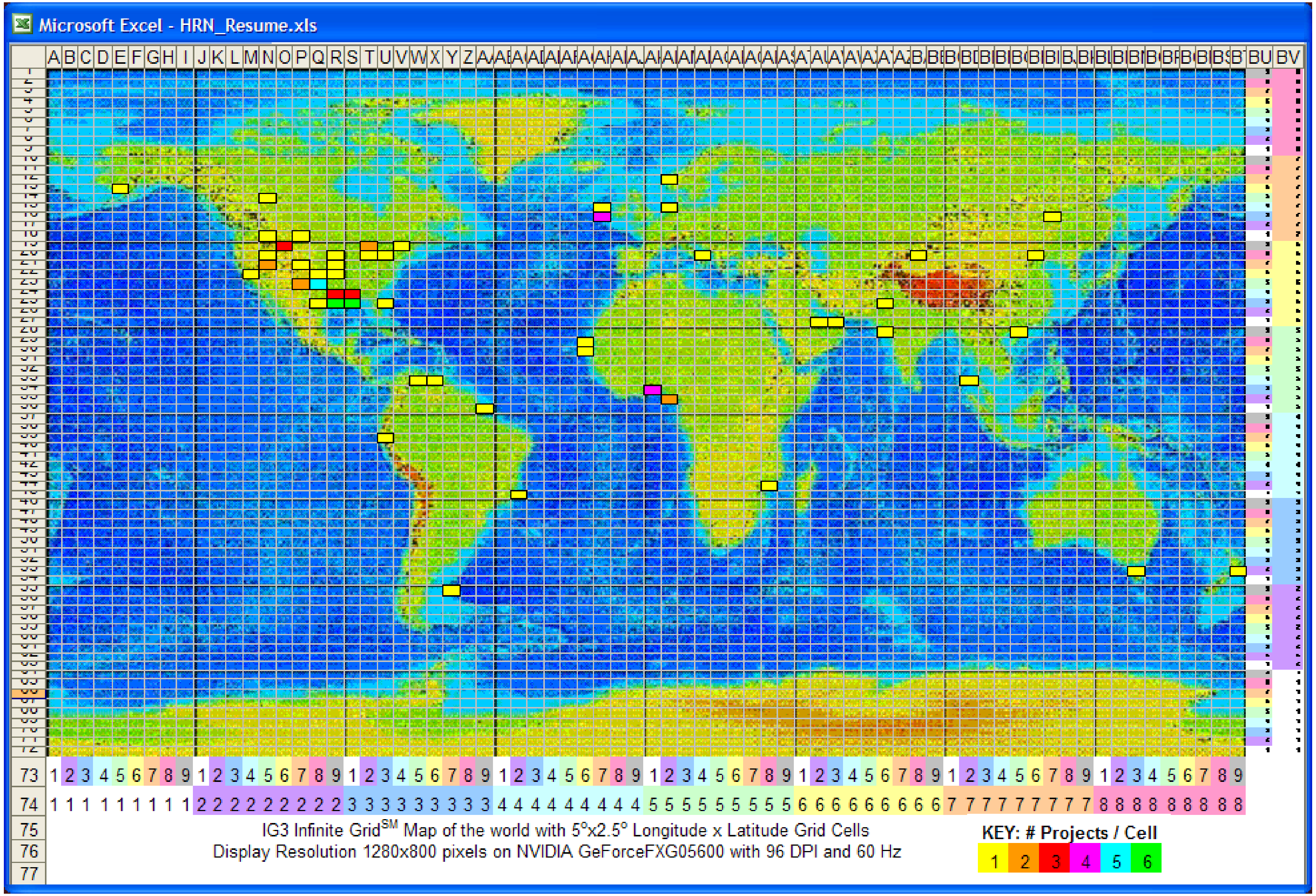
Cedar Valley Water

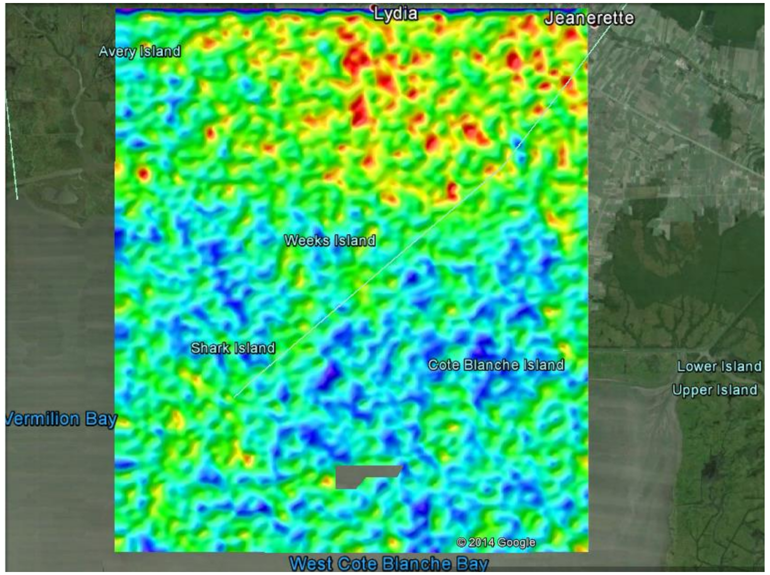
Gary F. Player – Geologist

H. Roice Nelson, Jr. – Geophysicist

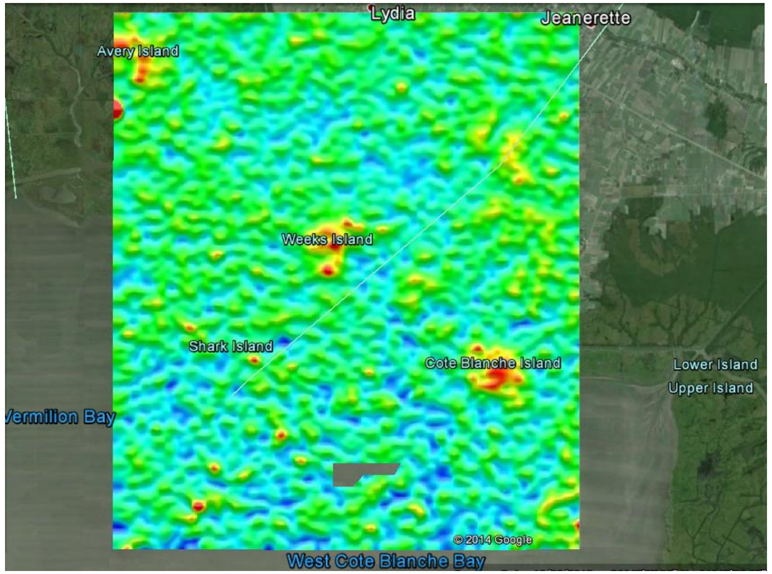
18 July 2014

H. Roice Nelson, Jr., Texas Professional Geoscientist #5120, places worked





Mapping Sweet Spots with Lightning Data



Dynamic Measurement LLC has developed a new geophysical data type: data mining lightning databases to explore for natural resources. Some key points:

