



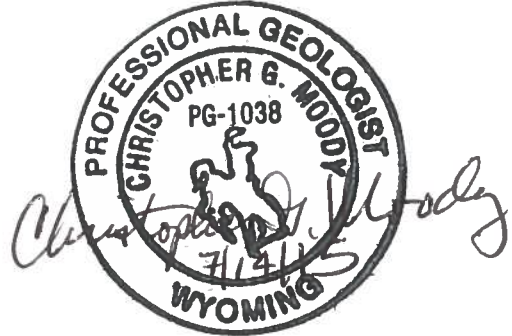
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July 14, 2015

Mr. Darren Parkin
Water Management Specialist
Community Development Department
City of Laramie
P.O. Box C
Laramie, WY 82073



Re: Technical Review of: Addendum to Site Specific Investigation White's University Motors Commercial Building Services, Inc., May 28, 2015, Wester Wetstein & Associates

Dear Mr. Parkin:

As requested by the City of Laramie, Wyoming Groundwater performed a technical review of the above referenced Addendum to the Site Specific Investigation (SSI) Report. The technical review focuses on the accuracy of report information regarding subject property geology/hydrogeology and provides the City with professional opinions regarding the proposed expansion of the parking area over the Spring Creek Ditch as it relates to the protection of the Casper Aquifer. Professional opinions provided herein are those of Wyoming licensed professional geologist Chris Moody (PG-1038).

This is the fourth review by Wyoming Groundwater of SSI-related documents pertaining to this facility (White's University Motors and formerly Laramie Ford). Previous SSI review submittals to the City are dated June 10, 2011, November 23, 2012, and June 10, 2014.

White's University Motors (WUM) is located immediately south of the City Springs enclosure (fenced area) which contains the Turner No. 2 municipal supply well, low-level reservoir, and the site of the original City Springs. The WUM facility is located in the southwest quarter of Section 35, Township 16 North, Range 73 West. This area was included in the Aquifer Protection Overlay (APO) zone and is subject to Enrolled Ordinance No. 1527 of the Laramie Municipal Code.

Background

The WUM facility is near two vulnerable features: 1) Quarry Anticline and 2) a man-made drainage channel referred to herein as the "Spring Creek Ditch" (ditch). The proposed project to extend the parking area over the ditch does not comply with the required 100 feet setback from these two vulnerable features.

Vulnerable features such as mapped geologic structures (e.g. faults and folds) and drainages are generic in the sense that there may or may not be direct evidence of enhanced vulnerability to contamination of the Casper Aquifer at a specific location along that feature. At the Spring Creek Ditch adjacent to WUM, however, there is evidence of direct hydraulic connection with the Casper Aquifer and enhanced vulnerability to contamination of the Casper Aquifer.

There is a spring in the ditch located immediately north of the WUM facility. The spring flows and dries up in response to the off/on operation, respectively, of the nearby Turner No. 1 and Turner No. 2 municipal supply wells. The behavior of the spring demonstrates that groundwater from the Casper Aquifer flows upward through the Satanka Shale and to the ground surface, and that the Satanka Shale is not an effective confining layer at this location. Given the head fluctuations in the Casper Aquifer caused by pumping the Turner wells, the Spring Creek Ditch, or portions of it, provides a direct conduit to the aquifer. The Spring Creek Ditch is a vulnerable feature that presents a high degree of vulnerability to the Casper Aquifer and the City water supply.

The proposed project involves extending the parking area northward approximately 70 feet to the City Springs enclosure fence. The new parking area would be used for the parking of sale vehicles. Spring Creek Ditch would be completely covered by an asphalt surface along the entire north edge of the property (i.e. 468 feet). As proposed, a corrugated arch culvert would be designed to allow water in the ditch to flow underneath the parking surface.

Addendum SSI Report Conclusions

The following is a list of relevant statements and/or conclusions as stated in the Addendum to the SSI.

- A variance to Laramie Ordinance No. 1527 is requested because the proposed project does not meet the 100-foot setback requirement (pg.1).
- Justification for the variance request include:
 - The proposed asphalt cover over Spring Creek Ditch provides a better barrier to the migration of contaminants into soil and potentially into the Casper Aquifer system (pg. 8).
 - If a spill were to occur, the asphalt cap allows the spill to be more effectively cleaned up and the contaminant threat removed (pg. 8).
 - The parking area will be sloped to the south away from identified vulnerable features and any contaminated run-off will be directed to the hydrodynamic separator for treatment (pg. 10).
 - The Satanka Shale and alluvial/colluvial cover in the ditch will provide a significant barrier to the downward migration of contaminated surface flow (pg. 10).
 - A similar variance was requested for the City Springs Chlorination Improvement Site (pg. 10).

