



Apex Environmental, LLC

July 19, 2013

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

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Ohio Environmental
Protection Agency
Southeast District

RE: Response to Ohio EPA Notice of Deficiencies dated December 11, 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 General Engineering review comments and the Geotechnical Resource Group comments. The responses regarding hydrogeology and related issues will be submitted under a separate cover.

The PTI Application narrative, calculations, and drawings 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 11, 2012;
- Attachment B – Revised PTI Application Narrative;
- Attachment C – Revised PTI Application Calculations; and
- Attachment D – Revised PTI Application Drawings.

Only the revised portions of the PTI Application are being submitted. The revisions to the narrative and calculations are indicated using ~~strikeout~~ for deleted text and *italics* for new text. The header of revised calculation pages have been updated with revision dates. 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 PTI Application 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.



Apex Environmental, LLC

Please contact me if you have further questions.

Best regards,

Dave Matthews, General Manager
Apex Environmental, LLC

Enclosures

cc: Bruce Misselwitz, JCGHD
Anthony Rizzo – Environmental Logistics Services, LLC
Apex file – Contiguous Expansion PTI Application
Rick Buffalini, Civil & Environmental Consultants

ATTACHMENT A

**RESPONSE TO OHIO EPA NOD
DATED DECEMBER 11, 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 – Hydrogeologic review comments. The Ohio EPA provided the hydrogeologic review comments in a letter dated December 28, 2012.

This response addresses the General Engineering review comments and the Geotechnical Resource Group comments. The deficiencies are repeated verbatim below and followed by the response in italicized text. The responses regarding hydrogeology and related issues are being submitted under a separate cover.

The PTI Application narrative, calculations, and drawings 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 to develop the site from the west to the east. As a result, the leachate collection layer and other associated drawings were revised to relocate the leachate sump to the first portion of the phase to be developed so that a temporary leachate sump could be avoided. The revised grading increased the proposed airspace by approximately 500,000 cubic yards to a total of approximately 61.1 million cubic yards. The revised grading plan required revisions to several calculations including airspace, soil balance, slope stability, settlement, and leachate management. The revised phasing and grading plan is depicted on Drawing 3A, Drawing 3C, Drawings 4A through 4E, and the Phase Development drawings.

In addition to the revisions made to the PTI Application to address the Ohio EPA NODs, the following revisions were made to the narrative and calculations in the Application:

- PTI Forms, Attachment A1. Appendix A was added which includes a table that lists all permits.
- The Leachate Storage Tank Calculation in Section (C)(5)(e) was revised to include the condensate from the proposed landfill gas processing plant.
- Section (C)(5)(k) was revised based on changes to the location of the proposed landfill gas management area location.
- The Surface Water Channel Calculation in Section (C)(5)(k) was revised to use grass lining instead of riprap lining where possible.
- Sections (C)(7) and (C)(8) were revised based on Alteration Requests for the current Vertical Expansion PTI Application that were approved by the Ohio EPA including 2012 Rail Area Improvements issued March 16, 2012 and the Rail Yard Expansion issued August 9, 2012.

- Section (C)(8), Odor Monitoring Plan was revised to be consistent with the PTI Alteration Request for the Vertical Expansion PTI Application submitted on June 13, 2013. The OMP is being resubmitted without tracking changes due to the extent of revisions.
- Section (C)(9), Explosive Gas Monitoring Plan was revised to discuss additional proposed enclosed structures at the facility.
- Section (C)(10) has been revised to refer to a list of permits that is presented in new Appendix (C)(10)-C.

In addition to the revisions made to the PTI Application to address the Ohio EPA NODs, the following revisions were also made to the drawings in the Application.

- All plan view drawings were revised with the 2013 topography.
- The relevant plan views have been revised to show the proposed landfill gas management area at the new location.
- Cross Section A-A on Drawing 5I changed with the proposed rail widening grading.
- A gas monitoring punch bar associated with the proposed gas management area has been added to Drawing 3B and the 6 series drawings.
- The solidification basin has been shown in the relocated location on Drawings 3A, 3B, and 6F, 6G, and 6H.
- Drawing 7B, Detail A, temporary cell divider berm configuration detail, was revised to show an extrusion weld on both sides.
- Drawing 7J, schematic of the landfill gas management area, was revised to be consistent with current design plans.
- The channel lining type was revised in the channel summary table on Drawing 7L.

