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DOMESTIC WELL DEPLETIONS IN THE RIO GRANDE BASIN

Section 72-12-1 of the 1978 Compilation of New Mexico Statutes tells us that:

> "…[b]y reason of the varying amounts and time such water is used and the relatively small amounts of water consumed in the watering of livestock, in irrigation of not to exceed one acre of noncommercial trees, lawn or garden; in household or other domestic use, and in prospecting, mining or construction of public works, highways and roads or drilling operations designed to discover or develop the natural resources of the state of New Mexico, application for any such use shall be governed by the following provisions:
>
> Any person, firm or corporation desiring to use any of the waters described in this act for watering livestock, for irrigation of not to exceed one acre of noncommercial trees, lawn, or garden; or for household or other domestic use shall make application or applications from time to time to the state engineer on a form to be prescribed by him. Upon the filing of each such application, describing the use applied for, the state engineer shall issue a permit to the applicant to so use the waters applied for.

"The State Engineer shall issue a permit..." There is no provision for public notice or hearing, or for any investigation on the subject of impairment of existing rights. Diversion from the wells is not measured, in most cases, and is not subject to New Mexico's prior-appropriation system. The depletion of the flow of rivers that results from the pumping is not the responsibility of the owners of the wells. The cost in terms of stream-flow depletion is borne by the holders of surface-water rights, which may be senior to the domestic-well right by 100 years or more. For administrative purposes, the annual diversion from one of these wells is limited to 3 acre-feet, which, in most of New Mexico, is enough to irrigate a one-acre garden. Nobody really knows how many of these wells for domestic supply have been drilled. Earlier hydrographic surveys, in preparation for

stream adjudication, did not take these wells into account.

This feature of the groundwater law has been with us from the beginning. The original attempt to bring groundwater under the State's water-rights administration was in 1927, in a law that declared the waters in "underground streams…" to be public, and subject to appropriation (Laws 1927, chap. 182). The 1927 law explicitly exempted water for domestic and stock-watering use from its provisions. When the 1927 law was repealed and replaced in 1931 (Laws 1931, chap. 130), there was no explicit exemption for water for domestic use, but the 1931 groundwater law applied only to "irrigation or industrial uses," and therefore left domestic and stock-watering uses unregulated. The current language in §72-12-1, affirmatively exempting small-scale domestic use, and many other uses besides, was added in 1953 (Laws 1953, chap. 61).

It accords with our ideal of Western self-reliance that each householder is guaranteed the right to develop his own water supply on his own land, without any interference by the state government. On the other hand, in providing the guarantee, we simultaneously take away much of the state's obligation to protect the right: another householder can come along and drill a well on his land, even if it happens to be just across the fence.

Is the aggregate pumping of "relatively small amounts of water" from domestic wells properly considered a *de minimis* water use, "trifling; minimal; so insignificant that a court may overlook it in deciding an issue or case," to use the definition from Black's Law Dictionary? The §72-12-1 permits limit diversion from each well to 3 acre-feet (977,553 gallons) per year, equivalent to a constant pumping rate of 1.86 gallons per minute. Although the actual average use is surely much less than even that tiny rate, the aggregate pumping still represents a significant amount of water.

Wilson and Lucero (1997, Table 5) estimate that total diversion from the §72-12-1 wells in the Rio Grande drainage basin (the Rio Grande and Lower Rio Grande Underground Water Basins combined) during 1995 was 19,318 acre-feet.This is equivalent to 2.9 percent of all groundwater diversions in the river basin, and about 0.9 percent of groundwater and surface-water diversions combined. The diversion from §72-12-1 wells in New Mexico's part of the Rio Grande drainage basin was about equivalent to the combined 1995 diversions by Santa Fe (12,560 acre-feet), Española (1,102 acre-feet), and Los Alamos (5,836 acre-feet). It was about the same as Las Cruces' diversion (19,071 acre-feet). In New Mexico as a whole, Wilson and Lucero estimate that domestic self-supplied water use (diversion) was 29,732 acre-feet in 1995, 0.67 percent of all withdrawals.

The population supplied by §72-12-1 wells (rural and urban self-supplied) was estimated at 192,028, or about 16.3 percent of the population of the Rio Grande basin. Wilson and Lucero (p. 13) based their estimates of water use on population data, assuming diversion of 70 to 100 gallons per capita per day (gpcd), depending on climate and the prevalence of indoor running water, for the segment of the total population that is not served by public systems. At the nationwide average rate of occupancy of 2.7 people per dwelling unit (p. 12), these diversion rates represent a range of 0.21 to 0.30 acre-feet/year per dwelling. The overall average rate of water use implicit in Wilson and Lucero's estimates is 0.27 acre-feet/year per dwelling.

