

May 15, 2015

Mr. Darren Parkin
Water Resource Specialist
City of Laramie
P.O. Box C
Laramie, WY 82070

RE: Review of the Site Specific Investigation Report for the Spradley Barr Dealership,
dated April 22, 2015

Darren,

WWC reviewed the referenced SSI, prepared by the Trihydro Corporation. Our review was supported by Hinckley Consulting, Inc., and their review comments are attached as a separate memorandum. Our reviews both concur with the report conclusion that the proposed development poses low risk of contamination to the Casper Aquifer.

There are several technical issues of a hydrogeologic nature that Hinckley Consulting outlines in the attached memorandum. WWC comments on the engineering related material are outlined below.

1. Item 7 requires the professional to calculate the 100-year floodplain, in the absence of flood plain mapping. There are no hydrologic estimates of the 100 year flow to and or off the site, or approximations of what area would be inundated.
2. In Item 8, WWC is not clear if the statements regarding the engineering of water and sewer connections are commitments, or not. The sentence that is unclear is the following: "These connections will be engineered in such a way as to limit the possibility of an undetected leak, such as double wall piping and pressure testing". WWC is not commenting on the need (or lack of need) these features. Our comment is directed at the looseness of the statement (also see "such as" in 12).

Similarly, in the last sentence on page 2-3, the phrase "should be maintained" is not a very strong statement with respect to committing action by a facility Owner, if that is in fact is intended. The same "should have" is at the top of page 2-4. WWC is of the opinion that recommendations (for whatever reason) should be very clear and unambiguous so that later stages of the planning/permitting/design know what is needed.

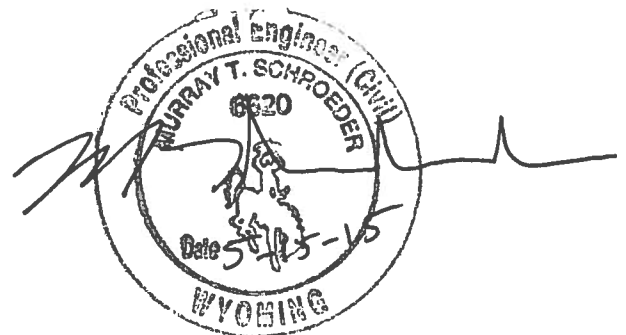
3. Section 10 commits the project, if built, to installing a stormwater separator, to capture (presumably to treat) stormwater. The appropriate hydraulic size, treatment effectiveness and maintenance of that facility are not clear, and may not be available at this point, but those requirements should be clarified by the City before the project is authorized.
4. The grading plans and descriptions of stormwater control are presented in item 10. Without a detailed hydrologic evaluation and hydraulic design, WWC cannot comment on the adequacy of the details. The concept appears sound, with respect to capturing site storm water and conveying it all through a separator and pond. The engineer and or City should clarify at what return interval (5, 10, 100 year) will the facility need to be designed. And, address, at least in a qualitative way, what happens to storm waters that result from return intervals that exceed the design storm.
5. The report does not address how storm water from off site (from the east, and may be the north) is conveyed through the proposed site improvements.

Please let me know if you have any questions.

Sincerely,

Murray Schroeder, P.E.
Branch Manager

MS:lw



HINCKLEY

CONSULTING

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MEMORANDUM

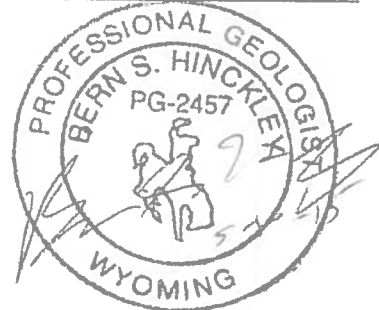
TO: Murray Schroeder

DATE: May 10, 2015

FROM: Bern Hinckley

PROJECT: Spradley-Barr

SUBJECT: SSI peer review



This memo provides a hydrogeologic review of the April 22, 2015 "Site-Specific Investigation Report - Spradley Barr Dealership - Laramie, Wyoming" by Trihydro Corporation, developed pursuant to Section 15.08.040.A of the Laramie Unified Development Code. Comment numbers refer to pages in the referenced report.

2-1: Here and/or on the "References" page (4-1), the report should include all other reports used in its creation, e.g. including the "Weston 2012" reference on Figure 1.

2-1: The statement, "Based on a review of the Wyoming Department of Environmental Quality, Solid and Hazardous Waste Online database, a record of previous contaminant releases at the subject property was not identified," is only partially responsive to required review item #2. If the statement, "The property is currently undeveloped" is intended to cover all aspects of the review other than WDEQ-identified hazardous wastes, the authors should say so, and explain why that observation adequately addresses each of the items enumerated in review item #2.

2-2 (also 2-1 and Photos 1, 2 and 4): The statement, "Water is conveyed through the culvert to the south under Beech Street and into a detention pond on the south side of Beech Street" implies these features are part of the site drainage. They are not. The "channel", "ditch", and "culvert" referred to serve only to conduct stormwater from the adjacent property (east) around the east and south perimeter of the subject property and directly into a channel on the south side of Beech Street that runs without interruption on down to join Spring Creek. These facilities are unrelated to the "on-site detention pond" referred to at p. 3-1. The report would be improved by explanation of the association of these facilities with the subject property. If the point of the authors' observation is that this ditch may have served to carry contamination onto the subject property, they should say so and develop that thought accordingly.

