ENVIRONMENTAL
LOGISTICS SERVICES

Apex Environmental, LLC

July 18, 2013

Mr. Craig Walkenspaw
District Engineer
Division of Materials and Waste Management
Ohio EPA Southeast District Office
2195 Front Street
Logan, OH 43138

2013 JUL 22 AM 9:29
OEPA
S.E.D.O

RE: Response to Ohio EPA Notice of Deficiencies dated December 28, 2012
Contiguous Expansion PTI Application
Apex Sanitary Landfill
Jefferson County, Ohio

Dear Mr. Walkenspaw:

The Ohio EPA submitted a letter dated December 11, 2012 to Apex Environmental, LLC (Apex) providing Notice of Deficiency #2 to PTI Application No. 06-08448 for a proposed contiguous lateral and vertical expansion and AMDWR increase for the Apex Sanitary Landfill. The letter contained Attachment A - General Engineering review comments, Attachment B - Geotechnical Resource Group comments, and Attachment C – Hydrogeological review comments. The Ohio EPA provided the hydrogeologic review comments in a letter dated December 28, 2012.

This response addresses the Hydrogeological review comments, including comments on the Hydrogeologic Site Investigation Report (HSIR), which is contained in Volume II of the PTI Application and the Groundwater Detection Monitoring Program (GWDMP), which is currently under separate cover, but will be contained in Volume V - Appendix C9A of the PTI Application upon finalization.

The HSIR and GWDMP have been revised in response to the Ohio EPA NOD. We are providing the following attachments:

- Attachment A – Response to Ohio EPA NOD dated December 28, 2012;
- Attachment B – Revised HSIR Covers, Spines and Narrative;
- Attachment C – Revised HSIR Tables;
- Attachment D – Revised HSIR Appendices;
- Attachment E – Revised HSIR Drawings;
- Attachment F – Revised GWDMP Covers, Spines and Narrative;
- Attachment G – Revised GWDMP Tables;
- Attachment H – Revised GWDMP Appendix D; and,
- Attachment I – Revised GWDMP Drawing A-1.

PO Box 157 ♦ 11 County 78 ♦ Amsterdam Ohio 43903 ♦ Tel: 740-543-4389 ♦ Fax: 740-543-3862

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Only the revised portions of the HSIR and GWDMP are being submitted. The revisions to the narrative are indicated using strikeout for deleted text and italics for new text. The revised drawings are indicated in the revision block of the specific drawing and in the revision column of the drawing list on the Title Sheet. Due to the number of drawings that are being revised, we are resubmitting the entire set.

Apex is providing two copies of the Response to Ohio EPA NOD and revised portions of the HSIR and GWDMP to the Ohio EPA and one copy to the Jefferson County General Health District. Apex will provide two additional complete copies of the revised PTI Application upon approval from Ohio EPA. Please contact me if you have further questions.

Best regards,

Dave Matthews, General Manager
Apex Environmental, LLC

Enclosure

cc: Bruce Misselwitz, JCGHD
Apex file – Contiguous Expansion PTI Application
Rick Buffalini, Civil & Environmental Consultants

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U.E.P.A.
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ATTACHMENT A

RESPONSE TO OHIO EPA NOD
DATED DECEMBER 28, 2012

ATTACHMENT A
RESPONSE TO OHIO EPA NOD DATED DECEMBER 28, 2012
CONTIGUOUS EXPANSION PTI APPLICATION
APEX SANITARY LANDFILL
JEFFERSON COUNTY, OHIO

The Ohio EPA submitted a letter dated December 11, 2012 to Apex Environmental, LLC (Apex) providing Notice of Deficiency #2 to PTI Application No. 06-08448 for a proposed contiguous lateral and vertical expansion and AMDWR increase for the Apex Sanitary Landfill. The letter contained Attachment A - General Engineering review comments, Attachment B - Geotechnical Resource Group comments, and Attachment C – Hydrogeological review comments. The Ohio EPA provided the hydrogeologic review comments in a letter dated December 28, 2012.

This response addresses the Hydrogeological review comments, including comments on the Hydrogeologic Site Investigation Report (HSIR), which is contained in Volume II of the PTI Application and the Groundwater Detection Monitoring Program (GWDMP), which is contained in Volume V - Appendix C9A of the PTI Application. The deficiencies are repeated verbatim below and followed by the response in italicized text.

The HSIR and GWDMP have been revised in response to the Ohio EPA NOD.

In addition to the revisions made to the PTI Application to address the Ohio EPA NODs, Apex has revised the phasing sequence of the proposed expansion. As a result, the implementation sequence for installation and sampling of the groundwater monitoring wells has been revised.

