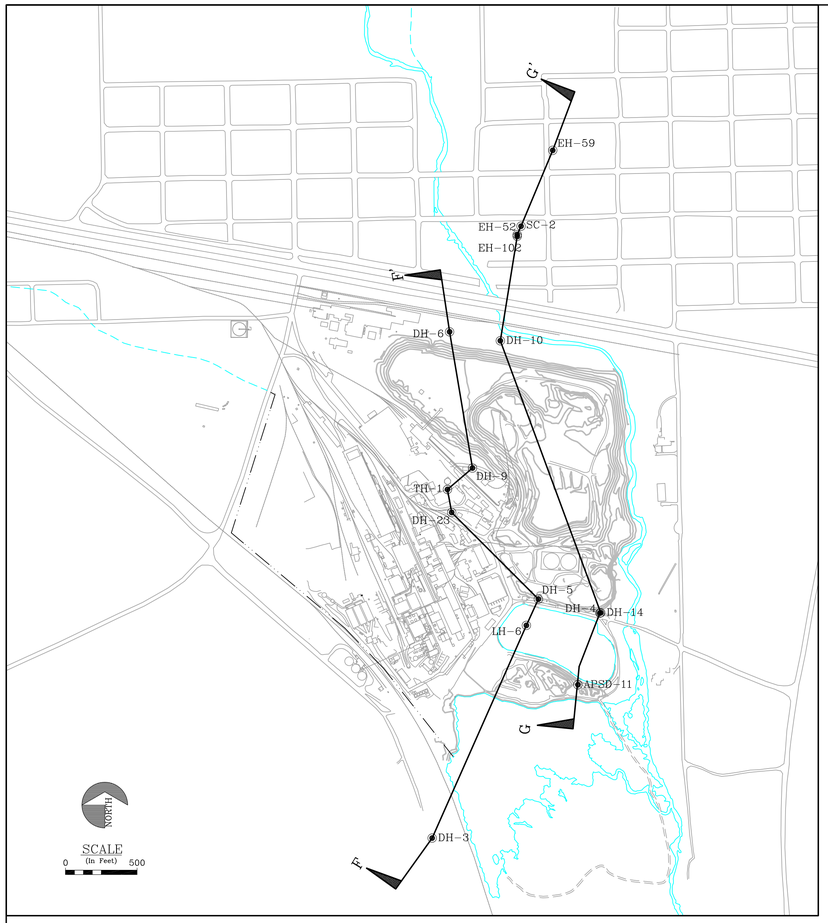
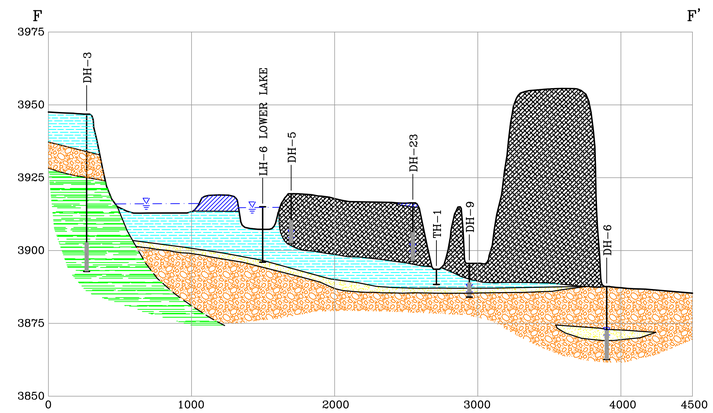
APPENDIX 5-A

Previous Geologic Cross Sections



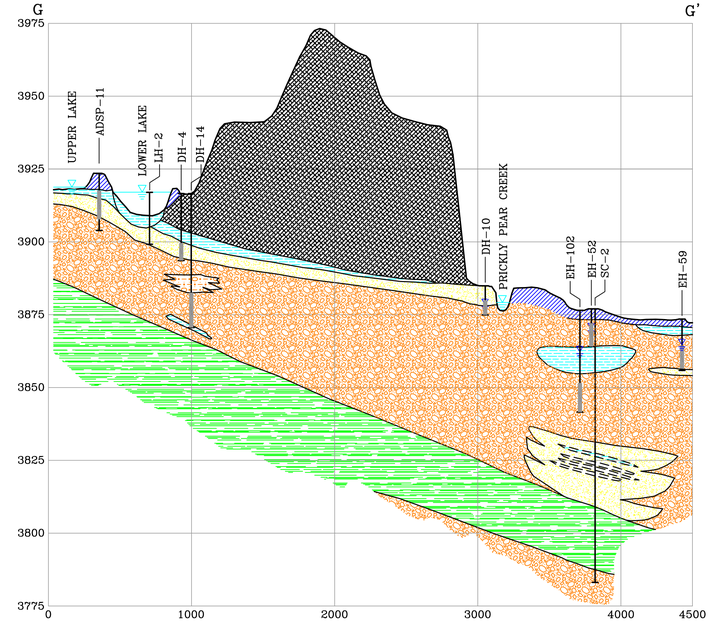
PLAN VIEW

SCALE: 1"=500'



SECTION F – F

SCALE: (H)1"=500' (V)1"=25'



SECTION G – G'

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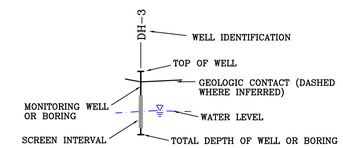
LEGEND



SLAG, AN IRON–ZINC RICH SILICA SMELTING BY–PRODUCT PLACED WHILE IN MOLTEN STATE.

FILL COMMONLY CONSISTS OF INTERMIXED SAND, SILT, CLAY AND GRAVEL. OFTEN INCLUDES WASTE CONSTITUENTS INCLUDING BRICKS, WOOD, COBBLES AND OTHER DEBRIS.

SHALLOW, FINE–GRAINED DEPOSITS CONSISTING OF INORGANIC SILTS AND CLAYS. THIS UNIT ALSO CONSISTS OF ORGANIC, BLACK, SOFT, LOW–DENSITY CLAYS, SILTS AND PEAT BENEATH UPPER LAKE, AND LOWER LAKE; AND NEAR WELLS DH–4, DH–5, DH–9 AND DH–29.

