

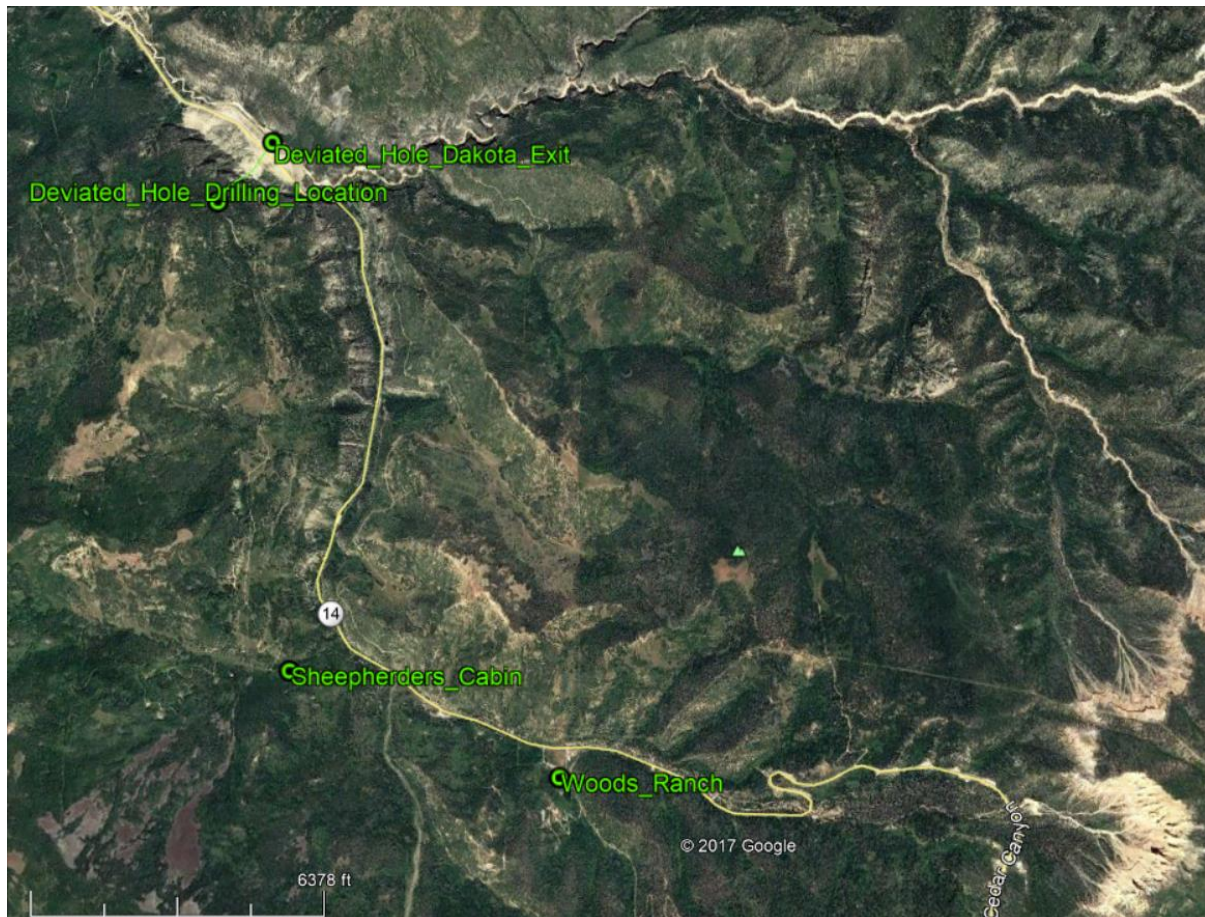
How to Test Fractured Quartz Monzonite Aquifer:

