

The Bedrock Research Wellfield at The Watershed Institute Pennington, NJ

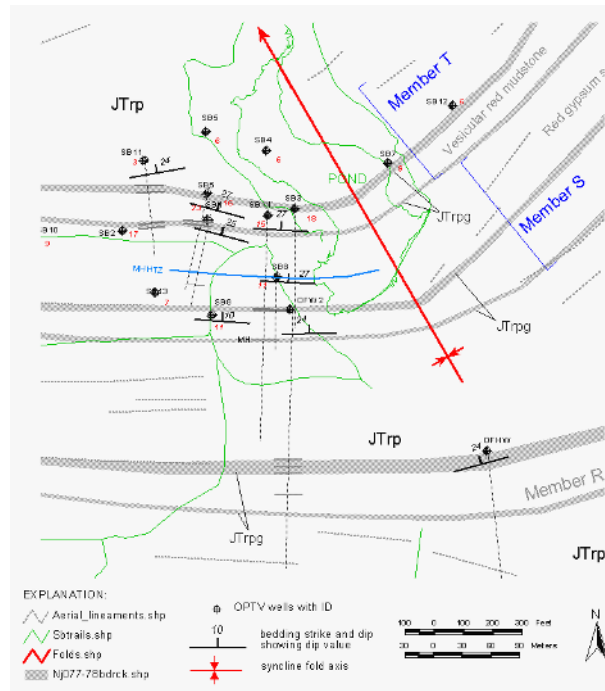


Summarized by Gregory Herman, PhD

The bedrock water-well field at the Watershed Institute was started in 1966 as a cooperative research program by the United States (US) and NJ geological surveys to study the nature of hydraulic anisotropy in fractured sedimentary bedrock. Thirteen wells were drilled by the air-rotary method at the site in 1966 prior to the construction of the pond. The field project was designed to demonstrate in a qualitative sense the anisotropic transmissive properties of the Passaic Formation on a regional scale (Vecchioli and others, 1969). A central well was pumped and drawdowns were recorded in adjacent observation wells. Asymmetric distribution of drawdowns was observed and they concluded that producing zones were restricted to some bedding planes that were areally continuous.

In 1994, the USGS reoccupied the well field, obtaining geophysical logs in ten of the wells that included acoustic televiwer and fluid-flow logs. Morin and other (1997) also ran some packer tests in order to further characterize the hydraulic nature of the Passaic Formation shale.

They concluded that bed planes are the most highly transmissive, the hydraulic effects of steeply dipping tectonic fractures is comparatively minimal, and almost an order of magnitude reduction in average **T** occurs 20 m (~66') below ground surface, possibly due to increasing effects of overburden pressure and cementation.



The research wellfield as mapped by the
NJ Geological Survey in 2004

A third research study was conducted at the wellfield by the NJGS from 2004 to 2011. That study involved obtaining optical televiwer logs in seven of the wells as part of a regional study of the physical nature of subsurface water-bearing features in fractured bedrock (Herman, 2010). A hydrogeological framework was developed for the site, and the well field was used intermittently to test and calibrate borehole logging equipment.

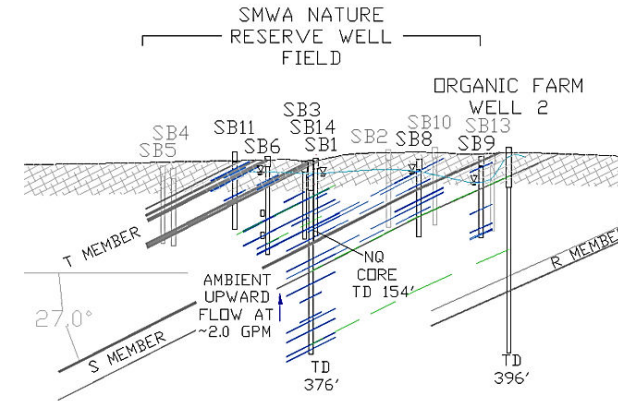
The framework was incorporated into an expanded hydrogeological profile including the nearby Honey Brook Organic Farm and Bristol Meyers research campus. The optical logs identified specific red and gray mudstone beds as part of the framework, and identified highly transmissive red beds as being gypsum-soil horizons that were leached out and laterally continuous like those shown below between three wells.

References

Vecchioli, John, Carswell, L.D., and Kasabach, H.F., 1969, Occurrence and movement of ground water in the Brunswick shale at a site near Trenton, New Jersey: U.S. Geological Survey Professional Paper 650-B, p. 154-157.

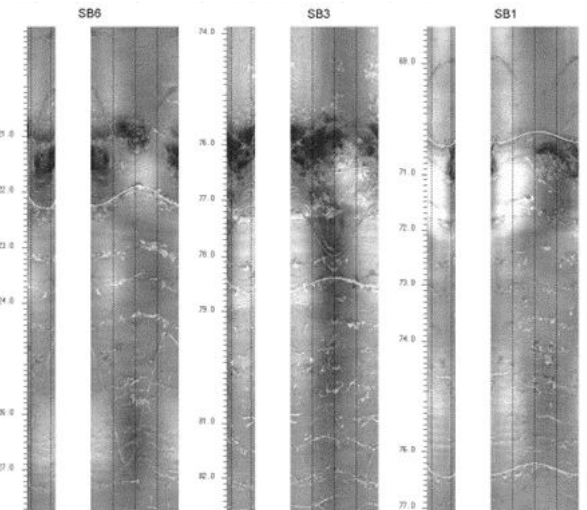
Morin, R. H., Carleton, G. B., and Poirer, S., 1997, Fractured-Aquifer Hydrogeology from Geophysical Logs; The Passaic Formation, New Jersey: Groundwater, v. 35, no. 2, p. 328-338.

2010 Herman, G. C., Hydrogeology and borehole geophysics of fractured-bedrock aquifers, in Herman, G. C., and Serfes, M. E., eds., Contributions to the geology and hydrogeology of the Newark basin: N.J. Geological Survey Bulletin 77, Chapter F., p. F1-F45.



NJGS hydrogeology profile through part of the
Stonybrook-Millstone well field

Stratigraphic correlation of wells SB6, SB3, and SB1 based on interpreted optical televiwer data, Stony Brook-Millstone Watershed Association well field, Wargo Rd, Hopewell Twp., Mercer County, New Jersey, N. J. Geological Survey, G.C. Herman, 2004 April 2



Optical televiwer logs showing subsurface
correlation of a highly-transmissive red bed