

Community-based Water Quality Monitoring Projects in Clinton, Clearfield, and Center Counties, PA Md. Khalequzzaman, Jacob Pierson, Gabe Murtorff, Mike Winters, and James Penrose

The Beech Creek Watershed is a moderately sized watershed situated in northern Centre County and southern Clinton County, Pennsylvania. This watershed is a mixed batch of streams, where half are still recovering from AMD impacts due to legacy coal mining in the region, while the other half of the water system is in pristine condition. Due to recent In the wake of Marcellus Shale gas-well drilling in central Pennsylvania, Lock Haven University Geology program forged partnerships with several community-based organization Marcellus Shale gas-drilling activity within the watershed, the Pennsylvania Senior Environmental Corps (PaSEC) in conjunction with the Lock Haven University Water and Environmental Lab initiated a water monitoring project to establish baseline data for the watershed. Twelve sampling locations were selected due to their proximity to Marcellus Shale gas-wells. Standard field tests were conducted and data was collected from each site by volunteers, then these samples were sent to the LHU Water and Environmental Lab for further analysis. Lab tests included total suspended solids, Barium, Iron, Magnesium, Aluminum, Calcium, Magnesium, Copper, Arsenic, Chloride, and Sulfates. concerned with environmental and ecological impacts of human activities on natural resources. Marcellus 2009 Marcellus (Sep) 2 High Quality PUBLIC SUPPLY Pennsvlvania Senior Environmental Corps volunteers. Mile 0 20 40 80 120 160 Starting in May 2010, Lock Haven University's (LHU) Geology Program forged partnerships with Centre County chapter of Pennsylvania Senior Environmental Corps, Beech pH :Box plot and Whiskers TSS : Box and Whiskers Plot samples. The LHU Water and Environmental Lab is maintaining a running database of all parameters measured in the field and lab incase of any future disturbances in these selected **a** 15.00 Hall Run and its tributaries, nestled in Sproul State Forest, are an integral part of South Renovo Borough Water System (SRBWS) that provides drinking water to a local hospital 250.00 **TDS : Box and Whisters Plot** Conductance: Box Plot and Whiskers **Barium : Box and Whiskers Plot** Copper: Box and Whisker plot **Total Iron : Box and Whiskers Plot Total Iron** Temperature **Specific Conductance** Sulfate Box:Whisker Plot Sulfate -- - -



Abstract: to monitor the quality of surface water in the vicinity of these drilling sites. The organizations that participated in these community-based water quality monitoring projects included the Clearfield and Centre County chapters of the Pennsylvania Senior Environmental Corps, Beech Creek Watershed Association, and the South Renovo Borough Water Supply System. Several sub-watersheds of the West Branch Susquehanna River, including the Hall Run, Beech Creek, and various small watersheds in Clearfield County, have been selected to provide baseline water testing as a service to the surrounding communities. The field parameters included temperature, pH, DO, TDS, conductance, ORP, and water flow. Additional lab analyse yielded several cation and anion values, including total iron, aluminum, manganese, copper, calcium, magnesium, zinc, arsenic, barium, bromine, sulfate, nitrate, phosphate, and chloride Based on the field and lab results, the following conclusions have been reached: 1. The water quality in the Hall Run watershed meets the drinking water standards for all tested parameters; 2. Although seasonal variations of several parameters were recorded in the Beech Creek watershed, none of the levels were of high enough values to warrant concern; 3. Not enough data has been collected in the small watersheds in Clearfield County to reach any firm conclusions about the possible seasonal and temporal variations in the measured parameters; and 4. Based on current data, no evidence of negative impact from Marcellus Shale gas-well drilling on surface water quality has been detected. In addition, these projects have provided invaluable hands-on experiences for LHU students, while assisting surrounding counties by partnering with several community-based volunteering programs that are **Methods:** Creek Watershed Association, and Centre County Conservation District. This alliance was established to monitor twelve locations in Beech Creek, seven in Hall Run, and 14 additional locations in Clearfield County. These locations were selected because of Marcellus Shale gas-well activities taking place around these selected watersheds. The volunteers collected water samples, measured field parameters, and then delivered them to LHU for further laboratory analyses. Lab analyses included tests performed with a DR 5000 Mass Spectrophotometer for heavy metals, and chemical titration for Calcium, Magnesium, and Total Hardness. For the Hall Run project a Sonde data logger was deployed in the field for one week to measure Temperature, Dissolved Oxygen, Specific Conductance, and Total Dissolved Solids. Standard field and lab protocol was followed in collecting and analyzing the watersheds due to Marcellus Shale gas-well drilling activities. and approximately 540 residents in Clinton County. These demands on the Hall Run watershed and its tributaries draws an average of 70,000 gallons per day directly from a reservoir and, during times of low-flow conditions, uses a well to supplement the drinking water supply system of the basin. The Hall Run watershed has recently seen a spike in Marcellus Shale gas industry activities within its borders. Recognizing the importance of this integral watershed, the LHU Water and Environmental Lab and the South Renovo Water Authority decided to take up this monitoring project assessing the baseline conditions of this pristine watershed. Water samples are collected from seven locations monthly, field tested, and brought back to the water lab for further analysis following standard field and lab testing protocols. A Sonde data logger was also deployed in the field for one week to measure Temperature, Dissolved Oxygen, Specific Conductance, ORP, Chlorophyll-a, and Total Dissolved Solids.



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The Clearfield Monitoring Program consists of six sub-watersheds that all contribute to the West Branch Susquehanna River System. One of the sub-watersheds supplies water to the Dubois reservoir, which services potable water for more than 17,000 residents. Most of the streams in this system are pristine with a small amount of the waterways being impacted by harmful Acid Mine Drainage . Due to the high clusters of Marcellus Shale gas-well drilling activity in the immediate proximity of local water supplies, the Pennsylvania Senior Environmental Corps (PaSEC) in conjunction with the Lock Haven University Water and Environmental Lab initiated a water monitoring project to establish baseline data for these watersheds. Fourteen sites were selected for monitoring which included standard field tests and collection of samples by volunteers. These samples are then sent to the LHU Water and Environmental Lab for further analysis by student lab assistants. These tests included total suspended solids, Barium, Iron, Magnesium, Aluminum, Calcium, Magnesium, Copper, Arsenic, Chloride, and Sulfates.

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