Global Environmental, LLC
Environmental Consulting

January 30, 2015

Ms. Lindy Sue Czubernat
Division of Environmental Permits
NYS Department of Environmental Permits
625 Broadway, 4th Floor
Albany, NY 12233-1750

RE: Comments for the Record
Cayuga Operating Company, LLC
SPDES Permit NY0001333
DEC No. 7-5032-00019-00004
228 Cayuga Drive, Lansing, New York

Dear Ms. Czubernat:

Global Environmental, LLC has conducted a preliminary review of the Cayuga Operating Company power plant relative to the SPDES permit renewal. Please accept these comments developed on behalf of the Tompkins County Environmental Review Committee of the Environmental Management Council. The Council is an official citizen advisory board created to advise the Tompkins County legislature on environmental matters in the Ithaca, New York area.

These comments are developed based upon my nearly 25 years experience in wastewater permitting, permitting and designing landfills, and my nearly 60 investigations of coal combustion waste disposal sites in 12 states.

Collectively, these technical comments support the need for a public hearing and an adjudicatory hearing, in addition to a full technical review of the power plant site and its SPDES permit. In summary, the Cayuga facility is not operating in compliance with Chapter 4, Quality Services, Subpart 360 regulations associated with the coal combustion waste landfill located onsite, as required in its SPDES permit.

The results of my preliminary review of landfill monitoring data indicate that significant and substantive technical considerations of non-compliance exist due to groundwater contamination at the landfill. This conclusion is based upon the following categories that are discussed in detail in the attached Technical Findings:

- The landfill was designed without a liner, a groundwater suppression system, or a leachate collection system that effectively prevents migration of coal combustion waste leachate into the glacial till and bedrock groundwater aquifers below the landfill.
- Groundwater beneath and hydraulically downgradient of the Cayuga landfill is contaminated with coal combustion waste constituents. This contaminated groundwater and / or leachate discharges into the stream bank of Milliken Creek, and the nature and extent of the contamination has not yet been defined, as required by Subpart 360.

- Cayuga uses groundwater protection standards that are too high to assure protection of human health and the environment and uses standards that are not consistent with what is required by Subpart 360 rules or the US EPA.
- Cayuga's determinations of which constituents in groundwater are due to landfill leakage versus their argument that the constituents are naturally occurring; their use of inter-well and intra-well data comparisons; and their determinations on what are naturally occurring or "background" concentrations are deeply flawed and results in an erroneous "trigger" mechanism to determine Subpart 360 landfill compliance.
- The groundwater patterns for the bedrock aquifer indicates that domestic water supply wells are hydraulically downgradient of the landfill and as such, may be at risk of contamination associated with the landfill. A more thorough investigation is warranted to define that risk.
- Investigative work performed in January 2014 identified suspect unpermitted discharges of contaminated groundwater and / or leachate into Milliken Creek and Cayuga Lake. Neither Subpart 360 rules nor the SPDES permit allow uncontrolled, unpermitted discharges to the surface water.

Should you have any comments or questions regarding this matter, please call me at 615-504-0956 or email me at markquarles@comcast.net.

Sincerely,

Mark Quarles

Digitally signed by Mark Quarles
DN: cn=Mark Quarles, o, ou, email=markquarles@comcast.net, c=US
Date: 2015.01.30 17:59:08 -06'00'

Mark A. Quarles, P.G.
Tennessee Licensed Professional Geologist

Attachment: Technical Findings

Technical Findings

The landfill was designed without a liner, a groundwater suppression system, or a leachate collection system that effectively prevents migration of coal combustion waste leachate into the glacial till and bedrock groundwater aquifers below the landfill.