- The proposed project will not pose a new or increased risk to the Casper Aquifer (pg. 11).
- Based on the size of the parking area and potential use, the risk to the Casper Aquifer due to surface water runoff is low (pg. 14).
- Construction of the expanded parking area will not impact the quality of water in the Casper Aquifer (pg. 14).

Site Inspections by Wyoming Groundwater

On July 7, 2015, Wyoming Groundwater inspected the Spring Creek Ditch and made the following observations:

- A spring occurs in the ditch approximately 20 feet west of the power pole. There was no standing or flowing water upstream of the head of the spring (i.e. to the east).
- Water flowed from the head of the spring to the west for approximately 160 feet where the flowing water “disappeared” from sight (i.e. infiltrated into ditch sediment).
- The flow of water in this stretch of the ditch was on the order of 1 to 2 gpm (visual estimate).
- There was no standing or flowing water in the ditch bottom from the point of disappearance to a point in the ditch approximately 130 feet west of the hydrodynamic separator located at the northwest corner of the facility. From that point downstream, there was a sustained flow of water westward in the ditch toward the confluence with Spring Creek.

On July 9, 2015, Wyoming Groundwater again inspected the Spring Creek Ditch and made the following observations:

- The leading edge of the spring flow in the ditch bottom had migrated approximately 50 feet further west (than the July 7th observation) before disappearing from sight into the sediment.
- The flow of water in the ditch appeared to have increased (visual estimate of 3 to 4 gpm).

The Turner wells had been last pumped on July 4th and it is likely that pumping had dried up the spring, and that on July 7th and July 9th the spring was flowing again in response to the increase in head as the Casper Aquifer recovered. Previous inspections of the ditch (e.g. April 2011) document flowing water in the ditch at greater quantity and through the entire length of the ditch from the head of the spring, to the separator outfall, and further west down the ditch. The rate of flow in the ditch and through the saturated sediment from spring discharge is variable and has not yet been measured precisely.

Technical Review of Report Information

The following comments are intended to expand and clarify information and conclusions provided in the Addendum.

Comment #1 – Regarding the thickness and confining ability of the Satanka Shale (Section 5, pg. 8; Section 5, item 4, pg. 10; Section 5, item 5, pg. 11; Section 5, item 6, pg. 11): On page 7, the author has correctly addressed this issue with the statement, “The documented spring flow in this drainage...indicates that there is sufficient fracturing associated with the folding and faulting occurring in the area to allow groundwater from the Casper Aquifer to flow upward through the Satanka Shale.” All subsequent discussions that imply or explicitly state that the Satanka Shale is an effective confining layer are irrelevant and should be struck from the Addendum. The Satanka Shale is not an effective confining layer along the Spring Creek Ditch.

Comment #2 - Regarding the ditch sediment discussion in Section 5, item 4, pg. 10: Conclusions derived from the observation that ditch sediments are low-permeability and have “armored off the channel” are unsupported and speculative. Observable surface flow is a function of a particular day’s balance between inflow from the spring(s) and the carrying capacity of the ditch sediment. The July 7th field observation of surface flow disappearing into the ditch sediment demonstrates that the ditch sediment does not preclude infiltration of water (and entrained contaminants). It should not be assumed that “any contamination that has been carried below the spring area will have a very limited chance of being introduced into the Casper Aquifer system.”

Comment #3 – Regarding the size and area of the spring and associated fractures in Section 5, item 4, pg. 10: The author’s use of the word “small” to characterize the size of the spring area and fracture conduit pathway along the ditch is inappropriate and unsupported by the limited data presented.

Given the proximity of the project area to the Quarry Anticline and other geologic structures, it is highly likely that there are multiple breaches in the confining ability of the Satanka Shale along the ditch and in the vicinity of the project area. The ditch excavation has exposed one or more of these features and the ditch sediment may be covering other springs that discharge groundwater at the ditch sediment/bedrock contact without exhibiting free flow in the ditch.

The entire ditch should be regarded as a highly vulnerable feature with the potential for direct, two-way communication with the Casper Aquifer as the nearby City municipal wells are exercised.