Comments from Attachment A – General Engineering Review

Comment No. 1 - On Plan Sheets 2C-1 and 2C-2 (Man-Made Potential Explosive Gas Migration Pathways), please amend the drawings to include the sewer/water lines and other underground utilities associated with the proposed solidification facility, rail unloading building and the landfill gas processing facility.

Response: Drawings 2C-1 and 2C-2 have been revised to show underground utilities associated with solidification facility, proposed rail unloading area, and proposed gas processing facility.

Comment No. 2 - On Plan Sheet 2D-2 (Siting Criteria Summary), a comment is provided relative to OAC Rule 3745-27-07(H)(3)(C) and water supply wells. In particular, the comment states "None within 1,000-ft of waste placement, except the well at the landfill office which meets the criteria of rule OAC 3745-27-07(H)(3)(C)(i)."

Please fully explain how the main office well satisfies the criteria of OAC Rule 3745-27-07(H)(3)(C)(i) or alternately criteria (ii or iii).

Please reference Comment No. 21 and its alternate justification narrative on Page C1-19.

Response: 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 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:

- Decommission the existing well and demonstrate that a new water supply well is separated from the limits of solid waste placement by a hydrogeologic barrier. Apex will install 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 this approach.
- Decommission the existing 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.

Comment No. 3 - On Plan Sheets 3A (Landfill Facilities/Utilities Location Plan), please amend the drawings to include all new utilities associated with the proposed solidification facility, rail unloading building and the landfill gas processing facility.

Response: Drawing 3A has been revised to show utilities associated with the solidification facility, proposed rail unloading area, and proposed landfill gas processing facility.

Comment No. 4 - On Plan Sheet 3B (Explosive Gas Control System Plan), please revise the drawing to merge the current GCCS as-built (Fall 2012) with the balance of the modeled system.

Response: Drawing 3B has been revised to show the February 19, 2013 as-built construction of the GCCS.

Comment No. 5 - On Plan Sheet 3B and subsequent drawings, please amend to incorporate the southern haul road from the rail yard (Constructed - Summer 2012).

Response: Drawing 3B and other applicable plan sheets have been revised to show the 2013 topography which includes the southern haul road from the rail yard.

Comment No. 6 - On Plan Sheet 3C (UAS Separation Isopach Map), please revise Note No. 4 to be reflective of Phase 6A-East's construction. And adjust the phasing limits to show Phases 6A and 6B. Please incorporate similar changes to subsequent drawings as necessary.

Response: Note 4 on Drawing 3C has been revised to remove mention of construction progress. The drawing has been revised to show Phase 6A, 6B, and 7A limits. Subsequent drawings have been revised in a similar manner. Additionally, page 1 of Section (C)(1) was revised to remove reference of the currently constructed cell.

Comment No. 7 - On Plan Sheets 4A (Horizontal and Vertical Limits of Excavation), please amend the drawing to include areas of excavation and fill associated with the proposed solidification facility, rail unloading building and the landfill gas processing facility. And please incorporate the as-built grading of the southern haul road from the rail yard.

Response: The location of the existing solidification basin does not appear on Drawing 4A. The excavation and fill associated with the proposed solidification basin location, rail unloading area, and landfill gas processing area have been added to Drawing 3A but are not shown on Drawing 4A because changes to the proposed grading plans would require revisions to all of the 4-series drawings.

Comment No. 8 - On Plan Sheet 4G (Top of Final Cover Grading Plan), the maximum elevation for the top of final cover is shown at 1577' msl which is 28' higher than Ohio's highest natural elevation which is at Campbell Hill near Bellefontaine, Ohio (1,549' msl). And the proposed maximum elevation is 189 feet higher than Jefferson County's highest natural elevation near Monroeville, Ohio at 1,388' msl.

When faced with a similar situation Cherokee Run Landfill elected to establish 1548' msl as their top of final cover.

In consideration of the proposed expansion, Ohio EPA requests that the expansion's top of final cover be reconfigured to be held less than 1549' msl.

