October 18, 2022

Jay A. Steinberg
Nevada Environmental Response Trust
35 East Wacker Drive, Suite 690
Chicago, IL 60601

Re: **Tronox LLC (TRX) Facility**
Nevada Environmental Response Trust (Trust) Property
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection (NDEP) Response to: *GW-11 Pond Closure Pre-Closure Summary and Alternatives Analysis*

Dated: September 6, 2022

Dear Mr. Steinberg,

The NDEP has received and reviewed the Trust's above-identified Deliverable and provides comments in Attachment A. A revised Deliverable should be submitted by **12/18/2022** based on the comments found in Attachment A. The Trust should additionally provide an annotated response-to-comments letter as part of the revised Deliverable.

Please contact the undersigned with any questions at wdong@ndep.nv.gov or 702-668-3929.

Sincerely,

Dong Weiquan

Weiquan Dong, P.E.
Bureau of Industrial Site Cleanup
NDEP-Las Vegas City Office

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NDEP Comment	Response to Comment	NDEP Comment on Response
General Comment 1: In Section 2.1 recommend adding sentence that provides the general dimensions (H x W x L) of the Pond embankment inclusive of the below ground component along with an additional figure showing both the map view and cross section. Doing so would be a helpful reference when reviewing each alternative.	The text in Section 2.1 has been modified to include the general dimensions of the GW-11 Pond (Pond) embankment, with reference to Section 3.3 which includes additional embankment dimension details. In addition, Figure 7 provides a map view and multiple cross sections of the Pond embankment with dimensions.	No further response required
Fatal Flaw 1: Cost Sections 4.3.1.3, 4.3.2.3, 4.3.3.3, 4.3.4.3, 4.4.3 various pages. The NDEP acknowledges this is a screening level alternatives analysis, however it is still important to provide sufficient cost detail for each alternative in order to support justification of a recommended remedy. For instance, in Section 3.3.3 Semi-volatile Organic Compounds (SVOCs) page 19 the HCB concentrations are relatively high in multiple borings. Per Section 3.3.10 additional investigation was to be completed in January 2022 with laboratory results expected in February 2022. The February 2022 results are not presented in this report, and therefore it is unclear what the cost impact could be if there were a larger quantity of embankment material failing TCLP. Therefore, the NDEP requests NERT provide an assumptions table for each alternative that includes all items that are expected to have a significant influence	As indicated in the GW-11 Pond Closure Pre-Closure Summary and Alternatives Analysis (Report), the cost estimates provided are pre-design cost estimates and, as such, include a range of -30 % to +50%. The primary purpose for inclusion of costs at this phase was to provide NDEP an order of magnitude basis to evaluate the recommended option presented in the Report. After approval of the Report by the NDEP, and as noted in NERT's 2022 Annual Budget, it is the intent of the Trust to develop a detailed cost estimate and basis for closure of the GW-11 Pond, which will represent the most cost-effective approach to successfully achieve the selected closure option with current unit and contractor pricing immediately before implementation. Acknowledging the above, a basis for the cost estimates presented in the Report has been included as Appendix H of the revised document. The January 2022 sampling was not designed to further the understanding of whether additional embankment materials might fail TCLP, rather it was designed to determine if additional embankment materials might be able to be managed on site as clean fill. Accordingly, and due to the fact that the purpose of the additional data was to reduce disposal volumes, the Trust opted to submit the Report ahead of	It does not appear that the volume reduction from dewatering is included in the cost estimates. Please explain the cost estimate of $1.6 million for disposal. The responses with respect to the estimates provided not accounting for the reduction in volume if they achieve the percent solids that are stated In Section 3.2. It states that there is approximate 50,075 to 52,975 cyds of solids. Assuming 53,000 cyds, and considering the other properties provided for this material (e.g., total solids of 2.78 % and specific gravity of 1.009) there is an estimated 1,250 tons (~800