Comment #4 – The location of the spring and associated features along the ditch are not identified in any figure presented in the Addendum.

Comment #5 – Regarding the ability of the hydrodynamic separator to adequately treat the additional runoff from the proposed parking area (Project Summary, pg. 1): Design

calculations should be provided to verify the capacity of the hydrodynamic separator and its ability to treat run-off from all paved surfaces at WUM.

Comment #6 - Discharge from a hydrodynamic separator into a surface drainage may require a NPDES discharge permit from the WDEQ. The City should contact WDEQ to determine if a NPDES permit is required, and if so, whether a permit has been obtained. In the absence of a required permit, the City should consider alternative monitoring and reporting requirements of the hydrodynamic separator outfall to assure proper operation and maintenance of this critical component of the proposed design.

Comment #7 – The channel analysis for the 100-year flood and the conceptual design of the culvert, as presented, are preliminary. As soon as possible, the City should obtain updated peak flow calculations and culvert design.

Comment #8 – Is the sliver of land between the existing parking area and the proposed expanded parking area at the northeast corner, as shown on Figure 2, to be paved and included in the parking area expansion?

Comment #9 - The potential for contamination is acknowledged throughout the Addendum via vehicle leaks, spills, and run-off from paved surfaces. Vehicles are reservoirs of hazardous material (e.g. antifreeze, gasoline, diesel, motor oil, brake fluid, etc.). Asphalt surfaces invariably acquire cracks, pot-holes, and compromises to surface integrity. Given that proposed project activities (vehicle parking) will be directly above a highly vulnerable feature and that the asphalt surface will prevent access to the ditch in the event of a spill, additional design elements that would preclude infiltration to the ditch should be required (e.g. impermeable liner beneath the asphalt surface).

Comment #10 – Regarding similarity with the variance associated with the City Springs Chlorination Application Site Improvements (CSCASI) (Section 5, item 5, pg. 10): There are two important differences between the CSCASI project and the proposed WUM project that indicate significantly less risk associated with the CSCASI project: 1) there is an identified breach in confining ability of the Satanka Shale in the ditch adjacent to the WUM project, and 2) the potential contaminant associated with the CSCASI project is salt brine (sodium chloride) which is innocuous.

Professional Opinion Regarding the Proposed Development and Risk to Casper Aquifer

Wyoming Groundwater agrees in concept that covering the spring and the section of Spring Creek Ditch adjacent to WUM may provide protection from accidental spills and contamination events that may “spill over” into the ditch from activities at the adjacent WUM parking lot. However, the elimination of this threat is offset by the risk of contamination by building a parking area directly above the ditch.

Wyoming Groundwater does not agree with the general conclusion that the proposed project will not pose a new or increased risk to the Casper Aquifer. Ultimately, the

perceived level of risk, be it low, moderate, or high, is subjective. In general, any development in the Spring Creek Ditch, especially one involving the potential storage and release of hazardous materials, should be avoided. The proposed project is directly over a vulnerable feature, directly over a spring that is in hydraulic connection with the Casper Aquifer, and is as close to a City municipal supply well as one can get.

The proposed design elements to reduce the risk of contamination are an asphalt surface to prevent infiltration and the reliance on WUM to properly maintain and repair the asphalt surface and hydrodynamic separator. The reduction of risk is based on the assumption that WUM will properly execute best management practices associated with the hydrodynamic separator, asphalt surface repair/maintenance, and limited use of the parking area. More rigorous controls (e.g. impermeable liner), not dependent on WUM diligence, should be considered that are designed to prevent the infiltration of run-off or spills through the asphalt cover and into the underlying ditch.

The proposed project is similar to existing developments along the ditch and in the ephemeral drainage further to the east: run-off from paved surfaces and parking lots of Imperial Heights Subdivision, Staples, Dollar Tree, Snowy Range Academy, and Hampton Inn all eventually discharge into this ditch and over the spring in question. A comprehensive plan to address this condition may be warranted.

The City should recognize that Wyoming Groundwater's expertise is in hydrogeology and not contaminant evaluation, mitigation, or facility design.

If you have any questions or comments, please feel free to contact me by phone or email.

Sincerely,

A handwritten signature in black ink that reads "Chris Moody". The signature is written in a cursive, flowing style with a long, sweeping underline that extends to the right.

Chris Moody, P.G.
Wyoming Groundwater, LLC