1. The landfill was originally constructed in 1977. None of the landfill area that was operational from 1977 to 1984 includes a soil or composite liner constructed with non-native, clayey-type soils or with man-made, composite geotextiles. Although another cell was built in 1986, it is unclear if that cell too was constructed without an impermeable liner.
2. Recent vertical expansions beginning in approximately 2007 continued to place wastes over those unlined cells.
3. Groundwater suppression drains were installed 5 to 8 feet beneath landfill cells built in 1978 and 1982 (Phase 1) and the 1984 section of Phase 2. Installation of these drains after the cells were constructed suggests that the landfill was constructed too close to the seasonal high groundwater table to prevent the water table aquifer from infiltrating up and into the waste.
4. Landfill phases constructed from 1977 to 1984 included leachate collection drains constructed on top of the base of the landfill.
5. The completed 4-stage Phase 1 landfill reached capacity in 1984 and was covered with an undefined "low permeability" soil cover system approximately 2-feet thick.
6. Phase 2 of the landfill was constructed to the north of Phase 1 and became operational in 1984. That section too was constructed without a liner, other than a 1-foot layer of re-compacted native soils; has groundwater suppression drains spaced 75 feet apart; has a 12-foot deep groundwater interceptor trench along the east; and has leachate collection drains spaced 100 feet apart. Phase 2 was expanded again with another cell in 1986.
7. In 1990, the unlined 1984 expansion area was vertically expanded to allow more wastes to be placed on top.
8. Cayuga describes the "native soils" at the landfill site as being a mixture of gravels, sand, silt, and clay[1]. A review of boring logs associated with site indicates that the uppermost soils are mainly gravels and sand[2].
9. Native soils at the bottom of the landfill cells provide little barrier to prevent leachate from seeping through the landfill bottom and from migrating to groundwater because of the expected high porosity, permeability, and horizontal hydraulic conductivity.
10. Although "groundwater interceptor trenches" have been constructed along the north and east edges of Phases 1 and 2 of the landfill[3] – for the apparent purpose of preventing the shallow groundwater from flowing under the landfill and into the waste cells – to a maximum depth of 12 feet below ground surface. According to Cayuga, the actual overburden groundwater in that area is typically 15 to 20 feet deep. As such, the trenches are likely ineffective for their intended goal because they are too shallow.

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[1] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.
[2] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.
[3] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.

11. Leachate collection drains in the bottom of some landfill cells are up to 100 feet apart. Such spacing over high permeability native soils would not be expected to completely capture leachate to prevent leachate seepage through the bottom of the cells.
12. If the groundwater beneath the landfill is in fact 15 to 20 feet below the ground surface and if the original landfill cells were only excavated 5 feet deep before placing wastes, any liquids being collected in the groundwater suppression drains that are 5 to 8-foot deeper than the landfill would be leachate that has seeped through the liner.
13. Groundwater suppression drains are spaced up to 250 apart. Such wide spacing is unlikely to prevent shallow groundwater – when present - from entering waste cells and substantially lowering the groundwater table and are also unlikely to collect all leachate that migrates through the bottom of the landfill.
14. Vertical expansions starting in 2007 placed even more waste over unlined portions of Phase 1 and Phase 2 cells; however, those expansions apparently included placement of some type of liners / covers over the top of old cells.
15. The presence of contaminated groundwater at the site indicates that the leachate collection and groundwater suppression systems have been ineffective at preventing groundwater contamination migration.
16. Coal combustion waste landfills generally result in larger amounts of leachate being produced (when compared to municipal solid waste landfills) because the wastes are not covered daily; are not covered during any intermediate period; and the working area can be quite large. Any precipitation that comes into contact with disposed combustion wastes becomes leachate that risks contaminating groundwater and surface water if not properly managed.
17. Because coal combustion waste landfills create large amounts of leachate, and precipitation accumulates in low-lying waste cells, any leachate and precipitation that leaks through a liner commonly "mounds" the shallow water table aquifer. That mounding can result in radial, 360-degree groundwater flow from the landfill. As such, a well that might normally be considered to be hydraulically "upgradient" before the landfill is built, can in fact become hydraulically "downgradient" of waste disposal areas. This fact requires careful consideration when designing a monitoring system for regulatory purposes and for assuring groundwater protection.

Groundwater beneath and hydraulically downgradient of the Cayuga landfill is contaminated with coal combustion waste constituents. This contaminated groundwater and / or leachate discharges into the stream bank of Milliken Creek, and the nature and extent of the contamination has not yet been defined, as required by Subpart 360.

18. Groundwater in both hydraulically "upgradient" and downgradient directions from the landfill – as defined by Cayuga - includes constituents that are indicative of coal combustion wastes that have leaked through the liner and were not captured by the groundwater suppression or leachate collection systems.
19. Cayuga's use of "upgradient" wells to argue that contaminants in the groundwater are naturally occurring and not related to the landfill fails to recognize that groundwater mounding likely has occurred, resulting in radial 360-degree groundwater flow from the landfill.
20. Cayuga has concluded that groundwater beneath the landfill is present in 1.) The overburden,

glacial till soil beneath the landfill, 2.) An intermediate section of soil and weathered bedrock, and 3.) The top 20 to 30 feet of the bedrock surface[4]. Cayuga has not concluded whether or not those three zones are separate water-bearing zones or continuous.

