Spring Water Development

Indian and Old House Springs

Mt. Veeder
Napa County, California

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Background

On Mt. Veeder water is critical. Most of the area north of Redwood Road and south of Mt. Veeder Road is fed by age old springs, while the properties south are served by both springs and wells. To my knowledge there are no successfully operating wells in the area of our property, but we are now blessed with abundant spring water.

When we purchased the Benkiser property our early due diligence surrounded the question of water supply. After we had agreed to purchase the property and during our contingency period, we evaluated the current springs and determined that while a good water supply probably existed, no stable spring management plan was in place. Lynne had a simple mantra….”show me the water”. The property had not had human residents for 30 years and the old water delivery system was shot. Simply put, the entire water system to serve our house and property required complete redevelopment.

What do we have and what shall we do?

On September 19th, 2005 I hired a local water company to perform a yield test of the existing springs. We measured Indian Spring at .9 gallons per minute and Old House Spring at 1.2 gallons per minute. A total of 2.1 gallons per minute is ok, after all that equates to 3,024 gallons per day and I calculated that we will use about 400-500 gallons a day in our home as a drinking water supply for kitchen, bath, cooking and laundry.

From the perspective of the Napa County building department, in order to build a house, it is necessary to exhibit at least 1 gallon per minute of water dedicated to your specific property. Although we clearly had enough for our building permit, we wanted to redevelop both springs with the expectation that such an effort was not only necessary for a safe and clean supply for the home, but that yields would be substantially increased.

When I began my research into possible development options, I found that there was very little information available on the subject and what did exist was rather generic. The best source of my early research was contained in a paper published by the North Carolina Cooperative Extension Service within the “Water Quality & Waste Management” group. An article titled, ***Protecting Water Supply Springs*** by Mr. Gregory D. Jennings-Agricultural Engineer, appeared as publication number AG 473-15 in March 1996.

In his paper Mr. Jennings stated it correctly:

> ***“A spring is a place on the earth’s surface where groundwater emerges naturally. The water source of most springs is rainfall that seeps into the ground uphill from the spring outlet. While springs may seem like an ideal water supply, they need to be selected with care, developed properly, and tested periodically for contamination.”***

Proper spring development helps protect the water supply from contamination. The objective of spring development is to collect the flowing water underground to protect it from surface contamination and store it in a sanitary spring box, or in our case two new 10,500 gallon concrete storage tanks. Proper development depends on whether the spring is concentrated in a relatively contained opening or whether the water seems to seep from the ground over a large area. These are known as either a "Concentrated Spring" or a "Seepage Spring".

Indian and Old House Springs are "Concentrated Springs". Typically, these concentrated springs occur along hillsides in mountain and piedmont areas at points where groundwater emerges naturally from openings in rock. These are the easiest springs to develop and protect from contamination. Proper development for concentrated springs consists of intercepting water underground in its natural flow-path before it reaches the surface.

Concentrated springs can either be developed in a **"French Drain"** configuration or **"Horizontally Drilled".** French drain systems require the following steps:

1. Dig upslope from the spring outlet to a point where flowing water is at least three feet underground or where rock is encountered.

2. Install a rock bed to form an interception reservoir. On the down-slope side, install a cutoff wall of concrete. The cutoff wall may not be necessary for a low-area spring where the "spring box" may serve as the collector.

3. Lastly, insert a collector pipe low in the cutoff wall to guide water into the spring box. As much as possible one should prevent water from backing up behind the wall, otherwise you risk harming the underground spring area as pressure backs up against the water source.

The disadvantages of this design for my applications was that the digging required uncovering a rather large area, bringing gravel and concrete to the site for construction, building the cutoff wall and constructing a air tight spring box.

"Horizontal Drilling" is another development option for concentrated springs. This process required less impact as the development is accomplished by horizontally drilling underground and finding the water resource. A 3"hole is drilled into the hillside and when the water source is found, you then complete the hole with a 1" copper slotted liner, with the last ten feet of copper pipe being a solid piece. A concrete sanitary seal is then pumped around the first ten feet of the copper pipe and a finally a 1 ½" pvc valve is connected to the end of the copper pipe.

The advantages of this approach in my application was that the disturbance was kept to a very small imprint, the water could be located underground without disturbing the surface which makes it easier to keep the spring free of contamination. An additional

benefit was the fact that we did not have to bring materials such as concrete, rock and heavy equipment to either spring.

I credit Mr. Les Hilger of Middletown for introducing me to the horizontally drilling option. Les is a very astute man and he put me in touch with two drillers, both of which operate out of Willits, CA. I hired both drillers to consult with me and based upon their proposals and my view of their experience, I selected Mendocino Waterworks to execute a horizontal drilling plan.