OAC 3745-27-07 (H) - Siting Criteria Issues

1. *OAC 3745-27-07 (H)(2)(e) - The isolation distance between the top of the uppermost aquifer system (UAS) and the bottom of the recompacted liner shall not be less than 15 feet. Apex needs to better explain and define the boundary of the shallow bedrock UAS and how the area that needs to be removed was determined. It appears from the cross sections that much of the shallow bedrock SZS/UAS is being removed during landfill construction but this is not*

clear from the text. Include a discussion of this issue in the application and at a minimum reference that discussion in this section. Also to better demonstrate this information graphically please include a drawing that shows the outline of the shallow bedrock to be removed, the outline of the shallow bedrock considered UAS, and plot the limestone piezometers and wells with their average yields.

Response 1: Drawing 3F-1 Limestone/Shallow Bedrock Average Yield Contours, has been prepared which includes the limestone yield results, including Piezometers P-13L, P-14L and P-15L, which are located in or near Phase 7 of the existing landfill. The average sustained yield data from each limestone piezometer have been contoured as shown in Drawing 3F-1 in order to determine the boundary of yields greater than 2.6 gallons per minute, which is the threshold yield rate for classification of a Uppermost Aquifer System (UAS) in a 2-inch well. Drawing 3F-1 has been added to the revised PTI Application. Also, Drawing 3F Top of Uppermost Aquifer System Contour Map has been revised to reflect the modified limits of the limestone UAS shown on Drawing 3F-1. A discussion of the determination of the UAS limits is included in narrative Section (C)(3)(d)(iv) of the revised PTI Application.

Construction of the base grades for the western portion of Phases 6 and 7 of the operating landfill as well as the contiguous expansion phases will result in nearly complete removal of the Pittsburgh Limestone, as shown on a new Drawing 3E-1 Area of Limestone/Shallow Bedrock Removal. There is a small area of remaining limestone in Phase 10 of the contiguous expansion area. The surrounding limestone removal will dramatically alter recharge to this small area, which will no longer be considered an aquifer. Thus, the isolation distance requirement does not apply to this small area of remaining limestone. This information has also been added to Section (H)(2)(e) of the revised PTI Application, Volume I, Section C1.2.

2. *OAC 3745-27-07 (H)(3)(c) – One thousand feet from a water supply well. Apex states that the well meets the requirements of OAC 3745-27-07 (H)(3)(c)(iii) "The water supply well or*

developed spring is separated from the limits of solid waste placement of the sanitary landfill facility by a hydrogeologic barrier". Apex needs to include a discussion of the hydrogeologic barrier that separates the well from the limits of solid waste. Apex should also provide some basic information about the well and its use including: depth of the well, what formation it draws water from, and is it a potable water source.

Response 2: As requested by the Ohio EPA, Apex has included a variance request in narrative Section (C)(2) requesting permission to use the existing water supply well at the facility until the waste limits are within 1,000 feet of the well. Prior to waste being placed within 1,000 feet of the water well, Apex will perform one of the following:

- Demonstrate that the water supply well is separated from the limits of solid waste placement by a hydrogeologic barrier. This will require the installation of a new water well to be constructed with steel casing extending to the Connellsville/Morgantown UAS and a continuous annular cement seal from the bottom of the steel casing to the ground surface. Apex will obtain Ohio EPA approval before implementing.

- Decommission the well and either reinstall the well 1,000 feet from the proposed limit of waste or install a cistern to provide water to the office.

Drawing 2D-2 and Sections (C)(1) and (C)(2) have been revised accordingly.

OAC 3745-27-06(C) – Hydrogeologic Site Investigation Report

1. *OAC 3745-27-06(C)(3) – Hydrogeologic Site Investigation Report, Introduction. Apex states that the investigation included advancing 34 soil borings. Ohio EPA recommends one boring per 4 acres per OAC 3745-27-06(C)(3)(f)(v), please indicate if there are other soil borings not included here that would allow you to comply with this recommendation.*

Response 1: The subsurface investigation of the Apex Landfill expansion area can be divided into four separate phases of subsurface drilling and exploration including the BBC&M May 2001 Hydrogeologic Investigation Report (HIR) for the permitted landfill, the installation of the existing detection monitoring well network for the permitted landfill, the August 2010 subsurface investigation for the proposed contiguous expansion HSIR, and the February 2011 Supplemental Hydrogeologic Investigation for the proposed expansion. The work plan for the expansion HSIR was submitted to Ohio EPA and included the soil boring locations and discussions were held with Ohio EPA to develop the supplemental subsurface investigation. Also, the consistency of the mine spoil material is amenable to a lower number of soil borings. Discussions of these four phases of work are presented in Section (C)(3)(g) of the revised PTI Application, Volume II (HSIR).