21. Groundwater contamination has resulted in the installation and / or sampling of 45 wells – 30 wells for the original Phase 1 and 15 wells for Phase 2. Of those 45 wells, 12 have been installed as "Tier 2" wells (for Phase 1 only) to investigate the downgradient contamination associated with Phase 1 of the landfill.
22. Although groundwater flow diagrams produced by Cayuga have illustrated a south-southeast bedrock groundwater flow direction[5] *towards residential properties with domestic water supply wells*, there is no indication that Cayuga has ever sampled those wells. See attached **Figure 1**.
23. Cayuga's most recent Environmental Monitoring Plan (2014) illustrates a dominant direction of flow instead towards the west-southwest. See attached **Figure 2**.
24. Flow in the bedrock aquifer is controlled by horizontal fractures along bedding planes and vertical fractures characterized by the regional bedrock fracture set[6], according to Cayuga. However, Cayuga has not defined the orientation (direction), the spacing of those joints, or the dip of the bedrock – key characteristics needed to define the rate and direction of flow of preferred groundwater pathways.
25. Cayuga has concluded that glacial till groundwater from the landfill discharges into Milliken Creek – a stream that is incised into bedrock - through seepage along the stream bank and along bedrock fractures. Potentiometric surface maps developed by Cayuga for sampling events however, do not illustrate that soil aquifer direction of flow. See attached **Figure 3**.
26. Approximately 2,000 feet of Milliken Creek lies adjacent to the landfill. According to topographic surveys provided by Cayuga during the landfill expansion process, the stream bottom elevations range from approximately 800 feet above mean sea level (MSL) to less than 700 feet MSL in the area of the landfill.
27. Cayuga has concluded that the groundwater elevations in the glacial till aquifer remain relatively stable throughout the year and also range from approximately 800 to 700 feet MSL. When these potentiometric surface elevations are compared to the stream bottom elevations, glacial till groundwater is influent into the stream along the entire approximate 2,000-foot lateral distance of the stream.
28. Cayuga has concluded that the groundwater elevations in the bedrock aquifer also remain relatively stable year-round and range from approximately 800 feet MSL to 680 feet MSL. When these elevations are compared to the stream elevations, bedrock groundwater would also be influent to most of Milliken Creek near the landfill.
29. When the potentiometric surface elevations of both the glacial till and bedrock aquifers are compared to the stream channel elevations, the elevations suggest that Milliken Creek downstream of the landfill is not always a discharge boundary – meaning that contaminated groundwater from the north can also flow *beneath* the creek and further to the south and southwest.

[4] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.
[5] 2005 and 2006 reports, Solid Waste Operating Report and Annual Groundwater Quality Monitoring Report, AES Cayuga, LLC, by Geomatrix, February 2006 and February 2007.
[6] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.

30. Although Cayuga admits that groundwater discharges into Milliken Creek, Cayuga has concluded that the dominant direction of flow of the landfill area is instead to the west-southwest towards Cayuga Lake.
31. Milliken creek is the nearest sensitive environmental receptor location because of the discharges of contaminated groundwater and / or leachate into the creek.
32. Cayuga concluded that the typical 500-foot spacing between downgradient monitoring wells is sufficient for the site because of the "low hydraulic conductivity of both the overburden and bedrock materials and the lack of identified areas of preferential flow"[7]. Typical gravel and sands in glacial till are not normally considered to be of "low" conductivity, especially in terms of horizontal groundwater flow velocity.
33. The Environmental Monitoring Plan (2014) includes no results of well / aquifer hydraulic conductivity tests (e.g. tracer, pumping, or slug tests); no tests to determine hydraulic gradient (slope) calculations; and no seepage velocity calculations to determine how fast the groundwater actually flows each day.
34. My review of groundwater data for the site indicates a maximum hydraulic gradient (or slope) of the overburden soil groundwater to be 8 percent (0.08 foot per foot) using the June 12, 1014 Overburden Groundwater Contour Map (**Figure 3**). That gradient can be considered to be quite steep. Given the porous nature of the glacial till soils and the steep gradient, the groundwater flow velocity from the landfill could be considered to be moderate to high.
35. My review of the overburden well locations south of Phase 1 of the landfill and north of Milliken Creek[8] demonstrates that wells do not meet the minimum 500-foot spacing required in Subpart 360 rules. Instead, the wells are constructed approximately 750 to 875 feet apart and do not monitor the groundwater that is influent to Milliken Creek.
36. As a result of this inadequate spacing, there is no early release groundwater detection monitoring system for the shallow, glacial till aquifer prior to groundwater entering Milliken Creek. Subpart 360 requires that Cayuga design and install a monitoring program that results in "early detection" of a contaminant plume.
37. My review of the bedrock well locations south of Phase 1 and north of Milliken Creek also demonstrates that bedrock and intermediate depth wells do not meet the minimum 500-foot spacing requirement. Instead, bedrock wells along the south side of the landfill are situated approximately 1,500 feet apart.
38. My review of two quarters of groundwater results in 2014 (February and June)[9] for what Cayuga has determined to be the "downgradient" Tier II compliance monitoring wells associated with Phase 1 of the landfill, determined that Cayuga has not yet defined the nature and vertical / horizontal extent of groundwater contamination downgradient of those wells. See attached **Table 1**.
39. The groundwater standard for arsenic used by Cayuga for the landfill is 0.025 mg/L – or *2.5 times higher than what the US EPA has determined to be safe to drink*. Arsenic is a human carcinogen[10], and the US EPA has established 0.010 mg/L as the safe drinking water