It is difficult to quantify depletion, the water actually lost to evaporation, and therefore the return flow that would be available to other users. Wilson and Lucero (1997, p. 13) assumed a uniform rate of 45 percent depletion, implying that 55 percent of the water produced from the domestic wells can be considered return flow. The disposition of wastewater in areas served by these domestic wells is commonly to septic tanks. In some settings, particularly where the water table is very shallow, the return flow can be more than 90 percent of the amount diverted, but in many places in New Mexico the return flow from septic tanks serves only to increase the moisture content of the soil and does not reach the water table. The water "returns to the groundwater system," to borrow the language of the condition in some groundwater permits, but it will not be available to other appropriators. It seems likely that the actual average rate of return flow is less than 55 percent, and that the depletion is more than 45 percent of 19,318 acre-feet/year, or 8,693 acre-feet/year.

Because the return flow related to domestic wells usually consists of septic-tank effluent, a

DOMESTIC WELL DEPLETIONS IN THE RIO GRANDE BASIN

high rate of real return flow, which looks good from a water-rights perspective, may simply mean that well-owners are pumping each others' wastewater.

The negative aspects of the §72-12-1 wells are most evident where they are most concentrated. Peterson (1999, p. 66) estimates that there have been 2,000 permits issued in the Sandia Underground Water Basin; annual diversions from them may constitute some 28 to 34 percent of the total water produced in the basin, but nobody knows for sure. Many of the wells predate the declaration of the basin (in 1966), and permits are still being issued. It seems probable that many of these wells interfere with each other, but there is no priority administration and the senior domestic rights are protected only from the effects of larger withdrawals that are subject to the State Engineer process, not from the combined effects of other §72-12-1 wells. The task of protecting the senior domestic rights has generally fallen to the counties; they have done it by regulating the sizes of lots in new developments.

In Placitas, a recent study by Peggy Johnson of the State Bureau of Mines and Mineral Resources shows that in some relatively small areas, where there is a relatively high density of wells and the aquifer system is made up of low-permeability rocks, water levels have declined several tens of feet over the years. In a part of southern Santa Fe County in which the supply is largely from §72-12-1 wells, water levels have declined in many individual wells.

Aside from water-rights questions, the individual wells pose some danger to their users, in that they are more likely than public-supply wells to capture septic-tank return or other contaminated water. State and county environmental regulations are an effort to avoid this problem, but they cannot be as effective as the well-siting studies, the required regular sampling and analysis, and the wellhead-protection programs that go along with public-supply wells.

The number of §72-12-1 wells must be prodigious. If the estimates of 19,318 acre-feet/year diversion, and 0.27 acre-feet/year diversion per dwelling, are more-or-less correct, then there would be about 72,000 wells in the Rio Grande basin. This number seems very high, until one reflects on the rough inventories that have been made. Just in the semi-urban area southeast of Santa Fe, for example, the State Engineer records show about 1,500 wells; there are estimated to be 3,100 wells in the Santa Fe River basin itself; and there are about 650 wells in the Pojoaque area. The sequential numbering of files in the Rio Grande Basin reached RG-72800 this past September, and that represents only the transactions since the basin was declared in 1956. In the Lower Rio Grande Basin, which was not declared until 1980, the file numbers have reached LRG-10600. Of course these file numbers include all kinds of wells and water rights, and permits for wells that have never been drilled, but perhaps 60 to 70 percent of them represent §72-12-1 wells.

If all of the wells did actually produce the full 3 acre-feet/year available to them, then the total would amount to something like 216,000 acre-feet/year–a very significant part of the total water resource of the basin. Everyone seems to agree that the average actual use now is far less than 3 acre-feet/year, probably something close to the 0.27 acre-feet/year implied in Wilson and Lucero's study, but the potential is there for a lot of expansion of gardening, and of water use. It seems absurd, in this time of peace and prosperity, to bring up the subjects of victory gardens and economic distress sufficient to cause a large increase in garden acreage, but both of those conditions have existed within living memory; if they happen again, there will be a significant increase in depletions by domestic wells.

