



**MWH**  
MONTGOMERY WATSON HARZA

## MEMORANDUM

To:	Donna Metzler, City Manager Brent Williams, Public Works Director	Date:	October 22, 2002
From:	Todd Jarvis	Copies:	Al Anderson, MWH Senior Consultant
Subject:	Moab and Grand Valley Water Partnership		

### Why is Moab concerned about Grand Valley's Water Use?

The City of Moab is concerned that a precedent is being set of transferring water rights from an aquifer with poor quality water to an aquifer with good quality water – a mixing of apples with oranges as opposed to apples with apples. Moab acknowledges that Grand Valley believes that the poor quality groundwater stored in the alluvium is the same as the drinking water quality groundwater stored in the Navajo Sandstone. However, the available hydrologic information does little to prove or disprove these opposing hydrologic positions. Obviously more pumping tests designed to specifically address this issue need to be coordinated and funded as a partnership between the City of Moab and Grand Valley.

While the City of Moab acknowledges that it does not use the Glen Canyon Aquifer System to its full capacity, Moab also recognizes that all water developed through wells creates a loss of water somewhere. The loss is largely from storage in an aquifer. A portion of groundwater developed through pumping of wells is always mined.

The U.S. Geological Survey Water Resources Division has recognized the need for "wise management of the limited amount of water available to this rapidly developing region". The limited recharge to the Navajo Sandstone is obvious from the age of the groundwater derived from wells and springs tapping the Navajo Sandstone. Age dating of the groundwater derived from the City's wells and springs for the recently approved the Sole Source Aquifer Petition determined that the water from the wells was apparently recharged to the aquifer prior to 1952; the spring water is apparently a mixture of water recharged to the aquifer prior to 1952 and recent water.

In the spirit of cooperation, Moab offered the groundwater management plan to the State Engineer's Office as a means of providing sustainable groundwater development for all wells and springs tapping the Navajo Sandstone not only Grand Valley, but also for the future of Moab. It is not designed to preclude Grand Valley from developing additional groundwater supplies, but rather acknowledges that the knowledge of how the Navajo Sandstone aquifer responds to development by wells is poorly understood and unpredictable given the current information. The fact that Grand Valley had to drill four test wells to find the Chapman well underscores this uncertainty. The large variations in the productivity between the closely spaced George White wells further provide evidence of the uncertainty in the Navajo Sandstone.

### What Are the Problems with using the George White Well No. 4 as an aquifer performance monitoring well?

Moab supports Grand Valley's proposal to install water level probes in the George White wells, but acknowledges that they would be installing these probes in their wells regardless as a means to monitor the pumping water levels in these wells to protect the pumping equipment. Because a water level probe apparently does not exist in the well, the history of water level data is more than likely incomplete.

Grand Valley actively uses the George White wells as sources of supply. The water level data collected from these probes will reflect water level changes due to pumping and stopping pumping or simply the change in aquifer storage near the well. Dedicated monitoring wells used solely to monitor the change in aquifer storage are common practice in aquifers at risk, and Moab's recommended location for a dedicated monitoring well is consistent with other areas where aquifers are at risk, such as the City of Cheyenne, Wyoming wellfield tapping the Ogallala Aquifer, and the San Antonio Water System, Texas tapping the Edwards Aquifer.

Unlike the thresholds summarized in the City of Moab's previously proposed groundwater management plan, Grand Valley's "trigger points" have no meaning with respect to changing their groundwater development practices should a "trigger point" be reached beyond meeting with the State Engineer's Office.

#### **Moab's proposed groundwater management plan is too restrictive**

Moab is confused as to why "ramping up" the production on Grand Valley's wells is considered unreasonable or too restrictive until the stress imposed by the new large capacity wells on the Navajo Sandstone is better understood. Grand Valley's resistance on placing short-term limits on the production from their wells, given that Grand Valley has admitted not needing the water until development and subsequent demands increase, also confuses Moab.