[7] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.
[8] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, Figures 3A and 4A, March 2014.
[9] Second Quarter 2014 Phase I Area Groundwater Contingency Monitoring Results, GEI Consultants, August 6, 2014.
[10] Toxicological Profile for Arsenic, US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, August 2007.

concentration.

40. Results tabulated in **Table 1** demonstrate that the US EPA MCL for arsenic was exceeded in 5 downgradient Tier II wells, and if the analytical results were rounded to the nearest two digits (0.01 mg/L), 12 of the 14 wells would have exceeded the US EPA-established acceptable concentration.
41. My review of those contingency monitoring well results indicated that of the 14 wells that were sampled, all wells had at least one constituent with at least one sampling event with reported constituents concentrations that exceeded either the Class GA Groundwater Standard (1999) used by Cayuga or the US EPA Maximum Contaminant Level (MCL).
42. The constituents in those 14 wells that exceeded a standard include: arsenic, ammonia, barium, boron, chlorides, iron, manganese, TDS, sodium, sulfate, and pH.
43. 12 of those 14 wells monitored in 2014 for Phase 1 contingency purposes are cluster wells that are located together, with depths getting progressively deeper according to shallow glacial till zone ("SH"), an intermediate zone ("DI"), and the deeper bedrock zone ("DD"). The 2014 quarterly data in **Table 1** indicate that contamination worsened in some wells as the depths increased.
44. The data presented in **Table 1** indicates that a vertical groundwater gradient exists, and that constituent concentrations can and do increase with depth.
45. The presence of arsenic and other constituents in the well "X01 DW" – a domestic water well that was reportedly used as a drinking water source for a former home at that location – indicates that coal combustion waste constituents have migrated to the former drinking water source.
46. Of these 14 Tier II wells that monitor up to three (3) distinctly different aquifer zones, no additional wells have been installed in a hydraulically downgradient direction to completely determine the nature and extent of the groundwater contaminants in each aquifer zone.
47. The stream surface water and sediment sampling program used by Cayuga in their Environmental Monitoring Plan (2014) does not monitor Milliken Creek and its sediments for all constituents that are monitored for groundwater that are also indicative of coal combustion waste contaminants. Instead, the surface water and sediment sampling constituent lists are much smaller.
48. Subpart 360 requires that Cayuga 1.) "Characterize the nature and extent of the release by installing additional monitoring wells as necessary", 2.) "Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration", 3.) Notify all persons who own the land or reside on the land that is directly over any Subpart of the plume of contamination if contaminants have migrated off-site", and 4.) "Initiate an assessment of corrective measures".
49. The threat associated with groundwater migrating beyond the Cayuga property line has not yet been defined, especially related to any possible impacts to domestic drinking water wells in the area.
50. The landfill groundwater monitoring program does not meet the Subpart 360 rules as described in the previous discussion. In order for Cayuga to be compliant with its SPDES permit, it must also be in compliance with Subpart 360 requirements for the landfill. As such, Cayuga is non-compliant with the requirements of its SPDES permit.

Cayuga uses groundwater protection standards that are too high to assure protection of human health and the environment and uses standards that are not consistent with what is required by Subpart 360 rules or the US EPA.

51. Cayuga has consistently reported in the quarterly and annual groundwater monitoring reports that the applicable groundwater standard for each constituent of concern for regulatory compliance purposes is the New York Class GA Standard[11].
52. The Class GA Standards used by Cayuga result in some constituent concentrations that are much higher than what the US EPA has determined to be safe to drink in their Maximum Contaminant Levels (MCLs) established in the Safe Drinking Water Act – most notably the MCL for arsenic.
53. Subpart 360 rules require that landfill operators establish a groundwater protection standard that uses the *more stringent* concentrations of the MCLs or other standards established by Subpart 701, 702, or 703 of New York rules, unless constituent concentrations established through baseline sampling *prior to landfill construction* demonstrate that naturally occurring higher concentrations existed.