SAND, WELL–SORTED TO SILTY, UNCONSOLIDATED ALLUVIUM; GENERALLY LENTICULAR AND HETEROGENEOUS.

ALLUVIAL GRAVEL AND COBBLES; HETEROGENEOUS, SAND, SILT OR CLAY MATRIX, VARIABLE WITH DEPTH AND LOCATION.

GRAVEL AND COBBLES IN SILTY CLAY MATRIX.

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REDUCED PRINT

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING

0 1

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDING

ASARCO INCORPORATED

CURRENT CONDITIONS/ RELEASE ASSESSMENT

GEOLOGIC CROSS SECTIONS OF SLAG PILE AND UNDERLYING STRATIGRAPHY

Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors
Helena, Montana
2727 Airport Road (406) 443-4150

FIGURE 4–1–16

UPDATE TIME: 3:05PM
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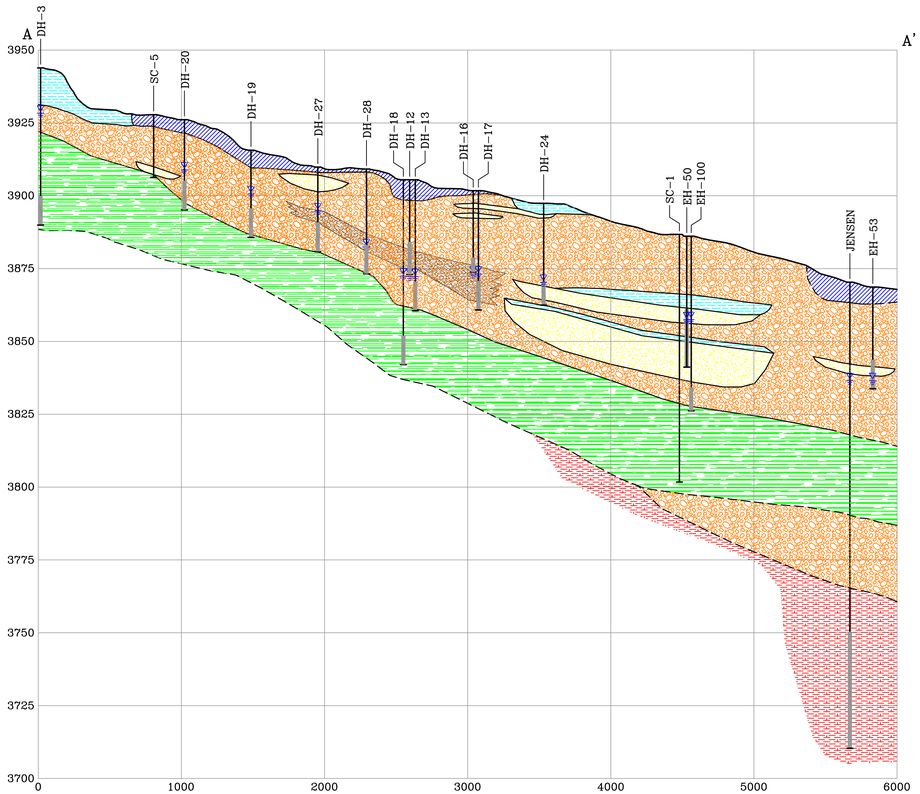
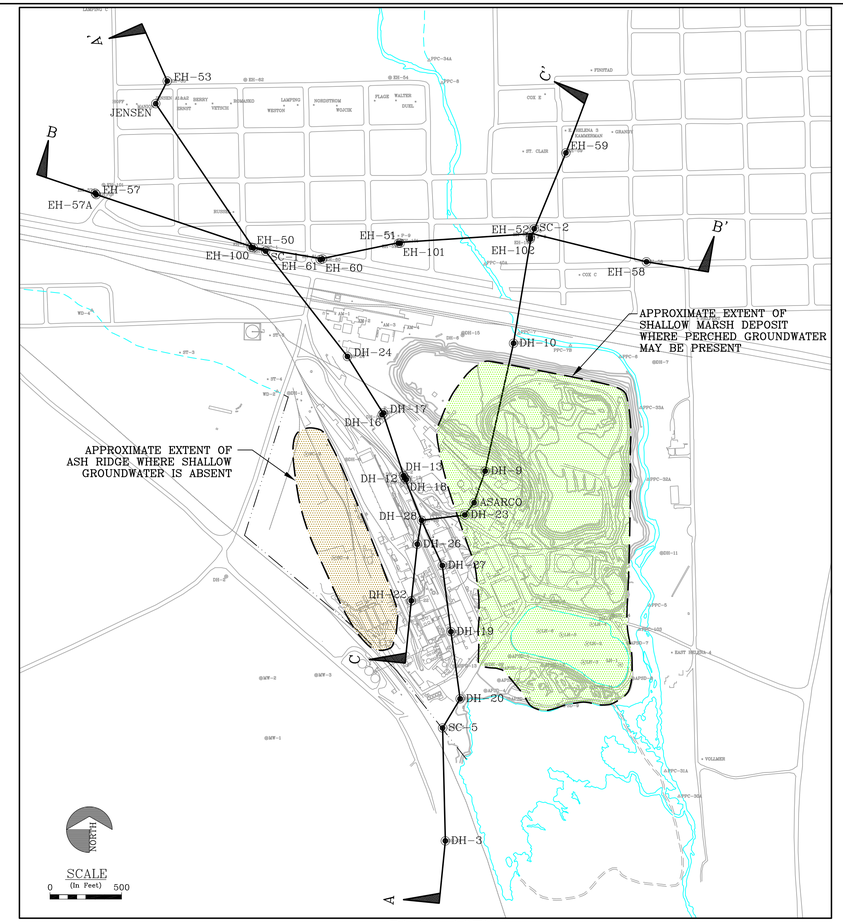


SECTION A – A'

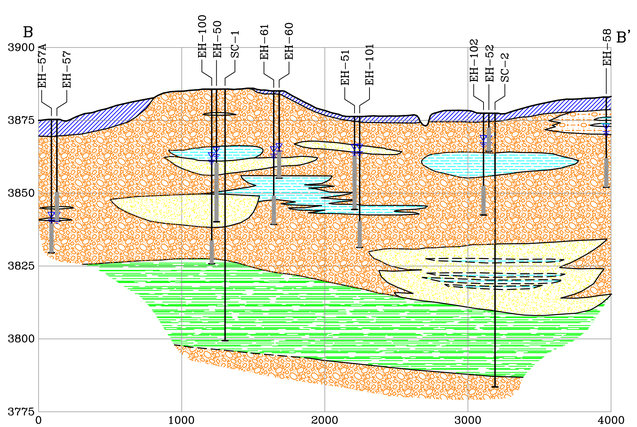
SCALE: (H)1"=500' (V)1"=25'