Response: - The proposed design complies with all applicable regulations at the proposed height; therefore, Apex requests that the application be reviewed at the proposed elevation.

Comment No. 9 - On Plan Sheet 4H (Surface Water Management Plan), please add a reference to Detail A/7A (Sedimentation No. 1), B/7M (Sedimentation Pond No. 2) and B/7M (Sedimentation Pond No. 3).

Response: - The requested references have been added to Drawing 4H.

Comment No. 10 - Plan Sheet 7D (Leachate Management System Details), please revise Detail F/7D (Valve Vault) to show its correct position with respect to the sideslope riser pipe and pitless adapter.

As a suggestion, please note that the valve vault is a "confined space" and should be posted as such. The optional encasement of the in-line condensation sumps (Details A/7H and B/7H) should also be posted as confined spaces.

Response: Detail F on Drawing 7D has been revised to better represent the actual configuration of the vault and pitless adapter. Detail F on Drawing 7D and Details A and B on Drawing 7H have been annotated to require "Confined Space" signs outside these features.

Comment No. 11 - On Plan Sheet 7G (Gas Management System Details), please add a typical detail to show the configuration of a gas extraction well that utilizes a caisson to support an extended well.

Response: Apex has elected not to utilize a caisson-style gas well for future construction.

Comment No. 12 - According to Section II (Multimedia Information), a NPDES permit, a 401 permit, a 404 water quality certification, an isolated wetland permit, and an air permit are needed for the proposed expansion. At the time of the original submission, these applications weren't submitted yet.

What is the status of these or other applicable applications?

Response: The NPDES permit application, air permit application, and wetlands permit applications are expected to be submitted before the end of 2013.

Comment No. 13 - Please revisit Section III (Additional Information) #9 to correct the "Total Area Within the Limits of Waste Placement" which should be the sum of "Area Previously Approved" and "New Area Added by this Permit."

Response: Section III (9) has been revised as requested. In Section III (9), the area currently filled has been revised to include construction of Phase 6A-East.

Comment No. 14 - Please revisit Section III #10 to correct the "Total Volume" which should be the sum of "Volume Previously Approved" and "New Volume Proposed by this Permit."

Response: Section III (10) has been revised to include the volumes considering the revised base grades. Additionally, the total volume filled reflects the volume filled as of December 31, 2012.

Comment No 15 - Section IV (Cost Estimates) reports that the Total Closure Cost Estimate is \$16,918,804 which actually appears to be based on some 183 acres as shown within Section (C)(5) [Closure Cost Estimate]. In contrast, Section IV declares 117 acres the "Worst Case Acreage" for when Phase 13 is just developed (please see Plan Sheet 6G).

Within Sections IV and (C)(5), please revise the Total Closure Cost Estimate with regards to the Worst Case Acreage only and without any discount for the installed gas collection and control systems. The proposed \$92,453/ac appears to be low.

Response: The final closure cost estimate in Section (C)(5) of the application have been revised based on a maximum anticipated open area of 95 acres. The estimated final closure cost per acre has been increased to \$106,942 to account for inflation since the original estimates were prepared. Attachment A1 of the permit application has been revised based on the recalculated closure cost estimate. The closure cost estimate in

Section (C)(5) and Attachment A1 have been revised based on increased costs in the final closure cost estimate.

Comment No. 16 - In recent years, Apex Environmental, LLC has progressively increased the facility's "worst case acreage." With the development of Phase 6A-East, the worst case acreage will be 87.3 acres. With the transition from the originally permitted 117.5-acre unit to the proposed expansion's 288.5-acre unit, beginning the closure of the original unit appears to be logical to limit the growing environmental liability.

In consideration of the proposed expansion, Ohio EPA requests the development of a systematic closure scheme for the originally permitted unit.

Response: Apex intends to cap a portion of the existing landfill unit equal to the lined area being constructed within the contiguous expansion area. The worst case open acreage will be limited to 95 acres. Capping will occur within 12 months of construction of the lined area. The Closure Plan in Section (C)(9) has been revised to include the proposed closure schedule.

Comment No. 17 - On Pages C1-5 & 6 [Information per OAC Rule 3745-27-07(A)(3)], please revise the compliance narrative to note the DFF&O of December 22, 2011 and revise Appendix C1-E as necessary.

