Performance Measures

List and describe the performance measures for each environmental medium containing a PCLE zone that will be used to determine if reasonable progress is being made by the response action in a timely manner. Use these measures to document effectiveness of the response action in the RAER.

The soil response action is based on removal of Category I materials and select Category II materials with COCs above select PCLs, covering of residual Category II materials, and construction of WCUs. The groundwater response action includes treatment of groundwater by PRBs, control of the on-site groundwater hydraulic gradient, and long-term reduction of COCs in groundwater by MNA. The response action also includes control of COC migration in stormwater runoff. The performance measurements for each of these components are discussed below. Details of groundwater monitoring and stormwater monitoring programs are provided in Worksheet 3.1.

Soil Removal Performance

The performance measure for soil removals will be grid-based confirmation sampling with sample results being compared to the residential $^{Tot}Soil_{Comb}$ PCLs in the East Property AA; the C/I $^{Tot}Soil_{Comb}$ PCLs in the Plant Entrance Arroyo AA, Area 12 of the PBA, the TCT's portion of Pile 1, the LC AA, the Floodplain AA and the East Sliver, Paisano parcel; and the $^{SW\text{-}GW}$Soil PCLs at the Former Antimony Building/storage yard on the plant site.

Cover Performance

The covers will prevent direct exposure to COCs with concentrations greater than the $^{Tot}Soil_{Comb}$ PCLs and will also minimize infiltration of water through soils with concentrations greater than the ^{GW}Soil PCLs, thereby controlling the soil to groundwater pathway. O&M activities will be performed to assure the integrity of the covers remain intact. Cover performance will be based on evaluation of groundwater data including both groundwater quality data and groundwater elevation data. Monitoring wells have been selected in up-gradient and down-gradient locations to demonstrate changes to groundwater quality in response to placement of the cover system. An additional groundwater monitoring well will be installed within each AA containing the plant site composite cover and in the individual covered areas (Boneyard, Fines Pile, and Category II Material Storage Area). The purpose of the new wells within the areas containing covers is to demonstrate that concentrations of COCs in groundwater do not increase following completion of the covers. Additionally, the groundwater elevation will be monitored in select well pairs to evaluate the control of the groundwater gradient in each of the plant site AAs (PBA, Acid Plant Arroyo AA, Pond 5/6 Arroyo AA, Pond 1 Arroyo AA, and South Terrace Arroyo AA).

WCU Performance

The WCUs will prevent direct exposure to COCs with concentrations greater than the $^{Tot}Soil_{Comb}$ PCLs and O&M activities will be performed to assure the integrity of the covers remain intact. Each WCU also has a liner to prevent releases of COCs to underlying soil and groundwater. However, because the WCUs at the Site lay over existing groundwater PCLE zones, the portion of the groundwater PCLE zone beneath the WCUs will be excluded from the requirement to meet the general groundwater response objectives. Beyond the perimeter of the WCUs, the groundwater response objectives will be addressed. WCU performance will be based on evaluation of groundwater quality data. Monitoring wells have been selected at locations up-gradient and down-gradient from the WCUs to demonstrate changes to groundwater quality in response to placement of the cover system. Groundwater quality data will be used to determine whether a potential release of COCs to groundwater has occurred from the WCU.

PRB Performance

The PRB performance will be evaluated using groundwater data for samples collected from monitoring wells located up-gradient, down-gradient and within both PRB-1 and PRB-2. Groundwater samples collected from wells within the PRBs will be analyzed for metals and general water quality parameters to determine the treatment performance within the PRBs. The groundwater quality data from up-gradient and down-gradient monitoring wells will be used to evaluate the overall effectiveness of the PRB treatment and response action activities designed to support the PRB treatment (source removals, soil covers, GHB system, and channel lining) in meeting the overall groundwater PCLs. Future permeable reactive cell(s) (PRCs) may be introduced into the groundwater response action at the PBA, if performance of the existing PRBs will not achieve critical ^{SW}GW PCLs at the Property boundary along the BNSF and Paisano Drive rights-of-way. A PRC includes an extraction well, a PRC treatment chamber containing ZVI, and re-injection well. The PRC is discussed as a contingency planning for the PRBs below under the section titled “Potential Problems”.

GHB Performance

The performance of the GHB groundwater extraction well in controlling the groundwater hydraulic gradient will be monitored using groundwater elevation data from monitoring wells within the Upper and Lower PBA. The purpose of the GHB is to control groundwater hydraulic gradient in the PBA to achieve the groundwater flux reductions from the PBA to the Rio Grande and to reduce groundwater velocities through the PRBs, increasing the level of treatment. Groundwater elevation data will be used to calculate gradients and velocities.

SWCRS Performance

The SWCRS includes three lined stormwater retention ponds located on the plant site that control the discharge of stormwater run-off from the composite cover system. Shortly after completion of the plant site response action activities, TCT will conduct a one-time cleanout of the plant site retention ponds to remove sediments potentially containing COCs. Collected sediments will be disposed in Cell 4. After completion of the response action activities, stormwater run-off from the plant site will no longer be in contact with soils having concentrations of COCs above critical PCLs ($^{SW-GW}$Soil PCL). Stormwater discharges released from the ponds, therefore, are unlikely to have elevated concentrations of COCs. Subsequent discharges of stormwater will not be tested unless impacts are suspected from system operations.

Gabion and Rip-rap Check Dam Performance

Historical observations and stormwater sample collection efforts at the Site demonstrate that the four existing outfalls and the four gabions in the East Mountain AA require at least 0.5 inches of precipitation before stormwater discharge occurs. The qualifying precipitation event for this RAP, therefore, is considered 0.5 inches. Gabion structures are used to control discharge of sediment with elevated levels of metals in the East Mountain AA where steep topography makes access difficult. Discharge from individual drainages within the SW-1 drainage basin is monitored at the downstream gabion location as illustrated on **Figure 11**. Four locations, SW-1a, SW-1b, SW-1c, and SW-1d, are monitored to evaluate impacts to the discharge at Outfall SW-1. The stormwater monitoring points will be inspected quarterly, and inspections will be documented. During qualifying precipitation events, if an appropriate sampling volume of stormwater is captured in the automatic sampler(s), samples will be collected. The rainy season typically spans from June through September. Samples are

collected from automatic samplers secured in down-stream locations from the gabion structures. When a stormwater event of sufficient duration and intensity occurs, collected samples will be analyzed for constituents noted in the monitoring parameter table in Worksheet 3.1. If no rain event occurs during a given quarter, an inspection will be documented but no sample collection will occur.

Surface water drainage flow patterns associated with the Floodplain are portrayed on **Figure 11**. Rip-rap check dams were selected as the BMP for control of sediment discharge from the Floodplain AA. Three new stormwater outfalls, SW-6, SW-7, and SW-8, are being established at each of the check dam discharge locations as illustrated on **Figure 11**. The check dam at Outfall SW-6 is located in the southern portion of the Floodplain AA along the western boundary at a culvert through the berm of the American Canal. The check dams for outfalls SW-7 and SW-8 are located adjacent to the concrete-lined channel of the PBA between Paisano Drive and the Rio Grande. Stormwater monitoring samples will be collected prior to discharge from the check dams and analyzed for constituents noted in the monitoring parameter table in Worksheet 3.1.