In percentage terms, the §72-12-1 wells may seem to be of minor importance. On the other hand, a consumptive use of even as little as 3 acre-feet/year is surely not *de minimis* in the Gila-San Francisco Underground Water Basin, where a U.S. Supreme Court decree (in Arizona v. California) requires that there be no new depletions. Here, the §72-12-1 permit is for "inside use" only, and transfer of an existing water right is a prerequisite for irrigation of any garden. The aggregate annual diversion of 19,318 acre-feet/year from the Rio Grande Basin would certainly not be considered *de minimis* by anyone if it all happened in one place on the Rio Grande, rather than being broadly dispersed. Withdrawals from §72-12-1 wells would perhaps not be *de minimis* where there are enough of them in one area to cause rapid water-level declines and mutual impairment, as seems to be happening in some

parts of New Mexico that are popular for semi-rural development.

Although we do not subject ourselves, at least as rural and semi-rural dwellers, to much meddling in our water supplies by state government, we self-reliant westerners insist on great care in the administration of the prior-appropriation system when it comes to water use on even a slightly larger scale. Applications for as little as a few acre-feet per year have been protested.

It's easy to imagine a situation in which a group of people own all of the surface-water rights in an area, including the water available in the irrigation system, but not all of the land that lies above the irrigation ditches. If land above the ditches is subdivided, and dotted with §72-12-1 wells, then the resulting depletion of surface water will be a loss to the surface-water owners. Indeed, this situation has developed in many places in New Mexico. Strictly speaking, it more resembles theft than western self-reliance. Perhaps it would be more equitable for the subdivider to acquire water rights to offset the surface-water depletion.

The State Engineer allows the estimated in-house use of water from §72-12-1 wells, usually at the rate of 0.067 acre-feet/year per person (0.18 acre-feet/year for the typical 2.7-person household), to be pooled to provide water rights for the formation of mutual-domestic central systems, while the wells themselves may continue in use for irrigation of the gardens. In theory, no more water-use will result, but in this subtle process a new water right, in an already fully appropriated stream, springs into being.

Some attempts to regulate domestic wells seem oriented toward controlling development itself, rather than remedying a perceived inequity in terms of water rights. A proposed ordinance in Sandoval County, which reflects the intensity of development based on individual §72-12-1 wells in and near Placitas, would generally limit new wells to "sustainable" or "impact-free" categories. A sustainable well is one for which diversion-less-return-flow would not exceed the recharge to the aquifer within the tract being supplied; an impact-free well would have "negligible impact" on all existing wells, springs, and creeks within a mile of the well and all properties served by it. Neither of these standards, while they may seem rather strict, addresses the fundamental water-rights issue. The hydrologic reality, of course, is that a "sustainable" well or a well that has "negligible impact" still represents a net loss of water from the basin, a loss for which there is no water-right accounting. The word "negligible" in this context remains to be defined.

In most places in New Mexico, and setting aside the question of strict adherence to the principal of prior appropriation, perhaps the water-rights effect of a §72-12-1 well really is *de minimis*. Where the aquifer is not stream-connected, or wells are distant from a river, and especially where the aquifer is relatively permeable and the number of wells per square mile is small, the influence in terms of drawdown in other wells, and depletion of streamflow, may well not be worth the State Engineer's effort to regulate.

It can certainly be argued that the same people would need about the same amounts of water, whether they are connected to a regulated system or have their own domestic wells, and the larger number of domestic wells spreads the drawdown effect over more area and thereby lessens the drawdown near larger production wells by some increment. If there are uncomfortably large water-level declines here and there, because some wells are tapping aquifers with very meager yield, this may simply be the price of independence.

The domestic-well exemption has some practical advantages: the permits are not much trouble for the State Engineer to issue, requiring no investigation, notice, or hearing, and therefore can be issued quickly and at low unit cost. The homeowner can proceed without the unpredictable delay and cost associated with the State Engineer process. Proliferation of shallow, private wells has another marginal advantage in some areas, particularly in the developing world: pumping of water from shallow wells tapping the aquifer near the water table, which in semi-urban and urban areas is often contaminated, helps to protect–at least for a while–the deeper part of the aquifer, which is tapped by the public-supply systems.

It would be a fairly simple matter to define large areas of the state in which the present rules might continue to work well enough. For most of New Mexico, perhaps the only practical change needed is a strengthening of the well-construction and well-record requirements, as will be discussed below. It may also make sense to set the face-value of these *de minimis* domestic permits at

some amount closer to the actual household water requirement, rather than the 3 acre-feet/year, not offering each applicant the right to irrigate a one-acre garden. The proposed Sandoval County ordinance would set the amount at one-quarter of an acre-foot per year.