As stated in Section (C)(3)(d) of the revised PTI Application, Volume II (HSIR), the Apex landfill and the contiguous expansion area are located on former coal and limestone strip-mines. Unconsolidated soils encountered beneath the expansion area are primarily reworked mine spoil deposits. Within the expansion area footprint, these mine spoil deposits will be removed, with the exception of the perimeter berm. The area of the perimeter berm is approximately 121 acres. Soil borings and test pits completed during the subsurface investigations described above include 30 soil borings and excavation of 14 test pit completed for the contiguous expansion HSIR, 4 borings completed for the February 2011 Supplemental Hydrogeologic Investigation for the proposed expansion, and 5 borings and 45 test pits completed for the permitted landfill HIR. Thus a total of 39 soil borings and 59 test pits have been completed in the mine spoil at the Apex facility. Although not all of the borings and test pits were completed within the 121 acre berm area, these soil descriptions and laboratory test results are representative of, and adequately characterize, mine spoil at the site as discussed in Section (C)(3)(d)(i)(a)(i) and (iii) of the revised PTI Application, Volume II (HSIR).

2. *OAC 3745-27-06(C)(3)(b)(i) – Identification and average yield of regional aquifer. Apex does not include the average yield from ODNR well logs within one mile of the site. Please include the average yield calculated from ODNR well logs.*

Response 2: Section (C)(3)(b)(i) of the revised PTI Application, Volume II (HSIR) has been revised to include the average regional yield from 16 privately owned water well logs located within one mile of the site. These logs were provided from the ODNR on-line water well database. Each private water well is identified on a new Drawing 2E - Regional Well Location Map that has been added to the revised PTI Application Drawings. The average regional groundwater yield is calculated to be 14.21 gallons per minute as shown on revised Table C3-2.

3. *OAC 3745-27-06(C)(3)(c) - Site mining activity. Apex is planning to remove a considerable amount of the Pittsburgh Limestone at the site, please include in this section the possible mining activities associated with this limestone removal.*

Response 3: Revised Drawing 3E-1 Area of Limestone/Shallow Bedrock Removal, indicates that the Pittsburgh Limestone will be mined in the western portions of Phases 6 and 7 of the permitted landfill and from the proposed contiguous expansion area. A surface mine permit # IM-1164, which became effective July 13, 2002 and expires on July 12, 2017 was issued to KCCI of Morristown Ohio. This permit was later transferred to Apex Environmental, LLC (Apex). Apex Energy, Inc. is listed as the only surface rights owner in the mine permit area. Apex will mine coal (No. 8 Pittsburgh Coal) and the Pittsburgh Limestone in conjunction with excavation of base grades for the contiguous expansion. Surface mine permit #IM-1164 will be updated and submitted to the Ohio Department of Natural Resources (ODNR) annually to shown the areas where the coal and limestone has been removed. The mining permit application will indicate that the mined area will be used as a solid waste landfill following removal of the limestone. This information has been added to Section (C)(3)(c)(i) of the revised PTI Application, Volume II (HSIR).

4. *OAC 3745-27-06(C)(3)(c)(iv) – Army Corps Wetland Delineation letter. The letter is not included in the application. Please submit this letter to be included with the application.*

   Response 4: Apex received a jurisdictional letter from the U.S. Army Corps of Engineers (COE) dated September 21, 2012. This letter has been included in Appendix C10-B of the revised PTI Application, Volume V.

5. *OAC 3745-27-06(C)(3)(d) – Site Geology and Hydrogeology. Please include some discussion of methodology explaining how sample depths were chosen for the soil borings.*

   Response 5: As requested, further discussion has been provided in Section (C)(3)(d) of the revised PTI Application, Volume II (HSIR) explaining the targeted sampling depths for soil borings. Mine Spoil comprises the majority of the site soils, thus, there were no target horizons where a distribution of disturbed and undisturbed samples were required. Due to the heterogeneous mixture of soils and rock that comprise the Mine Spoil, the locations and depths of samples collected for geotechnical laboratory testing were chosen based on the results of Standard Penetration Tests, pocket penetrometer readings, and likelihood of sample recovery. Shelby Tube samples were collected mainly in the softer cohesive zones encountered, however representative samples were also collected in stiffer zones.