Performance and maintenance of gabion structures and lined rip-rap check dams will be evaluated by comparing analytical results to the Daily Maximum Effluent Limitations and Stormwater Benchmark Concentrations presented in the Multi-sector General Permit (TXR050000). The Maximum Effluent Limitations will be used to document requirements of the stormwater discharge permit are being met, and benchmark concentrations will be used to evaluate the performance of the BMPs (gabions and rip-rap check dams). If Maximum Effluent Limitations are exceeded, BMPs will be accessed for correction of current performance. If Benchmark Concentrations are exceeded, BMP improvements will be evaluated to enhance performance.

Additional BMPs

Additional BMPs at the site include one rip-rap check dam and a gabion located in the Upper PBA on the South Arroyo between I-10 and the UPRR and two additional gabions (if determined to be needed after analysis of future sampling data) located adjacent to the South Arroyo on the East Property as illustrated on **Figure 11**. These four additional BMPs will be inspected quarterly during a qualifying precipitation event, and if appropriate sample volume can be captured, stormwater samples will be collected to monitor their performance. These data will not be used to determine compliance with remedial goals.

Potential Problems

Complete the table for the response action. When the response action consists of several components or multiple actions, complete one table for each major component or action.

Response Action Name/Designation: Groundwater Gradient Control

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Gradient control - ponding	Infiltration of standing water through covers and around edges affects gradient control	X		Identify ponding improve drainage/grading
PBA groundwater gradient	Pumping rate of GHB extraction well does not achieve gradient control.	X		Evaluate potential increase of pumping rate at GHB well and/or install second extraction well to increase capacity.
Drainage and stormwater BMP at offsite toe of West Plant Slope	Ponding stormwater runoff leads to infiltration which affects gradient control	X		Requirement of offsite property owner to fix drainage and prevent infiltration
Leaking lining of stormwater retention ponds	Infiltration of stored stormwater	X		Inspect and repair liner as necessary.
Leaking water utility infrastructure	Infiltration of water from leaking utility lines affects gradient control	X		Identify leak from monitoring water elevation levels, audit water system to detect water loss. Confirm location of water loss, use leak detection to determine appropriate repairs.

Response Action Name/Designation: Asphalt Pavement Covers

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Asphalt wear and cracking	Infiltration around edges of asphalt cover affects gradient control. A complete breach in the cover could lead to direct contact exposure to COCs.	X		Inspect asphalt roadways and parking lots. Initiate repairs and sealing of asphalt surfaces when cracking and pot holes have compromised up to 15 percent of local asphalt surface.
Settling and compromised surface	Infiltration of water through asphalt pavement affects gradient control.	X		Remove sufficient asphalt to repair subgrade as well as asphalt surface. Use health and safety plan to mitigate potential exposure to impacted soil beneath asphalt pavement.

Response Action Name/Designation: Category II Asphalt Covers

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Asphalt wear and cracking	Infiltration around edges of asphalt cover affects gradient control.	X		Inspect asphalt roadways and parking lots. Initiate repairs and sealing of asphalt surfaces when cracking and pot holes have compromised up to 15 percent of local asphalt surface.
Settling and compromised surface	Infiltration of water through asphalt pavement.	X		Remove sufficient asphalt to repair subgrade as well as asphalt surface. Use health and safety plan to mitigate potential exposure to impacted soil beneath asphalt pavement.

Response Action Name/Designation: Low Permeability Covers

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Gradient control - ponding	Infiltration around edges of caps affects gradient control	X		Identify ponding and improve drainage/grading
Cap integrity compromised by erosion, plant growth, or construction damage	Increased infiltration affect gradient control	X		Inspect caps for erosion, and vegetation growth or damage from construction. Repair as needed.

Response Action Name/Designation: Soil ET Covers

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Gradient control - ponding	Infiltration around edges of caps affects gradient control	X		Identify ponding and improve drainage/grading
Cap integrity compromised by erosion, plant growth, or construction damage	Increased infiltration affects gradient control	X		Inspect caps for erosion, and vegetation growth or damage from construction. Repair as needed.

Response Action Name/Designation: Slope Stabilization

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Stabilization layer compromised by exposure to sunlight and precipitation	Increased erosion	X		Inspect slopes for erosion. Repair and re-apply sealant as needed.

Response Action Name/Designation: Waste Control Units

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Erosion	Infiltration affects gradient control. A complete breach in the cover could lead to direct contact exposure to COCs.	X		Inspect caps for erosion, and vegetation growth or damage from construction. Repair as needed.
Ponding	Infiltration through covers affects gradient control	X		Identify ponding and improve drainage/grading.
Identification of leachate in detection system	Leaking through underliner leads to additional impacts to groundwater quality.	X		Monitor leachate generation rate in sump system, increase leachate pumping to prevent head build-up on liner.
Leachate pump failure	Build-up of pressure from leachate on leak detection system liner could result in breach in leak detection system, affecting gradient control and potentially resulting in additional impacts to groundwater	X		Replace leachate pump as soon as practicable.

Response Action Name/Designation: Permeable Reactive Barriers

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
PRB performance	Break through	X		PRC installation near the outlet of PBA.
PBA groundwater gradient control not effective	Pumping rate of GHB extraction well does not achieve gradient control.	X		Evaluate potential increase of pumping rate at GHB extraction well and/or install second extraction well to increase capacity.
Loading of arsenic and other metals onto surface reducing life of PRBs	Shortened operating life of PRBs.		X	PRC installation in South Arroyo on East Property to reduce mass of metals in groundwater and subsequent loading onto surface of ZVI media in PRBs extending life of beds.
Upper/Lower PBA Channel liner integrity compromised	Increase flow rate through PRBs; less treatment/greater loading	X		Inspect liner for erosion, burrowing animal, vegetation, and settling damage, conduct repairs

Response Action Name/Designation: Groundwater Hydraulic Barrier Extraction Well

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
COCs in extracted groundwater	Permit requirement		X	Apply for TPDES Permit, provide treatment of extracted groundwater prior to discharge, if necessary to meet TPDES Permit requirements
PBA groundwater gradient	Pumping rate of GHB extraction well does not achieve gradient control.	X		Evaluate potential increase of pumping rate at GHB well and/or install second extraction well to increase capacity.
Power failure	Temporary loss of gradient control		X	Emergency generator or other secondary power source brought on-site.

Response Action Name/Designation: Stormwater Retention and Detention Ponds

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Pond liner integrity compromised from erosion, plants, construction damage	Increased infiltration affects gradient control	X		Inspect liners for damage, erosion, and vegetation. Repair as needed.
Failure of stormwater pumping system	Overfill of retention ponds		X	Follow manufacturer's recommended maintenance schedule on pumps.
COCs in retained/detained water above discharge standards	Water cannot be released from ponds until discharge standards are met		X	Treat water as necessary to meet discharge standards

Response Action Name/Designation: Stormwater BMPs (Gabions and Check Dams)

List the potential problems that might be reasonably anticipated for the response action, describe the impact of each problem, and the response to the problem.

Description of the Potential Problem	Impact	Will this cause a response action failure?		Corrective Response
		Yes	No	
Stormwater Gabions and Check Dams	Dissolved COCs	X		Install filter fabric, increase maintenance cleanouts
Sediment discharge from high-flow precipitation events.	Stormwater discharge with total COC concentrations above benchmarks		X	Monitor and maintain filter fabric, removing accumulated sediment with elevated COCs.

List the monitoring and sampling of COC concentrations or other parameters that will be conducted during the response action. Illustrate the monitoring or sampling locations in Attachment 3A. If statistics or geostatistics will be used, provide details in Appendix 7. If monitoring or observation wells will be constructed for the response action, provide well construction details in Attachment 2B if not previously provided.

