



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street

Ref: EPR-EP

MEMORANDUM

SUBJECT: Review of Proposed Lionsback Resort Development

FROM: Darcy Campbell, Hydrogeologist
USEPA, Region 8

TO: Daniel Stenta, P.E., Engineer
City of Moab

Thank you for your request for a review of the proposed Lionsback Resort near Moab, Utah. I am the Sole Source Aquifer coordinator for EPA Region 8, and review projects that occur in designated Sole Source Aquifers when the project has some Federal funding. I understand that the Lionsback Resort and other developments proposed in the Moab area do not have Federal funding, so my review is not required and is totally at the discretion of the City.

I want to commend the City of Moab for having the foresight to obtain Sole Source Aquifer status for the Glen Canyon Aquifer system and to implement ordinances designed to protect the ground water. The City has developed Drinking Water Source Protection plans for its water supplies. The State of Utah/Division of Drinking Water has concurred with Moab's source protection plans.

I am providing comments primarily on the proposed Lionsback development. It has a number of environmentally friendly features, many due to the Sensitive Area Resort ordinance. The preservation of 70% open space, the very restricted availability of turf, use of native vegetation, the use of sewer rather than septic systems, no siting of a gas station or underground storage tank, water conserving measures, etc. will all help protect ground water. Again, the City is to be commended for these protective measures.

My general comments apply to all proposed developments on the Navajo sandstone within the designated Sole Source Aquifer for the Glen Canyon Aquifer System. I believe there are four developments currently: Lionsback, Cloud Rock, Stonecrest, and White Horse.

Hydrologic Understanding.

This is my understanding of the drinking water situation. The proposed Lionsback Resort project is located in the recharge area of the Glen Canyon Aquifer System, which is a designated Sole Source Aquifer. Based on reading a number of geologic and hydrologic reports (listed at the end of this memorandum), the Navajo sandstone is fractured and jointed in the area of the development, and

serves as an area of recharge to the Glen Canyon Aquifer system. The Glen Canyon/Navajo sandstone is the primary drinking water source for the City of Moab.

The Sole Source Aquifer Designation Petition of 2001 (City of Moab) says: “Because the Glen Canyon Aquifer System is exposed at the surface within the delineated Drinking Water Source Protection Zones, it is not protected from potential contaminants spilled on the ground. The aquifer is also vulnerable to (1) contamination introduced through poorly-constructed oil wells and test holes in the area, (2) increasing housing development and the effects of septic tank effluent disposal, and (3) contamination from a variety of activities in the recharge area . . . “

From the report by Steiger and Susong (USGS 1997), “Fractures can be important conduits for water to recharge the Glen Canyon Aquifer. . . .substantial recharge probably occurs where less than 8 inches of winter precipitation falls because the fractures provide conduits for water to rapidly recharge the aquifer.” The Lionsback and Cloud Rock developments appear to be within the area denoted as “highly fractured bedrock” on the map associated with this USGS report.

Potential contaminant sources located on the highly fractured Navajo sandstone may pose a greater risk to the Glen Canyon Aquifer system than potential contaminant sources located on the valley floor, because the fractures are a direct conduit to the drinking water source. In the valley, contaminants would not necessarily infiltrate into the Glen Canyon Aquifer system, due to an upward gradient from the bedrock to the valley fill.

The proposed Lionsback development is also in the Drinking Water Source Protection Zone of Skakel Spring. Skakel produces from the Wingate formation, which is overlain by the Navajo. The Navajo sandstone, Kayenta formation and Wingate sandstone are all part of the Glen Canyon Aquifer system. All other Moab sources (springs and wells) are from the Glen Canyon Aquifer system (primarily Navajo Sandstone) and some of the Drinking Water Source Protection zones overlap with the proposed Cloud Rock development.

Some questions that are important to consider:

- What is the distance to ground water below the proposed developments?
- How open are the fractures?
- What is the travel time for a spill/leak to get to the aquifer?