Response: The narrative has been modified to include the December 22, 2011 DFFO and the June 3, 2013 DFFO which approved Apex's proposed actions to comply with the 2011 DFFO. The narrative was also revised to include the April 29, 2013 DFFO regarding payment of fees. Appendix C1-E has been modified to include the DFFO and all new entries up to present date.

Comment No. 18 - On Page C1-6 [Information per OAC Rule 3745-27-07(A)(5)], please update when the most recent disclosure statement was submitted as necessary.

Response: Pages C1-3 and C1-6 of Section (C)(1) have been updated with the date of the most recent disclosure statement submittal.

Comment No. 19 - On Page C1-12 [Information per OAC Rule 3745-27-07(E)(3)], please revise the compliance narrative as necessary.

Response: Page C1-12 of Section (C)(1) has been modified to reflect the items discussed in response to Comment 17.

*Comment No. 20 - On Page C1-19 [Information per OAC Rule 3745-27-07(H)(3)(C)], the narrative notes the following "The authorized fill area, the contiguous new unit and proposed vertical expansion are **not** located within 1,000 feet of a water supply well or developed spring." In contrast, the following sentence says "Apex uses and controls two water wells that are on the facility and used to support operations; only one is within 1,000 feet from the limits of waste."*

Actually, the proposed limits of waste placement will be some 220' from the well located at the main office.

Please revise the narrative to clarify that the proposed expansion is within 1,000 feet of one water supply well.

Response: The narrative on page C1-19 has been clarified.

Comment No. 21 - *Reportedly, the water supply well adjacent to the main office is protected from the limits of waste placement by a "hydrogeologic barrier" as provided by OAC Rule 3745-27-07(H)(3)(C)(iii).*

Please show that this well is actually isolated by a hydrogeologic barrier. Alternately, the well could be replaced with a cistern.

Response: The narrative on page C1-19 was revised as discussed in the response to Comment No. 2.

Comment No. 22 - *On Page C1-21, please revise the facility compliance narrative to note the DFF&O of December 22, 2011.*

Response: The paragraph on pages C1-21 and C1-22 has been modified to note the December 22, 2011, April 29, 2013, and June 3, 2013 DFFOs.

Comment No. 23 - *Please revise and amend Appendix C1-E (Compliance Violations Summary) as necessary.*

Response: Appendix C1-E has been modified to include the DFFO and all new entries up to present date.

Comment No. 24 - *As available mid-December, 2012, please see Attachment C for further deficiencies as provided by the Southeast District Office's Division of Drinking and Ground Water (Joe Laughery).*

Response: Responses to the Hydrogeologic Site Investigation Report are presented separately.

Comment No. 25 - *Please see Attachment B for further deficiencies as provided by the Southeast District Office's Geotechnical Resource Group (Brian Queen).*

Response: Responses to the Stability Analyses comments and geotechnical comments have been addressed and are presented with this submittal.

Comment No. 26 - *As shown within Section (C)(5), please update the "remaining airspace of the existing unit", "anticipated life of facility" and other life estimates. As of December 29, 2010,*

some 13.9 MCY of permitted airspace remained with a projected remaining life of 5.1 years. With the increased AMDWR alone (without additional airspace), the remaining life of the facility was estimated at 3.6 years.

Response: The remaining airspace estimates contained in Section (C)(5) have been updated to include 2012 airspace consumed. Attachment A1 has also been revised to include the 2012 airspace consumed.

Comment No. 27 - As found within Section (C)(5), please revise the reported "Total Cost of Post-Closure Per Acre" to be based on the total permitted 288.5 acres and not the actual surface area of the landfill.

Response: The total post closure cost estimate contained in Section (C)(5) has been revised to use the permitted 288.5 acre footprint area.

Comment No. 28 - Within Section (C)(8) [Operational Information], please revise the Odor Management Plan based the resolution of the December 22, 2011 DFF&Os.

Response: The revised Odor Management Plan was submitted to the Ohio EPA on June 13, 2013 as required by the June 3, 2013 DFFO. The revised plan is provided with this submittal. Please note that due to the large number of revisions, track changes was not used in the narrative to make review easier.