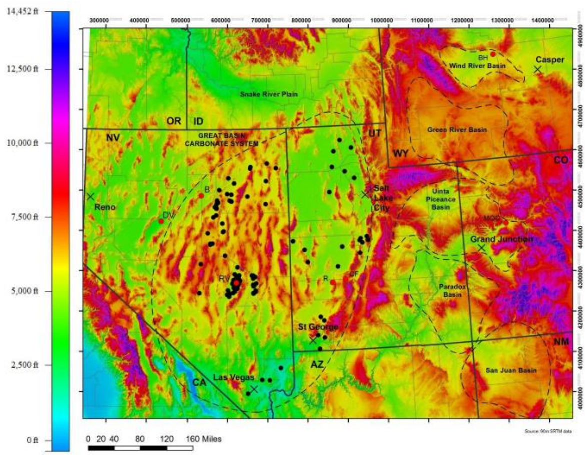
- Lightning occurs everywhere.
- Lightning strike locations and strike attributes have been measured for years by meteorologists for insurance, meteorological, and safety reasons.
- Lightning strike locations and attributes are not random. Rather both are controlled by shallow earth currents (terralevis currents) [AAPG Houston].
- Lightning strikes cluster, as shown in the top map to the left, where the density of lightning strikes on the Louisiana coast is shown.
- Lightning strike clusters are somewhat consistent over time, and can be stacked, similar to stacking seismic, to increase signal and decrease noise.
- Maps of different lightning strike attributes show different geologic attributes. For instance, the bottom left map shows a map of Rise-Time averaged over 15 years, causing the three salt domes in the area to blossom.
- DML has a worldwide exclusive license to the best lightning databases available with Vaisala, the owner of the NLDN (National Lightning Detection Network 15 + years data) and the GLD-360 (Global Lightning Database 4+ years), for natural resource exploration.
- DML has a U.S. patent on use of lightning data for natural resource exploration, and is applying for a patent on creating resistivity volumes.

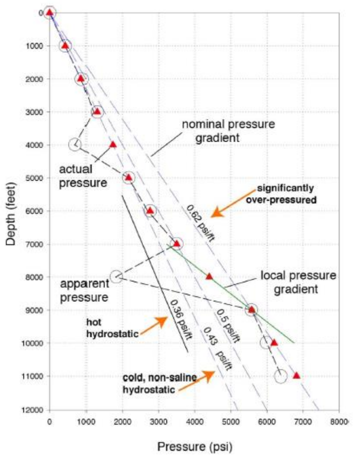
211 Baker Road #382
Barker, TX 77413

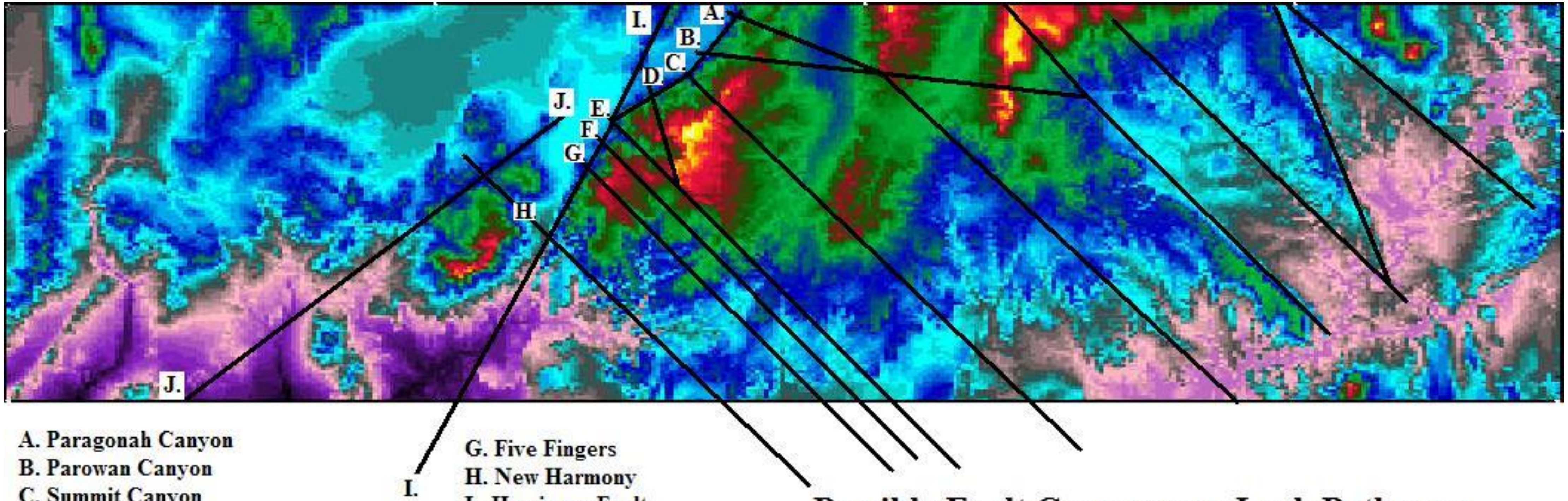
2155 West 700 South #31
Cedar City, UT 84720