Monitored Media	COC[1]	Other parameter (specify)	Sampling Method[2]	Sampling points or locations[3]	Depth/Height[4] (ft.)	Analytical or Field Screening Method	Sampling or Monitoring Frequency[5]
Groundwater	Antimony, Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Thallium, Zinc, Chloride, Fluoride, Nitrate, and Sulfate	Alkalinity, Arsenic species, Barium, Calcium, Iron, Magnesium, and Silica	Grab	See **Figures 1 and 2** and **Table 3-1** in **Attachment 3A**	Screened Interval	EPA 6020B (Total Metals, Inorganic Analytes) EPA E300 (Anions) EPA SW7470A (Mercury)	Semi-annually
Surface water	Arsenic, , Lead, Selenium, Chloride, and Sulfate		Grab	*Rio Grande* SEP-1 SEP-2 SEP-4 SEP-9 SEP-10 SEP-11 SEP-12 SEP-13	NA	EPA 6020B EPA E300	Semi-annually

[1] Specify the COCs to be monitored in this media. List either type of COC (such as VOCs, metals) if all the COCs of that type will be monitored the same way.
[2] Describe the sampling or monitoring methods and QC procedures in Appendix 1 unless the proposed sampling or monitoring procedure is the same as the sampling or monitoring procedure described in the APAR.
[3] Specify the sampling or monitoring point, such as the specific monitor well or general sampling or monitoring location.
[4] Specify the depth or height of the sampling or monitoring points.
[5] Specify the frequency at which this monitoring or sampling will occur.

Monitored Media	COC[1]	Other parameter (specify)	Sampling Method[2]	Sampling points or locations[3]	Depth/Height[4] (ft.)	Analytical or Field Screening Method	Sampling or Monitoring Frequency[5]
Stormwater	Consistent with TCEQ input: Antimony, Arsenic, Barium Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, and Zinc	In compliance with permitting requirements: TSS	Grab	*Outfalls*[1] Outfall SW-2 Outfall SW-3 Outfall SW-4 Outfall SW-5 Outfall SW-6 Outfall SW-7 Outfall SW-8 *Gabions* Basin 2, SW-1a Basin 3, SW-1b Basin 4, SW-1c Basin 6, SW-1d *Check Dams/BMPs* BMP 1 BMP 2 BMP3	NA	EPA 6020B EPA SW7470A EPA M2540D	Quarterly[2]
		Visual Monitoring	Visual	Gabions Pond/BMPs	NA	NA	Quarterly

[1] Specify the COCs to be monitored in this media. List either type of COC (such as VOCs, metals) if all the COCs of that type will be monitored the same way.
[2] Describe the sampling or monitoring methods and QC procedures in Appendix 1 unless the proposed sampling or monitoring procedure is the same as the sampling or monitoring procedure described in the APAR.
[3] Specify the sampling or monitoring point, such as the specific monitor well or general sampling or monitoring location.
[4] Specify the depth or height of the sampling or monitoring points.
[5] Specify the frequency at which this monitoring or sampling will occur.

Notes:
1 – TCT has been inspecting outfalls SW-2 through SW-5 and collecting samples when appropriate sampling volume can be captured. Inspection and sampling at SW-5 will continue. Inspection and sampling at SW-6, SW-7 and SW-8 will begin after approval of the RAP. Sampling at SW-2, SW-3 and SW-4 will continue contingent on implementation of a compatible response action by the adjacent, off-site property owner in coordination with TCT.
2 - Quarterly inspections of stormwater monitoring points will be conducted and documented. When qualifying rain events occur (>= 0.5 inch), if appropriate sampling volume of stormwater has been captured in the automatic sampler(s), stormwater samples will be collected. If no rain event occurs during a given quarter, no inspection or sample collection will occur.

Explain the reasons for the above-listed monitoring and sampling plan.

Groundwater Monitoring Program

The goal of the groundwater monitoring program at the Site is to demonstrate that the response actions have effectively mitigated potential exposures to COCs in soil and groundwater above their respective PCLs. The objectives of the monitoring plan are to:

1. Demonstrate that the WCUs do not adversely impact groundwater quality
2. Demonstrate performance of the combination soil covers to prevent future leaching of COCs to groundwater
3. Monitor groundwater quality compliance at alternate POE wells based on PMZ
4. Monitor groundwater elevations at plant site AMP wells to demonstrate achievement of the gradient control necessary to obtain the critical PCLs at the alternate POE wells (the downgradient edge of the PMZ at the eastern bank of the Rio Grande)
5. Monitor operational performance of PRBs
6. Monitor groundwater quality in AMPs in Floodplain AA to demonstrate that groundwater quality is achieving attenuation action levels (AALs) as described in **Worksheet 2.1**.

Figures 1 and 2 of **Attachment 3A** present the locations of the wells included in the groundwater monitoring program. Each of the monitoring objectives is described below.

<u>WCUs</u>
The Site has four WCUs including Landfill Cells 1, 2, 3, and 4, as shown on Figure 1 of **Attachment 3A**. Landfill Cell 1 is located in the Pond 1 Arroyo AA with the up-gradient groundwater quality being monitored at the new monitoring well (New Well 1) and down-gradient at monitoring well EX-8. The WCUs at Landfill Cell 2 and Landfill Cell 3 are within the Pond 5/6 Arroyo AA. The new monitoring well (New Well 2) provides the up-gradient monitoring point for both WCUs, while monitoring well MW-131 provides the down-gradient monitoring location. Figure 3 of **Attachment 3A** provides an illustration of the original topography at the Site prior to leveling the plant site by filling the arroyos. The contour lines demonstrate that monitoring well MW-131 is down-gradient from both Cell 2 and Cell 3. Finally, WCU Cell 4 is located in the northern half of the lower PBA. Waste Cell 4 has an up-gradient monitoring well located at EP-78 and EP-81 will be the down-gradient monitoring well just west of the Cell 4 Landfill.

<u>Performance of Combination Soil Covers</u>
Combination soil covers are being used as part of the response action to address direct contact pathways ($^{Tot}Soil_{Comb}$) and the soil-to-

groundwater-to-surface water pathway ($^{SW\text{-}GW}$Soil). The purpose of the monitoring program for the soil covers is to demonstrate that that installation of the cover prevents COC concentrations in groundwater beneath the cover footprint from increasing, consistent with TRRP requirements (30 TAC §350.33(a)(2)). A summary of the monitoring wells, their locations, and their proposed purposes is presented in Table 3-1 of **Attachment 3A**. Groundwater monitoring requirements for combination soil covers include up-gradient wells, wells located within the cover footprint, and down-gradient wells. Combination covers are planned for:

1. Category II Material Storage Area – East Property AA
2. Fines Pile – Upper PBA AA
3. Boneyard – Lower PBA AA
4. Lined channel – Upper and Lower PBA AA
5. Plant site – South Terrace Arroyo AA, Pond 1 Arroyo AA, Pond 5/6 Arroyo AA, Acid Plant Arroyo AA, and PBA AA

The covered areas are shown on Figures 1 and 2 of **Attachment 3A**. The Category II Storage Area has two up-gradient wells, one on the South Arroyo (EP-129) and one on the North Arroyo (EP-96). EP-94 will act as a monitoring well within the covered area and EP-120 will act as the down-gradient well. The Fines Pile will use EP-120 as the up-gradient well, EP-123 as the well within the Fines Pile boundary, and EP-78 as the down-gradient well. The combination cover for the Boneyard appears contiguous with the Plant Site cover; however, the groundwater gradient directs COCs from the Boneyard to the PBA channel. The materials stored within the Boneyard are highly heterogeneous and multiple wells will be used for monitoring groundwater within the Boneyard including EP-53, EP-75, and EP-76. Wells in the PBA are illustrated in Figure 2 of **Attachment 3A**. EP-82 will act as the up-gradient well for the Boneyard and Acid Plant Arroyo AA, and EP-147 and EP-149 will act as the down-gradient wells for the Boneyard. The lined channel within the PBA is being monitored as part of the monitoring of the PRB.