Some more effort toward education of the drilling contractors licensed by the State Engineer would probably be helpful. One difficulty with the §72-12-1 wells is that their characteristics, and particularly the amounts of water pumped from them, are only very poorly known. It is these wells, of course, that would provide broad geographic coverage of geologic and groundwater information, if the information were reliable. The State Engineer requires a well record for each new well, but the lack of accuracy of these records is legendary.

Well locations are customarily given with a precision no better than the nearest 10 acres, and the space for reporting the land-surface elevation is almost always left blank, so that the water-level information has limited usefulness.

Just a little more information about each well would be of great value. For example, instead of guessing at the well location, or giving a lot number in a subdivision (so that it will be necessary to go to the court house and look at the subdivision plat in order to find out where the well is), an investment of a few hundred dollars in a pocket GPS receiver would enable the driller to report an acceptably accurate location. A good elevation is harder to come by, but with a sound GPS map location, either the drilling contractor, or someone coming along later to use the data, can interpolate the elevation reasonably well from the topographic map.

The well record includes a blank in which to report the capacity of the well, but one never knows whether this estimate is based on actual pumping, or is simply a guess; or, if the well was indeed pumped, whether the capacity was limited by the aquifer's characteristics, the well's construction, or the choice of pump. There is almost never any indication of the drawdown required in order to produce water at the estimated rate. Only a little information about the aquifer can be deduced.

It would be easy to dramatically increase the usefulness of all this domestic-well drilling for our understanding of the resource, and the extra cost would be almost nothing in most cases. A few words in the well-record about how long the well had been pumped, and how the pumping rate was measured, together with a measurement of the depth to water at the end of the period of pumping, would make all the difference.

It's hard to think of a reason why we are better off not knowing these things, except that a little more effort on the part of drilling contractors and rural and semi-rural homeowners would be required. The water-well industry would be capable of these improvements.

It has also been proposed that pumping from the domestic wells be metered. This would be of much value in understanding the patterns of water use in a basin, but would be very expensive to institute and administer.

A great many of the §72-12-1 wells present problems related to their construction. A weakness in the traditional way that domestic wells were, and sometimes still are, constructed is that the annulus between the borehole and the casing is left open. Often there is only a short cement seal around the casing at ground level. This configuration allows contaminated water from the surface, or from septic tank leach fields, to move down the well and sully the water in the aquifer. This can be avoided in new wells by installing a clay or cement seal around the casing, above the water table or above the uppermost casing perforations. I expect that this situation will be addressed in amended State Engineer regulations.

When a domestic well is abandoned, often the only ceremony attending the abandonment is filing of an application for a permit for a new well. Many §72-12-1 wells have been abandoned, and it can be assumed that many or most of these have not been plugged and will continue to serve as potential conduits for the movement of contaminated water, especially after the casing rusts away or collapses. The current State Engineer regulations require only that "[w]ells from which all water rights have been removed shall be plugged in accordance with Article 4-14 and 4-19.1 (OSE, 1995, §2-13)." Article 4-14, as it happens, does not really require plugging at all; abandonment of a non-artesian well is considered satisfactory if no more is done than simply capping the casing. I expect that the State Engineer will also strengthen this provision.

A problem for the operators of public-supply systems, if §72-12-1 wells are permitted in their service areas, is that people have the option of choosing to ignore the conservation efforts of the public system, while depleting the same water source by drilling their own wells. This is thought to have happened to some extent in Santa Fe during the drought of 1996, when the City's efforts to control water use through rate increases led to some new wells (Craig O'Hare, Sangre de Cristo Water Co.).

New domestic withdrawals don't fit very well with the efforts being made by some communities, particularly Santa Fe and Albuquerque, to reduce reliance on groundwater mining, and move toward sustainable supply based on diversion of surface water. The New Mexico Municipal League (1998) studied the issue in depth, and has put forward draft legislation several times since the 1970s to give control of new §72-12-1 permits to the municipalities that own their water systems. This effort has not been successful so far, but the Interim Water and Natural Resources Committee has recommended "do pass" for the 2000 session. This proposed local-option law would apply only within the municipal boundary, and only to new wells within 300 feet of the nearest water line.

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