www.dynamicmeasuremetn.com
713.579.0172

Why Cedar & Beryl Valleys have lower than hydrostatic pressure in wells





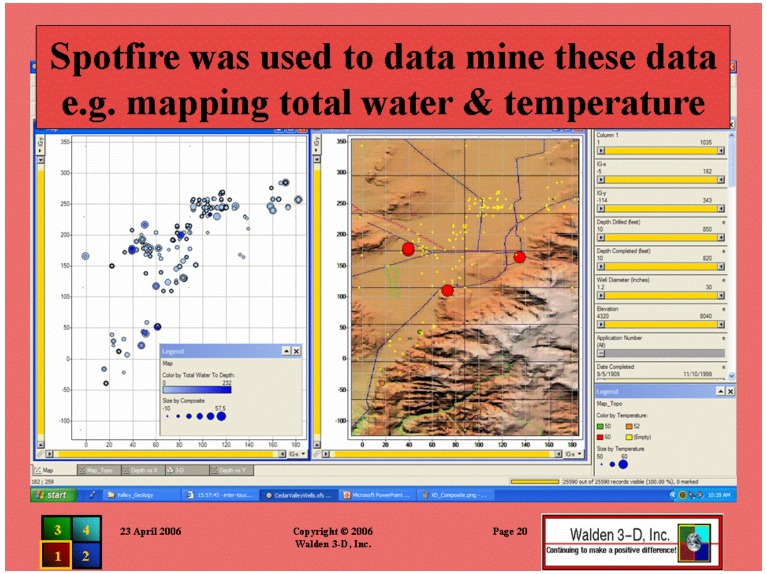


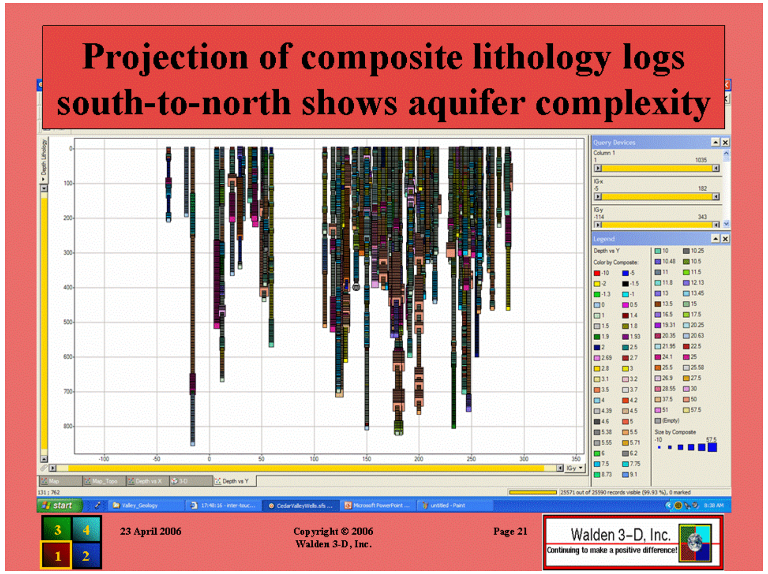
A. Paragonah Canyon
B. Parowan Canyon
C. Summit Canyon
D. Fiddlers Canyon
E. Cedar Canyon
F. Kararaville Canyon