Cayuga's determinations of which constituents in groundwater are due to landfill leakage versus their argument that the constituents are naturally occurring; their use of inter-well and intra-well data comparisons; and their determinations on what are naturally occurring or "background" concentrations are deeply flawed and results in an erroneous "trigger" mechanism to determine Subpart 360 landfill compliance.

54. Cayuga has determined that leachate collected from the landfill contains elevated concentrations of total dissolved solids (TDS), sulfate, iron, calcium, sodium, manganese, magnesium, cadmium, and selenium[12]. Cayuga discounted the importance of aluminum, iron, magnesium, manganese, selenium, sodium, and sulfate in the leachate as also being "present in background groundwater quality".
55. My review of groundwater reports for the landfill indicates that Cayuga did not identify arsenic as being elevated in the leachate and as a result, eliminated arsenic as a "constituent of significant importance" in their landfill monitoring plans.
56. My review of the leachate data[13] concluded that arsenic, boron, calcium, chloride, iron, manganese, TDS, sodium, and sulfate – as examples - are all good indicators of Cayuga coal ash leachate. All are also found in numerous on-site wells.
57. My review of the 2010 groundwater well, groundwater suppression system, and leachate drain results indicate a good correlation between what constituents are reported in the leachate, what has seeped through the bottom of the landfill and reported in the groundwater suppression system, and what is reported in monitoring wells.
58. The presence of these indicators in the groundwater suppression system supports the conclusion that the leachate is migrating from the landfill cells and is not being entirely collected by the leachate collection system.

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[11] Division of Water Technical and Operation Guidance Series, (TOGS 1.1.1), August 1999.
[12] 2010, Annual Solid Waste Operating Report - AES Cayuga, by AMEC Geomatrix, March 2011.
[13] 2010, Annual Solid Waste Operating Report – AES Cayuga, by AMEC Geomatrix, March 2011.

59. Cayuga has concluded that only one well at the site - downgradient bedrock well MAGDD-8705 - exhibits *any impact* from Phase 1 of the landfill, and that sole impact is only for sulfate[14]. Sulfate concentrations reported for that well in February and June 2014, as recent examples, were 201 and 199 mg/L. As a comparison, sulfate in "upgradient" wells at the northeast corner of the landfill (MAGUXX-7712, MAGUXX-8303, MAGUXX-8304) were comparable and ranged from 116 to 219 mg/L[15].
60. Cayuga's conclusion in 2010 that MAGUXX-8303 and MAGUXX-7712 are "upgradient" and therefore do not represent groundwater flowing from beneath the landfill is not based upon fact or their own data. When the monitoring program at the landfill included more wells in that area (e.g. 2006, before wells were destroyed to construct a portion of the Phase 2 landfill), those bedrock wells are clearly hydraulically *downgradient* of both Phase 1 and Phase 2[16]. See attached **Figure 1**.
61. Cayuga concluded that sulfate concentrations in two "upgradient" bedrock monitoring wells (MAGUXX-8303 and MAGUXX-7712[17], as examples) located near the eastern edge of Phases 1 and 2 of the landfill, support their argument that sulfate is naturally occurring and not due to leakage from the landfill. Instead however, groundwater flow directions in that area can explain the presence of sulfate in those wells.
62. Cayuga's determination of "trigger values" for regulatory compliance for each constituent in each well relies on "previous 10 quarters of established background data relative to the original October 2008 Environmental Monitoring Plan submittal", and some of those trigger values included groundwater with "exhibited impacts (primarily sulfate) from landfill operations".
63. As a result of the use of those 10 quarters, the "background" data used to establish the trigger values are not at all representative of true, pre-landfilling and naturally occurring background, or groundwater that is unaffected by leakage from the landfill.
64. My review of the 2010 annual groundwater data for bedrock wells MAGUXX-8303 and MAGUXX-7712, as two examples, shows notable concentrations of virtually all of the same constituents that Cayuga has detected in onsite leachate.
65. Cayuga's choice to compare hydraulically downgradient monitoring well samples to "upgradient" well concentrations for the same constituents constitutes an "inter-well" comparison in an attempt to justify or explain the presence of probable coal ash related constituents in wells that are not considered to be contaminated by the landfill.
66. Cayuga's reliance on that inter-well comparison of upgradient well sample results (and considering those results to be "background") to conclude that naturally occurring concentrations are not related to leakage from the landfill, results in misinterpreting the more probable impact to groundwater associated with the landfill.
67. Cayuga's Environmental Monitoring Plan (2014) and their rationale to determine when / if constituent concentrations in groundwater are significant enough to warrant a regulatory response is contrary to their preferred "intra-well" comparisons. According to Cayuga, "intra-well data comparisons are more effective than upgradient to down-gradient (i.e "inter-well)