PLAN VIEW

SCALE: 1"=500'

SHOWING CROSS-SECTION LOCATIONS, APPROXIMATE EXTENT OF SHALLOW MARSH DEPOIST AND EXTENT OF ASH RIDGE



SECTION B – B'

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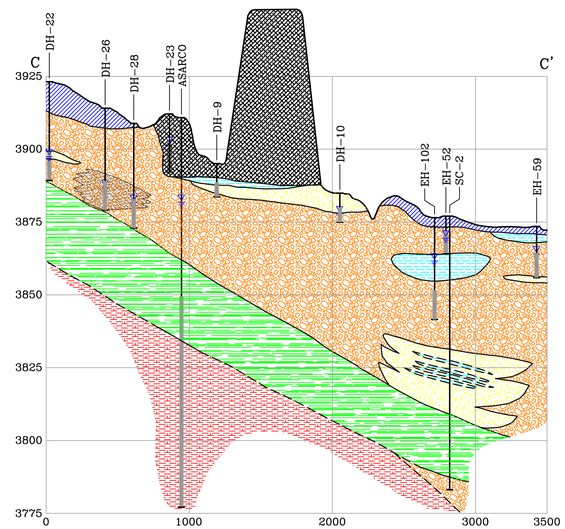

SECTION C – C'

SCALE: (H)1"=500' (V)1"=25'

LEGEND

DH-3 — WELL IDENTIFICATION

TOP OF WELL

GEOLOGIC CONTACT (DASHED WHERE INFERRED)

MONITORING WELL OR BORING

WATER LEVEL

SCREEN INTERVAL

TOTAL DEPTH OF WELL OR BORING

SLAG, AN IRON–ZINC RICH SILICA SMELTING BY–PRODUCT PLACED WHILE IN MOLTEN STATE.

FILL COMMONLY CONSISTS OF INTERMIXED SAND, SILT, CLAY AND GRAVEL. OFTEN INCLUDES WASTE CONSTITUENTS INCLUDING BRICKS, WOOD, COBBLES AND OTHER DEBRIS.

SHALLOW, FINE–GRAINED DEPOSITS CONSISTING OF INORGANIC SILTS AND CLAYS. THIS UNIT ALSO CONSISTS OF ORGANIC, BLACK, SOFT, LOW–DENSITY CLAYS, SILTS AND PEAT BENEATH UPPER LAKE, AND LOWER LAKE; AND NEAR WELLS DH–4, DH–5, DH–9 AND DH–29.

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BLACK–GRAY HYDROCARBON STAINING OBSERVED AT SEVERAL SMELTER SITE LOCATIONS. STAINING ALONG WITH OBSERVED PETROLEUM LIKE ODORS ARE PRESUMED INDICATIVE OF MAN–MADE ORGANIC CONTAMINATION.

SHALE BEDROCK.

ASARCO INCORPORATED

CURRENT CONDITIONS/ RELEASE ASSESSMENT

GEOLOGIC CROSS SECTIONS
A–A', B–B', & C–C'

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Consulting Scientists, Engineers, and Contractors
Helena, Montana
2727 Airport Road (406) 443-4150

EXHIBIT
4–4–1

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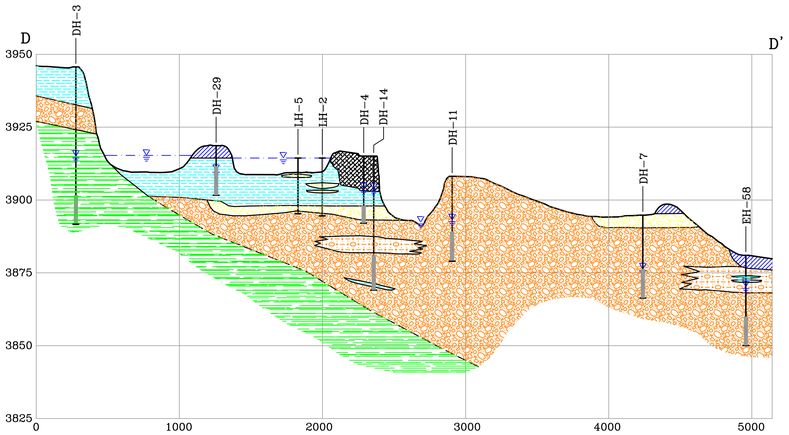
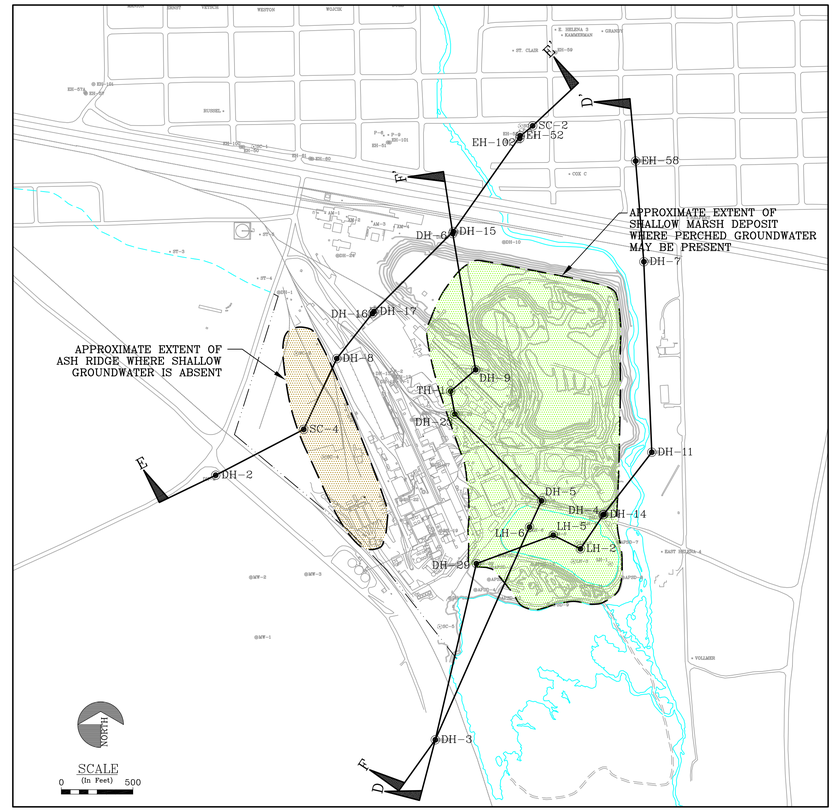