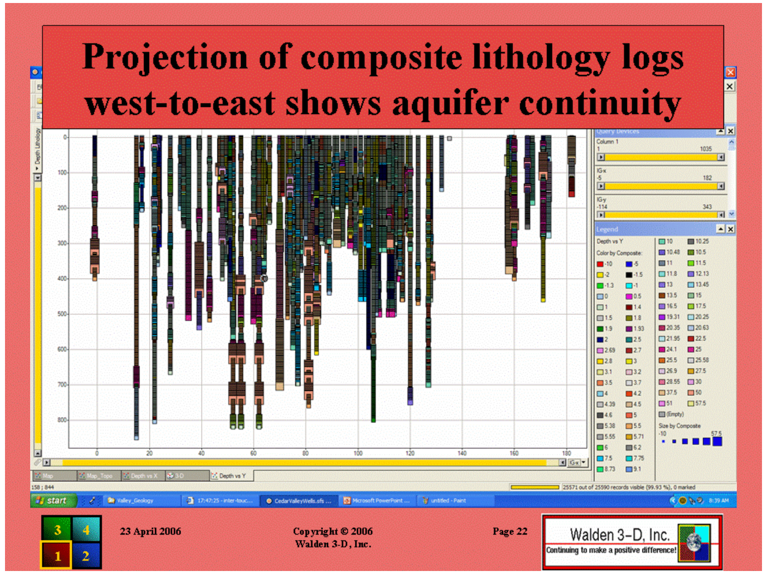
G. Five Fingers
H. New Harmony
I. Hurricane Fault
J. Pinevalley

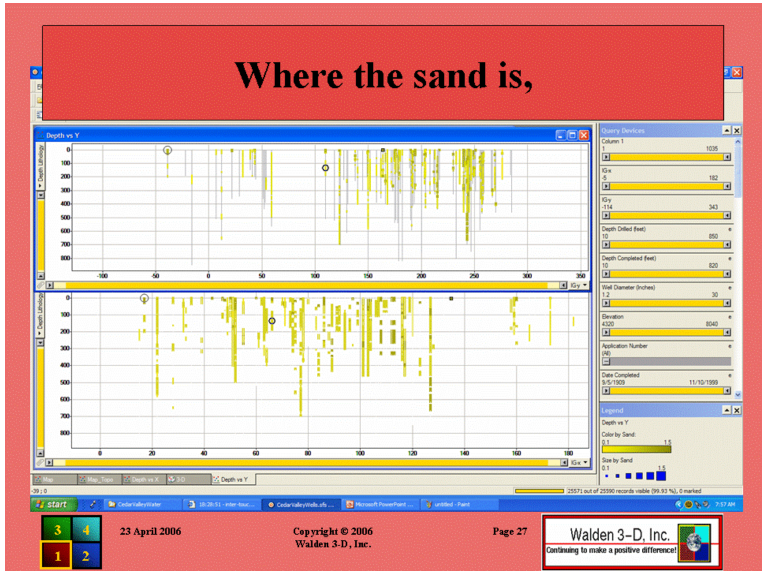
Possible Fault Geopressure Leak Pathways from Cedar Valley to the Colorado River

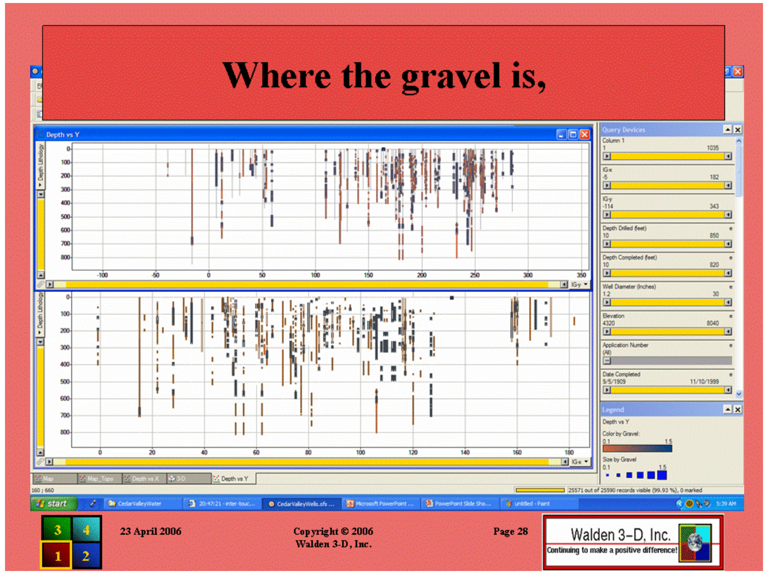
Data Mining Cedar Valley Water Well Data (http://www.walden3d.com/cedarcity/CedarValleyWater)