1. Support Frank Nichols re-opening and testing the Arco #1 well at Iron Springs.
2. Support Mrs. Renn Zaphiropoulos re-opening and deepening the well at her ranch.
3. Support is defined as tax abatements or other financial incentives.
4. Measure the water level in the 6 iron mine pits, basically between these two new water wells. Set up on-going measurement and monitoring of the water levels in the iron mine pits as well as aquifer levels in any wells surrounding these two fractured quartz monzonite wells.
5. Test the wells by producing them as fast as possible for as long as possible and monitor any interaction between the producing wells and the water levels in the iron mine pits or other wells.
6. When data shows a connection with water level and production of either or both of these wells, integrate results with annual rainfall to establish regulations on the amount of annual water which can be produced from quartz monzonite wells within a specified area surrounding the well.
 - a. Annual precipitation from published maps = 20 inches, or 1.667 feet
 - b. Infiltration = 10%, or 0.1667 feet.
 - c. Recharge per section = $640 * 0.1667 = 107$ acre-feet per year.
 - d. This implies 1 well per 10 sections to get 1,000 acre-feet per well per year with no drawdown. Since there are thousands of years of water stored in the aquifer, wells could be over-drafted a bit, though springs and streams would take a hit.
7. This test will allow transfer of water rights from Beryl and Cedar Valleys and open access to a new aquifer running from Pine Valley Mountain to Minersville.
8. The state engineer has stated water (from those who would lose their rights) can be transferred.