(cumulatively or individually) on the overall cost. The assumptions tables can show either an estimated quantity or quantity range for each item. The assumptions table should also include references to the cost estimate basis (e.g., contractor knowledge, vendor quote, model, etc.).	receipt and analysis of the additional data. Acknowledging the above, the text in Section 3.3 of the revised Report has been updated to include the results of the January 2022 sampling. Tetra Tech acknowledges that additional soil testing will be required during project implementation to finalize soil management planning and associated costs. However, based upon current data, there is no current basis for assuming any of the embankment material is hazardous. See the response to Essential Correction 11 below regarding the additional investigation of the embankment materials.	cubic yards) of dry solids in the material. If the material is dewatered to 25% solids in the geotubes, it would result in about 5,400 cyds of sludge for disposal. For the centrifuge option, it is indicated that the solids content could be in the 41% to 48 % range, which would produce about 2,600 to 3,100 cyds of dewatered sludge, respectively. NDEP requires an explanation why the calculation appears to be disposing of the entire 53,000 cyds and not considering the reduction in volume due to dewatering.
Fatal Flaw 2: Section 4.0 Development and Screening of Alternatives Page 25. The United States Environmental Protection Agency (USEPA) recognizes remedy effectiveness can be evaluated in terms of protectiveness and ability to achieve removal objectives. The protectiveness of the alternatives can be assessed in terms of how well they protect public health and the community, protect workers during implementation, protect the environment	Worker safety is a primary concern for implementation of all work completed at the NERT site. A thorough health and safety review will be completed as part of the GW- 11 Pond closure detailed planning and design. Additionally, job hazard analyses will be prepared at the task level for all work associated with GW-11 Pond closure. The text has been modified to include an evaluation of worker safety for each alternative. Additionally, Section 4.4.2 of the revised Report has been modified to include worker safety.	No further response required

and comply with ARARs. The alternatives analysis exhibits little consideration for worker safety beyond H_2S exposure. Given the nature of the work required to close GW-11 Pond, including potentially hazardous materials, working around water, and high volume of construction traffic, worker safety should be a priority consideration outlined for each alternative. Worker safety should also be captured in Section 4.4.1 Effectiveness Page 36.		
Essential Correction 1: Section 3.2.2 Analytical Testing Results Page 8 Section 3.2.2 states that the sludge sample contains 2.78 percent total solids and 1.71 percent suspended solids. Please provide more clarity regarding how the volume of sludge is defined. Is the 1.71 percent suspended solids included in the total solids, or are they two distinct layers?	The 1.71% suspended solids is included in the 2.78% total solids. Additional text has been added to Section 3.2.2 of the revised Report for clarity.	No further response required
Essential Correction 2: Section 3.2.2 Analytical Testing Results Page 8 High sulfate concentrations are present in the Pond which is said to be under anaerobic conditions. The Pond is currently utilized to receive off-spec GWETS effluent and to receive and store extracted groundwater during GWETS maintenance events therefore it does not seem that there is a constant, ongoing source of sulfate. If the Pond is under anaerobic conditions, sulfate levels should be lower. Please clarify if the anaerobic conditions have been verified. If	Anaerobic conditions have not been verified. Therefore, Section 3.2.2 of the revised Report has been modified to reflect that anaerobic conditions are assumed to be present within the pond based on microbial species testing (presented in Appendix E) and elevated detections of hydrogen sulfide, which is usually a result of sulfate reduction under anaerobic conditions. It should be noted that the concentrations of sulfate in groundwater across the NERT Remedial Investigation Study Area generally averages 2,000 milligrams per liter, which is similar to sulfate concentrations detected in water samples periodically collected from the Pond.	No further response required

the anaerobic conditions have been verified then please explain the presence of high sulfate concentrations.		
Essential Correction 3: Section 3.2.3 Solids Settling Test Page 9 The report on the settling tests is not included in Appendix C. *Was this testing performed at a different time?* *Is this why the data from the settling tests were not used to determine the polymer/coagulant doses performed in the Geotube and Centrifuge tests?*	The settling test described in the Report is typical of tests performed during the Alternative Analysis/Feasibility Study phase of a project. The objective of this test was to provide a broad understanding of settling characteristics of the sediment/water mix and polymers that would enhance the settling rate. The 2020 solids settling tests were successful in: • Providing a general understanding of solid content and the time for solids to settle without any polymer addition. • The effect on the rate of solids settling after addition of a specific polymer. • The effect on the rate of solids settling after varying the concentrations of a specific polymer and varying the total solids concentration of the solid/water mixture. • Providing data that informed subsequent tests, including the additional Alternative Analysis/Feasibility Study phase testing conducted for the geotube effectiveness test (Geotube Dewatering Technology [GDT] Test) and the centrifuge effectiveness test as detailed in Section 3.2.4. • The effectiveness of sodium permanganate to oxidize volatile hydrogen sulfide. The solids settling test is straightforward and it is common for this test to be conducted in-house. The summary of the test procedure, observations, results, and recommendations are provided in Section 3.2.3. A separate report of the test was thus not included with the appendices. The solids settling tests were conducted in September 2020 by Tetra Tech, prior to the geotube and centrifuge testing detailed in Appendices C and D, respectively. The results and data from	Suggest including the report describing the September 2020 testing by Tetra Tech as an Appendix