A site-specific review of available data related to depth to ground water, status of the fractures (size, connections, etc.) and estimated travel time for contaminants to reach ground water could be highly useful in evaluating the magnitude of the risk.

Risk Management

There is risk involved in locating any type of development in the recharge area of your drinking water supply. Some of the risks include:

- Bacterial or nitrate contamination from animal feeding operations
- Herbicides/pesticides/nitrate contamination from residential or other landscaping application (residential application rate for pesticides and fertilizer is generally greater than agricultural)
- Accidental spill of oil, gas, or other chemicals
- Storm water infiltration
- Road salts
- Sewer line leaks/septic tanks
- Household hazardous waste or other deliberate disposal
- Construction related spills
- Leachate from landfills

Any type of use within the recharge area has risks associated with it. Some of these risks can be managed by using ordinances, and the City has written ordinances that work toward protecting the aquifers. For example, there will be no septic tanks in the development, there will be no road salts used, there will be no animal feeding operations, etc. However, some of the risks are unpredictable.

Examples of Potential Problems

Here are some examples that I have dealt with in my work at EPA. We recently had a gasoline spill into a fractured rock aquifer in Montana. The fuel traveled 500 feet in 4 days, causing a significant human health and environmental problem. Another example is a fractured rock aquifer along the Front Range of Colorado, where a man doing vehicle repair at his home disposed of TCE, and it traveled into the fractured rock aquifer and became a site investigated under Superfund. It doesn't take a large quantity to contaminate an entire aquifer.

Leaks from septic tanks and sewer lines are another risk. Septic tanks will not be allowed within the Lionsback development, but leaking sewer lines could be an issue. What measures can be put in place to detect any problems with leaking sewer lines?

Also, how will storm water be dealt with? The infrastructure to deal with storm water should be protective of ground water. Collection and treatment of stormwater should be considered.

Some of the potential problems mentioned above could occur whether the proposed developments are in place or not. For example, people could deliberately or accidentally dispose of oil, gas, or

chemicals on undeveloped land. It seems that the likelihood is higher when there are more people living there.

Bonding

In order to protect the City against potential problems that are difficult to regulate, it may be possible to require a bond for the developments. Regulators require this of mining and other types of projects. If the aquifer becomes contaminated, the City of Moab and Grand County Water and Sewer Agency will be left with the expense of treating the water in perpetuity. It can be very expensive.

Monitoring

Developers could install monitoring wells (one upgradient, several downgradient) to assess baseline conditions and monitor the effect of the project on the aquifer. For the Lionsback Resort, this would help distinguish any possible future ground water contamination coming from the landfill versus the new development. This might be something the developer would want to do to protect itself. Installation of monitoring wells might be advisable for all new projects. The monitoring costs could be borne by the developer or industry sited within the Sole Source Aquifer.

Landfill/Possible Funding

The closed City of Moab landfill is also in the same area as the proposed Lionsback Resort. This is a potential source of contamination to Skakel Spring. The City requested that monitoring not be conducted due to the depth of the aquifer and a consultant's belief that the fractures are closed in the area. I would recommend installing a few monitoring wells downgradient of the landfill. There are funds available from our EPA Brownfields program to assess a site like this (\$200,000 maximum, which could include monitoring wells) and another possible grant (\$200,000) to do remediation. The web site is: www.epa.gov/brownfields and grants are due Nov. 14, 2008.

Revision of Drinking Water Source Protection Plans

The City of Moab has developed Drinking Water Source Protection Plans for all City water sources, and the Utah Division of Drinking Water has concurred with these plans. According to the State of Utah DEQ, Drinking Water Source Protection Plans are developed by water systems, and reflect local values and priorities related to protecting drinking water sources. The Utah Division of Drinking Water conducts a review to ensure that plans meet at least the minimum state requirements, but the overall scope and implementation of plans is the responsibility of the drinking water system. Moab's Drinking Water Source Protection Plans as written could be strengthened to more fully address the vulnerability and special nature of the Moab drinking water supply, and the Sole Source Aquifer status. They were written before the City obtained SSA status. It may be a good idea to revisit these plans and work with the State of Utah to determine what currently makes the most sense to protect the water supply at City of Moab wells and springs. During the DWSP plan process in 2001, new housing was not considered a potential contaminant source. The City of Moab has the choice of how aggressively it wants to protect its drinking water. Since the State of Utah only requires that a Drinking Water Source Protection Plan meet a minimum state-wide standard, Moab should consider

modifying their existing plan to specifically address these local issues and concerns.

