

26 September 2019

Mr. Richard P. Cobb, P.G.
Acting Manager, Division of Public Water Supplies
Bureau of Water
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62794-9276

Subject: Response to Request for Additional Information, Groundwater Management Zone (GMZ) Application for Manlove Natural Gas Storage Field.
People v. People's Gas Light and Coke Co.,
Champaign County, 17-CH-218

Dear Mr. Cobb:

At the direction of Peoples Gas Light and Coke Co. (Peoples Gas), GSI Environmental Inc. (GSI) is submitting this letter to respond to the Illinois Environmental Protection Agency's (Illinois EPA's) comments and requests for additional information regarding the referenced GMZ Application. These comments and requests were transmitted to Peoples Gas in a letter from Illinois EPA dated 6 September 2019.

Responses to specific requests and comments are provided below:

Illinois EPA: In order to properly assess the GSI/PGL information, Illinois EPA is requesting separate high-resolution graphics for the maps, 3-D visualization models, and cross section maps. These high-resolution graphics must include the lines of cross sections and the locations of the three existing recovery wells. For the cross sections, it would be useful to include and properly label the private wells that have been sampled. These additional models and cross sections may indicate a need to add additional recovery wells.

Response: *GSI can provide the requested information, although we respectfully suggest that this would be accomplished most effectively in the context of a meeting or webinar. This would allow Illinois EPA to request specific views of locations or cross-sections of interest. GSI or Peoples Gas will contact you regarding coordination of such a meeting or webinar.*

In the meantime, GSI has been evaluating existing geologic and gas distribution information to identify optimal locations for supplemental relief well locations. We have identified four such areas, shown on Figure 1. These areas represent those portions of the Mahomet Aquifer or shallower sand strata that extend to the highest elevations in the subsurface (i.e., the "peaks" of the sand layer). GSI believes that these areas might act as the equivalent of structural traps for gas accumulation. If so, these locations could represent optimal areas for additional relief well installation.

GSI also concurs with the potential usefulness of additional gas relief wells. Before installing and operating such additional wells, however, we believe it would be important to first commence operation of the existing wells. This would provide useful information that would likely affect the installation, design, and operation of any supplemental wells. We are currently working to design and procure gas recovery systems for the three existing wells, and will be in contact with Illinois EPA regarding applicable regulatory permitting.

Illinois EPA: Furthermore, there is not adequate analysis of the current proposed remedy of utilizing the existing three recovery wells and passive removal at the potable wells. The Order requires that the GMZ Application includes a “detailed description of all possible remedies considered, the actual remedy selected by Defendant and reasons why that remedy was selected over the others considered.” (Order, Section V.A, paragraph 41.h.ii). The GMZ Application does not adequately provide that analysis.

Response: *Other remedies were considered as a part of preparing the GMZ Application, but were not considered to be effective and/or practicable, and were therefore not selected for implementation. As noted in Section 7.2.2 of the GMZ Application, there are a number of challenges posed by site conditions to any potential remedy:*

Future remedial measures will be constrained primarily by the stability of methane in this setting, the overall volume of water at issue, and the complexity of the shallow hydrogeology in the vicinity of MC2. Groundwater in the shallow aquifers is present under methanogenic conditions, which accounts for the widespread occurrence of microbial methane naturally found in these aquifers. Under such conditions, the MC2 methane will be quite stable, and unlikely to quickly degrade over time.

In general, the most common approaches used to address stray subsurface methane in the US are to identify and terminate the source, allow natural attenuation processes to stabilize and reduce the dissolved gas, treat groundwater at point-of-use, and use relief wells to mitigate areas of higher methane accumulation. All of these approaches were selected for use at the MC2 site. The following other remedies were considered but not selected:

Enhanced Biodegradation: *It may be practicable at some sites to enhance oxidizing conditions in situ to promote the aerobic degradation of hydrocarbons, at least on a localized basis. This is not considered practicable at the MC2 site, however, given the volume of affected groundwater that would have to be treated in this manner, and the methanogenic character of the aquifer (see excerpt above).*

Hydraulic Control via Pumping Wells: *This approach can be used to constrain the migration of dissolved gas in groundwater. It is also best suited to simpler hydrogeologic settings, with layered geology, and relatively simple advective groundwater movement transporting the gas. At the MC2 site, none of these conditions are present. The impacted area does not appear to be migrating or actively expanding, but rather is generally stable (see Section 5.4 of the GMZ Application). The hydrogeology is comprised of complexly interconnected sands, with significant movement of groundwater between layers. Given the setting, and in the absence of significant ongoing migration, hydraulic control would be both impractical and ineffective.*

Air Sparging and Recovery: *This approach would utilize air sparging wells to inject air into the Mahomet Aquifer or other affected sand units. In concept, this process could strip gas from the groundwater and transport it to shallower depths, where it could be collected by recovery wells. In practice, such wells would only affect a very localized portion of the*

impacted area. To the extent that stripping was effective on even a local level, it would transform dissolved gas, which poses minimal risk, to a free gas/air mixture, which could pose a potentially large safety hazard. In addition, the localized shift to aerobic conditions could potentially have negative effects on the chemistry of the predominantly anaerobic Mahomet Aquifer.

On balance, the combined approach of source termination, point-of-use treatment, and relief wells was considered to be more likely to be effective than these alternatives, and was therefore selected for implementation.

Illinois EPA: Additionally, the GMZ Application lacks the required discussion and predictive modeling to show when remedial objectives will be achieved as required by the Order. (Order, Section V.A, paragraph 41.h.iii and iv).

Response: Section V.A, paragraphs 41.h.iii and iv require:

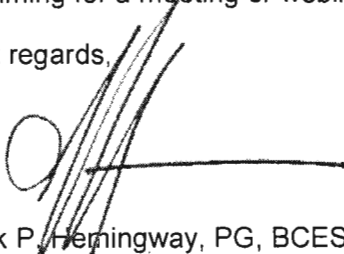
- *A discussion of the manner in which the selected remedy will achieve compliance with the cleanup objective. This information is provided in Section 7 of the GMZ Application.*
- *A description of the fate and transport of contaminants with the selected remedy over time. In the GMZ Application, this is discussed in Section 5.4 (the extent of the dissolved methane is generally stable) and Section 7.2 (the dissolved methane will likely be stable over time, given the geochemistry of the aquifers).*

These portions of the Order do not appear to require a time-to-complete discussion, nor do they reference predictive modeling.

Based on the size of the impacted area and the stability of methane in the subsurface setting, it may require several years or possibly greater than a decade for dissolved methane concentrations to exhibit an asymptotic pattern of decline, and therefore achieve remedial objectives. A more rigorous estimate of the time required to attain cleanup objectives could be prepared after the completion of two to three years of relief well operation combined with the monitoring proposed in the GMZ Application. At that time, this monitoring will have established a more robust dataset, which may reveal patterns of decline that could support such predictions.

I hope that this provides you with the information that you require to finalize your review of the GMZ Application. As noted above, GSI or Peoples Gas will be in touch with you soon to discuss the timing for a meeting or webinar to view the geologic information.

Best regards,


Mark P. Hemingway, PG, BCES
Principal Geoscientist

