic connection with overlying freshwater aquifers or surface water. Demonstration of aquifer separation would be supplied at the time the Notice of Intent to drill the well to appropriate nonpotable deep water is filed. Many lines of evidence may be considered to make the judgment as to the degree of hydraulic separation from other sources under OSE jurisdiction. As with the top of aquifer determination, these would be considered together. Figure 6 depicts the map and cross section showing the possible extent of the San Andres/Glorieta aquifer and fault displacement in the Rio West area. As you can see, we get into a lot of complexities when we are dealing with deep groundwater.

The well construction requirements specify that all deep wells will be considered artesian and will be required to meet the artesian specifications in the regulations. Following well construction, the well driller has 20 days in which to submit the well record. The OSE may require representative drill cuttings to be archived with the New Mexico Bureau of Geology and Mineral Resources core and cuttings archive.

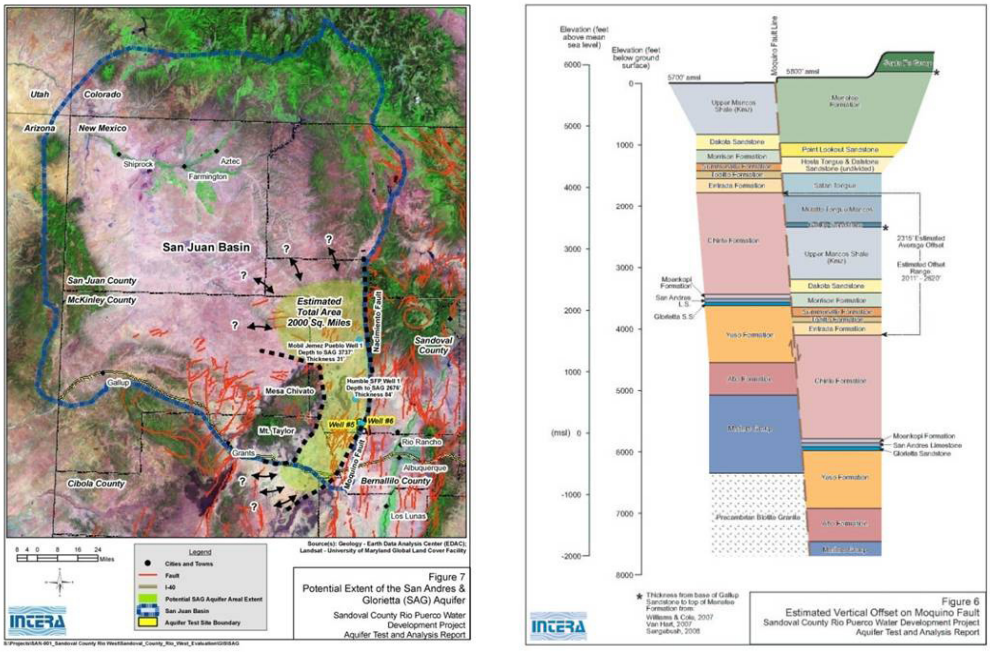

Figure 6. Map and Cross Section Showing the Possible Extent of San Andres/Glorieta Aquifer and Fault Displacement in the Rio West Area

A Plan of Operations must be submitted to the OSE but there is no filing fee associated with this. The plan contains general information on well ownership, well drillers, and well locations. As you move forward with the process, an exploratory well is drilled. Figure 7 shows the drilling of the Rio West well #6. The drill casing is staged at the right. The mud pit is beyond the rig in this photo. Figure 8 shows the trucks on site for cementing; the cement, interestingly enough, is dry and is mixed on site. Figure 9 shows the drilling mud being displaced out of the annulus by cement pumped into the casing. The mud pit was used only for waste on this job. Fresh drilling mud was added from surface tanks. Figure 10 shows that the Hubbard deep well was initially drilled on air/foam. Enough groundwater was discharged during drilling through the shallower strata that temporary effects to water levels in neighboring shallow wells were observed. The shallow aquifers penetrated by the deep well were cased and sealed off prior to drilling into the deep nonpotable aquifer.