Comment No. 29 - Please submit two copies of the "final ground water detection monitoring program" so they may be placed within Appendix C9-A (Ground Water Detection Monitoring Program) of the first two copies of the permit application.

Response: Two copies of the revised Ground Water Detection Monitoring Program are included with the hydrogeologic responses.

Comment No. 30 - Within Appendix C9-B (Explosive Gas Monitoring Plan), please revisit the "Discussion of Latest Explosive Gas Investigation" as necessary.

Response: Page 7 of the Explosive Gas Monitoring Plan contained in Appendix C9-B has been revised to reflect the most recent monitoring event.

Comment No. 31 - Within Appendix C9-B, please revisit the "Description of the Proposed Monitoring System" to include the installation of permanent gas monitoring probes for "other structures" within 200 feet of the waste limits.

Response: Page 7 of the Explosive Gas Monitoring Plan contained in Section C9-B has been revised to include the installation of permanent gas probes to monitor occupied structures within 200 feet of the waste limits.

Comments from Attachment B – Geotechnical Resource Group Comments

Comment No. 1 - The hydrostatic uplift calculations determined that a factor of safety of 1.40 could not be met as the facility is currently designed. Calculations were also included that indicated a factor of safety above 1.40 could only be achieved once waste is placed in the facility. These calculations verify that the site's current design does not meet OAC 3745-27-08(C)(7)(a) which states.

"The factor of safety for hydrostatic uplift shall not be less than 1.40 at any location during the construction and operation of the facility."

Since the weight of the liner system at the end of its construction is insufficient to achieve a factor of safety of 1.40 for hydrostatic uplift, the facility should be redesigned. Two possible designs are to raise the floor of the facility so it is not below the piezometric surface or to place a drainage layer beneath the liner to underdrain the liner system to prevent uplift pressure from developing in the areas of concern. It should also be noted that the current underdrain system is not providing drainage to all areas that show a piezometric surface above the liner.

Response: The design has been revised to include a geocomposite drainage layer beneath the Recompacted Soil Liner in areas where the factor of safety for hydrostatic uplift is less than 1.40. The drainage layer will outlet into the proposed gravity underdrains. The extents of the proposed drainage layer are shown on Drawing 4A and the detail is shown on Drawing 7A.

Comment No. 2 – The unit weight of the Municipal solid waste was modeled as 90 pcf. This unit weight is higher than what is typically found in literature, and tended to make the factors of safety slightly higher than what would have been modeled with a lower unit weight. The consultant for the facility should provide a site specific explanation for the higher unit weight or change it to 75 pcf and revise the submittal appropriately.

Response: The slope stability, settlement, and hydrostatic uplift analyses and associated narratives have been revised to incorporate a MSW unit weight of 75 pcf.

Comment No. 3 – The back calculated internal shear strength determined necessary to maintain a factor of safety of 1.5 may not be achievable at the site. The 2005 interface shear strength data is lower than what is required by the back calculation. The consultant for the facility should evaluate if a redesign of the facility is necessary.

| Material Interface | Normal Stress (psf) | PTI Peak Shear Strength (psf) | 2005 Peak Shear Strength (psf) | PTI Post-Peak Shear Strength Peak Shear Strength (psf) | 2005 Post-Peak Shear Strength (psf) |
|--------------------|---------------------|-------------------------------|--------------------------------|--|-------------------------------------|
| GCL vs GMX | 150 | | 76 | | 60 |
| GCL vs GMX | 1000 | | 356 | | 277 |
| GCL vs GMX | 3000 | 1500 | 1144 | 875 | 711 |
| GCL vs RSL | 6000 | 2000 | 2023 | 1290 | 1029 |
| GCL vs GMX | 1350 | 4100 | 3233 | 2100 | 1188 |

Response: CEC reviewed the results of the interface shear strength testing performed for each phase of construction from 2005 to present. Based on these results, the shear strength envelope specified in the CQA Plan is achievable with the materials being used. The required minimum shear strength for the liner system has been revised based on the proposed revision to the phased development of the site. The critical slope stability cross section has been revised and results in lower required peak interface shear strengths. The global slope stability calculation narrative has been revised and includes two graphs that show a comparison of past shear strength data and the shear strength envelope used in this calculation.