	the solids settling tests were utilized in determining the reagent doses for all subsequent tests performed by Tetra Tech or its subcontractors during the alternatives analysis phase of the work. The solids settling tests will inform additional tests that are anticipated during the detailed design and planning phase of the work. The text in Section 3.2.3 has been updated to clarify the tests were used to determine subsequent reagent doses in the geotube and centrifuge tests, and that the tests were not intended to be exhaustive at this stage and additional testing will be performed as necessary during detailed planning and design.	
Essential Correction 4: Section 3.2.3 Solids Settling Test Page 9 Solids settling tests were not performed with coagulant alone option. It is standard practice in jar testing to test each reagent separately. Please explain the rationale for this choice.	As noted in response to Essential Correction #3, the intent of the solids settling test conducted in 2020 was to provide information to support the development of various alternatives for GW-11 Pond Closure. Tests typically conducted during the Alternative Analysis/Feasibility Study phase are not expected to be exhaustive. It is anticipated that additional tests will be conducted during the detailed planning and design phase to develop the optimum dosage and combination of various reagents, including evaluating the effectiveness of coagulant as a stand-alone settling agent.	No further response required
Essential Correction 5: Section 3.2.3 Solids Settling Test Page 9 Provide the rationale for not testing permanganate on undiluted samples. Permanganate should have been included in all tests as permanganate addition is planned and the production of manganese dioxide from the reaction of the permanganate will affect settling parameters and any unreacted permanganate will affect the quality of the supernatant.	As noted in response to Essential Correction #3, the intent of the solids settling test conducted in 2020 was to provide information to support the development and evaluation of various alternatives for GW-11 Pond Closure. This included alternatives to address hydrogen sulfide. The 2020 solids settling test included tests with permanganate to evaluate the oxidative effectiveness on the site-specific hydrogen sulfide in GW-11 Pond materials. Also, as noted in Sections 3.2.4.1, the geotube effectiveness tests included dosage of permanganate on undiluted samples prior to polymer addition. No impacts from production of manganese dioxide were noted in these tests. Furthermore, as noted in Section 3.2.5, additional	No further response required

	permanganate dosage tests were conducted on undiluted samples to study the oxidative effectiveness and collect additional parameters. Finally, as noted in the response to Essential Correction #6 below, testing was performed to evaluate dewatering filtrate compatibility with the Biological Treatment Plant (Section 3.2.7). These tests included addition of permanganate (100 ppm and 500 ppm) and polymer to undiluted Pond samples, processing of the material through a geotube pillow, and collecting filtrate samples for laboratory analysis of parameters specific to Biological Treatment Plant operation. No impacts to filtrate water quality were noted that would prevent treatment in the Biological Treatment Plant. While the above referenced testing did not show any adverse effects on settling parameters or quality of the filtrate, additional testing is anticipated to be conducted during the detailed planning and design phase to optimize the permanganate dosage volume and rate, and further evaluate the potential impact from unreacted permanganate on filtrate quality.	
Essential Correction 6: Section 3.2.3 Solids Settling Test Page 9 In addition to photographs showing the settled solids and the clarity of the supernatant, quantitative measurements of the turbidity or TSS of the supernatant and the percent solids content of the settled solids would be helpful to assess the efficacy of the polymer/coagulant doses. Please explain why this was not done.	As noted in response to Essential Correction #3, the intent of the solids settling test conducted in 2020 was to provide information to support the development and evaluation of various alternatives for GW-11 Pond Closure. Tetra Tech concurs that quantitative measurements of turbidity and/or TSS of supernatant/filtrate and the percent solids content of the settled solids is useful in assessing the efficacy of the polymer/coagulant doses. For this reason, additional testing was performed to evaluate dewatering filtrate compatibility with the Biological Treatment Plant (Section 3.2.7) since the filtrate from dewatered GW-11 Pond solids will ultimately be treated via the Biological Treatment Plant. These tests included addition of permanganate (100 ppm and 500 ppm) and	No further response required

	polymer to undiluted Pond samples, processing of the material through a geotube pillow, and collecting filtrate samples for laboratory analysis of parameters specific to Biological Treatment Plant operation. The resulting filtrate was analyzed for quantitative measurement of TSS and other parameters specific to Biological Treatment Plant operation. While the above referenced testing showed that the permanganate and polymer dosing was effective and the resulting filtrate was suitable for treatment through the Biological Treatment Plant, additional testing was not required to perform this analysis but will be conducted during detailed planning and design to optimize the polymer/coagulant doses.	
Essential Correction 7: Appendix D How do the doses of polymer used in the geotube tests relate to the doses of polymer used in the settling test? Was the settling test data used to inform the polymer/coagulant choice of the geotube tests?	As is standard practice, the geotube effectiveness tests included polymer doses informed by the results of the 2020 solids settling tests and guidance by TenCate Geosynthetics, the geotube vendor. TenCate is a leading global supplier of geosynthetics for sediment dewatering projects and has supported tests on similar Tetra Tech and industry-wide environmental sediment dewatering projects. The 2020 solids settling test, as summarized in Section 3.2.3, used a range of 1 to 2.5 ppm polymer concentration. As summarized in Section 3.2.4.1, polymer concentrations of up to 3 ppm in the geotube effectiveness tests showed some solids passing through the geotube fabric, while polymer concentrations of 4 to 5 ppm showed clear filtrate with no observable solids passing through the geotube fabric. The polymer type was consistent between the two tests. A statement was added to Section 3.2.4.1 to explain that the data gathered from the solids settling test provided preliminary guidance for polymer dosing during the geotube test. It is anticipated that additional tests will be conducted during the detailed planning and design phase to develop the optimum dosage and combination of the various reagents.	No further response required

