Report on Spring 2010
Nitrate-Nitrogen Monitoring in the
Casper Aquifer Protection Area

Acknowledgements

The City of Laramie would like to acknowledge and thank those who cooperated in establishing, and participated in the Casper Aquifer Monitoring Program. Those entities include Albany County, the Wyoming Department of Agriculture Analytical Services Laboratory, and all landowners who voluntarily agreed to have their wells sampled. Without the assistance and participation of these organizations and people, the monitoring program would not be possible.

1.0 Background

In May 2008, the Laramie City Council adopted the updated Casper Aquifer Protection Plan and associated Aquifer Protection Ordinance. The updated Casper Aquifer Protection Plan (CAPP) includes several management goals for implementation within a few years' time, one of which is the implementation of a water quality monitoring program.

While the list of suggested monitoring parameters in the updated CAPP is considerably more exhaustive than what is feasible for the City to implement at this time, it was possible due to the cooperation of the Wyoming Department of Agriculture laboratory to conduct nitrate-nitrogen monitoring on 98 wells and total/fecal coliform testing on nine of those as well during the summer and fall of 2009. In addition, 52 wells (34 of which were repeat participants from 2009) were sampled n the spring of 2010 for nitrate-nitrogen. Fecal coliform testing was not conducted on the spring 2010 samples.

The nitrate-nitrogen data from the spring 2010 samples are in the report that follows.

2.0 Site Selection

In March 2010, letters were sent to landowners in the Casper Aquifer Protection Area (CAPA), as provided in a list from obtained from Albany County. These letters asked for the landowners' permission to collect a sample from their well to be tested for nitrate-nitrogen. In the interest of continued establishment of a monitoring network, the Water Resources Specialist collected samples from any site for which permission was granted. Samples were collected from a total of 52 wells, 34 of which had previously been sampled in 2009 and 18 of which were new participants.

3.0 Method

The Water Resources Specialist collected and handled samples and data in accordance with the methods outlined in the FY 2009/2010 Casper Aquifer Protection Area Monitoring Plan, in applicable SOPs.

4.0 Results

The results of all nitrate-nitrogen testing are shown in Table 1. Note, due to the desire to protect confidentiality of individual results, sites are assigned a site number according to their general location, and ownership/address information is not shared.

Well #	Sampling Date	NO3-N (ppm)		Well #	Sampling Date	NO3-N (ppm)
EG-10	4/20/2010	1.6		EG-71	5/17/2010	4.2
EG-12	5/20/2010	1.5		EG-72	5/20/2010	4.6
EG-13	4/27/2010	2.8		EG-73	5/20/2010	4.9
EG-14	5/20/2010	2.6		EG-74	5/25/2010	4.5
EG-15	5/17/2010	2.4		EG-75	5/25/2010	3.1
EG-17	5/20/2010	3.6		EG-76	5/25/2010	1.0
EG-18	4/27/2010	4.5		EG-77	5/26/2010	4.8
EG-18	4/27/2010	4.5		HJ-3	5/25/2010	0.86
EG-19	5/20/2010	1.8		HJ-3	5/25/2010	0.83
EG-24	5/17/2010	2.8		LS-1	5/18/2010	1.8
EG-25	4/12/2010	1.8		LS-1	5/18/2010	1.8
EG-25	4/12/2010	1.8		LS-12	4/29/2010	1.7
EG-26	5/20/2010	2.8		LS-12	4/29/2010	1.7
EG-28	5/17/2010	2.0		LS-13	4/29/2010	1.7
EG-29	5/17/2010	1.4		LS-14	5/4/2010	9.4
EG-35	4/20/2010	4.9		LS-15	4/29/2010	1.4
EG-49	5/17/2010	7.3		LS-18	5/18/2010	1.8
EG-51	4/20/2010	2.2		LS-2	4/29/2010	1.9
EG-54	5/17/2010	3.3		LS-20	5/26/2010	2.7
EG-55	5/17/2010	5.9		LS-22	5/4/2010	1.6
EG-63	4/20/2010	2.7		LS-3	5/18/2010	2.3
EG-63	4/20/2010	2.7		LS-6	5/4/2010	1.4
EG-64	4/20/2010	3.6		LS-6	5/4/2010	1.4
EG-65	4/27/2010	5.7		LS-8	5/18/2010	1.8
EG-66	4/28/2010	1.9		LS-9	5/18/2010	1.5
EG-66	4/28/2010	1.9		RC-13	5/18/2010	2.1
EG-67	5/17/2010	4.4		RC-14	5/20/2010	1.6
EG-67	5/17/2010	4.4		RC-2	5/20/2010	1.7
EG-68	5/17/2010	1.9		RC-2	5/20/2010	1.7
EG-69	5/17/2010	1.7		RC-6	5/18/2010	1.4
EG-70	5/17/2010	1.2		RC-8	5/18/2010	1.0

Table 1: Results of nitrate-nitrogen testing on samples collected in the Casper Aquifer Protection Area, spring 2010. Results showing for the same location on the same date are for duplicate samples collected according to the City's QA/QC plan.

Well numbers are assigned as "EG," "HJ," "LS," and "RC" according to the general geographic location of the well – respectively, East Grand, Happy Jack, Laramie South and Roger Canyon.

In the East Grand area, about 9% of wells sampled had a nitrate-nitrogen level above 5 mg/L, a smaller percentage than what was observed in the summer/fall of 2009. Outside of the East Grand area, only one well (in the Laramie South area) had a nitrate-nitrogen level above 5 mg/L. The averages for each area were as follows:

- East Grand: 3.2 ppm
- Laramie South: 2.4 ppm
- Happy Jack: N/A (only one sample)
- Rogers Canyon: 1.6 ppm

These averages are similar to those observed in the fall of 2009; however, it is worth noting that the average for the Laramie South area is skewed by one high result.