SECTION D – D'

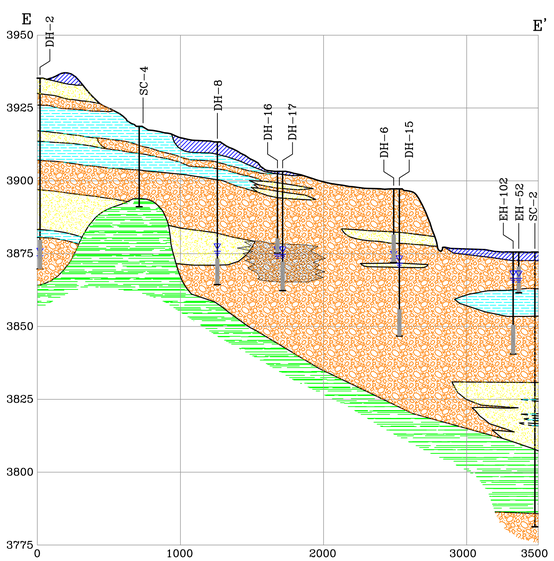
SCALE: (H)1"=500' (V)1"=25'



PLAN VIEW

SCALE: 1"=500'

SHOWING CROSS-SECTION LOCATIONS, APPROXIMATE EXTENT OF SHALLOW MARSH DEPOIST AND EXTENT OF ASH RIDGE



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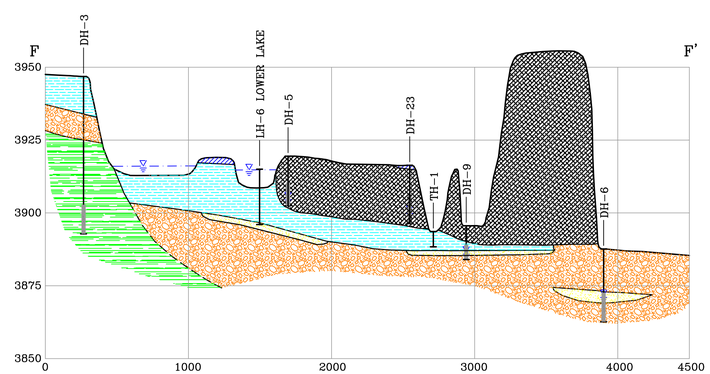

SECTION F – F'

SCALE: (H)1"=500' (V)1"=25'

LEGEND

DH-3 — WELL IDENTIFICATION

TOP OF WELL

GEOLOGIC CONTACT (DASHED WHERE INFERRED)

MONITORING WELL OR BORING

WATER LEVEL

SCREEN INTERVAL

TOTAL DEPTH OF WELL OR BORING

SLAG, AN IRON–ZINC RICH SILICA SMELTING BY–PRODUCT PLACED WHILE IN MOLTEN STATE.

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ASARCO INCORPORATED

CURRENT CONDITIONS/ RELEASE ASSESSMENT

GEOLOGIC CROSS SECTIONS
D–D', E–E', & F–F'

Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors
Helena, Montana
2727 Airport Road (406) 443-4150

EXHIBIT
4–4–2

UPDATE TIME: 10:34AM
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UPDATE: TUE, 3:43 PM
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LEGEND

- LOS-SS3 PHASE 2 SURFACE SOIL SAMPLE SITE
- RFI2SB-07 PHASE 2 SOIL BORING
- DH-76 PHASE 2 RFI MONITORING WELL
- DH-69 OTHER MONITORING WELL
- PZ102 PIEZOMETER
- DH-43 ABANDONED MONITORING WELL
- PPC-7 SURFACE WATER MONITORING LOCATION

NORTH

SCALE
(In Feet)
300 0 300 600 900

Hydrometrics, Inc.
Consulting Scientists and Engineers
Helena, Montana 59601
3020 Bozeman Avenue
(406) 443-4150