Essential Correction 8: Section 3.2.4.2 Centrifuge Page 11 How do the doses of polymer used in the centrifuge tests relate to the doses of polymer used in the settling test? Was the settling test data used to inform the polymer/coagulant choice of the centrifuge tests?	A statement was added to Section 3.2.4.2 of the revised Report to explain that the data gathered from the solids settling test provided preliminary guidance for polymer dose volume during the centrifuge tests, although the laboratory also conducted its own independent polymer evaluation as well (see Andritz Separation Technologies, Inc. laboratory report included in Appendix C).	No further response required
Essential Correction 9: Section 3.2.4.3 Filter Press Page 12 Polymer and/or coagulant are often added to assist with dewatering using a filter press. Because it is likely this test would have yielded different results if the polymer and/or coagulant were used, please explain why this was not done.	Tetra Tech concurs that evaluation of dewatering by mechanical separation methods may include chemical condition of slurry using polymers to assess potential enhanced efficacy. Primarily for this reason, the centrifuge effectiveness test and filter press effectiveness test were initially planned to include GW-11 Pond slurry feeds that were (1) untreated, and (2) chemically conditioned with the addition of polymers. Laboratory testing was performed by Andritz Separation Technologies, a leader in material separation testing technology and products. As described in Appendix C, the centrifuge effectiveness test was conducted with both untreated and conditioned slurry feeds. As part of the filter press effectiveness test, Andritz Separation Technologies recommended not performing a R-Meter test with polymer flocculated sludge because it is easy for an overdose of polymer to foul the filter cloth. Tetra Tech concurred with this recommendation based on: • The results of the filter press effectiveness test on GW-11 Pond materials without chemical conditioning which yielded low effectiveness results. • Use of higher levels of polymer concentrations necessary to improve dewatering results would negate the use of a specialized process like filter press and make the other alternatives more favorable (i.e., use of geotubes). • Maintenance and frequent shut-downs are one of the	NDEP recommends that any future testing involving a filter press also include polymer/ coagulant testing.

	primary disadvantages of the filter press technology when chemical conditioning is required to achieve optimal performance. It is common for polymers or materials escaping the pre-screening to foul the filter cloth. This would have further decreased the full-scale production rate and/or resulted in the need for multiple parallel units as back-up to allow for periods of maintenance.	
Essential Correction 10: Section 3.2.5 Hydrogen Sulfide Mitigation Page 13 A dose of 800 parts per million (ppm) permanganate is indicated as being effective to reducing H_2S concentrations below 10 ppm for the Pond. Adjusting to add in the molecular weight of sodium, this permanganate dose translates to a dose of 952 ppm sodium permanganate. Sodium permanganate is shipped as a 40 percent liquid so 2.4 g of the 40 percent solution would be added per liter of Pond material. The average volume of water in the GW-11 Pond in 2021 was approximately 35.1 million gallons. This would require a dose of 184,000 pounds of 40 percent sodium permanganate. Sodium permanganate is a strong oxidant capable of igniting if spilled on something flammable such a paper or wood. Using this amount of sodium permanganate would have a large cost and be risky to handle. The cost and risk should be addressed in the analysis.	Tests conducted as part of initial pre-closure activities were intended to evaluate the feasibility of different closure alternatives. Tetra Tech is aware of the considerations of using permanganate and acknowledges the importance of evaluating all aspects of full-scale implementation. Due to these risks, Tetra Tech has, and will continue to, work with the permanganate supplier, Carus, to identify safe and effective options for permanganate delivery, storage, and handling. Section 3.2.5 of the revised Report includes language stating that procedures will be developed in detail and reviewed by safety professionals as part of detailed planning and design.	No further response required
Essential Correction 11: Section 3.3.3 Semi-volatile Organic Compounds (SVOCs) page 19	With respect to the January 2022 data, please see our response to Fatal Flaw #1. The text in Section 3.3 and	The concern with the HCB is the high total concentrations