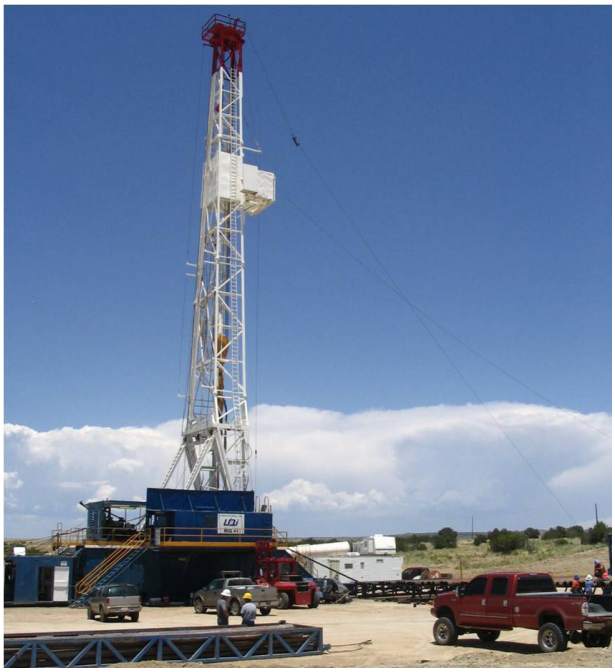

Figure 7. Drilling of the Rio West Well #6

Figure 8. Trucks on Well Site for Drilling

Figure 9. Drilling Muds being Displaced out of the Annulus

Figure 10. Hubbard Deep Well Initially Drilled on Air/ Form

Figure 11a is an interesting picture. The photo was taken in Dubai of the Burj Dubai, the world's tallest structure at 2,684 ft. The minimum length of our pipes is 2,500 ft (Figure 11b), so you can see how much pipe we are putting down into the ground. When put to scale, you can see that it is an enormous undertaking. In accordance with New Mexico regulations governing construction of artesian wells, the casing must be inspected by a representative of the OSE prior to installation and must meet API specifications or OSE approval. Figure 12 shows one of our onsite inspectors measuring casing wall thickness. Regulations require casing, cementing, plugging, and testing of artesian wells to be witnessed by an OSE representative. Note the threaded and coupled casing. Regulations specify the inside and outside diameter of the artesian casing and the number of threads per inch on threaded casing. Regulations also require the casing to be centered in the borehole. Typically this is done by using casing centralizers, installed at specified intervals along the casing to stand the casing back from the borehole wall. This allows cement to better surround the casing.

Figure 11a. The Burj Dubai, the World's Tallest Structure at 2,684 ft

Figure 11b. The Minimum Length of OSE Pipes Put in the Ground is 2,500 ft

Figure 12. An On-Site OSE Inspector Measuring Casing Wall Thickness

Figure 13 is a good photo of the cementing head. The wiper plug is in the head between the two lateral pipes. Cement is pumped through the lower pipe until the supply is exhausted, then the drill mud is pumped through the upper pipe, displacing the wiper plug downward. Figure 14 shows the cementing shoe that gets attached at or near the bottom of the casing. The wiper plug gets lodged into the opening, and the mud column behind (above) the plug gets shut inside the casing under pressure. Figure 15 depicts the activities on the mixer truck. Cement grout is sampled at the vortex mixer on the left. The control panel is monitored, and the mix is adjusted from the panel, including water, cement, and additives. Figure 16 shows grey cement starting to emerge from the annulus – some reddish mud is still visible. More cementing is necessary to achieve quality cement throughout the annulus. Another control on cementing is the wellhead safety. Figure 17 shows workers attaching the blowout preventer to the casing. And lastly, a pressure gage is used during pressure testing of the well casing to make sure there is a good seal. That is the last step in the OSE artesian well inspection process.

Figure 13. Photo of the Cementing Head.

Figure 14. Cementing Shoe

Figure 15. Activities on the Mixer Truck

Figure 16. Gray Cement Starting to Emerge from the Annulus

Figure 17. Attaching of the Blowout Preventer to the Casing

Regarding the proposed deep basin boundaries, we are referring to "reasonable ascertainable boundaries." When we look at hydrogeologic principles, we use existing knowledge; the geology and structure is also important but it is not the only factor; and there are major regional hydrologic divides between surface water and shallow groundwater that usually bound the deep basins. Figure 18 shows New Mexico's 39 groundwater basins, 40 if you separate the northern Rio Grande from the Middle Rio Grande, and where nonpotable groundwater may be found based on geophysical and well log data. We estimate that about 75 percent of the state may have nonpotable groundwater. Where shallow groundwater is nonpotable, deeper aquifers are also likely to contain nonpotable water. On the map, you can see the boundaries in yellow. The shallow groundwater flow regimes are the best available guide for delineating the groundwater flow regimes. The hydrologic connection between the deep aquifers and surface water or shallow groundwater is a matter of degree. It could be argued that most of the water, even though it is deep groundwater, it has a connection of some sort to an upper aquifer. The basin-fill aquifers already are underground water basins; the top of the aquifers is essentially a water table.

