Appendix E

Geologic Cross Sections:
E-1: Historical Lithology
E-2: Field Demonstration of Groundwater Remedy in Parker Brothers Arroyo
LEGEND:
- Monitoring Wells
- Abandoned Monitoring Wells
- Soil Borings
- Test Pit Locations
- Historic Arroyo Trace Lines
- Property Boundary
- Historical Drainage Divide
- Cross-Section A-N

Existing Conditions:
- Asphalt Areas from Site Operations
- Paved Areas Completed to Category II Remediation Standard
- Lined Landfill Cell
- Lined Stormwater Pond
- Buildings

FORMER EL PASO SMELTER SITE
EL PASO, TEXAS
EXPANDED VIEW – PARKER BROTHERS ARROYO

CITY: Highlands Ranch  DIV/GROUP: GIS DB: BG
Document Path: G:\GIS\ASARCO_ElPaso\GIS\MXD\RI_Revised\Fig E1-2 ExpandedView_PBA.mxd Date: 12/10/2014
NOTES:

1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT (ODS). RECORD ELEVATION IS 3738.19 (NAVD 88 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.

LEGEND:

- WELL SCREEN
- RECENT W.L.
- GROUNDWATER ELEVATION (DATI)
- BLUE INDICATES WELLS IN SIMULATION MONITORED NETWORK
- K = 0.15 (HYDRAULIC CONDUCTIVITY IN FEET/SECOND)
- 50' = TOTAL DEPTH OF BOREHOLE IN FEET BELOW GROUND SURFACE

DEFINITION:

- AMSL = ABOVE MEAN SEA LEVEL
- HIGH W.L. = HISTORIC HIGH GROUNDWATER LEVEL
- LOW W.L. = HISTORIC LOW GROUNDWATER LEVEL
- W.L. = WATER LEVEL
- BGS = BELOW GROUND SURFACE

VERTICAL SCALE IN FEET
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION: 4X
NOTES:

1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT Q460. RECORD ELEVATION IS 3738.19 (NAVD 88 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.

DEFINITION:
AMSL = ABOVE MEAN SEA LEVEL
WL = WATER LEVEL

HORIZONTAL SCALE IN FEET
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION (VE)=4x
NOTES:
1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT Q460. RECORD ELEVATION IS 3738.19 (NAVD 88 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.

DEFINITION:
AMSL = ABOVE MEAN SEA LEVEL
WL = WATER LEVEL

TOTAL ARSENIC CONCENTRATIONS IN GROUNDWATER

- <0.01 mg/L
- >0.01 mg/L
- >0.1 mg/L
- >1.0 mg/L
- >10 mg/L

EPA Arsenic Maximum Contaminant Level (MCL) = 0.01 mg/L

LEGEND

- SILT
- SLAG
- BASAL GRAVEL
- SAND/GRAVEL
- LOWER PERMEABILITY SAND/GRAVEL (SILTY, CLAYEY, CEMENTED)
- CLAY
- SHALE BEDROCK (MESILLA VALLEY FORMATION)

HYDRAULIC CONDUCTIVITY (K) VALUES IN FEET/DAY

TOTAL DEPTH OF BOREHOLE IN FEET BELOW GROUND SURFACE

GROUNDWATER ELEVATION (DATE)

WELL SCREEN (BLUE INDICATES SCREEN IN SEMI-ANNUAL MONITORING NETWORK)

ELEVATION, FEET (AMSL)

TD = TOTAL DEPTH OF BOREHOLE IN FEET BELOW GROUND SURFACE
NOTES:
1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT DATUM, RECORD ELEVATION IS 3736.19 (NAD 83 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.

TOTAL ARSENIC CONCENTRATIONS IN GROUNDWATER:
- = <0.01 mg/L
- = <0.1 mg/L
- = >0.1 mg/L
- = >1.0 mg/L
- = >10 mg/L
EPA ARSENIC MAXIMUM CONTAMINANT LEVEL (MCL) = 0.01 mg/L

DEFINITION:
AMSL = ABOVE MEAN SEA LEVEL
HIGH WL = HISTORIC HIGH GROUNDWATER LEVEL
LOW WL = HISTORIC LOW GROUNDWATER LEVEL
WLS = WATER LEVEL
BGS = BELOW GROUND SURFACE

EL PASO SMELTER SITE
EL PASO, TEXAS
CROSS-SECTION D'-D'
FIGURE E1-6
NOTES:
1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MCNUXENT QUAD, RECORD ELEVATION IS 3738.19 (NAD 88 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.

DEFINITION:
AMSL. = ABOVE MEAN SEA LEVEL
HIGH WL. = HISTORIC HIGH GROUNDWATER LEVEL
LOW WL. = HISTORIC LOW GROUNDWATER LEVEL
BGS. = BELOW GROUND SURFACE

EL PASO SMELTER SITE
EL PASO, TEXAS

CROSS-SECTION J-J'

TOTAL ARSENIC CONCENTRATIONS IN GROUNDWATER:

- ≤0.01 mg/L
- >0.01 mg/L
- >0.1 mg/L
- >1.0 mg/L
- >10 mg/L

EPA ARSENIC MAXIMUM CONTAMINANT LEVEL (MCL): 0.01 mg/L

WELL SCREEN
ARSENIC CONCENTRATION IN SOLS (mg/L)
HISTORIC TOPOGRAPHY
SAND/GRAVEL
BASEMATERIAL
SLAG
SAND/GRAVEL
LOWER PERMEABILITY SAND/GRAVEL
CLAY
SANDSTONE BEDROCK (HUECO FORMATION)
SHALE BEDROCK (NELLIS VALLEY FORMATION)

EL PASO SMELTER SITE
EL PASO, TEXAS

CROSS-SECTION J-J'

Figure E1-12
NOTES:
1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT 2460. RECORD ELEVATION IS 3738.19 (NAVD 88 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.