The HCB concentrations are relatively high in multiple borings. This could have significant project implications if material fails TCLP during implementation. Per Section 3.3.10 additional investigation was to be completed in January 2022 with laboratory results expected in February 2022. These results should be included in the closure analysis.	Appendices E and F have been updated to include the results of the January 2022 sampling. The embankment sampling data indicate that embankment materials are unlikely to be characteristically hazardous. Tetra Tech acknowledges that additional soil testing will be required during project implementation for waste profiling, but there is no current basis for assuming any of the embankment material is hazardous. As indicated in the table documenting the alternative cost assumptions presented in Appendix H of the revised alternatives analysis, the basis for the embankment material disposal costs included an assumption that 15% of the estimated embankment volume could be repurposed for use on site based on the preliminary sampling. The results of the January 2022 investigation indicate that the volume of soil with constituent concentrations less than the SMP soil screening levels may be limited to a smaller area in the vicinity of GW-11-10 than originally assumed. Based on the January 2022 sampling results, the basis for the embankment material disposal costs was updated using a revised assumption that 5% of the estimated embankment volume could be repurposed for use on site. The volumes and costs in Section 4.1.2, Section 5.0, and Appendix H have been updated accordingly.	in some of the samples and the limited amount of TCLP data. NDEP recommends that during subsequent phases of the project, additional sampling be conducted for TCLP HCB analysis to confirm the embankment material is nonhazardous throughout prior to disposing of the material offsite.
Essential Correction 12: Section 3.4.3.1 Embankment Fill page 22 1st paragraph stated that "Standard penetration resistance values in the fill ranged from 22 to greater than 50 blows per foot". A review of the boring log does not appear to have any SPT values greater than 50 blows. Please correct or update as necessary. 4th paragraph stated "cohesion values of 430 and 180 pounds per square foot. Please discuss how these two	Boring logs for GW-11-1 and GW-11-2 each present SPT values greater than 50 blows per foot (e.g., "50/0.4ft" indicating 50 blows to drive 0.4 ft, which is considered refusal and is indicative that more than 50 blows would have been required to drive the standard sample distance of 0.5 ft). Therefore, no corrections to the text are believed to be required. Historical information indicates that the GW-11 Pond embankments were constructed of borrow material placed from the Pond excavation in a cut and fill operation. This is consistent with field observations and laboratory results that classified both the materials identified with the names	No further response required

numbers are used to produce the value in Table 7.	"embankment fill" and "native sand" as silty sand and silty sand with gravel. Cohesion values presented in Table 7 of the Report were derived by averaging the cohesion values for the four samples from the same soil type (338 psf), then applying a conservative reduction given the driven, or disturbed, sampling method (modified California sampler). A footnote has been added to Table 7 of the revised Report to clarify how the values were derived.	
Essential Correction 13: Section 3.4.3.2 Natural Sand page 22 2nd paragraph stated "cohesion values of 350 and 390 psf. Please discuss how these 2 numbers are used to produce the value in Table 7.	Historical information indicates that the GW-11 Pond embankments were constructed of borrow material placed from the Pond excavation in a cut and fill operation. This is consistent with field observations and laboratory results that classified both the materials identified with the names "embankment fill" and "native sand" as silty sand and silty sand with gravel. Cohesion values presented in Table 7 of the Report were derived by averaging the cohesion values for the four samples from the same soil type (338 psf), then applying a conservative reduction given the driven, or disturbed, sampling method (modified California sampler). A footnote has been added to Table 7 of the revised Report to clarify how the values were derived.	No further response required
Essential Correction 14: Section 3.4.4 Slope Stability Analysis page 23 2nd paragraph, item 6 stated that "the WC-West Pond remains fully lined, nearly empty. The evaluation presented is a long-term stability scenario based on the WC-West Pond filled to the maximum height. Recommend adding the factor of safety for short-term stability scenario where the WC-West Pond is nearly empty, which is stated to be the normal condition, and the water in the GW- 11 Pond is rapidly drawn down.	The most conservative model is that in which the GW-11 Pond is empty and the WC- West Pond is filled to the maximum height due to the lateral loading from the weight of the water, which is the scenario presented in the Report. A model was also run with the WC-West Pond empty and resulted in the same minimum factors of safety as the scenario that was presented in the Report. Table 8 was updated to include an additional row presenting the minimum factors of safety in a scenario where the WC- West Pond is empty. Additionally, results from the SLIDE analyses of this scenario have been added to Appendix G. Rapid drawdown of water levels can affect the stability of unlined earthen dams. Because both the GW-11 Pond and the	No further response required