Finally, the plant site encompasses five AAs, each of which will have individual monitoring wells to track the performance of the covers.

1. South Terrace AA. Monitoring well EP-68 is located on the boundary between South Terrace and Pond 1 Arroyo AAs, as illustrated on Figure 1 of **Attachment 3A**, and will be the up-gradient monitoring location for the plant site cover within the South Terrace AA. An up-gradient well EP-67 is located will act as an up-gradient monitoring well on the south side of the South Terrace AA. Monitoring well EP-72R is located within the planned cover and EP-20 will be the down-gradient monitoring location. Monitoring well EP-71R is the down-gradient well on the south side of the AA.
2. Pond 1 Arroyo AA. Monitoring well EP-68 will also be used as the up-gradient groundwater monitoring point for the Pond 1 Arroyo AA, as described above for the South Terrace Arroyo AA. Two monitoring well locations have been selected within the planned cover: a new well (New Well 1) east of the Cell 1 Landfill and monitoring well EX-8. Well EP-35 will be the down-gradient monitoring location for the Pond 1 Arroyo AA.
3. Pond 5/6 Arroyo AA. A new monitoring well (New Well 2) will be used as the up-gradient monitoring location for the Pond 5/6 Arroyo AA. MW-131 will serve as the monitoring point within the covered area. Wells EP-117 and EP-13, along with a new well (New Well 5) will serve as the down-gradient monitoring locations.
4. Acid Plant Arroyo AA. Well EP-82 will also be used as the up-gradient monitoring location for the Acid Plant Arroyo AA. A new monitoring well (New Well 3) will be placed within the planned cover in the Acid Plant Arroyo AA. In addition, wells EP-49, EP-51, and EP-100 along the western portion of the Acid Plant Arroyo AA will act as cover monitoring locations. The

downgradient monitoring location for the Acid Plant Arroyo AA is problematic due to the historical acid plant release. No easily identifiable monitoring well will serve as a down-gradient monitoring point for the Acid Plant arroyo AA.

5. PBA AA. Monitoring of groundwater within the covered area of the PBA is largely covered by surrounding areas. The up-gradient monitoring point will be well EP-82, and the down-gradient monitoring locations include wells include EX-1, EP-156R, and EP-54.

Groundwater Compliance at Alternate POE wells for the PMZ

The PMZ for the Site encompasses groundwater from the monitoring well EP-84 within the East Property AA (identified on Figure 1 in **Attachment 3A**) across the entire plant site and PBA to the eastern bank of the Rio Grande. The establishment of a PMZ allows for the movement of the points of compliance from within the PCLE zone to alternate POE wells at the downgradient edge of the PMZ. The alternate POE wells for the Site are the monitoring wells in the floodplain adjacent to the eastern bank of the Rio Grande: MW-9S, MW-11S, MW-2, EP-112, EP-133, EP-128, EP-4, EP-6, and EP-7, as shown on Figure 1 of **Attachment 3A**.

The Alternate POE wells for the plant site AAs have been selected at down-gradient locations from each of the AAs with monitoring wells MW-9S, MW-11S, MW-2 down-gradient from the Floodplain AA; wells EP-133 and EP-128 down-gradient from the Pond 5/6 Arroyo AA; EP-4 down-gradient from Pond 1 Arroyo; and EP-6 and EP-7 down-gradient from South Terrace Arroyo.

The AMPs are as follows:

- PBA AA: EX-1, EP-154, EP-155R, and EP-156R.
- Floodplain AA: EP-58, EP-64, EX-4, and MW-132D.

Groundwater Elevation/Gradient Control

The application of a PMZ under TRRP requires the establishment of AMPs. The concentrations of COCs in groundwater are monitored at the AMPs to demonstrate attenuation of the COCs within PCLE zone such that the critical PCL will be met at the alternate POE wells. However, due to the way the critical groundwater PCL (groundwater-to-surface water discharge, ^{SW}GW) for the Site is calculated, this RAP proposes monitoring additional wells for changes in groundwater elevations, which will be used in gradient calculations, rather than for changes in COC concentrations. The key component in calculation of the ^{SW}GW PCL is the groundwater to surface water dilution factor (DF), which is calculated using equations and assumptions presented in TRRP Guidance (RG-366, TRRP-24). This guidance allows for a Tier 2 ^{SW}GW PCL calculation based on site-specific dilution factors (30 TAC §350.75(i)(4)(E) calculated with the groundwater flow rate and relative surface water critical low-flow rate of either the Harmonic Mean Flow (HMF) for human health endpoints and the seven-day, two-year low flow (7Q2) for ecological receptors using the following equation:

$$Dilution\ Factor = GW\ F / (GW\ F + SW\ F)$$

where:

GW F = Groundwater Flow (cfs)
SW F = Surface Water Flow (cfs: 7Q2 or HMF)

The groundwater flow used in the dilution factor calculation is based on site-specific measurements, and is currently estimated to be 0.074 cfs for the combined plant site arroyos and PBA AAs (Arcadis 2016a). Reducing the groundwater flow (as proposed through the gradient control provided by the plant site soil covers, the GHB well (for the PBA), and lining of the PBA channels) will result in an increase of the ^{SW}GW PCLs. The initial calculation of the dilution factor and subsequent ^{SW}GW PCLs are subject to change following the response action. However, the combination soil covers have been designed to target an 80 percent reduction in overall infiltration at the Site. The subsequent decrease in infiltration rates will lead to decreases in groundwater gradient and saturated thickness on the plant site beneath the cover system (thus leading to a reduced groundwater flow). Therefore, the plant site AMPs will have groundwater elevation measurements collected to determine future groundwater flow for discharge to the Rio Grande.

The TCEQ publishes the critical low stream channel flow rates for listed segments of waters of the State in the *Procedures to Implement the Texas Surface Water Quality Standards* [TSWQS] (TCEQ, 2010). The Rio Grande in the vicinity of Site is identified as Segment 2314 in the TSWQS (30 TAC §307). Segment 2314 has a reported 7Q2 flow rate of 2.1 cfs under low-flow conditions during winter and spring months when the IBWC restricts flow on the Rio Grande (TCEQ, 2010). The calculated harmonic mean flow for the low flow period on the Rio Grande based on IBWC gaging data from 1983 through 2012 was estimated to be 6.2 cfs.

Wells that will act as gradient monitoring wells for the PMZ are listed in Table 1 in **Attachment 3A**.