PHASE II RFI SITE CHARACTERIZATION REPORT FOR THE EAST HELENA FACILITY

PHASE II RFI SAMPLING LOCATIONS AND SITE FEATURES

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AUTOCAD 2000 DRAWING (DWG)
EXHIBIT
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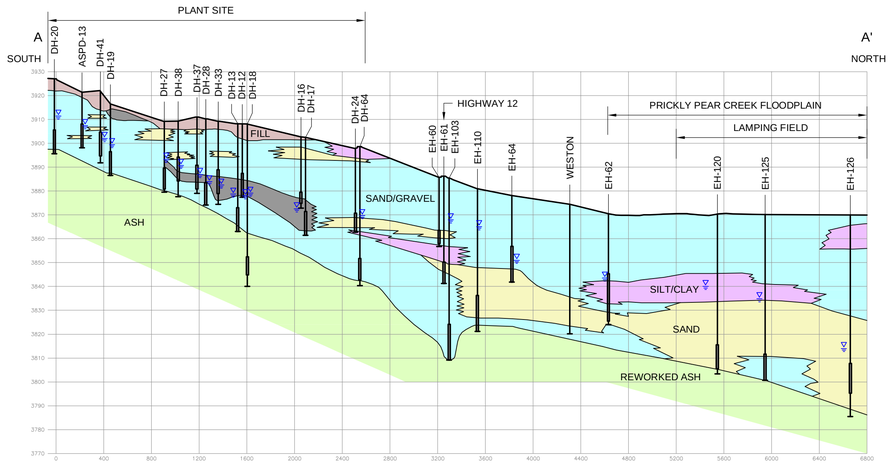
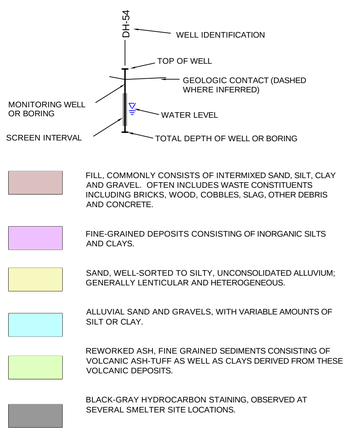
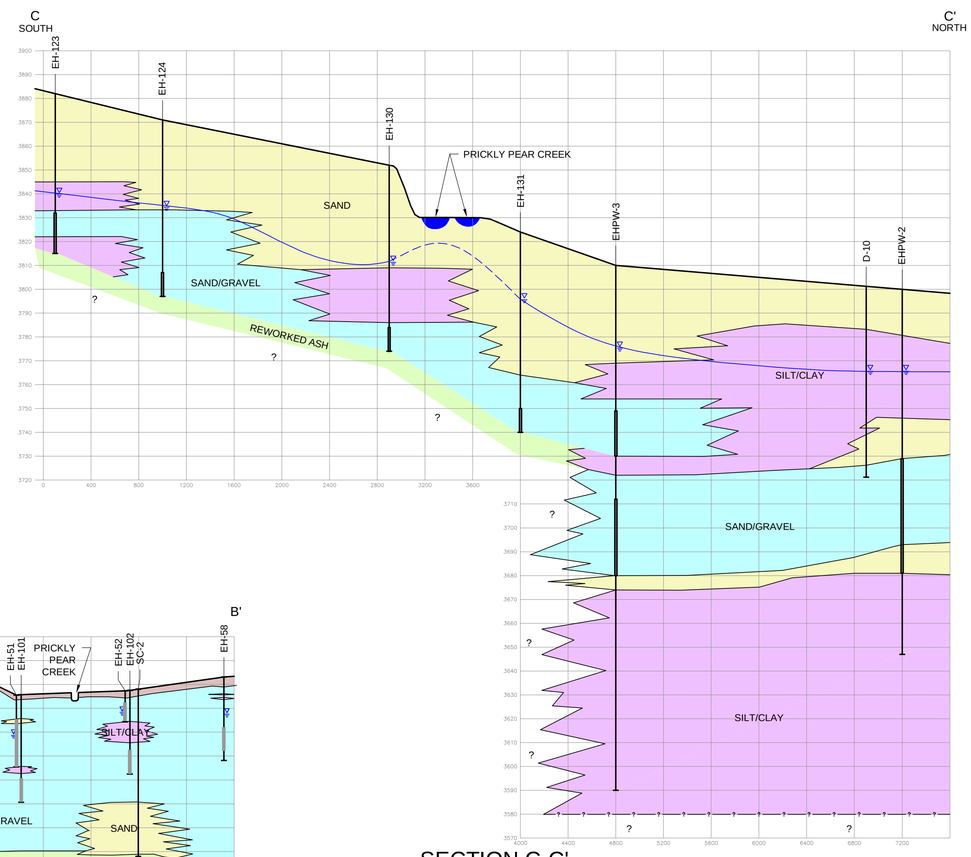


SECTION A-A'

SCALE: (H) 1"=600' (V) 1"=30'

LEGEND





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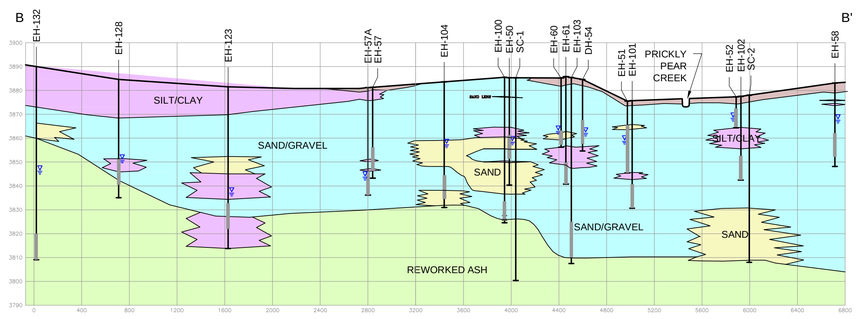

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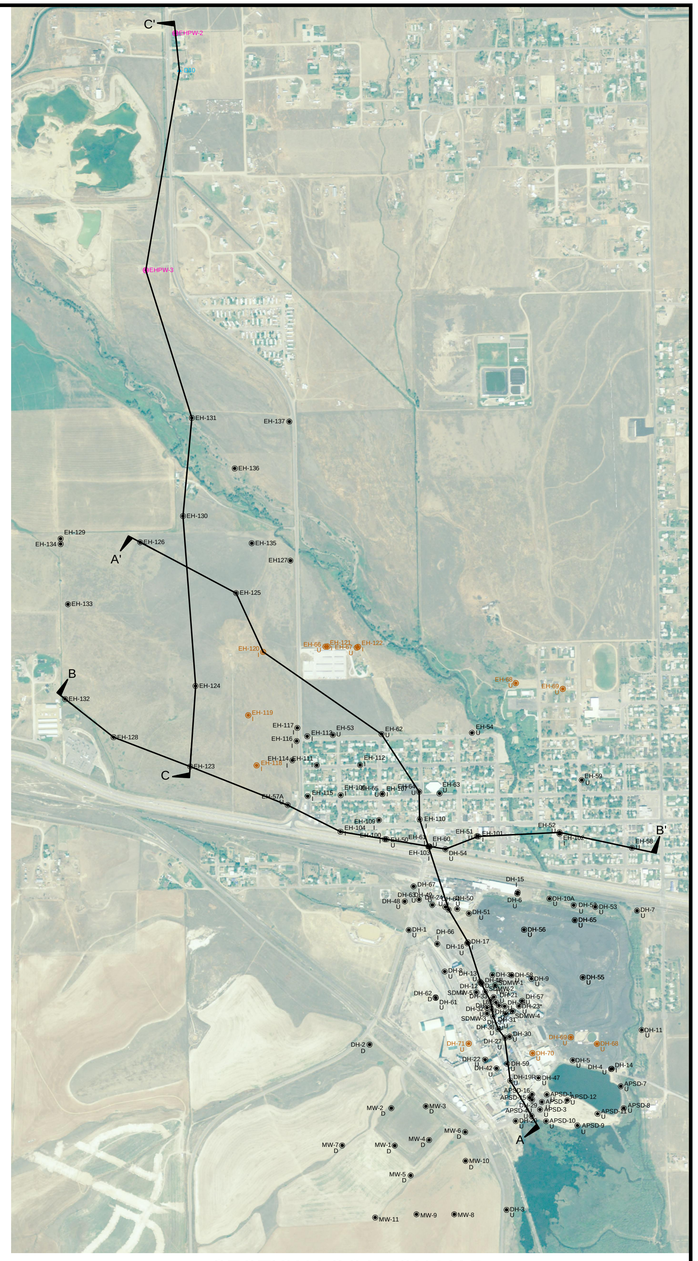