Comment No. 4 – Weak saturated sandy clay mine spoil with SPT blow counts less than 4 were found I soil boring SB-20 at an elevation between 1238 and 1242. Soils with blow counts below 4 have been known to suffer undrained failures during excavation and loading. A cross section in a location similar to that shown in Figure 1 should be evaluated for interim undrained stability.

Response: Based on the proposed grading plan, the soft mine spoil material that was encountered in Test Boring SB-20 from Elevation 1238 to 1242 will be removed as part of the landfill construction. The proposed berm is approximately 80 to 90 feet from Test Boring SB-20 where mine spoil will remain in place at Elevation 1238 to 1242. Due to the high variability in the mine spoil over short distances, CEC does not believe that it is reasonable to assume that the soft material encountered in Test Boring SB-20 will extend 80 to 90 feet to the proposed berm where mine spoil will remain in place. Therefore, an additional slope stability cross section was not performed as discussed with the Ohio EPA. If soft material is encountered during excavation in this area or any area within the landfill footprint it will be removed and replaced with suitable fill or sampled and tested for shear strength in accordance with Section 3.0 of the CQA Plan.

Comment No. 5 – There is a 2H:1V slope associated with the proposed gas management area. The consultant should evaluate the stability of this slope.

Response: The proposed gas management area has been relocated to the north and is no longer adjacent to the contiguous expansion. The stability of the 2H:1V side slopes associated with the gas management area will not affect the stability of the contiguous expansion area.

Comment No. 6 – In the shallow saturated stability calculations, the consultant attempted to apply a factor of safety of 2.0 to the calculation by multiplying 2.0 times the peak 100 year 24 hour storm, which resulted in a 5.12 inches/hour rain event or 3.61E-03 cm/sec rain event. However, since the permeability of the vegetative soil was estimated at 4.2E-5 cm/sec the impingement rate used in the calculation defaulted to 4.2E-5 cm/sec for the permeability of the vegetative soil and thereby making the applied factor of safety irrelevant in the calculation. In order to properly apply a factor of safety in this calculation, one must apply it to the reduction factors. The consultant should revise the calculation appropriately.

Response: The factor of safety of 2.0 was applied to the reduction factors as requested.

Comment No. 7 – The design permeability of the vegetative cover soil is 4.20E-5 cm/sec. Some soils are not able to maintain this low of permeability after drought conditions. Please include the testing of the long term permeability of the vegetative soil in the quality assurance quality control plan. Please refer to Guidance Document 700 “Selecting Material for Cap Protection Layers”.

Response: The permeability of the vegetative cover soils was incorrectly reported in the calculation narrative as 4.20E-5 cm/sec; however, the actual permeability used in the calculation was 1.00E-4 cm/sec. This is the same permeability that was used in the calculation performed for the approved Apex vertical expansion PTI Application and has been approved at other sites. Guidance Document 700 “Selecting Material for Cap Protection Layers” states that the permeability of vegetative cover soils will likely increase by 1 to 3 orders of magnitude due to years of root intrusion, freeze/thaw, and wet/dry cycles. Based on permeability test results performed for the contiguous

expansion, the average permeability of undisturbed site soils is $5.60\text{E-}6$ cm/sec. This is approximately 2 orders of magnitude less than the permeability used in the calculation. CEC believes that the permeability of the vegetative cover soils once placed and compacted will be less than or equal to the undisturbed in-situ samples because the vegetative cover will be tracked in with dozers and the in-situ mine spoil was placed in an uncontrolled manner. Therefore, CEC believes that $1.00\text{E-}4$ cm/sec is representative of the proposed vegetative cover soils long-term permeability. The calculation narrative was revised to state the permeability of $1.00\text{E-}4$ cm/sec.

Comment No. 8 – The post settlement slope of the leachate collection pipe between points 1230 and 1229 is 0.20%. This is below the regulatory limit of 0.5%. The consultants should revise the design appropriately.

Response: The elevation of the leachate collection system in this area has been revised to maintain a post settlement slope of at least 0.5%. The grading change has been made to Drawings 4A through 4E.

Comment No. 9 – The structural fill area on the west side of phase 7 was not evaluated sufficiently for settlement. Please add the settlement points indicated in Figure 2 and evaluate them for settlement. When this evaluation is complete, the consultant will determine that the slopes in these area do not meet the regulation and the design will need to be revised in this area (see Table 2).