6. *OAC 3745-27-06(C)(3)(d)(iv) – Uppermost Aquifer System. Apex did not include the average regional yield or the average yield at the site in this discussion of how the UAS was determined. In table C3-9 it appears as if the UAS wells are being compared with site average yield of the UAS. When determining the UAS at the site the average regional yield should be used to make that determination/comparison. Please include the average yields of the formations and the average regional yield in this discussion and revise table C3-9 as needed.*

Response 6: Table C3-9 of the revised PTI Application, Volume II (HSIR) has been revised to compare the UAS wells to the average regional yield (14.21 gpm). The UAS classification criteria used in the HSIR now corresponds to the criteria provided in the Ohio EPA Guidance Document DDAGW 02-05-100 - Definition of an Aquifer System.

7. *OAC 3745-27-06(C)(3)(d)(iv) – Mine Spoil Significant Zone of Saturation. Figure 3G shows 11 wells in the mine spoil, yet the text indicates that yield testing was only conducted on six piezometers. Please discuss these other wells and why they were not included in the yield testing.*

Response 7: Mine Spoil piezometers B-1A, B-2A, B-7A, B-401A, and B-402A exhibit limited water columns, generally less that 3 or 4 feet above the screen tips. Based on the limited available drawdown above the pump intake that would be used for yield testing efforts, it is not likely that a significant yield test could be performed at these piezometers. This information has been added to Section (C)(3)(d)(iv) of the revised PTI Application, Volume II (HSIR).

8. *OAC 3745-27-06(C)(3)(d)(iv) – Bellaire/Summerfield Significant Zone of Saturation. Apex states that: "Based on the yield data evaluation provided below and the fact that the unit does not exist beneath the entire facility, the Bellaire/Summerfield unit has been designated as an SZS for the facility." A unit does not have to be below the entire facility to be a UAS, please consider revising this statement.*

Response 8: The text concerning the Bellaire/Summerfield unit extent has been removed from Section (C)(3)(d)(iv) of the revised PTI Application, Volume II (HSIR). Based on the yield data evaluation provided in the text, the Bellaire/Summerfield unit has been designated as an SZS for the facility.

9. *OAC 3745-27-06(C)(3)(d)(iv)(a) – Temporal fluctuations in ground water levels. Water levels show an increasing trend from October to March (table C3-6). Please discuss this*

trend in the text of this section. Does more recent data show any change, have the water levels continued to rise?

Response 9: Table C3-6 of the revised PTI Application, Volume II (HSIR) has been updated with recent groundwater elevation data recorded in November 2011, May 2012, and December 2012. In contrast to observed groundwater elevations from October 2010 to March 2011, recent data suggests that groundwater levels do not exhibit an increasing trend. It is important to note that Ohio experienced abnormally high precipitation amounts in March 2011 which accounts for the spike in water levels during this time. Groundwater elevations have since settled and consistent fluctuations have been observed during recent measurements. This discussion has been included within Section (C)(3)(d)(iv)(a) of the revised PTI Application, Volume II (HSIR). Updated hydrographs are also provided in Appendix C3-F to demonstrate the temporal fluctuations in groundwater levels from October 2010 to December 2012.

10. *OAC 3745-27-06(C)(3)(d)(iv)(b) – Interpretation of ground water flow system (Connellsville/Morgantown). More wells may be needed to describe groundwater flow in the valley near B-7B. Well 7B may be located on a groundwater divide, with flow to the north and the south. Does groundwater discharge to the valley?*

Response 10: Two existing piezometers, B-7B and B-403 located south-southeast of the expansion area, exhibit water levels that are higher than surrounding piezometers and, thus, a potentiometric high is mapped in this vicinity of the UAS. Geologic cross sections included in the revised PTI Application indicate that the base of the Connellsville and Morgantown units do not exhibit a consistent, site-wide dip direction. The variable nature of the UAS structure appears to influence groundwater flow directions in portions of the UAS. As indicated on Drawing 5D Geologic Cross Section C-C, the UAS dips to the north in the vicinity of B-7B and B-403. The observed flow direction in the vicinity of these two piezometers may be due to the structural dip.

Also, in valley areas where the UAS outcrops/subcrops, it is expected that topographically-controlled groundwater divides exist. The approximate location of the Connellsville/Morgantown subcrop has been added to Drawing 3R - Connellsville–Morgantown Potentiometric Map December 10, 2012 that is included in the revised PTI Application, Volume II (HSIR). The UAS outcrop/subcrop, based on surface elevations in the southern valleys, is expected to be found more than 2,000 feet south of piezometer B-7B and is beyond the map area in Drawing 3R. Topographic influences that create a groundwater divide and discharge boundary this far south of the expansion apparently does not override the structural influence in the vicinity of B-7B and B-403. Apex believes the proposed UAS monitoring well network and designation of upgradient and downgradient wells is accurate based on existing information. As proposed, monitoring wells for the expansion area are completed and water levels recorded, another evaluation of the UAS flow lines and adequacy of the monitoring well network will be completed and reported to Ohio EPA.