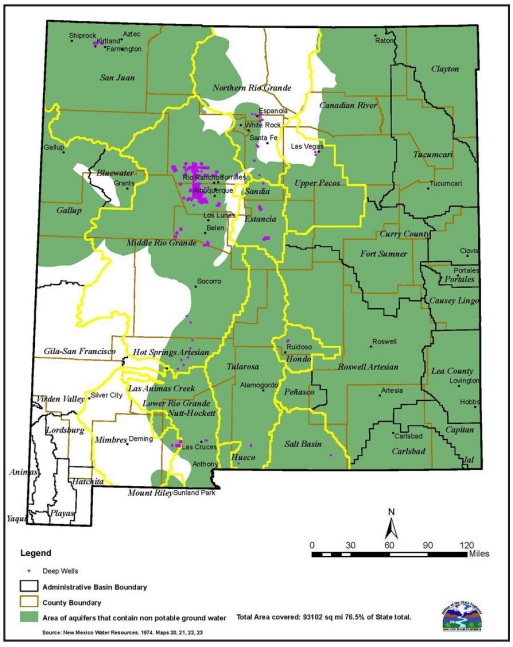

Figure 18. New Mexico's 39 Groundwater Basins

Figure 19's legend indicates the major aquifers: those in red are not considered major aquifers; the green are Basin and Range aquifers; and so on. You can see where our deep well Notices of Intent have been filed, a majority in the Middle Rio Grande. The map also indicates the proposed deep basin boundaries that OSE is looking at. This is a draft map and still a work in progress.

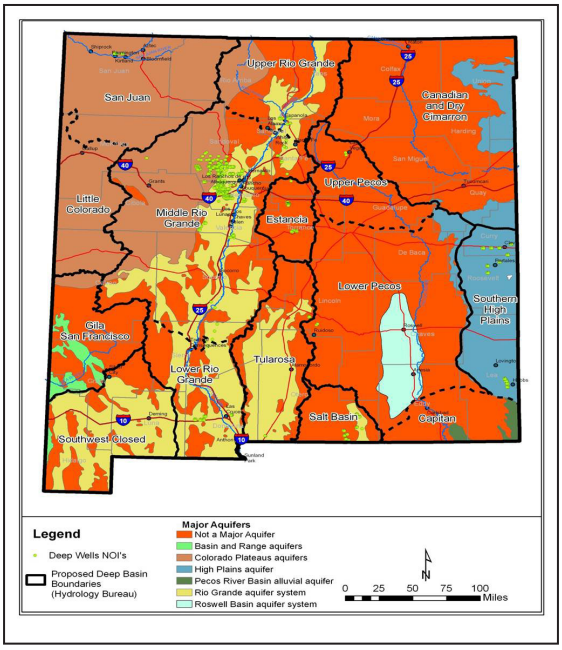

Figure 19. Legend of Major Aquifers.

Figure 20 provides some additional overlays looking at water level elevations with our proposed deep well basins. They are based primarily on regional hydrogeologic divides that generally coincide with the major rivers and stream systems within the state such as the Rio Grande, the Pecos, the Colorado, and Canadian. This is to ensure that we are looking at a strict interaction between surface and groundwater. The boundaries track declared underground basin boundaries and shallow groundwater contours relatively well. Topographic divides are modified where the hydrogeology indicates. An example is the southwest boundary of the Lower Rio Grande. The southwest corner of the state is really a groundwater basin. Going back to the 39 or 40 existing groundwater basins that we have already declared, and to meet the letter of the statute, we would have to declare deep underground water basins for all 40 declared basins. Preliminarily, we are looking at most 15 deep underground water basins with our hydrology bureaus input. I want to thank Mike Johnson the Hydrology Bureau Chief who has done a lot of work on this for the OSE. We continue to look at potential deep basin boundaries and at closed surface water sub-basins. Examples would be the San Augustine and Jornada sub-basins to be included with the dominant surface water system. If you look at the San Augustine Plains, they have been included in the Middle Rio Grande basin and the Jornada is in the Lower Rio Grande basin. We are connecting those two major water basins for administrative purposes. For the administrative division of major basins, sometimes we need to make those a little more convenient for our internal processes and our WATERS database. Thus the closed groundwater basins are declared as separate entities and still maintain protection of mined shallow groundwater. We look at those groundwater basins where we strictly have groundwater mining. In the Estancia Basin, the High Plains aquifer, and the Tularosa area, we really just have groundwater basins without surface water interactions and connections.