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[14] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.
[15] 2010, Annual Solid Waste Operating Report – AES Cayuga, by AMEC Geomatrix, March 2011.
[16] 2006, Solid Waste Operating Report and Annual Groundwater Quality Monitoring Report, Figures 3B and 4B, February 2007.
[17] 2010, Annual Solid Waste Operating Report – AES Cayuga, by AMEC Geomatrix, March 2011.

comparisons at sites such as the Cayuga facility"[18].

The groundwater patterns for the bedrock aquifer indicates that domestic water supply wells are hydraulically downgradient of the landfill and as such, may be at risk of contamination associated with the landfill. A more thorough investigation is warranted to define that risk.

68. An independent search in January 2015 for water well users completed by Dr. John Dennis – Environmental Planner and Member of the Tompkins County Environmental Review Committee – identified at least 25 water wells within an approximate 1-mile radius of the landfill.
69. That search identified three water wells within approximately 1,000 feet of the southeastern corner of the landfill. See **Figure 1**.

Investigative work performed in January 2014 identified suspect unpermitted discharges of contaminated groundwater and / or leachate into Milliken Creek and Cayuga Lake. Neither Subpart 360 rules nor the SPDES permit allow uncontrolled, unpermitted discharges to the surface water.

70. Another investigation performed by Dr. John Dennis along the streamline of Milliken Creek and the surrounding landfill area on January 24 and 25, 2015 identified at least one unpermitted groundwater discharge into Milliken Creek in the landfill area. Prominent, frozen groundwater seepage along the northern landfill side of the creek was visible, but due to the snow coverage and frozen conditions, a more complete inspection could not be performed.
71. Visual observations of the stream bank indicated that contaminated groundwater and / or leachate may be entering the creek through groundwater in the glacial till and bedding planes along the stream.

72. Sediment at the Milliken Creek seep was reddish-brown in color – characteristic of typical coal combustion waste groundwater-to-surface water discharges.

[18] Environmental Monitoring Plan, Cayuga Ash Disposal Facility, by GEI Consultants, March 2014.

73. Dr. Dennis also identified another suspected unpermitted discharge of coal related constituents approximately 275 feet south of the plant's coal pile storage area. As was observed at the Milliken Creek location, sediments at that discharge location also exhibited visual characteristics of coal-related constituents. This discharge flows into Cayuga Lake.

74. Cayuga is not authorized to discharge leachate into any surface stream, other than from Outfall 013 associated with "discharge from Ash Disposal Site Sedimentation Pond (direct discharge to Cayuga Lake) and from the emergency overflow from that pond (Outfall 014). As such, any additionally identified discharges into Milliken Creek – if confirmed to be leachate or contaminated groundwater – would be a violation of the SPDES permit.
75. Subpart 360 for the landfill also considers discharges of leachate to either groundwater or surface water to be illegal. Specifically, Subpart 360 requires that Cayuga design and operate the landfill in a manner to "*prevent the migration of leachate into surface water or groundwater*".

Table 1

Concentrations Near or Greater than the Standard
February and June 2014
Tier II Wells

Well Name	**Arsenic** (mg/L)	**Ammonia** (mg/L)	**Barium** (mg/L)	**Boron** (mg/L)	**TDS** (mg/L)	**Sodium** (mg/L)	**Sulfate** (mg/L)	**Chloride** (mg/L)	**Iron** (mg/L)	**Manganese** (mg/L)	pH
Standard	**0.01 (MCL)**	**2.0**	**1.0**	**1.0**	**500**	**20**	**250**	**250**	**0.3**	**0.3**	**6.5-8.5**
8105	**0.0134**	**-**	**-**	**8.33**	**1,380**	**60.3**	**560**	-	-	-	-
8703 SH	0.009	-	-	0.36	**500**	19.2	107	-	-	-	-
8703 DI	0.008	1.6	-	0.633	**950**	**275**	102	216	-	-	-
8703 DD	**0.0139**	1.4	**1.2**	0.785	**2,060**	-	-	**1,830**	**0.522**	-	-
8715 DI	-	-	-	-	**1,320**	**238**	**-**	**550**	-	-	-
8715 DD	0.0077	**4.3**	0.856	-	**1,580**	**234**	-	**664**	**1.45**	**0.336**	**-**
8716 DI	0.0078	-	-	-	415	15.9	-	-	**1.3**	-	-
8716 DD	0.005	**1.6**	-	-	-	-	-	-	-	-	-
8705 SH	0.0067	**0.7**	-	-	**610**	**59.4**	-	106	-	-	-
8705 DI	0.0083	-	-	-	**875**	**48.4**	148	**265**	**2.35**	-	-
8705 DD	**0.0118**	**4.4**	-	0.677	**900**	**351**	201	168	**0.831**		-
0501 SH	**0.0171**	-	-	-	400	-	-	-	-	-	-
0501 DD	-	-	-	-	-	-	-	-	-	-	11.8
X01 DW	**0.016**	-	-	-	**755**	**58.1**	94.6	195	**0.56**	-	-