	WC-West Pond are lined, there is not expected to be an effect on the amount of water within the shared embankment during a rapid drawdown scenario that would affect stability, which is represented by the model results.	
Essential Correction 15: Table 7 page 24 Unit Weight Values: Please provide a statement indicating whether these values are average values from the 4 test samples or from one specific sample.	The unit weight values are average values from the four test samples. A clarification statement has been included as a footnote to Table 7.	No further response required
Essential Correction 16: Section 3.4.4 Slope Stability Analysis Last paragraph, item 4 page 24 "If necessary, new fill …" Would the requirement for new fill be determined in the design phase considering that the type of material specified as "new fill" may impact the requirement for erosion protection?	Correct. The requirement for new fill will be determined in the design phase.	No further response required
Essential Correction 17: Section 3.4.4 Slope Stability Analysis Last paragraph, item 5 page 24. "If necessary, provide rip rap …" Would erosion protection be determined in the design phase considering that when the liner is removed from the GW-11 Pond as part of the closure requirement, the slope will be exposed and susceptible to erosion.	Correct. Erosion protection will be determined in the design phase.	No further response required
Essential Correction 18: Section 4.2 GW-11 Pond Contents Removal and Treatment/Disposal Alternatives page 27 Alternative A is the only alternative where water is pumped off prior to solids removal. Please explain whether water is being retained in the other two options to create a	The other two options (Alternatives B and C) involve pumping a slurry to a dewatering area and returning filtrate to the GW-11 Pond prior to treatment of the water through the Biological Treatment Plant. This process (Alternatives B and C) results in water being retained in the pond prior to treatment through the Biological Treatment Plant. Hydrogen sulfide mitigation will be performed prior to removal of pond solids; therefore, it is	With alternatives B and C, consider removing as much water as practical prior to starting the remediation project so that this water does not have to be managed.

water blanket to prevent the emission of H_2S?	not the intent of the other two options to create a water blanket to prevent the emission of hydrogen sulfide.	
Essential Correction 19: Section 4.2 GW-11 Pond Contents Removal and Treatment/Disposal Alternatives (various subsection bullets) page 27 *Bullet 3a. The NDEP recommends considering constructing the geotube containment area within the GW-11 Pond footprint. After pumping water down within the Pond area to the extent practicable, an area for the geotubes could be partitioned off with a temporary dam. The sludge within the containment area could be pumped and consolidated within the remaining Pond area.* *Bullet 4a. At this point. consider not eliminating plate and frame press and provide it as an option with centrifuge, referring to them both as mechanical dewatering.*	Bullet 3a: Tetra Tech previously evaluated partitioning of the pond as part of a pond replacement planning evaluation, which was presented to the NDEP during a November 30, 2017 status meeting. Based on that evaluation, partitioning of the GW-11 Pond for closure was not deemed cost effective given that the Pond construction and its configuration created logistical challenges that would not be encountered during construction of a separate geotube containment area. In addition, construction of a separate geotube area will facilitate removal of all sludge from within the basin footprint, allowing a more streamlined and cost-effective process for liner removal and additional pond closure activities to proceed while material in the geotubes dewater. Accordingly, we do not believe the Report should be revised to consider this option. Bullet 4a: Although results of the plate and frame press testing were unfavorable as described in Section 3.2.4.3, Section 4.2 has been updated to retain both plate and frame press as mechanical options while indicating that only centrifuge was evaluated and screened in detail based on better performance in the laboratory testing.	No further response required
Essential Correction 20: Section 4.3.2 Alternative A Removal of GW-11 Pond Liquids in Advance of Solids (various subsection bullets) page 29 *Bullet 2a. Is there an option to add more solids removal equipment ahead of the GWETS to allow more processing of the water with the system?* *Bullet 3a. It is stated that mechanical removal would be the most effective means to remove the solids. Before*	Bullet 2a: There is not sufficient space within the existing GWETS treatment plant footprint to add additional solids removal equipment. A separate containment area with filtration equipment would need to be constructed. The same volume of solids from the GW-11 Pond would need to be removed whether by additional filtration equipment added to the GWETS or the other methods discussed and evaluated. As noted in Section 3.2.7, the influent flow rate to the Biological Treatment Plant for dewatering of the GW-11 Pond solids will be dependent on Trust treatment priorities and the resulting hydraulic capacity of the Biological Treatment Plant.	No further response required