The City adopted its Ordinance 2001-10 (Source Protection Zone ordinance) based on a generic ordinance published by EPA in 1992, which addressed certain potential contaminant sources but did not address residential/commercial development. The ordinance may need to be reconsidered with respect to the vulnerability of the aquifer and new activities proposed in the source protection zone.

The State of Utah has recently passed legislation that will require all counties to have a Source Water Protection ordinance in place by 2010. This would be a great opportunity to work with Grand County to protect the Glen Canyon Aquifer.

State Trust Lands/Future Development

Some of the proposed developments are sited on former State of Utah School and Institutional Trust Lands Administration (SITLA) land. The City of Moab may want to coordinate with the State DEQ (Source Water Protection) and SITLA regarding future land transactions, to ensure that the aquifer is protected.

I would be happy to discuss this with you further and visit Moab to discuss my comments. Please contact me at (303) 312-6709 or campbell.darcy@epa.gov. It may be advisable to get an opinion on the proposed developments from the Utah Geological Survey (Mike Lowe has done work in the Moab area, and can be reached at 801-537-3389) and to get an opinion from the Utah Source Water Protection Program (Kate Johnson is a contact, and her phone number is 801-536-4206).

Information Reviewed

Sole Source Aquifer Designation Petition for the Glen Canyon Aquifer, May 2001, and related USGS reports attached to the petition, as needed.

Drinking Water Source Protection Plan for Skakel Spring, January 2001, Montgomery Watson.

Interim Geologic Map of the Moab Quadrangle, Grand County, Utah, Doelling et al, 1995.

Geology and Water Resources of the Spanish Valley Area, Grand and San Juan Counties, Utah. Technical Publication No. 32, State of Utah DNR, 1971

Ground-Water Conditions in the Grand County Area, Utah, with Emphasis on the Mill Creek-Spanish Valley Area, Technical Publication No. 100, State of Utah DNR, 1990

USGS 1997. Recharge areas and quality of ground water for the Glen Canyon and valley-fill aquifers, Spanish Valley area, Grand and San Juan Counties, Utah, Steiger and Susong, WRI Report

97-4206

Lowe et. al, 2007. The Hydrogeology of Moab-Spanish Valley, Grand and San Juan Counties, Utah, with Emphasis on Maps for Water-Resource Management and Land-Use Planning. Special Study 120, Utah Geological Survey, Utah DNR, 2007.

Lionsback Resort Preliminary Design Guidelines, 1/28/08

Chapter 17.32 of the Zoning Ordinance for SAR, Sensitive Area Resort Zone.

Numerous maps of the designated SSA, proposed development,

Skakel Spring Drinking Water Source Protection Plan maps

Moab Landfill Ground Water Monitoring Exemption Request.

Gates, W. 1997. The Hydro-Potential (HP) Value: A Rock Classification Technique for Evaluation of the Ground-Water Potential in Fractured Bedrock. Environmental and Engineering Geoscience, Vol III, No. 2, Summer 1997, pp. 251-267.

Grand County Solid Waste Management Special Service District #1, Request for Exemption from Groundwater Monitoring Closed Moab Landfill.

Moab City Ordinance 2001-10, Establishing Drinking Water Source Protection Zones Surrounding all City Wells and Springs, 2001.

Drinking Water Source Protection (DWSP) Guidelines for Cloudrock, Grand County Utah. February 5, 2008, Loughlin Water Associates LLC.