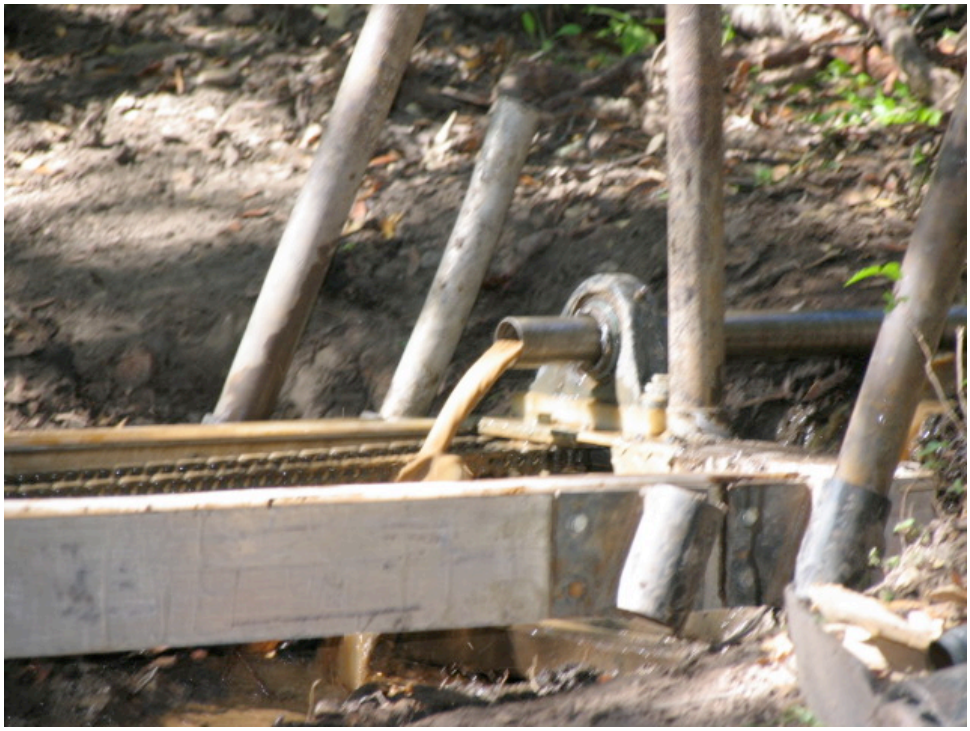
The effort started with a detailed geological and "natural metaphysical" look at the existing springs which included the use of dowsing rods.

Larry Desmond evaluates the Old House Spring area with his Dowsing Rod

Indian Spring

Once the underground water source is located, an uphill line is selected for drilling. We commenced the drilling of the Indian Spring on June 5th, 2006 and completed the hole with copper tubing on June 6th after allowing the spring to produce and "clean-up" overnight.

Drilling underway at Indian Spring



Immediate and successful drilling result at Indian Spring

Indian spring was drilled horizontally for 80' with the best water found at the 70 foot interval. The new hole was cased with 80' of 1" copper pipe, the last ten feet of which was non-perforated. The bottom of the hole is estimated to be about 10 feet below the surface. We know that we captured the spring because the existing spring dried up as we have provided a new path for the spring water.