PRB Performances

The performance of the PRBs has been documented in the Field Demonstration of Zerovalent Iron Treatment Technology in Parker Brothers Arroyo--Performance Monitoring report (Malcolm Pirnie, 2014), which is included in **Attachment 2A.19**. Monitoring wells documenting water quality through the PRBs include: up-gradient of PRB-1 (EP-138R), down-gradient of PRB-1 (EP-142, EP-143, EP-144, EP-146, and EP-147), up-gradient of PRB-2 (EP-148), and down-gradient of PRB-2 (EP-152S, EP-152D, EP-154, and EP-156R). Wells EP-140B and EP-140C are located within PRB 1. Wells EP-150BS and EP150CS are located within PRB 2.

MNA Performance

The groundwater PCLE zone for the Site extends to the eastern bank of the Rio Grande. The groundwater quality at the eastern bank of the Rio Grande will recover once gradient control reduces the flux of COCs in groundwater discharge from the Site. MNA will be the groundwater response action for groundwater in this portion of the Site. Modeling results estimate that MNA in the PMZ will require approximately 30-years to achieve ^{SW}GW PCLs at the alternate POE wells. Under TRRP, the alternate POE for groundwater-to-surface water discharge from a PMZ is a groundwater monitoring well immediately up-gradient to the groundwater-surface water discharge point. Therefore, nine alternate POE wells along the Rio Grande will be monitored for concentration data (MW-9S, MW-11S, MW-2, EP-112, EP-133, EP-128, EP-04, EP-06, EP-07). Additionally, four wells within the Floodplain AA (EP-58,

EP-64, EX-4, and MW-132D) will be designated as AMPs for collection of concentration data to monitor the MNA performance. Although the ^{SW}GW PCLs will not be met at the AMP and alternate POE wells during the MNA treatment period, surface water samples will be collected from the Rio Grande to demonstrate that there are no surface water PCL exceedances. As discussed above, monitoring of the groundwater gradient will be performed as part of the PMZ monitoring and included in the MNA performance evaluation. The groundwater elevations will be measured in selected wells from each of the AAs in the plant site to demonstrate, through the calculation of the associated hydraulic gradients, that groundwater containing concentrations above the PCLs is no longer being discharged to the Rio Grande from the plant site due to gradient control.

Monitoring Well Network

A total of 66 wells are proposed for the monitoring network at the Site. Many of the monitoring wells serve multiple purposes to achieve the six objectives identified in the beginning of this plan. The Table 1 of **Attachment 3A** summarizes the recommendations for the wells, data collection rationale, and their corresponding purposes to meet the overall monitoring objectives.

Surface Water Monitoring Program

The goal of the surface water monitoring program at the Site is to demonstrate that the response actions have effectively mitigated potential exposures from migration of COCs in groundwater to surface water above their respective PCLs. The objectives of the monitoring plan are to:

1. Demonstrate that surface water quality in the Rio Grande at the alternate POE wells supports the conclusion of gradient control evaluation described as part of the PMZ objectives.
2. Demonstrate that re-lining of the American Canal (when completed) has controlled migration of COCs from groundwater to surface water of canal. (Note: The response action in the American Canal is being performed by the IBWC, based on its settlement with ASARCO).
3. Monitor surface water concentrations to show that concentrations meet PCLs at down-gradient location on the Rio Grande.

Eight surface water monitoring points located in the Rio Grande, are presented on Figure 4 of **Attachment 3A**. Of these eight surface water monitoring locations, seven locations (SEP-1, SEP-2, SEP-9, SEP-10, SEP-11, SEP-12, and SEP-13) are associated with groundwater wells identified as alternate POE wells in the groundwater monitoring program and one location is at the down-gradient extent of the Site (SEP-4). Surface water samples will be analyzed for arsenic, lead, selenium, chloride, and sulfate, which will be compared to the critical surface water PCLs of 0.01 mg/L, 0.0073 mg/L, 0.005 mg/L, 340 mg/L, and 600 mg/L, respectively.

Three other established surface water monitoring points are located within the American Canal (SEP-3, SEP-6, and SEP-7). Future monitoring of water quality on the American Canal at locations SEP-3, SEP-6, and SEP-7 will be the responsibility of the IBWC as part of remediation of the American Canal based on their $22 million settlement with ASARCO.

Stormwater Monitoring Program

Stormwater monitoring will be conducted in conformance with requirements of the Multi-sector General Permit (MSGP: TXR050000) for stormwater discharges from industrial facilities. Stormwater sampling is currently being conducted at four of the existing outfalls (SW-2, SW-3, SW-4, and SW-5). Inspection and sampling at SW-5 will continue. Inspection and sampling at SW-2, SW-3 and SW-4 will continue contingent on implementation of a compatible response action by the off-site property owner in coordination with TCT. In addition, stormwater monitoring activities will be performed at the stormwater gabion structures in the East Mountain AA (SW-1a through SW-1d); at outfalls associated with the rip-rap check dams in the Floodplain AA (SW-6, SW-7, and SW-8); additional BMPs including a check dam and gabion in the upper PBA; up to two gabions or equivalent, if needed based on performance data, on the South Arroyo; and the SWCRA ponds, as discussed below. Stormwater monitoring locations are illustrated on **Figure 11** and Figure 4 of **Attachment 3A**.

As shown on Figure 4 of **Attachment 3A**, only the most down-stream gabion structures (a total of 4) will be monitored for stormwater discharge. However, all gabion structures will have visual inspections performed on a quarterly basis, if a qualifying precipitation event (greater than 0.5 inches of precipitation) has occurred. If no qualifying event occurs during a quarter, this will be documented and no inspection will be performed. Automated sampling devices will be installed downstream of the most downstream gabion structures to collect stormwater samples, when discharges occur at these locations. Stormwater samples will be analyzed for total metals including antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, and zinc and results will be compared to Maximum Daily Effluent Limitations and Benchmark Values presented in the MSGP. Total weighted concentrations at stormwater outfalls will be compared against Benchmark Values and daily maximums effluent limitations. Benchmark Values represent the desired levels for evaluation of gabion performance. Maintenance of gabions including sediment removal or additional discharge BMPs, such as adsorbent filter fabric materials, will be added until stormwater discharge meets Benchmark Values.

Stormwater rip-rap check dams will be installed at the Floodplain AA to control discharge of COCs adsorbed to sediment entrained in stormwater run-off from the Site to the American Canal and concrete-lined channel of the PBA between Paisano Drive and the Rio Grande. Visual inspections of these BMP features will be performed quarterly with samples taken during a qualifying event (greater than 0.5 inches of precipitation). If no qualifying event occurs during a quarter, this fact will be documented and maintained for inclusion in the monitoring reports (RAER). In accordance with the requirements of the MSGP, when discharges occur at these locations, stormwater samples will be collected from the outlet of the concrete-lined channel of the PBA and from the culvert outlet to the American Canal and analyzed for total metals including antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium and zinc to determine the concentration of COCs being discharged. Reports will be submitted annually.

The SWCRS ponds retain stormwater on-site; however, discharges are made from the ponds to maintain sufficient capacity in case of heavy precipitation events. During construction activities, water from the SWCRS retention ponds will be tested and compared to Maximum Daily Effluent Limitations and Benchmark Values presented in the MSGP prior to discharge. No water will be discharged in excess of maximum limitations. Benchmark Values represent the desired levels prior to discharge. Shortly after construction is

completed, the sediments in the ponds TCT will conduct a one-time cleanout of the retention ponds. Pond sediments will be collected and disposed in Cell 4 on. Discharge water will not require testing after the cleanout has occurred.

Use this worksheet to describe the O&M activities for each response action. In situations where the response action consists of more than one major component, for clarity one worksheet can be completed for each major component.