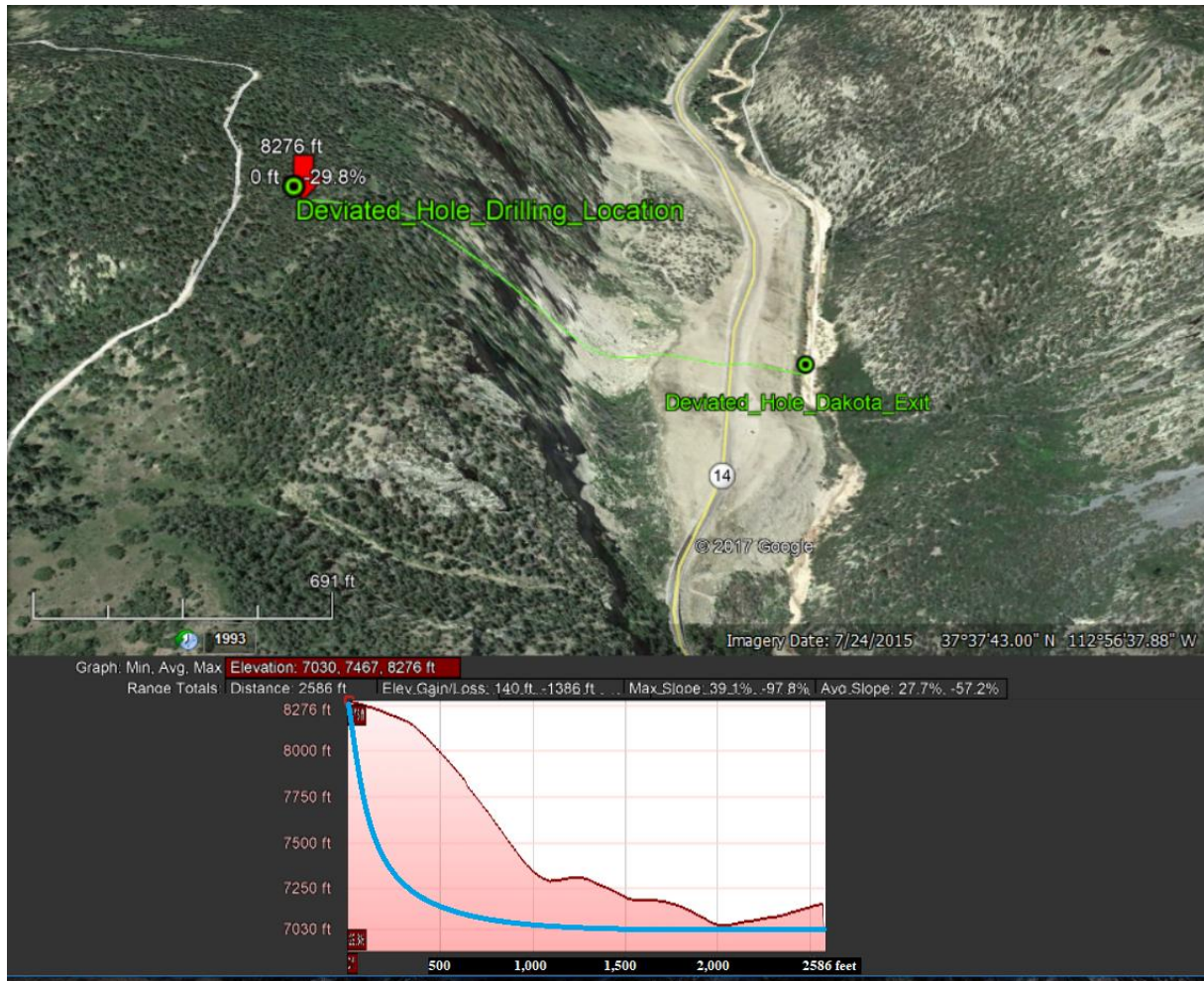


How to test the Cretaceous Aquifer (where Cretaceous age rocks are the white Straight Cliffs Formation down to the Dakota Formation above and below Highway 14 where the landslide happens):

1. Woods Ranch and SUU's Shepherdder's Canyon sit on top of the Straight Cliffs Formation.
 - a. Gary Player had a drilling permit for Woods Ranch. A new drilling permit can be obtained.
 - b. SUU has been approached about drilling a well at their property, where the road goes to Shepherdder's Cabin.
 - c. Go to http://www.walden3d.com/IronCounty/CedarValleyWater/170727_Cretaceous_Aquifers/ for videos of Joseph Armstrong water witching these two locations with comments and questions.
2. After obtaining a financial commitment to drill a test well, select one of the above sites. Joseph Armstrong witched both sites, and sees both sites as being at least as good as the new Enoch well.
3. Drill a test well and produce it hard to see how much production is possible. Water can be run into Coal Creek.
4. Monitor Kids Pond spring and other springs and wells in the area during the production test to see if there is any slow-down or draw down from the production test.
5. This test will demonstrate the viability of producing water from a new aquifer consisting of Cretaceous Age Rocks, which run from South Iron County to Brian Head and Summit.



6. Once this is demonstrated investors and a drilling company can be identified to drill a deviated hole behind where the landslide regularly occurs (1,246 foot fall with a 2,586 foot deviation), as shown by the display and cross section on the following page.



7. This well will be the first of several along this ridge, and the well will:
 - a. Remove any pumping cost for new water, by letting gravity drain the wells.
 - b. Drain water away from the cliff face stopping, or at least slowing down, the occurrences of landslides.
 - c. Provide a new source of water which can be distributed through the existing irrigation systems running off of Coal Creek.
 - d. Create a new source of energy by putting turbines in the deviated wells.

Cedar City, Iron County, or the CICWCD – individually or in concert – cannot afford not to test these ideas prior to burdening the citizens of Iron County with a \$250,000,000 tax over many years. At most, proposed test wells will be less than \$500,000. The deviated well might cost \$4 million, and should not be undertaken until there are test wells at Woods Ranch and/or Shepherder’s Canyon. Two Quartz Monzonite and two Cretaceous tests wells might cost \$2 million, or 0.8% of the proposed tax burden to be placed on Iron County citizens for a pipeline to the West Desert. These four test wells, by themselves, have the possibility of significantly reducing, or possibly replacing enough water being pumped in Cedar Valley to eliminate the 7,000 acre-foot per year deficit, which the State Engineer is rightly concerned about. These tests would delay or possibly eliminate the need for the pipeline to the West Desert, greatly reducing the tax burden on Iron County citizens.