Figure 1

**Potentiometric Surface Diagram (Modified)
August 2006**

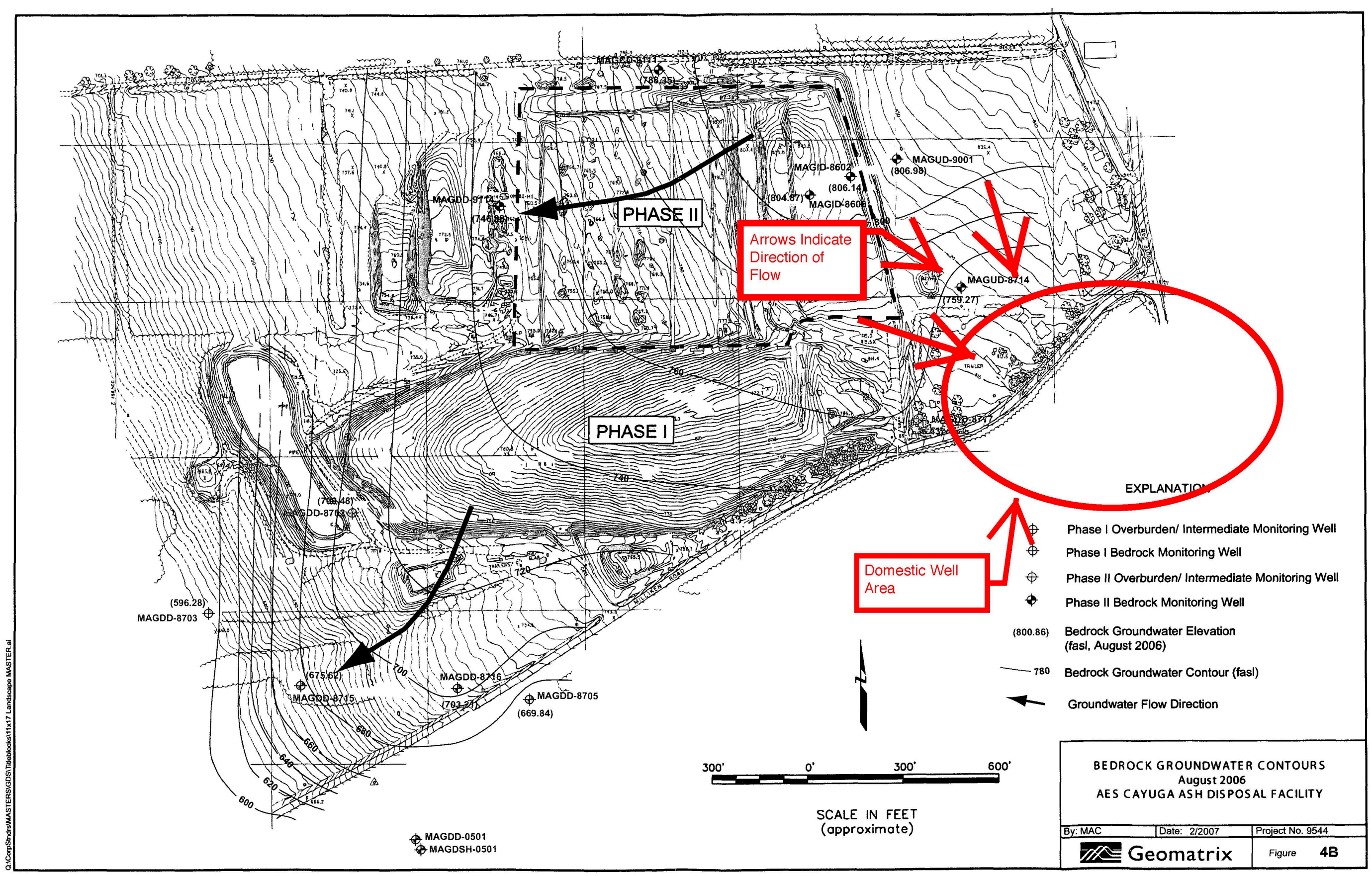

Figure 2

**Potentiometric Surface Diagram