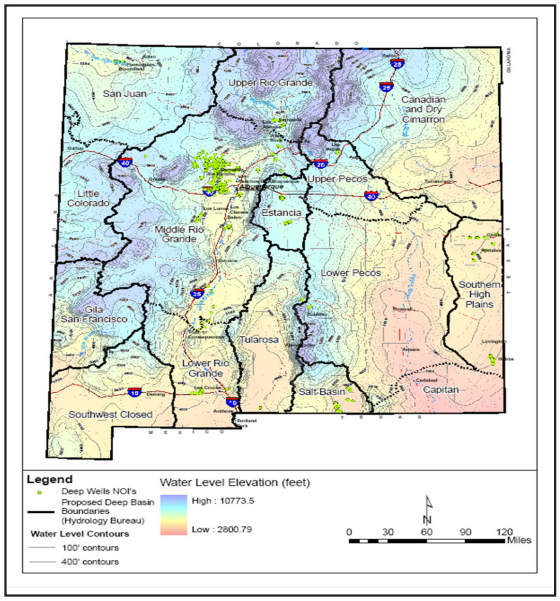

Figure 20. Additional Overlays Look at Water Level Elevations with OSE Proposed Deep Well Basins

We have many administrative concerns which include 1) protection of existing water rights of surface water and shallow groundwater and meeting interstate compact flows; 2) locations of existing Notices of Intent, which are being considered on a case-by-case basis; 3) optimizing

the public's understanding of the process once it is determined; and 4) the fact that deep aquifers may cross boundaries in certain areas like the San Juan and the Middle Rio Grande.

The important part of this presentation and the big question really is whether there is a hydraulic connection. Right now with OSE's deep basin administration, we can actually assume that all surface water is connected to the shallow groundwater, which in that case would mean that it is subject to OSE jurisdiction. If the sources are connected, there is no evidence to support the declaration of a separate aquifer. Thus, as per the law that was amended (72-12-25 as amended in 2009), we could decide not to declare groundwater basins in certain areas of the state. The OSE could reject applications for new appropriations under 72-12-3. In other words, in a fully appropriated surface water basin that is considered connected to the groundwater, then there are no new appropriations and we could reject applications on that basis. We could also reject Notices of Intent to drill, which are submitted pursuant to that same law that was amended. Again, if there are not two distinct aquifers, shallow and deep, then this statute does not apply, and we could reject those applications.

If there is a hydrologic connection, effects could be calculated and compared to reasonably conservative thresholds. There is a procedure that has been used in Colorado for what they call non-tributary groundwater. In 1985, Colorado's Senate Bill 5 provided a framework to guide the appropriation of groundwater in the Denver basin – if you are familiar with the Denver basin, you know there is a layered aquifer system consisting of four stacked layers that are all producing groundwater. These are separated and confined basins, and as you go below the four layers, there is another source of deep water. In 1986, the Colorado State Engineer adopted rules to carry out the provisions of that Act. The definition of non-tributary is that the measured effect on the surface water system must be below a statutory threshold for the groundwater in that location. Non-tributary groundwater may be used without developing a plan for mitigating effects to the surface water system; which means if it isn't considered tributary, you can pump that water, use it, and you will not affect the surface water supply due to an allowable threshold. The threshold in this particular case limits annual withdrawals to 1 percent of the amount of water that underlies the owned land. So if you look below the four layers into the deep aquifer knowing the area of the owned land and an estimate of the depth of aquifer below the 4 layers, you can calculate a volume. If you can stay within 1 percent extraction of that volume per year, you essentially have a 100-year water supply and staying below that threshold, you are able to use that water without having to offset the effects on the surface water supply. This is an interesting scenario and it is not uncommon with what we do with groundwater basins, such as critical management areas, where we limit the amount of water we take from those basins. Interestingly, there has only been a handful of these deep wells drilled so far. The deep wells in the Hondo basin (Hideout Wells) require offsets for projects that exceed thresholds. We are still in our infancy in establishing thresholds but quite frankly, it makes sense to say there are hydrologic connections and we need to account for cumulative effects.