Figure 1 depicts the fall 2009 and spring 2010 nitrate levels for those wells which were tested during both sampling periods.

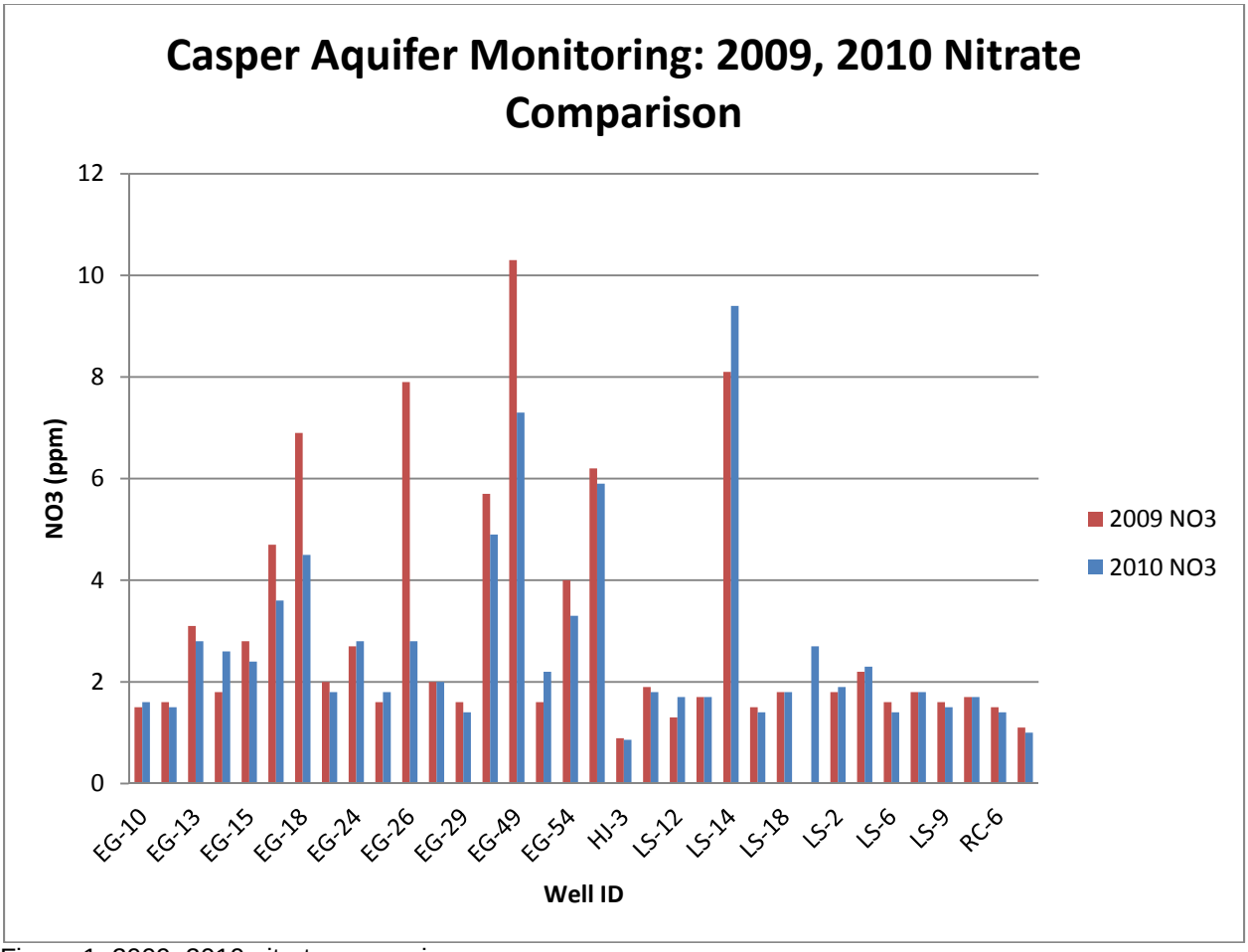

Figure 1: 2009, 2010 nitrate comparison.

Overall, it can be observed that nitrate levels were generally similar or lower in the spring 2010 sampling period as compared to fall 2009.

5.0 Conclusions and Recommendations

Data indicate that nitrate-nitrogen levels are still most elevated in the East Grand area, and analyses continue to indicate that this could be linked to the high density of septic systems in these subdivisions.

It is recommended that monitoring not only continue for nitrate-nitrogen on a biannual basis, but that additional monitoring be conducted for other parameters, including chloride and possibly caffeine and/or nitrogen isotopes to further evaluate the sources of contamination.

It is noted that while nitrate-nitrogen levels were observed to be elevated in the “East Grand” area in *private* wells, the City wells do not at this time show corresponding elevated levels of nitrate-nitrogen.

The monitoring conducted in 2009 and 2010 touched only on one contaminant of concern for the aquifer protection area: nitrate. While this is certainly an important contaminant to continue monitoring, other contaminants such as those associated with lawn care, and petroleum products and other hazardous materials that may enter the system through spills and accidents on Interstate 80, should also be monitored in the future.

Appendix

Albany County has established design and construction standards for small wastewater systems. These standards are available for download from the County's website at http://www.co.albany.wy.us/Departments/Planning/tabid/59/Default.aspx.

The State of Wyoming has established water well construction standards. These standards are available for download from the Wyoming Department of Environmental Quality's website at http://deq.state.wy.us/wqd/groundwater/index.asp.

Additional City water resources information is available on the City's website at http://www.ci.laramie.wy.us/cityservices/communitydevelopment/outreach/index.html.