2-2: The objective of the on-site investigation is to augment or confirm the information gleaned from the literature search at review item #1. Thus, an affirmative statement regarding the

individual components of review item #5 is required. For example, were “vulnerable features” which may have escaped the attention of the mapping referenced at review item #1 investigated? Is it the professional opinion of the author, based on both the literature review and the on-site inspection, that no such “vulnerable features” are present within 100 ft. of the study site?

2-3: The author appropriately provides the formation dip and distance used to estimate the thickness of the Satanka Shale to be 150 ft. thick. However, the reason for describing this result as “the estimated minimum thickness” (emphasis added) is not stated. If there are good, site-specific reasons to think the thickness may be more than calculated, i.e. that the estimate is conservative in this regard, the author should share those reasons.

My calculations confirm 150 ft. as a reasonable estimate, based on the information presented on the WGS mapping. However, comparison of Figures 1 and 2 demonstrates that the mapped location of the “LCCC” wells (Fig. 1) is not on the LCCC campus (Fig. 2). This discrepancy should be resolved, and the Statements of Completion for the LCCC wells reviewed for evidence of the actual thickness of the Satanka Shale encountered.

The report misrepresents the conclusions of the 2008 CAPP regarding the Satanka Shale. The CAPP states, “The Technical Review Committee agreed that at least 75 vertical feet of undisturbed Satanka Shale (50 percent more than the thickness of the zone of apparent connectivity) was needed to effectively protect the Casper Aquifer ...” (emphasis added). The term “safety factor” appears nowhere in the 2008 CAPP; it was used in the 2002 CAPP only to describe the entire 75 feet of overlying Satanka. The 2008 CAPP states that 75 feet is “needed”, without qualification. Thus, compliance with a 75 ft. requirement requires confirmation of two conditions: 1) that “at least 75 vertical feet” of Satanka are present; and 2) that the Satanka is “undisturbed”. In addition to the geometric calculation of Satanka thickness, the author should develop and explain their consideration of the “undisturbed” criterion.

Similarly, the “75-foot thickness” line is misrepresented as being an accurate identification of this important parameter. In fact, the opposite is the case: As noted in the 2008 CAPP, “it is known that in several instances the calculated line of 75 feet of Satanka Shale is inaccurate. At Soldier No. 1 well there is 41 feet of Satanka Shale but the calculated 75 feet line is to the east of Soldier No. 1. At Turner No. 2 well, there is 74 feet of Satanka Shale so the calculated 75 feet line should coincide with Turner No. 2 yet the calculated line is east of Turner No. 2. At Spur No. 1 well there is 54 feet of Satanka Shale and yet the calculated 75 feet line is very near that well when the actual line should be further west of the Spur No. 1. Since there are known areas where the calculated line is inaccurate, it was decided that the western boundary should be moved to ensure that at least 75 feet of Satanka Shale was overlying the Casper Aquifer.” (2008 CAPP, p. 49).

The inaccuracy of the 2002 CAPP “75-foot thickness” line has since been confirmed at other locations as well, including in at least one report by TriHydro themselves. In their “Final Site-Specific Investigation Report - Laramie Ford Expansion - Grothouse Construction” (Nov. 17, 2012), for example, TriHydro concluded “the thickness of Satanka Formation at the subject

property is approximately 60 ft.” (p. 2-3). This site is distinctly west of the “75-ft” line presented on Figure 2 of the present report, i.e. in an area supposed to have a thickness in excess of 75 ft.

It appears the authors further seek to minimize the significance of the established western boundary of the APO, stating, “the western boundary of Zone 2 was moved west to the nearest section or half section line to add yet another level of safety to the CAPP and allow for easier administration of affected lands.” In fact, the 2008 CAPP states, “In order to account for the uncertainty in local geology and to allow for effective implementation of the CAPP, the west boundary of CAPA Zone 3 has been straightened and moved to the west of the calculated 75 feet line.” (emphasis added).

2-4 (and 4-1): The authorship of the 2006 Laramie Water Management Study is incorrectly identified. The referenced report was developed by WWC Engineering. Perhaps the authors are referring to a preliminary research report by Mr. Taboga attached as Appendix 10B to the WWC report. In any case, the authors incorrectly identify the “depth to groundwater” as “at least” as deep as their estimated top of the Casper Formation. It is extremely unlikely that the 110 ft. of head at the bottom of the Satanka Formation has failed to penetrate into the Satanka Formation, or that the overlying Satanka is otherwise dry through its entire thickness.

3-1: see comments above (2-3) regarding the authors’ misrepresentation of the established western boundary of the APO. That the subject property may or may not have been included in a 2002 APO which was based on a line now known to be seriously in error at multiple locations is irrelevant to application of the 2008 CAPP and Section 15.08.040.A of the Laramie Unified Development Code. If it is the authors’ intention to support a general argument for revision of the 2008 APO boundaries rather than simply providing an SSI for the subject property, that issue should be directly addressed along with the supporting evidence and analysis.

Conclusion: Despite the deficiencies identified above, I concur with the authors’ basic conclusion that the thickness and presumably relatively undisturbed nature of Satanka Formation overlying the Casper Aquifer at the study location is likely sufficient to preclude significant contamination of the Casper Aquifer by release of contaminants at or near the ground surface.

Bern Hinckley, P.G.