We recognize the CICWCD has not paid us for advice, and if that is required in order to act on these proposed tests, we will be glad to bill the CICWD for access to our experience and suggestions.

The CICWCD, by implication from pursuing a \$250 million pipeline to provide 27,000 acre-feet of water to Cedar Valley, has set the price of water at \$9,259.26 per acre-foot in Cedar Valley:

\$250,000,000 divided by 27,000 acre-feet = \$9,259.26 per acre-foot

Table Showing the Value of Water in Individual Wells Drilled into either the Quartz Monzonite or the Cretaceous Undeveloped Aquifers:

Gallons per Minute	Acre-feet per Year	x	\$9,259.26	=	Value
0.62	1	x	\$9,259.26	=	\$9,259.26
3.10	5	x	\$9,259.26	=	\$46,296.30
6.20	10	x	\$9,259.26	=	\$92,592.59
15.49	25	x	\$9,259.26	=	\$231,481.48
30.98	50	x	\$9,259.26	=	\$462,962.96
61.95	100	x	\$9,259.26	=	\$925,925.93
154.89	250	x	\$9,259.26	=	\$2,314,814.81
309.77	500	x	\$9,259.26	=	\$4,629,629.63
619.55	1,000	x	\$9,259.26	=	\$9,259,259.26
929.32	1,500	x	\$9,259.26	=	\$13,888,888.89
1,239.10	2,000	x	\$9,259.26	=	\$18,518,518.52
1,548.87	2,500	x	\$9,259.26	=	\$23,148,148.15
1,858.65	3,000	x	\$9,259.26	=	\$27,777,777.78
2,168.42	3,500	x	\$9,259.26	=	\$32,407,407.41
2,478.20	4,000	x	\$9,259.26	=	\$37,037,037.04
2,787.97	4,500	x	\$9,259.26	=	\$41,666,666.67
3,097.75	5,000	x	\$9,259.26	=	\$46,296,296.30

Since the CICWCD is laying the groundwork for, and since the GMPC is an extension of the State Engineer, a Utah state regulatory agency, it seems appropriate to review some of the successes and failures of other agencies and groups which have regulated the production of natural resources. The best known examples are “The Texas Railroad Commission” (TRRC), and “OPEC”, which mirrored Texas Railroad Commission approaches when setting oil prices worldwide.

Possibly the Central Iron County Water Conservancy District (CICWCD) can learn and avoid issues TRRC and OPEC faced, including:

- Setting natural resource prices always loses to the free market, especially for a commodity like water.
- Setting regulations to minimize waste and misuse of natural resources wins in the end (like limiting water production in a naturally fractured reservoir to annual rain replenishment).
- There will be court cases, no matter what you do, and no matter how fair your approach is.
- Sometimes the best advice does not come from paid consultants.
- Be more like the TRRC and learn from them and less like OPEC.

The next page highlights historical developments at OPEC and TRRC, possibly of interest for planning purposes.

The Texas Railroad Commission (TRRC):