SECTION LOCATION MAP

SCALE: 1"=800'

Hydrometrics, Inc.
Consulting Scientists and Engineers
Helena, Montana 59601
3020 Bozeman Avenue
(406) 443-4150

PHASE II RCRA FACILITY INVESTIGATION
SITE CHARACTERIZATION WORK PLAN
ASARCO EAST HELENA FACILITY

GEOLOGIC CROSS SECTIONS

DRAWING FILE NUMBER
105408H009
AUTOCAD 2000 DRAWING (DWG)
EXHIBIT
3

UPDATE TIME: 12:18 PM
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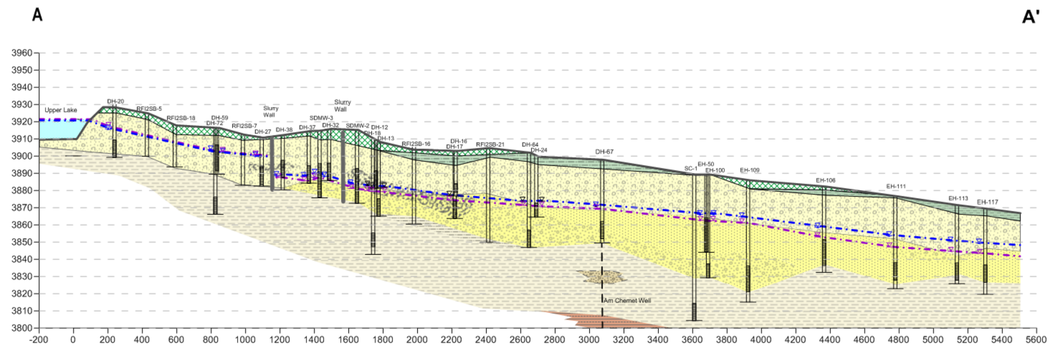
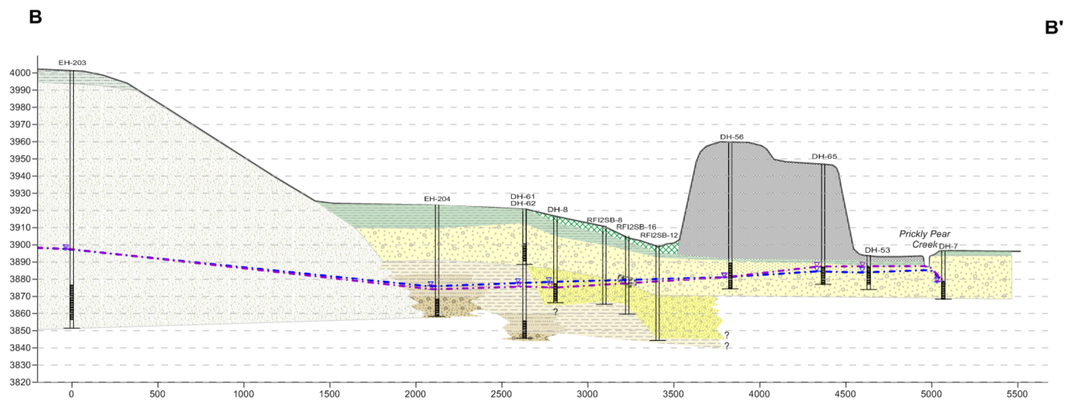
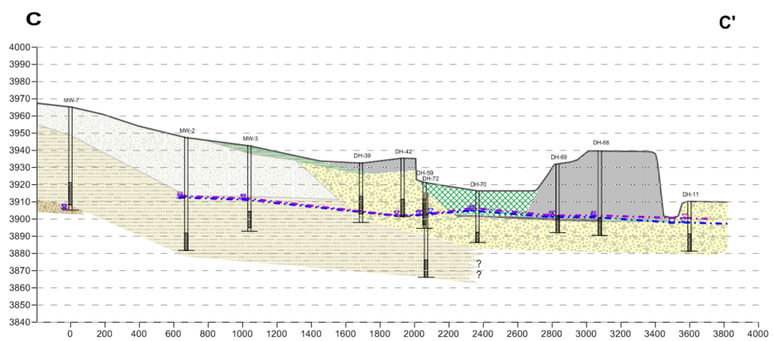
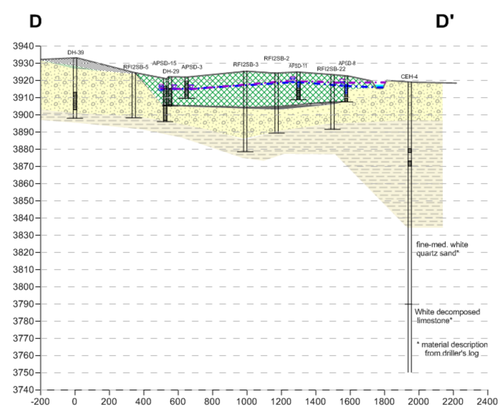