Moab proposes an alternative groundwater management plan. The monitoring program consists of allowing Grand Valley a peak day production of no more than the water rights requested to be transferred under the following conditions:

- ◆ Interference with Moab's sources will be monitored using the metered discharge rates from Moab Spring No. 3 and changes in the water quality from Moab's sources. Moab contends that Spring No. 3 is the best point of performance and verification monitoring because (1) the springs represent the hydrologic low for the Navajo Sandstone aquifer where groundwater stored in the Navajo Sandstone converges to discharge as the springs, and (2) spring flows are continuously monitored and have been for over 10 years. Moab's proposed index values, or thresholds, include, but are not limited to a drop below 350 gpm in Moab Spring No. 3 which signifies that the Grand Valley wells are significantly affecting Moab's water supply. If flow from Moab Spring No. 3 drops below 350 gpm, then the State Engineer's Office will require Grand Valley to limit the production from both wells to 50% of the water right until Grand Valley shows the diminished flow is not due to their well use. **The risk to Grand Valley under this scenario is that the impact of overdeveloping the aquifer and impacting Spring No. 3 may not be seen within a few years. Consequently, Grand Valley's water system growth may outstrip what the Navajo Sandstone can reasonably sustain before the overdevelopment is observed and reduced abstractions are required to not only maintain the sustainability of the Navajo Sandstone Aquifer, but also protecting and acknowledging Moab's prior appropriation of water rights. The thresholds listed above will be adhered to indefinitely.**
- ◆ Degradation of water quality is one indicator of developing an aquifer beyond sustainability. Because both Grand Valley and Moab rely on the Navajo Sandstone as their principal source of drinking water supply, it is imperative that the quality of the developed groundwater remains potable. Overpumping of the Navajo Sandstone to the point of causing encroachment by the lower quality water stored in the alluvium or derived from deeper aquifers will be monitored by bi-annual sampling of one well within Moab's wellfield, as mutually agreed upon by Grand Valley and Moab, along with sampling from Spring No. 3 with the sampling events occurring during the seasonal high flows typically occurring during the winter, and the seasonal low flows occurring during the late summer and early fall. Water from these sources will be analyzed for general chemistry of the water including Total Dissolved Solids (TDS). If the TDS from one or both sources increases 10% or more, then the State Engineer's Office will require Grand Valley to limit the production from both wells to 50% of the water right until Grand Valley shows the increase in TDS is not due to their well use. **The risk to Grand Valley under this scenario is that the water quality is permanently degraded – for both parties. The thresholds listed above will be adhered to indefinitely.**

### Partnership for Better Understanding the Navajo Sandstone Aquifer

The populations of Moab and the surrounding areas are continuing to grow and expand. In planning for this expansion the communities must ensure a quality and reliable water source for the expected population, while at the same time ensuring the preservation of the surrounding ecosystems. In order to plan for the future water consumption, a thorough understanding of the water resources [i.e., the groundwater aquifers (the Glen Canyon Aquifer System and the valley-fill aquifers) and the surface water features] in the area must be established. To fully understand the water resources in the Moab area the interaction of groundwater and surface water needs to be further researched and examined. The hydraulic connection between surface water and groundwater as well as between and within the groundwater aquifers must be determined. Anisotropy of the groundwater aquifers (specifically of the Glen Canyon Aquifer System) may significantly impact the relationship, if any, between surface water and groundwater.

Moab desires to learn more about the local aquifers by funding research by graduate students. The primary focus of the research shall be to determine the extent and timeframe of the interaction between groundwater and surface water in the area. In addition, the hydraulic connection between potentially different aquifers within the Navajo Sandstone of the Glen Canyon Aquifer System shall be analyzed. As the anisotropy of an aquifer may significantly impact the interaction of groundwater and surface water, quantification of the anisotropy of the Navajo Sandstone aquifer in the immediate vicinity of Moab and surrounding area.

The anticipated costs for funding a graduate student to undertake this work is approximately \$40,000. Given that the information will be mutually beneficial, Moab proposes that Grand Valley match the Moab's financial contribution to this research.