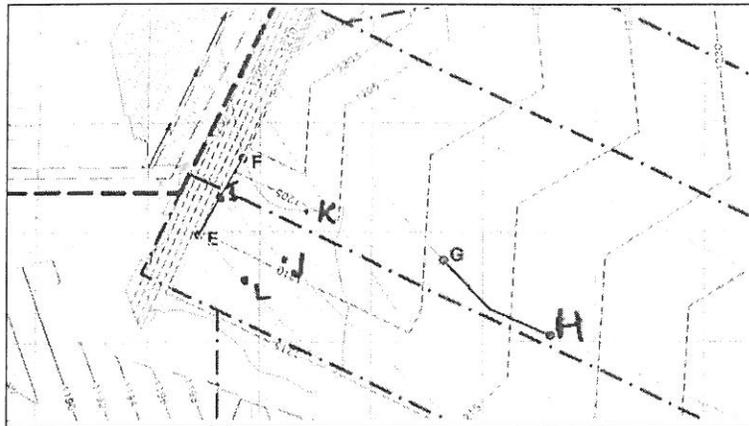


Figure 2

Post Settlement Slope and Strain Calculation – Existing Facility

Table 2

| Point No. | Pipe | | | Pipe | |
|---|--------|---------|---------|--------|---------|
| | I | J | K | L | E |
| Top of RSL El. | 1207.1 | 1209.1 | 1205.6 | 1212 | 1210.3 |
| Top of Waste El. | 1265.7 | 1322 | 1318 | 1312 | 1271.2 |
| Top of Existing Ground El. | 1182 | 1174 | 1188 | 1180 | 1159.8 |
| Top of Bedrock El. | 1179.0 | 1171.0 | 1185.0 | 1177.0 | 1156.8 |
| Top of Final Cover El. | 1269.7 | 1326.0 | 1322.0 | 1316.0 | 1275.2 |
| MSW Thickness (ft) | 57.6 | 111.9 | 111.4 | 99.0 | 60.0 |
| Shot Rock Thickness (ft) | 22.1 | 32.1 | 14.6 | 29.0 | 47.4 |
| Residual Soil Thickness (ft) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| <u>RSL</u> | | | | | |
| Po (psf) | 187.5 | 187.5 | 187.5 | 187.5 | 187.5 |
| ΔP (psf) | 5,987 | 10,874 | 10,829 | 9,713 | 6,201 |
| S _c (ft) | 0.012 | 0.076 | 0.076 | 0.064 | 0.016 |
| <u>Shot Rock</u> | | | | | |
| Po (psf) | 1,547 | 2,247 | 1,022 | 2,030 | 3,321 |
| ΔP (psf) | 7,721 | 13,308 | 12,038 | 11,930 | 9,709 |
| S _c (ft) | 1.730 | 3.084 | 1.474 | 2.689 | 3.864 |
| <u>Residual Soil</u> | | | | | |
| Po (psf) | 195 | 195 | 195 | 195 | 195 |
| ΔP (psf) | 9,268 | 15,555 | 13,060 | 13,960 | 13,030 |
| S _c (ft) | 0.184 | 0.241 | 0.222 | 0.229 | 0.221 |
| Total S _c (ft) | 1.926 | 3.401 | 1.771 | 2.982 | 4.101 |
| Horizontal Dist. (ft) | | 210 | 120 | | 150 |
| Original Distance (ft) | | 210.010 | 120.051 | | 150.010 |
| Final Distance (ft) | | 210.001 | 120.015 | | 150.027 |
| Pre-settlement Slope (%) | | -0.95% | 2.92% | | 1.17% |
| Post-settlement Slope (%) | | -0.25% | 1.56% | | 1.91% |
| Strain (%) | | -0.004% | -0.030% | | 0.011% |
| ⁽¹⁾ Negative strain indicates tension. | | Fail | Fail | | Pass |

Response: The settlement calculation has been revised to include the analysis of points in Figure 2. Based on the results of our revised calculation, the post settlement slopes in this area meet the minimum slopes required. The revised calculations are provided in Section (C)(4).