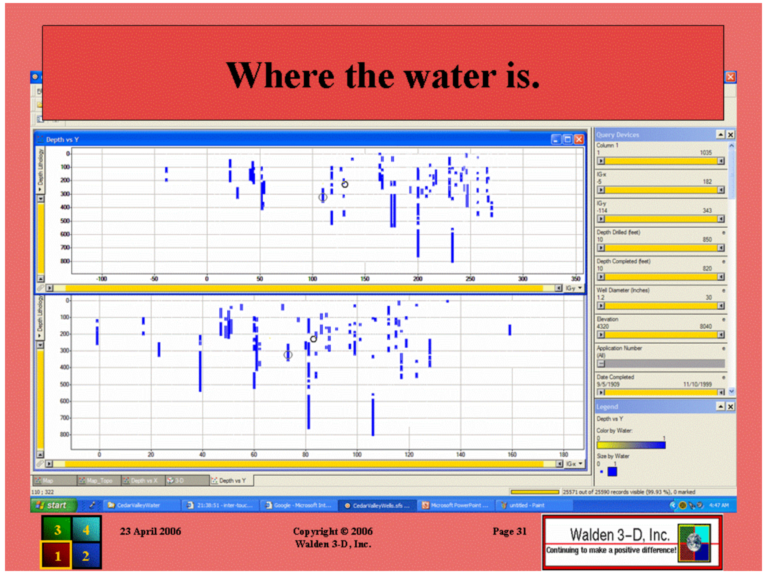












Quartz Monzonite Aquifers West of Cedar City, Utah

Eventual production of ground water from the quartz monzonite aquifer will not reduce the amount of water available from the sand and gravel aquifer under Quichapa Lake.

It is now time to make decisions about more aggressive water exploration. The Quichapa Creek No. 1 exploratory well disclosed the likely presence of an immense fractured granitic aquifer west of the Cedar Valley. However, the well was not drilled deep enough to show the thickness of the aquifer at that location. An old oil well drilled in Iron Springs Gap disclosed about 2,600 feet of quartz monzonite, and about 3,000 feet of the same rocks are revealed at the outcrops (surface exposures) in the Pine Valley Mountains.

Visual observations during drilling showed increasing amounts of available water with depth, with the greatest quantity (about 125 - 150 gallons per minute) estimated at 702 feet (total depth). However, the specific yield of the fractured granitic aquifer discovered in the well was not determined with a brief, shallow test. Similarly, the true chemical nature of water from the granitic aquifer was not disclosed by sampling only the shallower "cascading" water source. Cedar City was eventually able to install casing to 275 feet in the new well in order to seal off the shallow aquifer. However, the portion of the well bore below the casing collapsed before water could be sampled from the granitic aquifer. Now that casing is in place, the well should be deepened to at least 1,000 feet, “under reamed” out to no less than 6" diameter, cased with a slotted liner from 500 feet to total depth, and tested with a multistage, slim hole, submersible or top drive pump. Once these additional steps are completed, the City will have a better knowledge of the potential water supply that could be obtained from the fractured quartz monzonite aquifer.