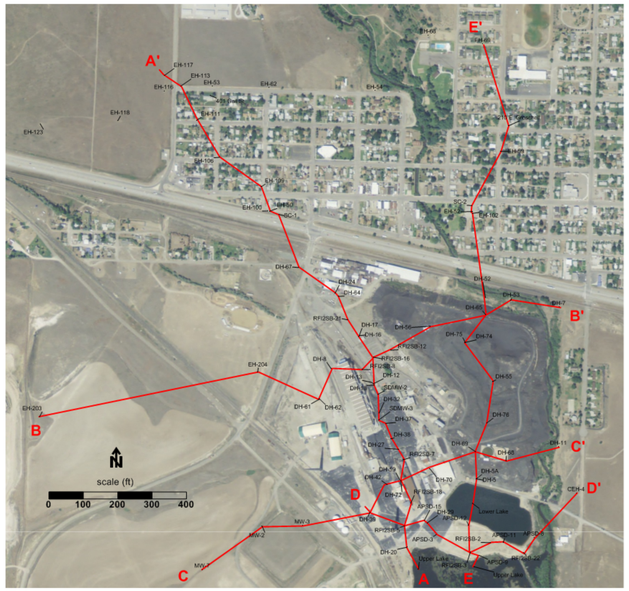


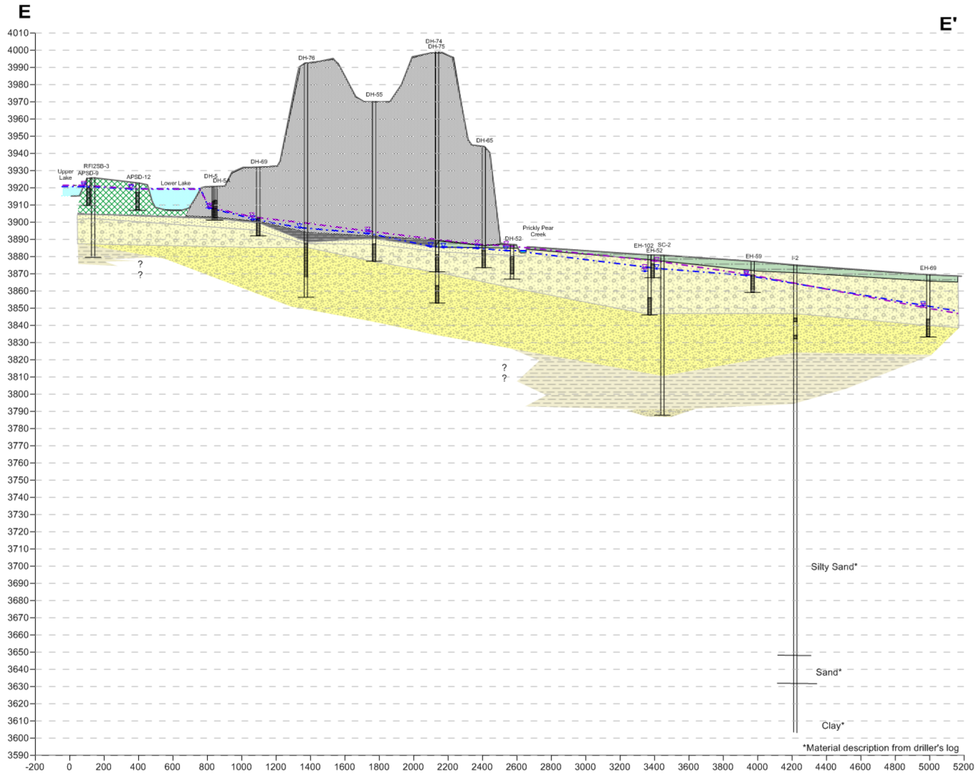


LEGEND

- Slag
- Fill
- Holocene Silt
- Holocene Organic Silt (marsh/wetland sediments)
- Quaternary Sand & Gravel
- Quaternary/Tertiary Sand
- Quaternary/Tertiary Silty Sand & Gravel
- Undifferentiated Tertiary Silt, Silty Sand & Silty Gravel
- Tertiary volcaniclastic Silt/Clay unit (weathered and/or reworked ash deposits)
- Tertiary interlayered F.Sand & volcaniclastic Silt/Clay
- Tertiary Sand & Gravel
- "Burnt Shale" (as described in drillers log, typically refers to indurated clay)
- Hardrocarbon stained soils
- June 2010 static water level
- October 2010 static water level