Section (C)(3)(d)(iv)(b) of the revised PTI Application, Volume II (HSIR) has been revised to reflect the discussion above regarding the influence of geologic structure and discharge boundaries on UAS groundwater flow.

11. *OAC 3745-27-06(C)(3)(d)(iv)(b) – Interpretation of ground water flow system (Bellaire/Summerfield). It appears that the Bellaire/Summerfield should discharge to the valleys. Are seeps or springs evident in these valleys to the south? With groundwater likely discharging to surface water in the valleys on the south side of the expansion area, underdrains may be necessary in these locations. Please either include a discussion about the possible need for underdrains in this section or reference another section where the need for underdrains is discussed.*

Response 11: The estimated locations of the combined Bellaire/Summerfield outcrops/subcrops are shown on Drawing 3Q Bellaire–Summerfield Potentiometric Map, December 10, 2012, which depicts both the top and bottom of the outcrop/subcrop

positions. The presence of the subcrop positions along the valley side slopes and man-made cuts represent groundwater discharge boundaries and appear to have created several groundwater divides in the Bellaire/Summerfield unit. Flow lines presented on Drawing 3Q emanate from these divides. Section (C)(3)(d)(iv)(c) of the revised PTI Application, Volume II (HSIR) has been revised to include this information.

CEC completed a field reconnaissance on April 23, 2013 to map seeps and springs at the Apex facility. The reconnaissance covered valleys to the south, east and northwest of the facility. Wet areas were observed at the locations shown on the December 10, 2012 potentiometric maps and appeared to be groundwater discharge features. Significant surface water flow was observed in the wet areas in the axial channels in the southeast, southwest and northwest valleys. Side-slope seeps/springs were observed to flow only in the southern valleys and were mapped using hand-held GPS instruments. A total of 12 groundwater seeps were identified along the side slopes of these valleys. An error occurred in determining the GPS location of Seep-1, thus, this seep is not included on the drawings. Thus, the seeps are numbered Seep-2 through Seep-12 on Drawing 3Q.

The mapped seep locations are shown on Drawing 3Q Bellaire–Summerfield Potentiometric Map, December 10, 2012, Drawing 3P Limestone/Shallow Bedrock Potentiometric Map, December 10, 2012, Drawing 3O Mine Spoil Potentiometric Map, December 10, 2012, Drawing 3K Mine Spoil Potentiometric Map, March 28, 2011, Drawing 3G Mine Spoil Potentiometric Map, December 6, 2010, and the Drawing 3E Top of Bedrock Map. Based on seep elevations compared to potentiometric contours and top of bedrock contours, it appears that the source of the seeps is from the Mine Spoil and/or contact between the Mine Spoil and the top of bedrock. CEC believes the permeability contrast between the Mine Spoil and the competent top of bedrock causes groundwater to daylight as seeps and springs along valley side slopes and in existing drainage swales.

At the operating landfill, underdrains have been constructed in excavations to control shallow groundwater beneath the recompacted soil liner (RSL). The underdrains have been constructed to discharge to valley structures that existed prior to mining at the site. The locations of proposed underdrains in the contiguous expansion area are shown on Drawing 4A of the revised PTI Application. This information has been added to Section (3)(d)(iv)(b) of the PTI Application, Volume II (HSIR).

12. *OAC 3745-27-06(C)(3)(d)(iv)(c) – Identification and characterization of recharge and discharge areas. This section needs to include a discussion of any springs or seeps in the valleys to the south. Potentiometric maps indicate that these valleys affect ground water flow. Based on these maps Ohio EPA would expect to see water discharging from the Bellaire and possibly the Connellsville/Morgantown at these locations. Please include a discussion of these valleys in this section.*

Response 12: Please see the response to Comment 11 above. CEC believes the permeability contrast between the Mine Spoil and the competent top of bedrock causes groundwater to daylight as seeps and springs in existing drainage swales along valley side slopes. Section (C)(3)(d)(iv)(c) of the revised PTI Application, Volume II (HSIR) has been revised to include the information presented in response to comment 11 above.

13. *OAC 3745-27-06(C)(3)(e) – Ground Water Quality. Groundwater quality was established by sampling 18 wells but 25 wells were used for yield testing. Explain the methodology behind this choice, why were the same 25 wells not sampled and how were the wells that were sampled chosen?*

Response 13: A minimum of four groundwater samples were collected from each monitored zone (five were collected in both the UAS and Bellaire/Summerfield SZS). The methodology for the quantity of samples collected was referenced from page 16 in the HSI Work Plan which was submitted to Ohio EPA on July 2, 2010 and discussed during a meeting on July 15, 2010. The HSI Work Plan states that "up to four

piezometers will be sampled per zone and analyzed for compounds 1 to 78 listed in Appendix I of OAC 3745-27-10." For each zone, sampling was conducted at the higher yield piezometers (observed during well development) and existing monitoring wells.