Beautifully Developed Indian Spring flowing 4 gallons per minute

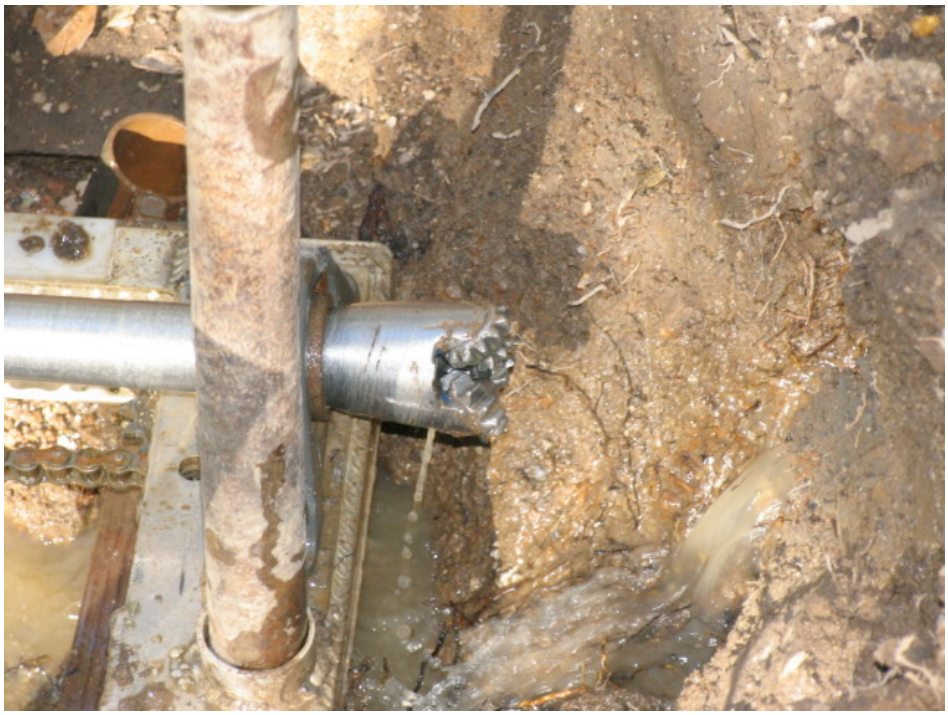
Old House Spring

Next up was the drilling effort at "Old House Spring". There a very similar approach was taken with regards to the dowsing and spring evaluation. Mr. Desmond selected the course and drilling began. Old House Spring is actually two springs and this proved a little more difficult to track and capture within one hole. We actually ended up with two separate copper pipes producing spring water.

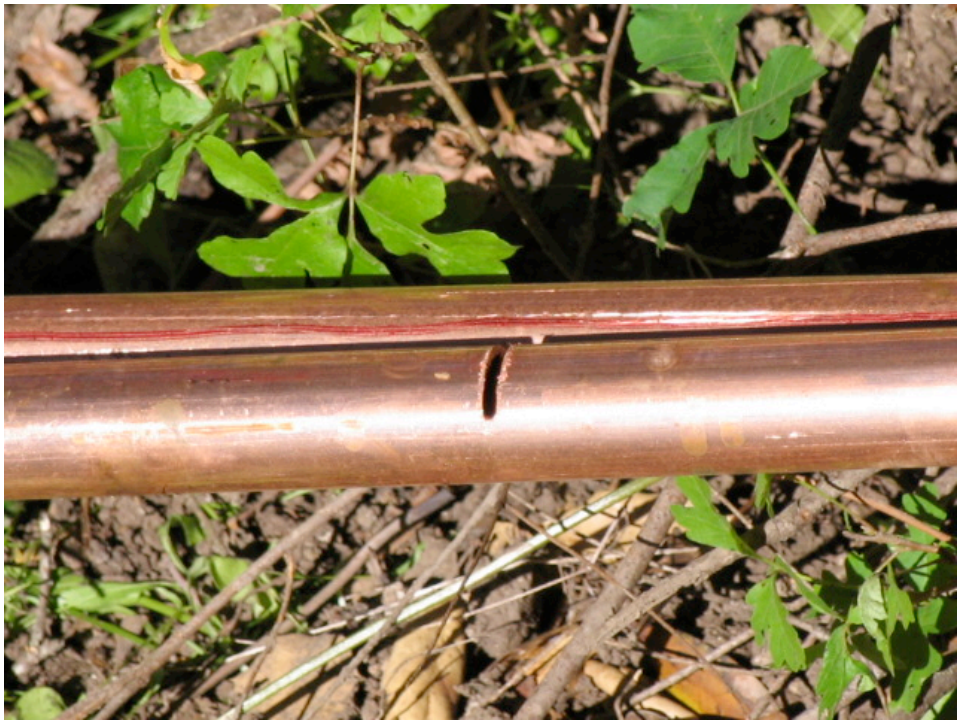
The drilling commenced on June 6th and was completed on June 7th. The hole was drilled 61' and in this hole we encountered more rock which made the drilling more difficult. The best water source was discovered at 55' and the hole was initially completed with one perforated copper pipe of 60' with the last 10' being non-perforated.