Prior to 2009, the statute lacked clarity. An offshoot of this was that the State Engineer could recognize the right to drill a well and put water to beneficial use within a reasonable period of time pursuant to Notices of Intent that had been filed and published prior to the 2009 amendments. Also, if major surface water basins are determined to be hydraulically connected, that would leave only a few groundwater basins that could be declared as deep basins. I want to caution you that the shallow groundwater could also be hydraulically connected to the deeper groundwater in certain areas.

Our next steps Include: 1) declaring nonpotable deep water aquifers if technically defensible; 2) determining the legal significance of the Notices of Intent filed and published prior to 2009 (are they actually Notices to Drill or are they Notices to Appropriate?); 3) formalize procedures for filing applications to appropriate water from deep aquifers; 4) formalizing procedures to manage drilling and reporting of deep wells; 5) setting a well-defined process to facilitate development of deep nonpotable resources while protecting water rights and compacts; and 6) recognizing that the economics of development will limit irrational exuberance in using deep aquifer water in the near term.

The last item listed is probably the most important. There are economic limitations to development and to borrow from Alan Greenspan, there is "irrational exuberance" here. If you look at all the filings that occurred in 2009, I would call that irrational exuberance because in reality the

process is very expensive and time consuming. The OSE should have ample time to get a handle on the processes and we will establish procedures for utilizing this groundwater making sure the proper protections are in place for existing uses.

Thank you.

Table 1. Notices of Intent

Notices of Intent

NOI's for Deep Weels Filed Under Section 72-12-25 thru 72-12-28 NMSA

Notice of Intent file date	File number	Number of wells	Applicant (s)	Quant. (afa)/ combined	Depth (ft)	# of Wells Drilled	Well completion date	County
08/20/97	RG-67055	1	MIDWAY RANCH LTD PARTNERSHIP	400	2792	1	1997	Bernalillo
06/16/06	RG-88934	14	RECORP & MATACAN	16,000	3000 to 6000			Sandoval
02/22/07	RG-88934	7	RECORP& MATACAN PROPERTIES	8,000	3000 to 10000			Bernalillo
10/24/07	H-3923	1	THE HIDEOUT		3102 to 3600	1	Incomp.	Lincoln
10/13/07	H-4043	1	THE HIDEOUT	300	3500	1	2008	Lincoln
01/16/08	RG-88934	14	SANDOVAL, COUNTY, RECORP, BUTERA, CARINOS, & TESORO	16,000	3000 to 10000	2	2007	Sandoval
07/16/08	RG-90730	1	COMMONWEALTH UTILITIES CORP	110,000	5000			Bernalillo
07/23/08	RG-90739	35	ARTISCO OIL & GAS LLC	12,000	3500 to 10000	2	2007	Bernalillo
09/29/08	E-9535	1	ZORRO TRUST	500	3500			Santa Fe
10/29/08	RG-91042	46	WETLAND DEVCO LP	15,000	2500 to 10000			Bernalillo
11/26/08	RG-90186	17	KING BROTHERS RANCH	25,000	2500 to 10000			Sandoval
12/08/08	RG-91113	20	L BAR ENERGY LLC	10,000	3000 to 3500			Sandoval
12/30/08	RG-91167	2	DIAMOND TAIL LIMITED	100	2500 to 5000			Sandoval
01/02/09	RG-91153	11	SANDOVAL COUNTY	32,000	3000 to 10000			Sandoval
02/18/09	RG-90739	31	ATRISCO OIL & GAS LLC	15,000	3500 to 10000			Bernalillo
12/31/08	LRG-14623	5	CITY OF LAS CRUCES	5,000	5000 to 6000			Dona Ana
01/26/09	ST-247	1	SWEETWATER RISING LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Otero
1/26/09 & 2/6/09 & 3/5/09	T-5565	3	DOWN LOW LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500-10000			Otero
1/26/09 & 3/5/09	URG	3	HARMONY WELL INC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Sante Fe
01/26/09	URG	1	PHOENIX & AVRIEL LLC	15,000	2500 to 10000			Sante Fe
01/26/09 & 3/5/09	URG	3	ELDORADO MINES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Santa Fe

