



# Mendon City Corporation

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November 4, 2015

Mr. Michael Grange, P.E.  
Construction Assistance Manager  
Utah Division of Drinking Water  
P.O. Box 144830  
195 North 1950 West  
Salt Lake City, Utah 84114-4830

**RE: Additional Source Investigation and Test Well Construction  
System #03011, File #08141, SRF#3FI34**

Dear Mr. Grange,

As you are aware the city of Mendon has expended hundreds of thousands of dollars in well drilling activities to locate additional groundwater sources over the past few years with limited success. Consequently, in an effort to continue those groundwater investigation activities without the expense of drilling dry wells, Mendon is requesting herewith an adjustment in the purpose and/or scope of the remaining 'Additional Source' loan funds. The amount of funds remaining in the SRF#3F34 loan is \$269,902.95.

The purpose of the work is to perform electro-geophysical groundwater assessments which consist of conducting:

- (1) Electromagnetic induction surveys to identify groundwater pathways in the foothills of the Wellsville Mountains west of Mendon; and,
- (2) Electro-seismic point surveys within specific parcels in the lower elevations of Mendon in order to generate an array of electronic boreholes.

The electromagnetic induction approach is a unique application of sound scientific principles and proprietary technology used to accurately map preferential groundwater flow paths. Groundwater is one of the best, and most prevalent, naturally occurring electrical conductors. Willowstick Technologies, LLC capitalizes on this physical characteristic by directly energizing groundwater, at depth, with a signature alternating electric current. As the electric current flows through the groundwater it generates a magnetic field (Ampere's Law) characteristic of the injected electrical current. This unique magnetic field is measured at the earth's surface using a highly tuned and extremely sensitive instrument proprietary to Willowstick Technologies. This

approach allows for the identification and location of possible groundwater flow paths without ground penetration.

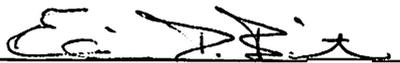
The electro-seismic approach is a geophysical surveying methodology where a mechanical (seismic) wave is introduced into the earth. As the seismic wave propagates through the earth it agitates both the rock matrix and the pore fluid, but not at the same rate. Displacing water molecules moves the electrical charges and generates a small electrical signal that travels back to the surface of the earth at near the speed of light. This signal is then measured and recorded by ground antennae. The amplitude of the signal (voltage) is indicative of the amount of subsurface water present, and the time the signal is received after the impulse is proportional to the depth. This signal is a function of rock porosity, permeability, fluid contents and soil saturation. The deeper the aquifer the longer the electro-seismic signal takes to arrive at the surface. An electro-seismic cross-section indicates at what depth and location along a traverse line the top and bottom of the aquifer occurs. The greatest amplitude in electro-seismic signals is generated when the electro-seismic wave enters or exits a water bearing zone. The result of the electro-seismic approach is a three-dimensional array of electronic boreholes similar to multiple well logs without the drilling effort and the visualization of the groundwater stratification for determination of the dimensional extents of the underlying aquifer(s).

Upon completion of the electro-geophysical groundwater investigations, Mendon will consult with appropriate staff from the Utah Division of Drinking Water in order to determine the most suitable location for mechanically drilling a groundwater test hole and performing flow quantity and water quality tests.

Cost for conducting the electro-geophysical groundwater assessments is estimated at \$90,000; cost for construction of a groundwater test well and performing pump tests and water quality analyses is estimated at \$60,000.

Should you have any questions, please contact me.

Sincerely,



Edwin D. Buist,  
Mendon City Mayor  
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