discounting it due to potential damage to the liner, the NDEP recommends further evaluation of methods to protect the liner such as using small rubber tire equipment with specialty buckets and extensive monitoring and contingency plans during removal. A protective layer could also be used for an isolated area in the Pond to perform any aggressive mixing and/or loading. Consider as part of this step to allow the material to dry out to the extent practicable and mix with the embankment soil to meet the paint filter test. *Bullet 3b. The NDEP recommends further discussion of the disposition of the material in the vacuum trucks. How many trucks would have to be removed accounting for the excess water that would be generated using this approach? What would be the cost implications for subsequent solidification prior to disposal?*	Additionally, Section 4.3.2.2 explains that the feed rate of filtrate to the Biological Treatment Plant is expected to be small relative to influent flow from the well fields given current operating conditions (e.g., 100 gpm dewatering filtrate combined with 1,000 gpm well field flow). Assuming a 100 gpm feed rate and an approximate total volume of 35 million gallons in the GW-11 Pond, the filtration would require an estimated 243 days of operation and result in an average solids removal rate of 218 cubic yards per day. Accordingly, and while acknowledging the estimated 243 days of operation, we do not believe additional solids equipment ahead of the GWETS to allow additional processing would be a cost-effective option. Bullet 3a: As a point of clarification, Section 4.3.2 states that mechanical removal with heavy equipment would be the most effective removal method if the solids were sufficiently dry. Section 4.3.2.1 further discusses the likeliness of heavy equipment damaging the liner and creating a conduit for release to the subsurface of residual water in the GW-11 Pond. Methods to protect the liner were considered when evaluating this option. Section 4.3.2.2 states that additional measures required to minimize damaging the liner and creating a potential pathway for a release are technically feasible, but will add to the complexity and time required to complete the solids removal. However, the risk of damaging the liner could not sufficiently be reduced or eliminated with these methods. Bullet 3b: Based on an estimated 52,975 cubic yards of solids in the GW-11 Pond and an average vacuum truck size of 2,500 gallons, a minimum of 4,280 vacuum truck loads would need to be removed. This does not account for inefficiencies with water intake or as overall pond levels decrease. These inefficiencies may add 25% or more to the	

	number of vacuum trucks loads required. Assuming 10 vacuum truck round trips per day operating six days per week, it would take more than 20 months to complete solids removal with this option. Subsequent solidification or stabilization at the landfill would be required for low solids concentration slurry and result in additional costs when compared to other mechanical removal methods and other alternatives. Accordingly, we do not believe additional discussion involving disposition of material by vacuum trucks is necessary to include in the revised Report.	
Essential Correction 21: Section 4.3.2.2 Implementability page 30 *The term "technically feasible" is used to describe additional measures that could minimize damage to the liner. Given the significance damaging the liner presents, and the apparent influence this concern has to the rating of Alternative A, the NDEP recommends expanding this section to include some examples of methods and equipment that would make removal of solids using heavy equipment technically feasible. The addition of a figure(s) showing tools, equipment and techniques would be helpful.*	Heavy equipment could technically be used to remove solids on top of the liner. The use of equipment on top of geosynthetic membranes requires restrictions on the ground pressure of the equipment (typically less than 6 psi), limitations on the type of movement (e.g., limited turning, no sudden starts/stops, etc.), and barriers over liner subjected to repeated vehicle traffic. Therefore, while technically feasible, the use of heavy equipment would add to the complexity and time required to remove the solids as noted in Section 4.3.2.2. Given the potential for liner damage and potential releases to the subsurface from this option, this option was not recommended. Section 4.3.2.2 has been updated to include additional discussion regarding the removal of solids using heavy equipment.	No further response required
Essential Correction 22: Section 4.3.3 Alternative B – Solids Dewatering Utilizing Geotubes page 31 *If H_2S mitigation is being done prior to solids or water removal, why wouldn't the water be removed before removing and dewatering the solids? The solids would be easier to manage if the water was pumped*	In Alternative B, the water in the GW-11 Pond is necessary to slurry and transport the pond solids to the geotube dewatering area. All of the water in the pond will ultimately be treated via the Biological Treatment Plant. Treating a portion of the water before removing and dewatering the solids will not improve efficiency. A water blanket is not necessary to manage the H_2S after permanganate treatment.	With 2.8% solids, additional water should not be necessary to pump the material. Refer to NDEP response to response to Essential Correction 18

off and it would be more efficient to empty the Pond during the dewatering step without additional water removal and treatment. Is there a concern that a water blanket is necessary to manage the H_2S even after the permanganate treatment?		
Essential Correction 23: Section 4.3.3 Alternative B – Solids Dewatering Utilizing Geotubes page 31 *3b notes "hydraulic methods" while cost table 11 states "Hydraulic Dredging". If hydraulic dredging is the only hydraulic method being employed then recommend changing 3b and entirety of Section 4.3.3 to "hydraulic dredging" as it is more succinct.*	We concur. "Hydraulic methods" has been changed to "hydraulic dredging" throughout the GW-11 Pond Closure, Pre-Closure Summary and Alternatives Analysis.	No further response required
Essential Correction 24: Section 4.3.3.2, 3e, Page 31 *Sending the water from the geotube dewatering to the GWETS and not back to the Pond would minimize managing the water multiple times. Please consider making this change or provide an explanation of why this is not possible/advisable.*	As noted in Section 3.2.7, the influent flow rate to the Biological Treatment Plant for dewatering of the GW-11 Pond solids will be dependent on Trust treatment priorities and the resulting hydraulic capacity of the Biological Treatment Plant. Section 4.3.2.2 explains that the feed rate of filtrate to the Biological Treatment Plant is expected to be small relative to influent flow from the well fields given current operating conditions (e.g., 100 gpm dewatering filtrate combined with 1,000 gpm well field flow). The dewatering rate of the geotubes is initially expected to be much higher than the allowable influent flow rate to the Biological Treatment Plant, and the dewatering rate cannot be scaled back to match a lower Biological Treatment Plant feed rate. Filtrate from the geotube dewatering can be pumped or gravity drained to the GW-11 Pond at rates that match the dewatering rate of the geotubes, while water can be pumped from the pond to the Biological Treatment Plant at a rate that matches the hydraulic capacity of the Biological Treatment Plant, thus affording the Trust maximum flexibility while implementing pond closure.	Please refer to NDEP response to response to Essential Correction 18