14. *OAC 3745-27-06(C)(3)(f)(i)(a) – Wells within one mile of the Facility. Drawing 2E was not included with the application, please submit Drawing 2E.*

Response 14: Drawing 2E – Regional Well Location Map has been included in the revised PTI Application, Volume II (HSIR) as requested. The average regional yield from 16 privately owned water well logs filed with ODNR is calculated to be 14.21 gallons per minute. A copy of each privately owned water well log is included in the revised Appendix C3-B and summarized on Table C3-2.

15. *OAC 3745-27-06(C)(3)(f)(ii)(f)(i) – Hydraulic conductivity measurements for unconsolidated units. This section should include a discussion/comparison of the lab testing vs. the slug testing results.*

Response 15: Section (C)(3)(f)(ii)(f)(i) has been revised to include a comparison of vertical hydraulic conductivity results from laboratory testing versus horizontal hydraulic conductivity results observed from slug testing. The vertical hydraulic conductivities ranged from 7.10×10^{-8} to 3.70×10^{-5} centimeters per second (cm/sec), with a geometric mean of 5.60×10^{-6} cm/sec. Higher values were observed with horizontal hydraulic conductivity testing with values ranging from 5.89×10^{-5} to 1.09×10^{-2} cm/sec and a geometric mean of 3.67×10^{-4} cm/sec.

16. *OAC 3745-27-06(C)(3)(f)(ii)(f)(iii) – For saturated consolidated stratigraphic units, at least one field measurement of hydraulic conductivity per saturated consolidated unit and one additional measurement per saturated consolidated unit for each twenty acres. Apex does not include the number of test performed on each consolidated unit in this section or show that they meet the minimum requirement stated above. It does appear that Apex has*

performed enough tests to meet the minimum requirement but it should be stated in this section to show compliance with the rule.

Response 16: The expansion area is approximately 180 acres. Based on the testing frequency criteria, a minimum of nine hydraulic conductivity tests were performed on each consolidated unit via slug tests and packer testing. A total of six slug tests were performed on both the Limestone/Shallow Bedrock and Bellaire/Summerfield units, and five slug tests were conducted on the Connellsville/Morgantown unit. Additionally, packer testing was conducted on piezometers P-1, P-5, and P-9. Packer testing included six tests within the Limestone/Shallow Bedrock unit, 24 tests within the Bellaire/Summerfield unit, and 28 tests within the Connellsville/Morgantown unit. This discussion has been applied to Section (C)(3)(f)(ii)(f)(iii) of the revised PTI Application, Volume II (HSIR).

17. *OAC 3745-27-06(C)(3)(f)(v)(f) – Depth to phreatic and piezometric surfaces. Ohio EPA was not able to locate a discussion about the depth to the water table in the sections specified. Please include a discussion of the depth to the water table across the site in this section.*

Response 17: Section (C)(3)(f)(v)(f) of the revised PTI Application, Volume II (HSIR) has been revised to reference new Drawing 3O - Mine Spoil Potentiometric Map, December 10, 2012 and Drawings 3G and 3K have also been revised to present the approximate limits of Mine Spoil, which represents a discharge boundary for groundwater flow in the Mine Spoil unit.

18. *OAC 3745-27-06(C)(3)(g)(i) – BBC & M May 2001 HSI Investigation. Please include the results for this investigation as a table or appendix in the application.*

Response 18: A summary of the methodologies used in the BBC&M May 2001 Hydrogeologic Investigation Report (HIR) are presented in Section (C)(3)(g) of the

revised PTI Application, Volume II (HSIR). Please refer to the BBC&M May 2001 HIR for the results of that investigation.

OAC 3745-27-10 Ground Water Monitoring Plan

1. *OAC 3745-27-10(B)(1) - Ground Water Monitoring System, Page 9 Second paragraph: The text states that the shallower SZS wells will only be installed if ground water is encountered during the drilling of the deeper UAS well. This section must be expanded to specify how the determination will be made that the upper SZS units are saturated or not. Please outline the drilling procedure that will be employed. Drilling down to a formation and leaving the borehole open for a few minutes is not acceptable. Also, how will it be determined whether water in the borehole is from the Bellaire or shallow limestone above? Please outline the drilling procedures, and a method to determine if the SZS is in fact saturated.*

   Response 1: An outline of the drilling procedures have been incorporated in Section (B)(3) of the revised Groundwater Detection Monitoring Program (GWDMP).