01/26/09 & 03/5/09	URG	3	SAN JUAN PEAKS LLC FOR THEBENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Santa Fe
01/26/09 & 03/5/09	URG	3	MONUMENT VALLEY LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Santa Fe
01/28/09 & 3/5/09	URG	3	GROUNDED & POLITE LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Sante Fe
01/28/09 & 3/4/09	RG-91195	3	GROUNDED & POLITE LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Bernalillo
02/16/09	RG -91218	10	SANDOVAL COUNTY & COMMISSIONER OF PUBLIC LANDS	19,000	3000 to 10000			Sandoval
02/16/09	RG-91217	4	THE NOT SO DEAD SEA LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Bernalillo
02/10/09	RG-91216	1	RIO PUERCO DEVELOPMENT	100,000	2500 to 6500			Bernalillo
02/18/09	RG-90739	24	ATRICSO OIL & GAS LLC	15,000	3500 to 10000			Bernalillo
02/19/09	URG	4	CAJA DEL RIO PARTNERSHIP	100,000	>2501			Santa Fe
02/24/09	RG-91230	6	NM RANCH PROPERTIES INC	3,000	2600 to 12000			Sierra
02/24/09	RG-91230	2	NM RANCH PROPERTIES INC	1,000	2600 to 12000			Socorro
02/24/09	E-9567	19	MORIARTY LAND & CATTLE INC	25,000	2500 to 10000			Torrance
02/24/09	RG-91236	3	ARMIJO LAND LLC	1,000	3000 to 10000			Bernalillo
02/24/09	RG-91237	6	PAINTED DESERT LLC	2,000	3000 to 12000			Bernalillo
02/27/09	UP-4259	1	MILLIKEN RANCH INC	10,000	3000			San Miguel
02/27/09	UP-260	1	MILLIKEN RANCH INC	10,000	3000			San Miguel
03/10/09	RG-91265	12	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			Valencia
03/10/09	E-9572	12	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			Torrance
03/10/09	SJ-3874	12	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			San Juan
3/10/09	L-12406	16	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			Lea
03/10/09	CC-2053	20	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			Curry
03/10/09	P-4498	12	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			Roosevelt
03/11/09	M	16	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	25,000	2500 to 10000			Dona Ana
3/12/09 & 4/28/09	RG-91265	13	SAN JUAN PEAKS LLC FOR THE BENEFIT OF THE CIMMISSIONER OF PUBLIC LANDS	65,000	2500 to 10000			Bernalillo

03/12/09	RG-91267	10	SAN JUAN PEAKS LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	50,000	2500 to 10000			Bernalillo
03/13/09	RG-91268	17	MONUMENT VALLEY LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	85,000	2500 to 10000			Bernalillo
03/13/09	RG-91280	2	KJJRJ LLC	10,000	2500 to 10000			Valencia
03/13/09	RG-91280	4	KJJRJ LLC	20,000	2500 to 10000			Valencia
03/13/09	RG-91274	2	HAT CREEK CATTLE CO LLC	10,000	2500 to 10000			Socorro
03/13/09 & 4/28/09	RG-91265	38	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	190,000	2500 to 10000			Sandoval
03/16/09	URG	3	CITY OF ESPANOLA	1,500	3000 to 3000			Rio Arriba
03/16/09	RG-91355	4	CITY OF ESPANOLA FOR THE BENEFIT OF THE COMISSIONER OF PUBLIC LANDS	2,000	3000 to 8000			Rio Arriba
3/13/09, 3/16/09 & 4/28/09	RG-91265	32	NATURAL BLUE RESOURCES LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	160,000	2500 to 100000			Sandoval
03/16/09	URG	1	BRADLEY A. AITKEN	25,000	2500			Santa Fe
03/16/09	ST-251	4	SCHAFER	16,000	2500 to 10000			Otero
03/16/09	T-5587	4	DUGGAR TRUST	6,500	2500 to 10000			Lincoln
03/16/09	ST-252	16	Y BAR RANCH LLC	64,000	2500 to 10000			Otero
03/16/09	ST-250	8	GEORGE & BARBARA RAUCH	32,000	2500 to 10000			Otero
03/16/09	ST-249	4	WAVERLY DUGGAR	16,000	2500 to 10000			Otero
03/17/09	RG-91279	5	MESA DEL SOL LLC	14,500	2600 to 12000			Bernalillo
03/19/09	RG-91309	3	SANTA FE CANYON RANCH LLC	2,000	2500 to 10000			Santa Fe
03/23/09	RG-91311	1	BREEZY POINT LLC FOR THE BENEFIT OF THE COMMISSIONER OF PUBLIC LANDS	15,000	2500 to 10000			Sandoval
04/02/09	RG-91153	25	SANDOVAL COUNTY	40,000	3000 to 10000			Sandoval
	Total	607		Total	1700,800			

Last updated 4/29/09 by C. Peters