- 19 Dec 1890 the Texas Constitution was amended to provide for the TRRC to regulate railroads.
- 10 Jan 1901 First gusher, Spindletop, produced so much oil prices dropped to 34 cents per barrel.
- 09 May 1905 Texas Legislature declared an emergency pertaining to regulation of drilling, operation, and abandonment of oil, gas, and water wells.
- 02 Apr 1913 Texas Legislature amends law relating to prevention of waste of natural gas declaring an emergency.
- 20 Feb 1917 Legislature declares pipelines to be common carriers and gives TRRC jurisdiction.
- 31 Mar 1919 Legislature enacts a statute requiring conservation of oil and gas, forbidding waste.
- 26 Nov 1919 TRRC adopts first Statewide Rule for oil and gas well spacing for conservation.
- 12 Jun 1920 Legislature declares production and sale of natural gas a public utility under TRRC.
- 19 Mar 1923 Legislature makes water pollution by petroleum a crime.
- 12 Jan 1924 Texas Court of Civil Appeals sustains TRRC's power to regulate gas utilities.
- 1927 First voluntary proration in Texas limited production of Yates Field below capacity.
- 04 Apr 1928 TRRC issues first proration order based on conservation statutes for Hedricks Pool.
- 10 Oct 1929 TRRC issues proration order based on market demand tied to Panhandle Field.
- 14 Aug 1930 TRRC issues first Statewide Proration Order to 750,000 barrels per day.
- 13 Dec 1930 TRRC issues a proration order for Panhandle Field, limiting to 25% of potential.
- 04 Apr 1931 TRRC issues first proration order for East Texas Field for 1000 barrels/day/well.
- 16 Apr 1931 Legislature enacts first Marginal Well Statute: 10 barrels to 2,000 feet; 20 barrels effective 01 May 1931 1 million barrels per day, 1/3rd of U.S. production, & price 10 cents/barrel.
- 28 Jul 1931 three judge federal court holds proration order East Texas field invalid.
- 02 Sep 1931 TRRC issues second proration order for East Texas Field after state of insurrection.
- 12 Nov 1932 Special Session of Legislature enacts Market Demand Act increasing TRRC power.
- 13 Apr 1935 Legislature prohibits production of oil & gas to cause waste, controlled by TRRC.
- 11 May 1935 Legislature levies a tax on petroleum products to fund TRRC.
- 01 Mar 1937 U.S. Supreme Court holds TRRC can classify certain wells as "sweet gas wells".
- 31 Dec 1947 Texas Supreme Court upholds TRRC to prevent wasteful flaring of casing-head gas.
- 27 Feb 1961 Legislature enacts a law requiring a TRRC permit to drill injection wells.
- 01 Jun 1964 TRRC adopts recompilation of the Statewide Rules merging present regulations in.
- 30 Aug 1965 Legislature enacts Mineral Interest Pooling Act authorizing TRRC to do pooling.
- 28 Mar 1965 To increase exploration incentives TRRC increased the discovery allowable period from 18 months to 24 months.
- 20 May 1975 Legislature enacts Geothermal Resources Act with TRRC & Texas Water Quality Board to publish and enforce rules and regulations to encourage development and production.
- 16 Jun 1977 Legislature creates Natural Resources Council charged with enhancing the same.
- 22 Oct 1986 The Tax Reform Act enacted, removing investment tax credit and lowering corporate tax from 46% to 40%.
- 06 Jul 1988 US EPA found state and federal regulatory programs adequate.
- 20 Feb 1990 Statewide Rule 50, "Enhanced Oil Recovery Projects" allow a tax incentive.
- 01 Sep 1991 Statewide Rule 22, "Protection of Birds," adopted tied to open oil tanks & oil waste.
- For every advance listed here, there were lawsuits driving the response and counter-response.

The Organization of the Petroleum Exporting Countries (OPEC):

- 14 Sep 1960 formed by Iran, Iraq, Kuwait, Saudi Arabia, & Venezuela.
- Later joined by Qatar (1961), Indonesia (1962), Libya (1962), UAE (1967), Algeria (1969), Nigeria (1971), Ecuador (1973), Angola (2007), Gabon (1975), & Equatorial Guinea (2017).
- Objective to co-ordinate and unify petroleum policies among Member Countries for fair prices.
- Prices rose steeply twice, triggered by Arab oil embargo (1973) and Iranian Revolution (1979).
- Prices crashed in 1986 responding to a big oil glut and consumer shift away from hydrocarbons.
- Environmental issues emerged on the international energy agenda in the late 1980's.
- Prices generally stable in the 1990's.
- Prices strengthened in early 2000's because of OPEC oil price band mechanism.
- Global economy the main risk as global macroeconomic uncertainties, petroleum oversupply, etc.
- The world learned to hate OPEC, and with market price changes they become obsolete.