Response Action Name/Designation: **Worksheet 3.2.1** Soil Evapotranspiration (ET) Covers

List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

Soil ET covers are being used on the north plant site and south plant site portions of the combination cover, as well as on the Category II Material Storage Area on the East Property AA. Approximately 50 percent of the final plant site cover will be composed of soil ET covers. The O&M of the soil ET covers at the Site is focused on cover maintenance to assure integrity of the barrier to prevent direct contact exposure to COCs and water infiltration.

O&M activities for the ET covers include:

1. Cover inspections following qualifying storm events greater than 1.25 inches of rainfall in 1-hour or 10-year storm events.
2. Annual cover inspections
3. Cover repairs associated with subsidence, erosion, burrowing animals, and invasive vegetation
4. Grading and drainage repair based on evidence of ponding

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

After acceptance of the soil RACR, the cover systems will be monitored and inspected. Inspections are required after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event) or on an annual basis during period of extended drought. Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the cover systems. Necessary repairs to the soil covers will be scheduled and completed as soon as possible but must be completed within 90 days.

Any future development of the property will include evaluation of the overall infiltration rate for the surface of the property to assure long-term effectiveness of the response action. Surface infiltration rates where ET covers are in place will be required to maintain the 0.19 cm/yr overall infiltration rate. Future land use shall not result in alterations of surface drainage leading to ponding of water on the Soil ET covers. Design of building foundations, footers, utilities, pavement, stock piling, landscaping, or any other structures or facilities must be approved by TCEQ and USEPA prior to construction. Any construction on soil ET covers that may disturb, penetrate, abrade, re-vegetate, or in any other way compromise the integrity of the soil ET cover shall provide adequate design information to demonstrate that the performance specifications of the original ET cover are met or exceeded by the proposed construction. Future landscaping shall not include vegetation that may compromise the integrity of the soil ET cover. Proposed utility lines, water features, and irrigation systems shall not provide a potential source of water to the subsurface of the soil ET covers.

List the routine tasks required to operate the response action.

Not applicable.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the cover systems will be monitored and inspected after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event) or on an annual basis in times of drought. Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the ET cover systems. Additionally, at a minimum, the ET cover systems will be inspected annually. Inspections will look for signs of erosion, animal burrowing, invasive plants, subsidence, and ponding. Maintenance of the covers will include removing burrowing animals and unwanted vegetation, re-grading and/or improving drainage for areas where ponding has developed, and filling/repairing erosion damage. Necessary repairs to covers will be scheduled and completed as soon as possible but within 90 days.

Response Action Name/Designation: **Worksheet 3.2.2** Asphalt Covers

List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

Asphalt covers are being used on the plant site as a portion of the composite cover. Approximately 30 percent of the plant site is covered by either the Category II asphalt covers or asphalt pavement. The O&M of asphalt covers at the Site is focused on cover maintenance to assure integrity of the barrier to prevent direct contact exposure to COCs and water infiltration.

O&M activities for the asphalt covers include:

1. Asphalt inspections following heavy use events
2. Annual asphalt inspections
3. Asphalt repairs associated with damage, subsidence, and weathering

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

After acceptance of the soil RACR, the asphalt cover systems will be inspected on an annual basis where asphalt driveway and parking surfaces are subject to heavy use and wear. Annual inspections of asphalt covers will evaluate the condition of those surfaces. Areas of pavement showing severe wear (including extensive cracking, potholes, and frayed edges) will be scheduled and repaired as soon as possible within 90 days.

Future construction is prohibited on Category II asphalt covers. Any future development of the property will include evaluation of the overall infiltration rate for the surface of the property to assure long-term effectiveness of the response action. Surface infiltration rates where asphalt covers are in place will be required to maintain the 0.1 cm/yr overall infiltration rate (**Appendix 3.7**). Future land use or construction on asphalt drive and parking areas shall not result in alterations of surface drainage leading to ponding of water on the plant site. Design of building foundations, footers, utilities, pavement, stock piling, landscaping, or any other structures or facilities must be approved by TCEQ and USEPA prior to construction. Any construction on asphalt covers that may disturb, penetrate, abrade, or in any other way compromise the integrity of the asphalt cover shall provide adequate design information to demonstrate that the performance specifications of the original asphalt cover are met or exceeded by the proposed construction. Proposed utility lines, water features, and irrigation systems shall not provide a potential source of water to the subsurface around asphalt covers.

List the routine tasks required to operate the response action.

Not applicable.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the asphalt cover systems will be monitored and inspected on an annual basis. Additional inspections may be completed if individual events or traffic patterns/equipment may have caused damage to the containment systems. Inspection will look for signs of wear and tear, physical damage, and subsidence. Extensive wear of more than 15 percent of the asphalt surface on a per acre basis will be used to trigger the requirement for maintenance. Maintenance of the asphalt will include filling and sealing the asphalt surface, re-grading and/or improving drainage for areas where ponding has developed, and re-constructing subsurface base courses in the case of subsidence damage. Necessary repairs to the asphalt will be scheduled and completed as soon as possible but within 90 days.

Response Action Name/Designation: **Worksheet 3.2.3** Low Permeability Covers
List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

The low permeability covers include areas between the two main cover features (the soil ET cover and the asphalt cover) in the final composite cover for the plant site. The O&M of the low permeable covers at the Site is focused on cover maintenance to assure integrity of the barrier to protect against direct contact exposure to COCs and to minimize water infiltration.

O&M activities for the low permeability covers include:

1. Cover inspections following qualifying storm events
2. Annual cover inspections
3. Cover repairs associated with subsidence, erosion, burrowing animals, and invasive vegetation
4. Grading and drainage repair of any ponding

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

After acceptance of the soil RACR, the cover systems will be monitored and inspected after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event). Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the cover systems. Necessary repairs to the soil covers will be scheduled and completed as soon as possible but within 90 days.

Any future development of the property will include evaluation of the overall infiltration rate for the surface of the property to assure long-term effectiveness of the response action. Surface infiltration rates where low permeable covers are in place will be required to maintain the 0.1 cm/yr overall infiltration rate. Future land use shall not result in alterations of surface drainage leading to ponding of water on the low permeable covers. Design of building foundations, footers, utilities, pavement, stock piling, landscaping, or any other structures or facilities must be approved by TCEQ and USEPA prior to construction. Any construction on low permeable covers that may disturb, penetrate, abrade, re-vegetate, or in any other way compromise the integrity of the low permeable cover shall provide adequate design information to demonstrate that the performance specifications of the original low permeable cover are met or exceeded by the proposed construction. Future landscaping shall not include vegetation that may compromise the integrity of the low permeable cover. Proposed utility lines, water features, and irrigation systems shall not provide a potential source of water to the subsurface of the low permeable covers.

List the routine tasks required to operate the response action.

Not applicable.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the cover systems will be monitored and inspected after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event). Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the containment systems. Necessary repairs to the cover system will be scheduled and completed as soon as possible within 90 days. At a minimum, the cover will be inspected annually. Inspection will look for signs of erosion, animal burrowing, invasive plants, subsidence, and ponding. Maintenance of the cover will include removing burrowing animals and unwanted vegetation, re-grading and/or improving drainage for areas where ponding has developed, and filling/repairing erosion damage.

Response Action Name/Designation: **Worksheet 3.2.4** Slope Stabilization

List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

Slopes along the northern plant site and on-site slopes along western plant site will be stabilized using surface sealant. The O&M of the stabilized slopes at the Site is focused on erosion control to minimize erosion and water infiltration.