Drilling underway at Old House Spring

Matt Smith (center) proves invaluable in assisting the drilling crew

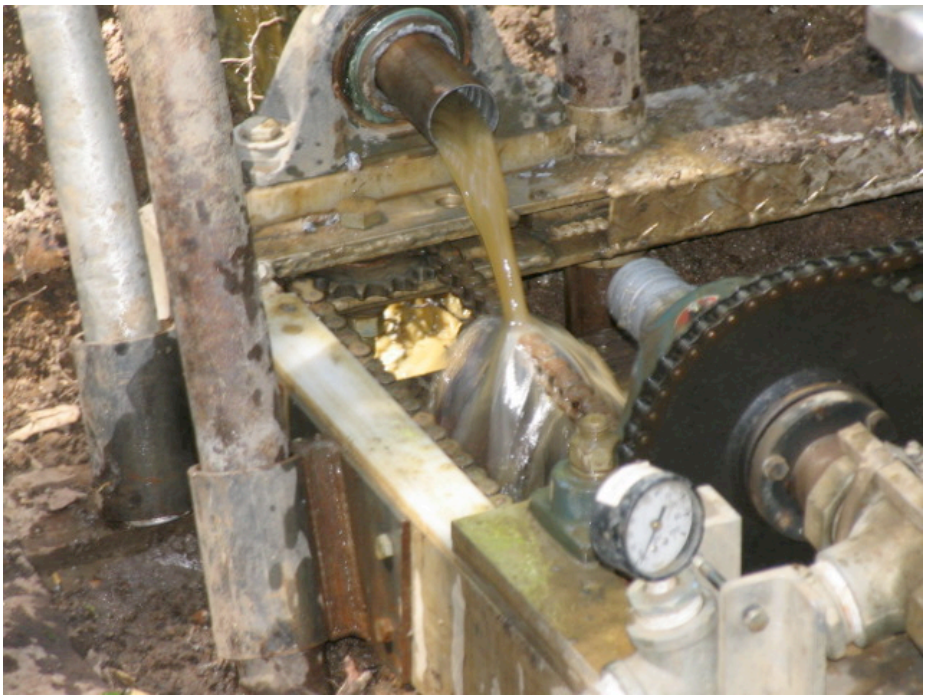


3” Drill Bit drills a nice clean hole

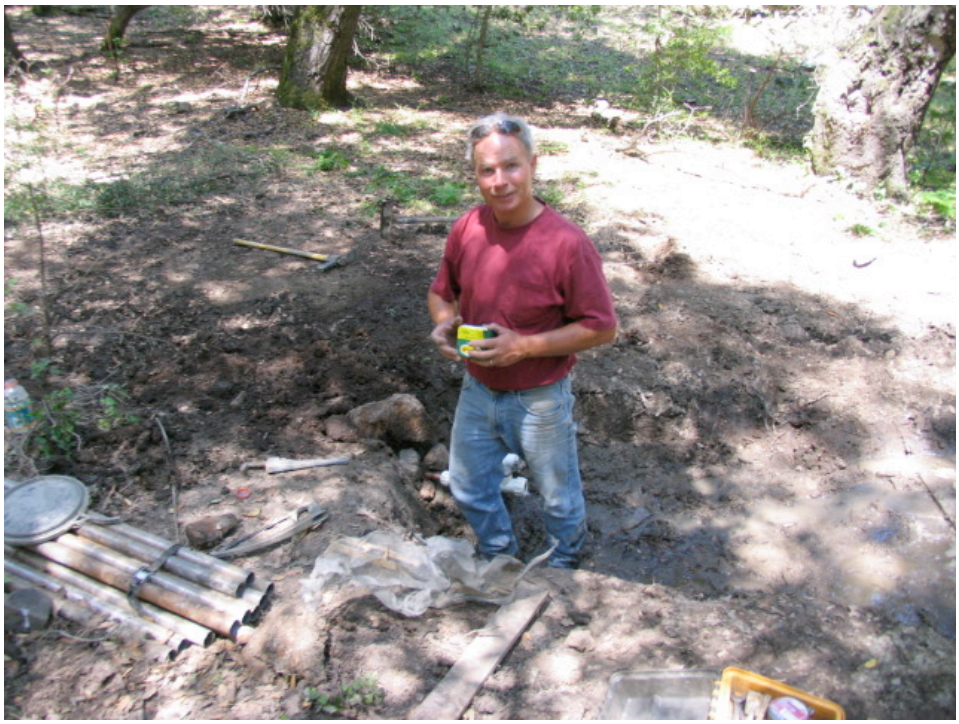


Perforated Copper Tubing brings the water home

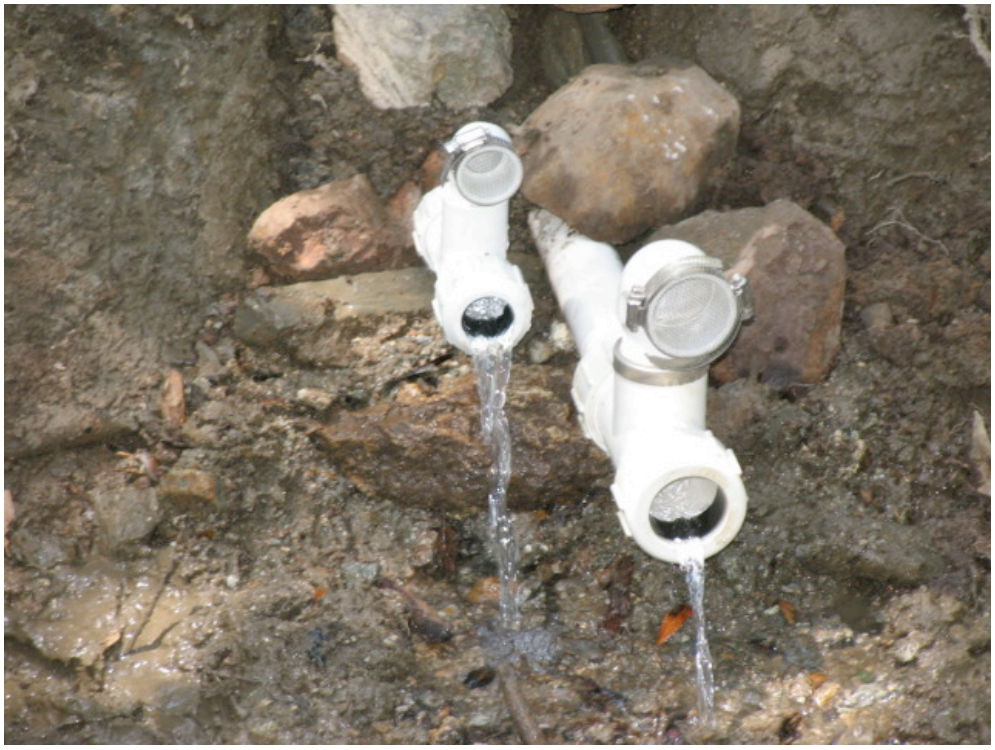
A Cement Sanitary seal is applied under high pressure—stand back!!



Successful Results at Old House Spring

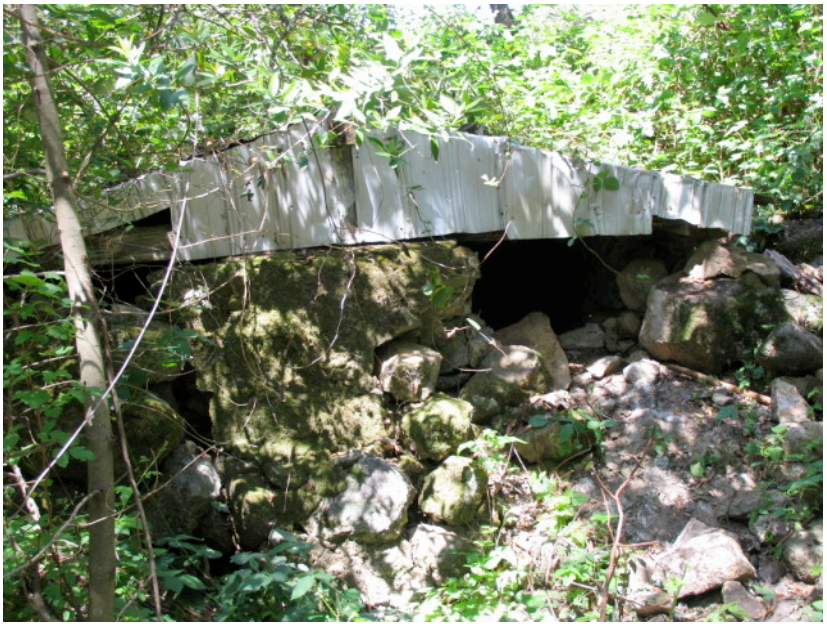


Larry Desmond working magic at Old House Spring



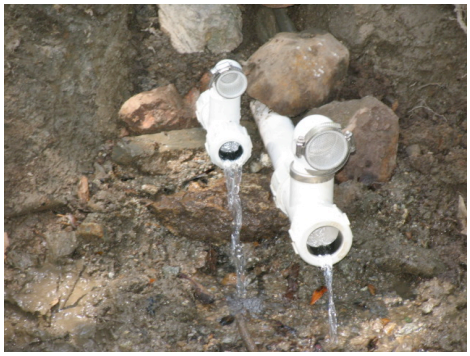
Duel Completion at Old House Spring flowing 3 gallons per minute

From this…..and 2.1 gallons per minute:



Original Indian Spring

…..To this and a combined 7.0 gallons per minute or 10,080 gallons per day. All in a weeks work!!



"Old House Spring

"Indian Spring"

Given our positive results, I would recommend a horizontal drilling program to anyone with similar spring conditions. The benefits being minimal surface impact and maximum sanitary protection.