2. *OAC 3745-27-10(B)(1) - Ground Water Monitoring System & Drawing A-1: An insufficient number of wells are proposed on the south side of the proposed expansion area. Ohio EPA recommends an additional well cluster be installed on the south side of the proposed landfill between the 424 and 425 clusters for the shallow limestone (if present), the Bellaire and the Connelsville/Morgantown formations. Ohio EPA believes that the valley between these two proposed locations could topographically influence ground water flow patterns in this area of the site and this valley could be a preferential flow path.*

   Response 2: An additional monitoring well cluster, B-429, has been added to the proposed expansion area monitoring network at the location proposed on Drawing A-1, between the previously proposed well clusters B-424 and B-425. The B-429 cluster will monitor the Bellaire/Summerfield SZS and the Connellsville/Morgantown UAS. The Limestone/Shallow Bedrock SZS is not expected to be present due to the unit's subcrop

within the southeastern valley; however, if the shallow limestone is observed in the boring during advancement of the deeper B-429 UAS well, and evaluation of the yield of the limestone will be made in accordance with the method discussed Section (B)(3) of the revised GWDMP and in Response 1 above.

3. *OAC 3745-27-10(B)(1) - Ground Water Monitoring System & Drawing A-1: No shallow limestone wells are shown on the west side of the site on Drawing A-1. The cross sections appear to show the shallow limestone present on the west side of the site. If during drilling the deeper UAS well, the presence of the limestone and whether it is saturated or not needs to be evaluated. Please include this in the text on page 9 of the ground water monitoring program plan.*

   Response 3: As requested, the text in Section (B)(1) has been revised to reference the evaluation of groundwater in the Limestone/Shallow Bedrock SZS, which is further discussed in Section (B)(3). Revisions have been made to the Monitoring Well Installation Schedule in Section (B)(1) of the revised GWDMP and Table 2 to include proposed Limestone/Shallow Bedrock SZS wells in the western portion of the expansion. Drawing A-1 has been revised to illustrate the location of these proposed monitoring wells.

4. *OAC 3745-27-10(B)(1) - Ground Water Monitoring System & Drawing A-1, page 11: Ohio EPA understands that Apex will not know how many underdrains will be needed until construction commences, however it appears based on topography, presence of valleys, cross sections and potentiometric maps that there is a probability that at least two underdrains on the south side of the proposed facility will be needed. Please note this in the text on page 11.*

   Response 4: Section (B)(1) of the revised GWDMP indicates the that underdrains will be constructed in the contiguous expansion area at the locations shown on Drawing 4A of the PTI Application.

5. *OAC 3745-27-10(B)(2) - Uppermost Aquifer System, Page 12: The bottom paragraph states that the Connellsville/Morgantown UAS is generally unconfined. This is not a huge issue but the cross sections reveal water levels above the top of the unit in many wells. It would seem that generally, the unit is confined. Further discussion in the text could help in understanding why Apex has determined that the unit is unconfined.*

   Response 5: Additional discussion has been included in Section (B)(2) of the revised GWDMP regarding whether the UAS is either confined or unconfined. UAS piezometers with groundwater elevations above the unit suggest that the aquifer is confined below the proposed expansion with the exception of the southwestern and northeastern portions. The aquifer, however, is generally unconfined beneath the operating landfill.

6. *OAC 3745-27-10(B)(2) - Uppermost Aquifer System, Page 13: The discussion at the top of the page states that ground water flow on the eastern portion of the site is to the north. Based on Ohio EPA's comments on the hydrogeological study this conclusion regarding flow to the north opposite the dip of the southeastern valley, may have to be revised. Ohio EPA believes that flow on the southeastern side of the proposed site may be to the south as found on the western side of the site.*

   Response 6: Please see the response to HSIR comment no. 10 above regarding flow in the UAS. Apex has agreed to add a monitoring well nest, B-429, in this vicinity to provide additional potentiometric data in the southeastern valley area. As proposed monitoring wells for the expansion area are completed and water levels recorded, another evaluation of the UAS flow lines and adequacy of the monitoring well network will be completed and reported to Ohio EPA.

7. *OAC 3745-27-10(B)(2) - Uppermost Aquifer System, Page 13: At the bottom of page 13 Apex states their opinion concerning a dry well and what warrants a violation for inadequate well network. Ohio EPA believes this kind of language is not needed in the GWDMP and should be removed. Ohio EPA agrees that a well that is dry because the formation that it*

monitors lacks sufficient water to sample does not warrant a notice of violation for inadequate well network. It is Ohio EPA's opinion though, that a dry well is not always sufficient evidence that the formation is dry at that location. In some cases other evidence is available or becomes available that would allow for the possibility that the formation could produce enough water for sampling if the well's location, depth, or screened interval was adjusted. Failure to adequately characterize and/or monitor a formation could be interpreted as a violation of OAC 3745-27-06 and 10.