O&M activities for the stabilized slopes include:

1. Annual inspections
2. Re-application of surface sealant and repair of significant erosional features

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

After acceptance of the soil RACR, the stabilized slopes will be monitored and inspected annually. Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the stabilized slopes. Necessary repairs to the stabilized slopes will be scheduled and completed as soon as possible but within 90 days.

Any future development of the property will include evaluation of the overall infiltration rate for the surface of the property to assure long-term effectiveness of the response action. Future land use shall not result in alterations of surface drainage that directs stormwater flow to the stabilized slopes. Design of building foundations, footers, utilities, pavement, stock piling, landscaping, or any other structures or facilities must be approved by TCEQ and USEPA prior to construction. Proposed utility lines, water features, and irrigation systems shall not provide a potential source of water to the surface or subsurface of the stabilized slopes.

List the routine tasks required to operate the response action.

Not applicable.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the stabilized slopes will be monitored and inspected annually. Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the stabilized slopes. Necessary repairs to the slopes will be scheduled and completed as soon as possible within 90 days. Inspection will look for signs of erosion. Maintenance of the stabilized slopes will include re-application of surface sealant and repair of significant erosional features through re-grading and/or improving drainage for areas where erosional features have developed, and filling/repairing erosion damage.

Response Action Name/Designation: **Worksheet 3.2.5** Waste Control Units
List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

The O&M of the WCUs at the Site is focused on monitoring potential leachate production during initial years of the landfill operation and cover maintenance to assure integrity of the barrier to prevent against direct contact exposure to COCs and water infiltration.

O&M activities for WCUs include:

1. Cover inspections following qualifying storm events
2. Annual cover and leachate collection system inspections (Cell 4 only)
3. Cover repairs associated with subsidence, erosion, burrowing animals, and invasive vegetation
4. Leachate collection and disposal as required (Cell 4 only)

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

During the closure/post-closure care period, a low flow pump will be placed at the bottom of the Cell 4 leachate riser. The head in the sump will be monitored monthly, and, in the event that leachate levels rise above the minimum operating level, the pump will be used to remove leachate. Monthly monitoring of the sump will be performed until no liquids are observed in the sump for four consecutive quarters after closure. The sump will be monitored, thereafter, during annual cover inspections. Power for the pumps will be provided by a portable generator. A back-up pump and generator will be provided if breakdowns occur. A tank will be provided for temporary (less than 30-day) leachate storage at the facility in the event that leachate is generated.

Future construction on WCUs is prohibited. Future land use shall not result in alterations of surface drainage leading to ponding of water on WCUs. Design of any landscaping or other features on WCUs must be approved by TCEQ and USEPA prior to construction. Any construction at WCUs that may disturb, penetrate, abrade, re-vegetate, or in any other way compromise the integrity of the protective landfill soil cover shall provide adequate design information to demonstrate that the performance specifications of the original landfill soil cover are met or exceeded by the proposed construction. Future landscaping shall not include vegetation that may compromise the integrity of the protective soil cover.

List the routine tasks required to operate the response action.

Routine pump maintenance for leachate sump pumps.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the cover system and leachate collection system for the WCUs will also be monitored and inspected after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event). Additional inspections may be completed if inclement weather or other events occur that may have caused damage to the cover systems. Necessary repairs to the Cell 1 through Cell 4 covers and the Cell 4 leachate collection system will be scheduled and completed as soon as possible but within 60 days. The WCU will be inspected annually. Inspection will look for signs of erosion, animal burrowing, and invasive plants. Maintenance of the cover will include removing burrowing animals and unwanted vegetation, re-grading and/or improving drainage for areas where ponding has developed, and filling/repairing erosion damage.

Response Action Name/Designation: **Worksheet 3.2.6** Stormwater Retention/Detention Ponds
List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

The O&M of the stormwater retention/detention ponds at the Site is focused on controlling the infiltration of stormwater into subsurface and potential migration of sediment entrained in stormwater run-off. After installation of the response actions and a one-time clean-out of the stormwater retention ponds, sediment collected within the plant site stormwater retention ponds will not contain COCs due to the presence and maintenance of barrier covers preventing stormwater run-off from coming into contact with impacted soil.
O&M activities for lined stormwater ponds include:

1. Liner inspections following qualifying storm events to assure erosion or subsidence damage is not imminent to the liner
2. Annual liner inspections to identify potential leaks
3. Liner repairs associated with inspection findings

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

After acceptance of the soil RACR, the stormwater ponds will be monitored and inspected. Any future development of the property will include continued inspection and maintenance. The principal maintenance activity will be sediment removal from the lined ponds to prevent sediments from becoming suspended and released as part of runoff (see details in Section 3.1). Inspections may indicate damage to the liner systems requiring repairs. Necessary repairs to the liners will be scheduled and completed as soon as possible but within 90 days.

Future development at the Property will not interfere with operations, maintenance, and monitoring of the stormwater retention/detention ponds or pumping system. Future land use shall not result in alterations of surface drainage leading to changes in holding capacity of the retention/detention ponds. Design of modifications to the ponds or landscaping/other features around the ponds must be approved by TCEQ and USEPA prior to construction.

List the routine tasks required to operate the response action.

Routine pump maintenance for stormwater discharge pumps.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the lined stormwater pond system will be monitored and inspected on an annual basis or after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event).

Additional inspections may be completed if damage to the liner systems appear apparent from subsidence or erosion. Necessary repairs to the liner systems will be scheduled and completed as soon as possible but within 90 days. At a minimum, the pond liners and pumping system will be inspected annually. Inspection of liners will look for signs of leaks or tears in liner, erosion, and subsidence. Inspections of pumping system will include pump stations and valve boxes. Maintenance of the liner will include filling/repairing erosion and subsidence damage and repairing tears and leaks in the liner. Manufacturer's recommended maintenance on pumps will be followed.

Response Action Name/Designation: **Worksheet 3.2.7** Sediment BMPs

List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

The O&M of BMP features at the Site, including check dams and additional gabions or equivalent as needed, are focused on controlling the potential migration of sediment entrained in stormwater run-off. Sediment collected in the check dams and gabion(s) or equivalent in the Upper Parker Brothers Arroyo and Floodplain AAs will potentially be impacted by COCs due to the presence of soil with COC concentrations above TRRP residential PCLs.

O&M activities for BMP features include:

1. Inspections following qualifying storm events.
2. Clean out of BMP features associated with inspection findings.

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

After acceptance of the soil RACR, the BMPs will be monitored and inspected. Any future development of the property will include continued inspection and maintenance. The principal maintenance activity will be sediment removal from the BMPs to prevent sediments from becoming suspended and released as part of runoff. Inspections may indicate accumulation of sediment. Necessary removal of sediment will be scheduled and completed as soon as possible but within 90 days.

Future development at the Property will not interfere with operations, maintenance, and monitoring of the BMPs. Future land use shall not result in alterations of surface drainage leading to changes in holding capacity of the BMPs. Design of modifications to the BMPs or landscaping/other features around the BMPs must be approved by TCEQ and USEPA prior to construction.

List the routine tasks required to operate the response action.

Not applicable.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the BMPs will be monitored and inspected on an annual basis or after significant rain events (e.g., greater than 1.25-inches of rainfall in 1-hour or the 10-year storm event). Sediment removals will be performed on an as-needed basis for the BMPs in the Upper PBA and Floodplain. The vacuum method (or equivalent method) will be employed for the East Mountain gabions.