Essential Correction 25: Section 4.3.3.2 Implementability page 32 *The document would benefit from additional discussion of the challenges of dewatering this material with the geotubes. It may be difficult because the material has 90 percent fines that will pass though the geotube without the appropriate chemical addition and a dredge will produce a very inconsistent dredge stream requiring continuous adjustment of the chemical additives.*	Dewatering of the GW-11 Pond solids using geotube technology was tested in the field and confirmed to be effective when the appropriate dosage of polymer is added to GW-11 Pond media prior to dewatering. TenCate, a leading global supplier of geosynthetics for environmental sediment dewatering applications, was consulted regarding the geotube specifications for use in the geotube dewatering test given the GW-11 Pond material properties, including percent fines. A TenCate representative was also present during geotube dewatering tests to evaluate the results of the field tests and confirmed the success of the field test and GW-11 Pond material suitability for geotube dewatering. Dredge operations typically include real-time flow rate and density monitoring of the slurry to allow adjustment of polymer dosing. Additional discussion has been added to the revised Report to present the abovementioned detail.	No further response required
Essential Correction 26: Section 4.3.3.2 Implementability page 33 *Section notes: "Hydraulic removal and geotube dewatering are commonly used in the environmental industry for removal of sediments from impoundments and waterways." This section would benefit from the addition of a figure(s) that shows examples of the tools, equipment and methods used to accomplish this.*	A design of the geotube dewatering system will be prepared during detailed planning and design. In addition to the geotube dewatering system, details regarding the hydraulic removal method and tools to be used during solids removal will be prepared at that time. For purposes of this Report, Figures 9 through 12 have been added to show typical dredging components and geotube dewatering operations.	No further response required
Essential Correction 27: Section 4.3.4 Alternative C – Solids Dewatering Utilizing Centrifuge page 33 *3b notes "hydraulic methods" while cost table 12 states "Hydraulic Dredging". If hydraulic dredging is the only hydraulic method being employed then recommend*	Please see our response to Essential Correction 23.	No further response required

changing 3b and entirety of Section 4.3.4 to "hydraulic dredging" as it is more succinct.		
Essential Correction 28: Section 5.0 Recommendations page 39 State clearly that NERT is recommending Alternative B. Please also provide a textual explanation for the range of costs presented in Table 14. It appears that the range of estimated costs is between $14.8 M and $31.7 M, with the most probable cost being $21.1 M. Clearly state that these estimates together represent the range of probable costs and explain.	The text in Section 5 of the revised Report has been modified to more clearly state that NERT is recommending Alternative B and to explain the range of probable costs.	No further response required
Minor Correction 1: Appendix E Boring Log, please provide legends for the symbols and abbreviations used in the log.	A legend has been provided in Appendix E of the revised Report for the symbols and abbreviations used in the boring logs.	No further response required
Minor Correction 2: Section 3.2.6 Pond Solids Removal page 14 The text should clarify the discussion of the dredge type. The term hydraulic dredge typically includes any dredge that moves the material hydraulically (including a typical cutter-head dredge).	Specific types of equipment for solids removal, including hydraulic dredge type, will be specified as part of detailed planning and design.	No further response required
Minor Correction 3: Section 3.4.3.1 Embankment Fill page 22 4th paragraph stated "Direct shear testing was performed". It should be noted that the mode of failure in a direct shear test sample may overestimate shear strength values and result in a less conservative FOS.	Direct shear testing is a standardized test method for evaluating shear strength of soil. The results of the direct shear testing conducted for this Report fall within the published range of shear values for similar soil types and based on Tetra Tech's experience, other shear test methods would likely result in values within the same range. Therefore, it is not believed that other shear test methods would result in significantly different values than the static and seismic factors of safety modeled and reported in the Report.	No further response required