June 2012 Bedrock Aquifer**

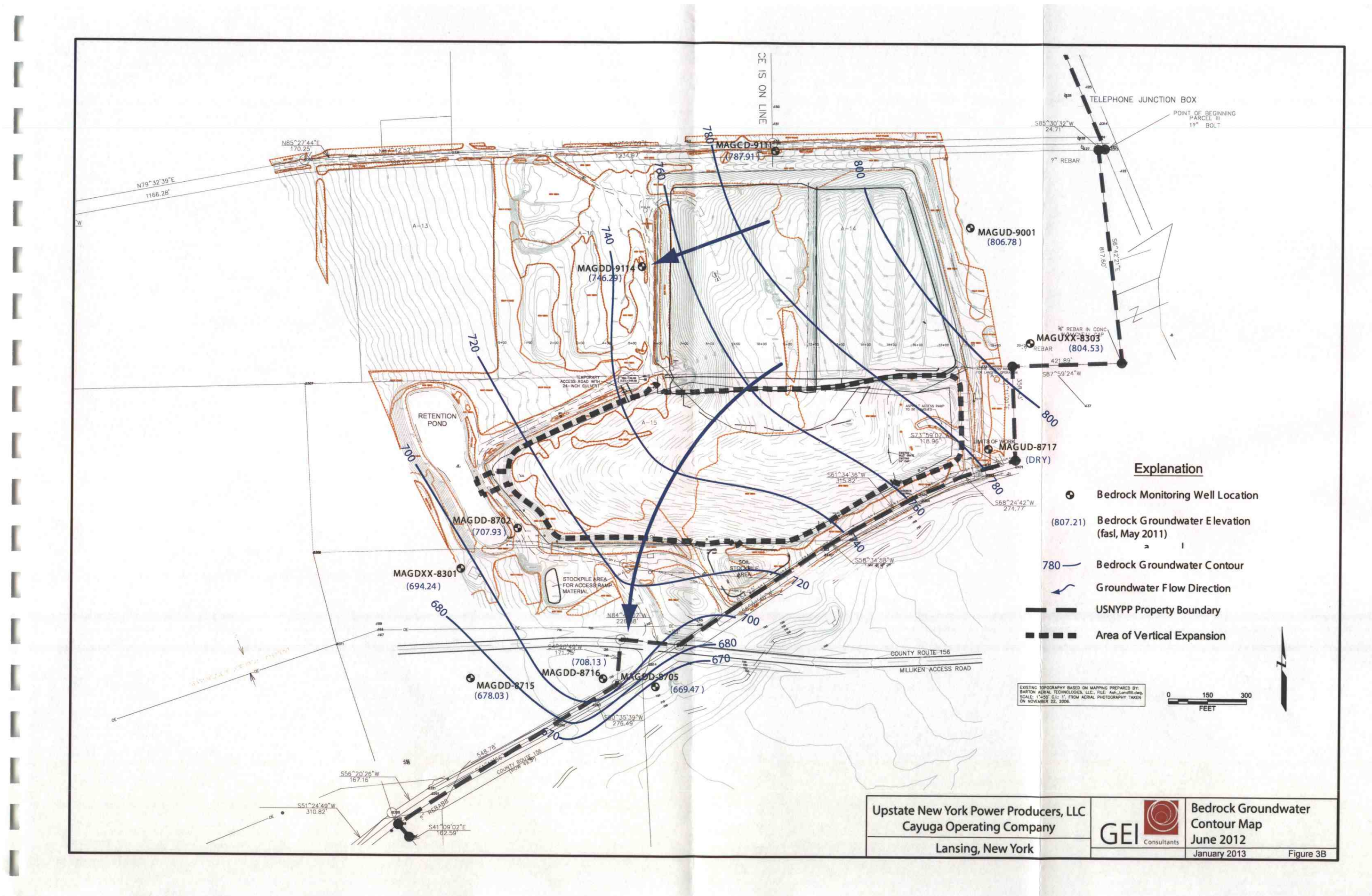

Figure 3

Potentiometric Surface Diagram
June 2012 Overburden Glacial Till Aquifer