

AN UPDATE ON THE DILLSBURG EARTHQUAKE SWARM

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As many of you know, the earthquake swarm that started in October, 2008 is still continuing today. The largest tremor of this swarm occurred on October 25, 2009 and was measured at magnitude 2.8. The latest tremor to have been reported was on January 20, 2010 from the Warrington- Blair Mountain roads area. Thus far, 901 tremors have been reported by the residents, although we know that many more have occurred that were not reported. Just how long this swarm will continue is unknown, but a search of earthquake research literature has only yielded the longest duration of about 8 months. The Dillsburg swarm is now entering its 17th month.

With the Columbia University results now published (www.dcnr.state.pa.us/topogeo/openfile/dillsburg.pdf) from their portables during the fall of 2008 and the Perry Bates sponsored portable seismographs installed in the summer of 2009, we know the small epicenter area along Old York Road, their depths and geologic relationship. Most of the earthquakes recorded by these two portables networks were plotted within 500 feet of Old York Road between Ore Bank Road and Warrington Road. The depths of the majority of the tremors were 1,600-1,800 feet, very shallow for earthquakes. Thanks to the research conducted by the U.S. Bureau of Mines in the iron ore fields in the area of the tremors, we also know that the hard, dense rock known as diabase reaches a depth of 1,800 feet. We **believe that** the diabase is fracturing under pressure at these depths, causing the tremors.

So we have established the locations and **an idea** of what is occurring to produce these tremors. We still don't know (and may never know), the triggering factor for these tremors. Several **hypotheses** involving a possible triggers have been proposed including the stress on the diabase created by the movement of the North American plate and pressure involving groundwater in the area or a combination of the two above factors. If you would like to read more about a relatively new theory involving East coast earthquake, do an Internet search for "hydroseismicity."

What we know for sure is that the 19th century iron mines are not solely responsible for the tremors. The mines, some reaching a depth of about 350 feet, may be indirectly involved with the triggering of the tremors. We are also monitoring numerous residential wells for the water depth to track **any change** in the area's water table. It is hoped that in the near future, **an abandoned well** will have instruments installed to give us a better picture of the groundwater behavior. We also hope to have a gauging instrument installed in a small stream in the area that will also give us an idea on how rainfall influences the groundwater system. This instrumentation will be installed and monitored by the United States Geological Survey.

Also, the possibility of installing a seismograph on the property of the Northern School District is being investigated. What a great opportunity for the school's earth science students

to conduct their own “Backyard Geology” research.

Finally, for those that did not attend the last community meeting in November at Northern High School, we thank all of the local government officials, police and fire personnel and the many residents who have assisted in gathering information and providing research equipment for us. Helen Delano of the Pennsylvania Geologic Survey greatly aided in the summer portable seismic network data collection and the production of the Columbia University report.