Additional inspections may be completed if damage to BMPs appear apparent from subsidence or erosion. Necessary repairs to the BMPs will be scheduled and completed as soon as possible but within 90 days. At a minimum, the BMPs will be inspected annually. Inspection of BMPs will involve looking for accumulation of sediments, erosion, and subsidence. Maintenance of the BMPs will include removal of accumulated sediments, filling/repairing erosion and subsidence damage.

Response Action Name/Designation: **Worksheet 3.2.8** Stormwater Gabions (SW-1a, SW-1b, SW-1c, and SW-1d in East Mountain AA)

List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

The O&M of the stormwater gabions at the Site are focused on controlling the migration of COCs adsorbed to sediment particles entrained in stormwater run-off. As described in section 2.4.3.2 of the revised Conceptual Site Model, Pathway Evaluation, and PCL Report, dated July 2016, O&M will include stormwater discharge monitoring, inspections of gabions, and the removal of potentially impacted sediment from the behind the gabions as necessary. The goal is to prevent discharge of impacted sediment by over-topping of gabions during high-intensity storm events. Monitoring of the gabions is focused on inspections for accumulated sediment which can cause discharge from over-topping of gabions during high-intensity storm events.

O&M activities for the stormwater gabions include:

1. Monitor stormwater discharge from the downstream gabion structure for each of the basins (SW-1a through SW-1d) along with stormwater discharge monitoring at Outfalls SW-2 and SW-8 (**Figure 4** in **Attachment 3A** and **Worksheet 3.1**).
2. Evaluate stormwater quality at each drainage basin by sampling when a qualifying precipitation event, as defined in the stormwater permit (TPDES General Permit No.TXR050000, included in Appendix F of the revised Conceptual Site Model, Pathway Evaluation, and PCL Report, dated July 2016). The concentrations of COCs in stormwater from the southern portion of the East Mountain AA that discharge to Outfall SW-1 are estimated based on flow-weighted average concentrations. Flow-weighting is based on relative stormwater flow estimated for each of the drainage basins. For example, a 25-year precipitation event for El Paso would result in stormwater flow rates of 10 cfs for Basin 2, 28.4 cfs for Basin 3, 18 cfs for Basin 4, and 36.4 cfs for Basin 6, respectively. The flow-weighted average was calculated using the drainage basin areas and stormwater flow rates (Q) summarized on Figure F-2 in the revised Conceptual Site Model, Pathway Evaluation, and PCL Report, dated July 2016.
3. Perform and document inspections on a quarterly basis or immediately after qualifying precipitation events (0.5-inch or greater) of down-stream gabions structures for individual drainages in East Mountain AA to determine whether discharge is occurring. Remove sediment on as-needed basis. Sediment that accumulate behind the gabion structures likely lead to concentrating metals. The locations of the rock gabions in the East Mountain AA are illustrated on **Figure 11**. These structures are remotely located and away from any usable haul roads. A number of alternatives to clean the sediments from the gabions were evaluated. Ultimately, removal of sediments by vacuum truck using temporary piping was determined to be the most effective means. . Sediment removals from behind the rock gabions were completed in February 2016. Prior to removal efforts, approximately 14 cubic yards of sediment had accumulated behind the rock gabions. The pictures below are of the downstream rock gabion in Basin 6.

Before Removal

After Removal

The gabion maintenance event successfully removed 14 cubic yards (cy) of sediment from behind the rock gabion structures. Future gabion maintenance will be performed in a similar method using temporary piping and vacuum truck removal. Sediment removed from gabions are assumed to have elevated concentrations of metals and will be disposed of in Cell 4. The automatic samplers have been deployed to collect stormwater samples from the next qualifying precipitation event. Results of this ensuing event will determine the effectiveness of the BMP.

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

The stormwater gabions are designed to slow down the flow rate of stormwater run-off from the East Mountain AA drainages to allow settling of entrained sediment. The gabions have reduced the number of discharge events in response to average precipitation events. The key parameters for evaluating the performance will be the number of discharge events and the water quality of stormwater discharges. The response to increased over-topping of gabions may be to clean out accumulated sediments more often.

Future development at the Property will not interfere with operations, maintenance, and monitoring of the stormwater gabions in the East Mountain Assessment Area.

List the routine tasks required to operate the response action.

Not applicable.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

After submission of the soil RACR for the response actions in soil and on-site groundwater, the stormwater gabions will be monitored and inspected on a quarterly basis. Stormwater quality samples will be collected during significant storm events when a measureable discharge is generated using dedicated sample devices that collect the “first flush” stormwater that flows from the down-stream gabion. Additional inspections may be completed if severe storm events occur. Necessary repairs to the gabions will be scheduled and completed as soon as possible but within 30 days. Removal of accumulated sediment will be performed on annual basis.

Response Action Name/Designation: **Worksheet 3.2.9** PRBs and GHB
List all portions of the response action to which this information applies.

Describe the O&M and inspection activities that will be required to operate and maintain response action components.

The PRBs are a passive treatment system for groundwater passing through the ZVI media. As a result, there are no O&M costs specifically for them. The short- and long-term performance of the PRBs is largely related to the GHB extraction well. The GHB controls groundwater gradient going into the PRBs. By lowering the groundwater gradient from pumping the GHB, the groundwater velocity through the PRB decreases and the level of groundwater treatment increases. The O&M of the GHB extraction well, therefore, is imperative to the operation of both the PRBs and the GHB. The O&M for the GHB is focused on extracting sufficient groundwater from the Upper PBA to control groundwater flow across the PRB, while being low enough not to draw contaminated groundwater from the South Arroyo.

O&M activities for GHB include:

1. Operation of well pump at constant rate
2. Monitoring groundwater elevations between GHB and PRB-1 to evaluate groundwater gradient and flow
3. Monitoring and maintaining the extraction pump and motor to manufacturer's specific recommendations
4. Monitoring groundwater quality from the extraction well to evaluate whether contaminated groundwater is being drawn into capture zone

List and discuss the key operating parameters for a properly functioning response action. Address how changes in these parameters will result in operating changes, providing sufficient detail to explain how the operator will know the component is functioning properly.

The groundwater pump placed in the extraction well is the only actively functioning piece of equipment as part of the response action. Water quality from the extraction well will be monitored semi-annually to verify that COCs in groundwater from other portions of the Site are not being extracted and will not be discharged to the Rio Grande. Semi-annual monitoring will also include measurement of groundwater elevations in select monitoring wells in the PBA. The groundwater gradient in the PBA and the groundwater velocity across the PRBs will be used to determine whether increases or decreases in groundwater pumping rates are required. Power for the pumps will be provided by a utility drop. A back-up pump and generator will be provided if breakdowns occur. A tank will be provided for temporary storage at the well site in the event that water will be used instead of discharged to the Rio Grande.

Future development of the Property shall not interfere with operations, maintenance, and monitoring of the GHB extraction and conveyance system.

List the routine tasks required to operate the response action.

Routine pump maintenance for the groundwater extraction pump will be performed in accordance with manufacturer's recommendations. Inspection of other equipment including the pipeline and control panel will be done on a regular interval.

List the routine tasks required to maintain the response action, including scheduled inspections, maintenance, and component replacement.

Semi-annual monitoring of groundwater and extracted water will be performed to determine the operational efficiency of the system. Groundwater elevation data and other pumping data will be downloaded to evaluate pump performance.