DEFINITION:
- AMSL = ABOVE MEAN SEA LEVEL
- HIGH WL = HISTORIC HIGH GROUNDWATER LEVEL
- LOW WL = HISTORIC LOW GROUNDWATER LEVEL

TOTAL ARSENIC CONCENTRATIONS IN GROUNDWATER:
- <0.01 mg/L
- >0.01 mg/L
- <0.1 mg/L
- >0.1 mg/L
- >1.0 mg/L
- >10 mg/L

EPA ARSENIC MAXIMUM CONTAMINANT LEVEL (MCL) = 0.01 mg/L

EL PASO SMELTER SITE
EL PASO, TEXAS

CROSS-SECTION M-M'

VERTICAL EXAGGERATION (VE) = 20X
VERTICAL SCALE IN FEET
HORIZONTAL SCALE IN FEET
FIGURE C

CROSS-SECTION N-N'
EL PASO SMELTER SITE
EL PASO, TEXAS

NOTES:
1. NORTHING AND EASTING COORDINATES ARE TEXAS STATE PLANE, CENTRAL ZONE (NAD 83 DATUM) AND ARE IN U.S. SURVEY FEET.
2. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT Q460. RECORD ELEVATION IS 3736.19 (NAVD 88 DATUM).
3. MEASURING POINT FOR ALL WELLS IS TOP OF CASING ON THE NORTH SIDE.
4. IN GENERAL, SAMPLES WERE COLLECTED AT FIVE FOOT INTERVALS IN BORINGS DEPICTED ON CROSS SECTION N-N'. ARSENIC CONCENTRATIONS IN SAMPLES NOT DEPICTED ON THE CROSS-SECTION WERE NOT DETECTED AT OR ABOVE THE LABORATORY REPORTING LIMIT OF 10mg/L (MILLIGRAMS PER Kilogram).

DEFINITION:
AMSL = ABOVE MEAN SEA LEVEL
WL = WATER LEVEL

LEGEND

ARSENIC CONCENTRATION IN SOILS (mg/L)
GROUNDBWATER ELEVATION (DATE)
WELL SCREEN
WELL/BORING ID OFFSET FROM ALIGNMENT

VERTICAL SCALE IN FEET
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION (VE) = 2.5x
**Legend:**
- Interim Site Monitoring Well
- Abandoned Monitoring Well
- Soil Boring
- Property Boundary
- Historic Arroyo Trace Lines
- Historic Drainage Divide
- Bedrock
- Total Arsenic Contours (mg/L), August - September 2011
- Water Level Contour (feet amsl)
- Cross Section Lines
- Approximate Parker Brothers Arroyo Saturated Thickness Extent
- Permeable Reactive Barrier (PRB; size exaggerated)
- Proposed Landfill Extent

**Note:**
- amsl - above mean sea level
- mg/L = milligrams per liter
- Arsenic Texas Risk Reduction Rule - Protective Concentration Limit (PCL) = 0.01 mg/L
NOTE:
1. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT CAMEL, RECORD ELEVATION IS 3738.79 (NAVD 88 DATUM).

LEGEND:
- SLAG
- SAND/GRVEL (SANTA ALLUVIUM)
- SAND/CLAY (TOP HANGAR FORMATION)
- SANDSTONE (SUZANO FORMATION)
- SHALE BEDROCK (SUZANO VALLEY FORMATION)
- PERMEABLE REACTING BARRIER
- BACKFILL (LOW PERMEABILITY MATERIAL)
- ESTIMATED CURRENT WATER LEVEL

DEFINITIONS:
- AMSL = ABOVE MEAN SEA LEVEL
- NAVD = NORTH AMERICAN VERTICAL DATUM
- NGS = NATIONAL GEODETIC SURVEY

FORERER EL PASO SHELTER SITE
EL PASO, TEXAS
FIELD DEMONSTRATION OF GROUNDWATER REMEDY
IN FARMER BROTHERS ARROYO

PRB-1 CROSS-SECTION A'-A'
NOTE:
1. ELEVATIONS ARE BASED ON NGS VERTICAL CONTROL MONUMENT ON EL, RECORD ELEVATION IS 3738.79 (NAVD 88 DATUM).

LEGEND:
- Silt:
- Sand/Silt (Dezebeware):
- Sandstone Bedrock (Monado formation):
- Shale Bedrock (Hipkelka Valley formation):
- Permeable Reactive Barrier:
- Backfill (Low Permeability Material):
- Estimated Current Water Level:

DEFINITIONS:
AMSL = ABOVE MEAN SEA LEVEL
NAVD = NORTH AMERICAN VERTICAL DATUM
NGS = NATIONAL GEODETIC SURVEY