Response 7: As requested, our opinion concerning dry wells and what warrants a violation for an inadequate well network has been removed from the GWDMP. The proposed procedure to evaluate the potential for an open boring to produce a sufficient quantity of groundwater for sample collection is provided in Section (B)(3) of the revised GWDMP.

8. *OAC 3745-27-10(B)(3) - Well Construction, page 16 & Drawing A-1: The table on page 16 provides the abandonment schedule for the wells used in the hydrogeological study. Drawing A-1 provides for the abandonment of P-6S, P-6L, B-7A, B-7B and P-10S located on the southern side of the site. The table on page 16 does not list these wells. Ohio EPA would recommend that all of these wells be left in place for water level measurements and possibly assessment if ever an SSI is detected on this side of the site. The cross sections indicate these wells produce water. Ohio EPA would also accept well P-8A as being left in place for water level data in the mine spoil. Please add these wells to the GWMP for water level measurements.*

Response 8: Drawing A-1 and the table in Section (B)(3) has been revised to illustrate that the aforementioned piezometers will be left in place for water level measurements. The table in Section (B)(3) has also been revised to remove piezometer P-8A from the abandonment schedule. Also, the well abandonment schedule has been revised to reflect the revised phasing sequence in the contiguous expansion area.

9. *OAC 3745-27-10(C)(2)(c)(i) - Well Evacuation, Page 20: Please make it clear in this section that as many wells as possible will have dedicated pumps installed.*

Response 9: Revisions to the GWDMP, Sections (B)(3) and (C)(2(c)(i) specify that all monitoring wells which can sustain a yield required for low-flow sampling will be equipped with a dedicated bladder pump.

10. *OAC 3745-27-10(C)(2)(c)(i) - Well Evacuation, Page 21 Minimum/No Purge Sampling: It is unclear why no purge sampling is needed and when it would be used. Please either remove this section or expand the text to justify the use of this sampling technique. If a well cannot be sampled with a low flow procedure, then pumping the well dry and allowing it to recover would be a viable option. Using the bailer method outlined on page 22 is acceptable as well. The no flow sampling is confusing and requires additional discussion.*

Response 10: The methodology for minimum/no purge sampling is referenced from the previously approved GWDMP (Revised December 2011) for the existing landfill. This reference has been added to Section (C)(2)(c)(i) of the revised GWDMP. No purge sampling may be needed to establish background data in low yield wells and is discussed in Section 4.5.4 of the Ohio EPA Technical Guidance Manual for Groundwater Investigations (May 2012).

11. *OAC 3745-27-10(C)(3) - Measurements of Groundwater Elevations: The text states that a potentiometric map will only be constructed if more than 50% of the wells in a formation are not dry. Please remove this sentence from the text. A plot of the data on a map will be sufficient when insufficient data exists.*

Response 11: The text regarding the construction of potentiometric surface maps has been clarified in Section (C)(3) of the revised GWDMP. Potentiometric maps will be prepared in conjunction with any major sampling event. If dry monitoring wells preclude

the ability to prepare representative potentiometric contours, then only a plot of the data for these wells will be shown on the map.

12. *OAC 3745-27-10(C)(6) - Underdrains, Page 34: The last sentence of the first paragraph states that if it is determined that a waste derived release to the underdrain has occurred then assessment would be initiated. Appendix C states in the flow chart that assessment would be entered only if deemed appropriate by Ohio EPA. Please revise so that the appendix and the text correlate. Ohio EPA would accept the provisions of the appendix.*

Response 12: The text concerning assessment for underdrains with a waste derived release has been revised to correlate the provisions of Appendix C.

13. *Table 2: Please revise the table listing the monitoring well network and whether a well is up or down gradient based upon Ohio EPA comments on the hydrogeological report and the GWMP.*

Response 13: Revisions were made to the proposed hydraulic positions in the Mine Spoil SZS, Limestone/Shallow Bedrock SZS, and Bellaire/Summerfield SZS units based on additional information regarding recharge and discharge areas. Table 2 – Proposed Monitoring Well Construction Summary has been revised accordingly. Proposed monitoring locations and well construction summaries have been updated to include the Limestone/Shallow Bedrock SZS wells in the western portion of the expansion in addition to the newly proposed monitoring well cluster, B-429, which will monitor the Bellaire/Summerfield SZS and the Connellsville/Morgantown UAS.