UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL RESPONSE TEAM
Las Vegas, Nevada 89119

February 1, 2013

MEMORANDUM

SUBJECT: Groundwater Flow and Influences to Groundwater Flow in Wedron, Illinois

FROM: Donald T. Bussey, Environmental Scientist, CPG-08847 DTB

TO: Tinka G. Hyde, Director
USEPA Region 5 Water Division

Margaret M. Guerriero, Director
USEPA Region 5 Land and Chemicals Division

The purpose of this memo is to provide a review of existing data related to groundwater flow in Wedron, Illinois and to give an opinion on the influences on the direction of groundwater flow.

The Town of Wedron, Illinois is located in LaSalle County, just west of the Fox River, approximately 50 miles west-southwest of Chicago. The town is bounded to the east by the Fox River and a railroad line, and to the west by two Wedron Silica Sand mining quarries. The main residential portion of the town is bounded by topographic highs, one to the north, and one to the south.

Wedron Silica's Pit #3 has been excavated beneath the natural water table. Standing water presently is exposed within the pit. Water has been historically withdrawn from this pit, as well as other nearby pits and a surface stream, for use in mining processing. Over a recent one year period (2011) it was recorded that over 18,000,000 gallons were withdrawn (about 35 gallons per minute, on average). Anecdotal evidence from town residents suggests the water level in the pit has been even lower in the past than it is presently, with some local residential wells reportedly going dry during some of these occasions.

Residential potable groundwater wells also withdraw groundwater from the water table aquifer. Assuming 40 such wells, and using an average per well of 400 gallons per day (for the average family of four), wells in Wedron withdraw about 5,840,000 gallons per year (11.1 gallons per minute). Withdrawal from mining Pit #3 is more than three times this amount. In addition, there are three known wells installed at depths of over 200 feet. Two are residential wells each providing potable groundwater to several residences, and one other which supplies groundwater to a Wedron Silica facility within town, where as many as 60 persons may work. The two deep residential wells may withdraw groundwater from the deeper zone at about 2.8 gallons per minute. The Wedron Silica deep well may withdraw groundwater at a rate equal to the two deep residential wells combined. It is not known if groundwater withdrawal from this deeper zone is in communication with the water table aquifer, but it is a possibility. Assuming even more water withdrawn from other pits and the surface stream, water loss to the water table aquifer is significantly more attributable to mining operations than local residential well usage.

Prior to recent man-made cultural disturbances (mining, residential well usage) the expected natural groundwater flow direction through the town would be from the west, through the town between the two topographic highs, with discharge to the Fox River to the east. Today it appears that this expected natural flow direction has been reversed west of the railroad line. Recent surface water and groundwater elevation data collected on October 31, 2012, by Region 5, USGS, and EPA contractor personnel, revealed that the water level in Pit #3 was at 484.3 feet above mean sea-level (AMSL), while the elevation from a groundwater well just west of the railroad line was over 502 feet AMSL. This is an approximately 18 foot difference, with the water level in Pit #3 being lower than that of the monitoring point. In addition, during the same monitoring event, several other groundwater elevation readings were obtained from other wells within the town, with calculated groundwater elevations between 493 and 502 feet AMSL, sloping towards the pit, and supporting the conclusion that groundwater flow within the town west of the railroad line is towards Pit #3. Groundwater flow east of the railroad line during this monitoring event was towards the Fox River.

An additional observation made possible by the recent EPA/USGS field efforts was that groundwater was not encountered within soil borings advanced to bedrock via direct-push methods with the exception of nearby the Fox River (east of the railroad line). It is usual that groundwater will be above the overburden/bedrock interface. This line of evidence adds to the conclusion that groundwater flow has been reversed west of the railroad line in the Town of Wedron.

The Region also performed an assessment to evaluate potential source areas of the BTEX contamination found to be impacting many of the Wedron residential groundwater wells. Multiple potential sources were identified, all in the eastern portion of the town, located just west of the railroad line. With calculated groundwater flow west of the railroad line being evaluated to be flowing to the west towards Pit #3, and the number of affected residential wells between the source areas and Pit #3 being affected, a conclusion can be made that BTEX contamination originating from the identified source areas is migrating with groundwater flow towards the west and Pit #3.

In conclusion, mining operations are generally responsible for the reversal of natural groundwater flow direction and lowering the water table in Wedron. Based on the above reasoning, a cessation of groundwater withdrawal from the water table aquifer via mining operations would allow the water table aquifer to rebound and flow direction to reverse, over a significant period of time, reestablishing the more natural groundwater flow direction (west to east within the town), with discharge to the Fox River. A properly designed groundwater monitoring plan shall be prepared. This plan shall employ several permanent groundwater monitoring wells, with groundwater elevations collected regularly and concurrently in all planned wells and a monitoring port in mining Pit #3, using pressure transducers and data loggers. This shall provide supplemental evidence as to the current flow direction, and interaction between Pit #3 water level and the groundwater elevations within the Town of Wedron.

cc: Jacqueline Clark, Associate Regional Counsel, USEPA Region 5
Steven Faryan, On-Scene Coordinator, USEPA Region 5

List of References:

Final Letter Report, Wedron Groundwater Site, Weston Solutions, Inc., September 21, 2012.

USEPA WaterSense (www.epa.gov/watersense/pubs/indoor.html)

USEPA Region 5 Field Logbook Notes, October 31, 2012

USGS Wedron, Illinois 7.5-minute Quadrangle (1970)

Wedron Silica Company Response to Request for Information, Response to Question 13, July 24, 2012