Phase Six Report by Gary F. Player August 17, 2012, p. 4

Bedrock Aquifers East of Cedar City, Utah

1. Brian Head Town recently completed a well that encountered porous, water bearing Cretaceous sandstones from 1,300' to 1,500' below Bear Flat in Brian Head. The elevation at Bear Flat is about 9,800', suggesting that the water bearing sandstones were present at elevations ranging from 8,300' to 8,500'. The well was pumped at 1,500 gallons per minute, and the static water level when not pumping is about 10 feet below ground level.
2. Similar sandstones occur in Cedar Canyon from the drainage divide west of Cedar Breaks to Right Hand Canyon. The Cretaceous bedrock formations are at least 4,000 feet thick, and contain at least 2,000 feet of porous sandstones.
3. At least 10,000 acre feet of water could be produced from the sandstone each year without depleting the aquifer.
4. Layers of sandstone and shale beneath Cedar Breaks are gently tilted to the east, causing much of the ground water to flow to the east in the subsurface, away from Cedar City.
5. The sandstone aquifers are buried so deeply under the Markagunt Plateau that counties to the east of Cedar Breaks are not able to utilize the water, and it is essentially wasted.

Gary F. Player

Utah Professional Geologist No. 5280804-2250

February 25, 2012

WATER STORED IN CEDAR MOUNTAIN, WEST OF CEDAR BREAKS, IRON COUNTY, UTAH

AREA	4	TOWNSHIPS			
AREA	144.00	SQ. MILES			
AREA	92,160.00	ACRES			
AREA	4,014,489,600.00	SQ. FEET			
GROSS THICK.	1,000.00	FEET	MINIMUM		
GROSS THICK.	3,000.00	FEET	LIKELY		
GROSS THICK.	5,000.00	FEET	MAXIMUM		
SANDSTONE	0.40	VOL/VOL	MINIMUM		
SANDSTONE	0.50	VOL/VOL	LIKELY		
SANDSTONE	0.60	VOL/VOL	MAXIMUM		
POROSITY	0.15	VOL/VOL	MINIMUM		
POROSITY	0.20	VOL/VOL	LIKELY		
POROSITY	0.25	VOL/VOL	MAXIMUM (INTERGRANULAR PLUS ALL FRACTURES)		

VOLUME OF WATER = AREA * THICKNESS * SAND % * POROSITY

MINIMUM	5,529,600.00	ACRE-FEET	
LIKELY	27,648,000.00	ACRE-FEET	
MAXIMUM	69,120,000.00	ACRE-FEET	

LIKELY VOLUME OF GROUND WATER IN PLACE UNDER 4 TOWNSHIPS:

27,648,000.00 ACRE-FEET

ANNUAL INFILTRATION

PRECIP.	15	INCHES PER YEAR	MINIMUM	*1.25*	*FEET*
PRECIP.	20	INCHES PER YEAR	LIKELY	*1.67*	*FEET*
PRECIP.	30	INCHES PER YEAR	MAXIMUM	*2.50*	*FEET*
AREA	4	TOWNSHIPS			
AREA	144.00	SQ. MILES			
AREA	92,160.00	ACRES			
AREA	4,014,489,600.00	SQ. FEET			
INFILTRATION	0.05	VOL/VOL	MINIMUM		
INFILTRATION	0.1	VOL/VOL	LIKELY		
INFILTRATION	0.15	VOL/VOL	MAXIMUM		

ANNUAL INFILTRATION = AREA * PRECIPITATION * INFILTRATION

MINIMUM	5,760.00	ACRE-FEET
LIKELY	15,360.00	ACRE-FEET
MAXIMUM	34,560.00	ACRE-FEET

LIKELY VOLUME OF INFILTRATION UNDER 4 TOWNSHIPS:

15,360.00 ACRE-FEET PER YEAR

THAT INFILTRATION AMOUNT WOULD PROVIDE THE "LIKELY" VOLUME OF GROUND WATER IN 1,800.00 YEARS

GARY F. PLAYER
03/24/08
rev. 07/03/14