Cross Section Scale
Horiz. Scale 1"=400 ft, Vert. Scale 1"=40 ft





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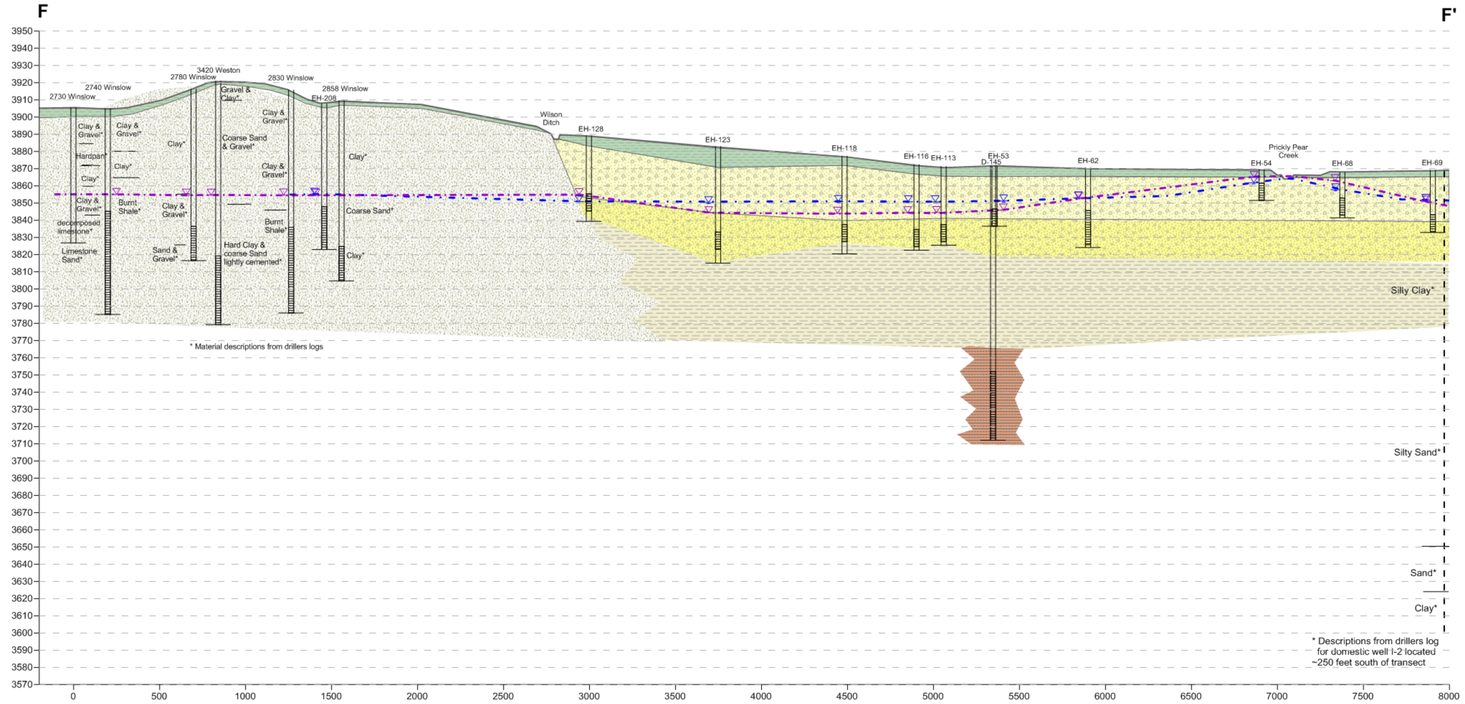
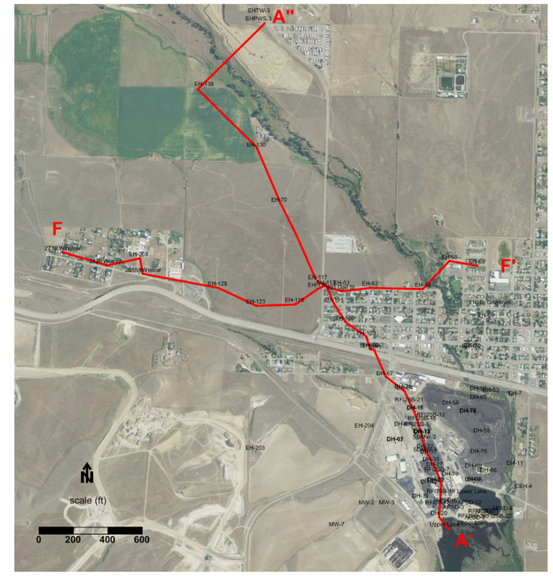
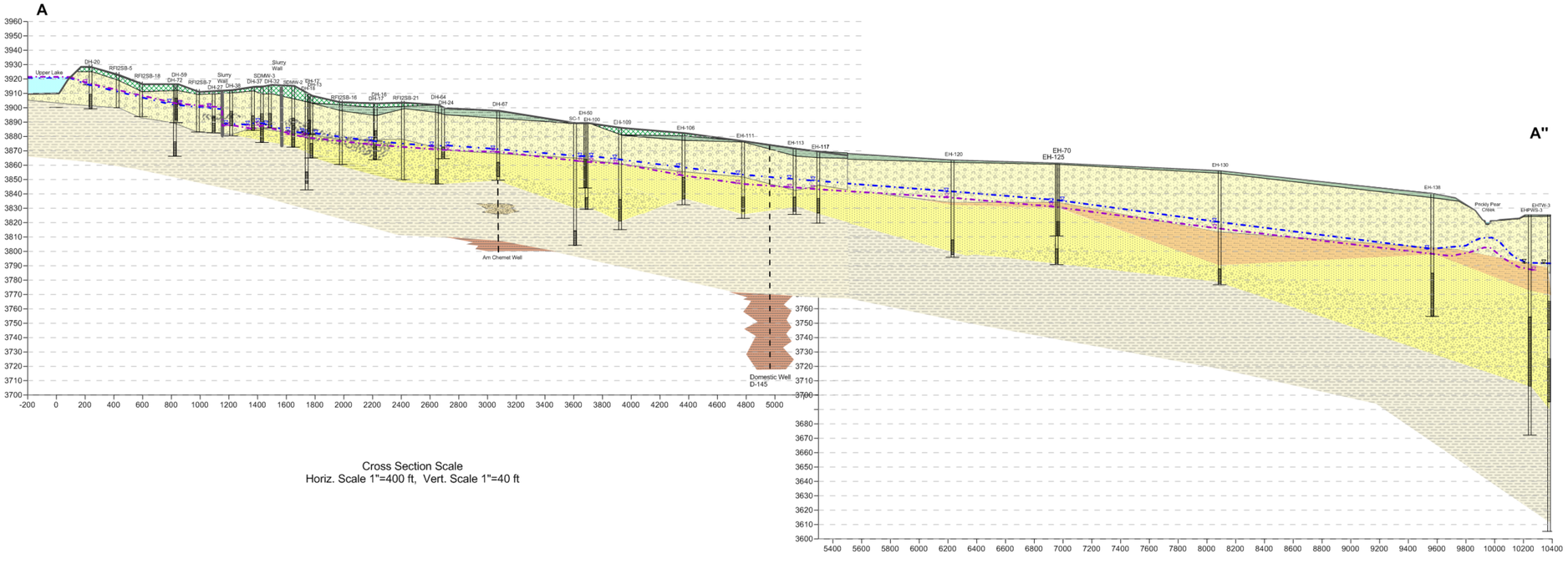
PHASE II RCRA FACILITY INVESTIGATION
SITE CHARACTERIZATION REPORT FOR
THE EAST HELENA FACILITY

GEOLOGIC CROSS SECTIONS

EXHIBIT
3-1







Cross Section Scale
Horiz. Scale 1"=400 ft, Vert. Scale 1"=40 ft

LEGEND

- Slag
- Fill
- Holocene Silt
- Quaternary Sand & Gravel
- Quaternary/Tertiary Silty Sandy Clay
- Quaternary/Tertiary Sand
- Quaternary/Tertiary Silty Sand & Gravel
- Undifferentiated Tertiary Silt Sand & Gravel
- Tertiary Volcaniclastic Silt/Clay Unit (weathered ash)
- Tertiary interlayered F.Sand & Volcaniclastic Silt/Clay
- Tertiary Sand & Gravel
- "Burnt Shale" (material description in well log typically used to refer to a consolidated clay)
- Hardrocarbon stained soils
- June 2010 static water level
- October 2010 static water level

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PHASE II RCRA FACILITY INVESTIGATION
SITE CHARACTERIZATION REPORT FOR
THE EAST HELENA FACILITY

GEOLOGIC CROSS SECTIONS

EXHIBIT
3-2

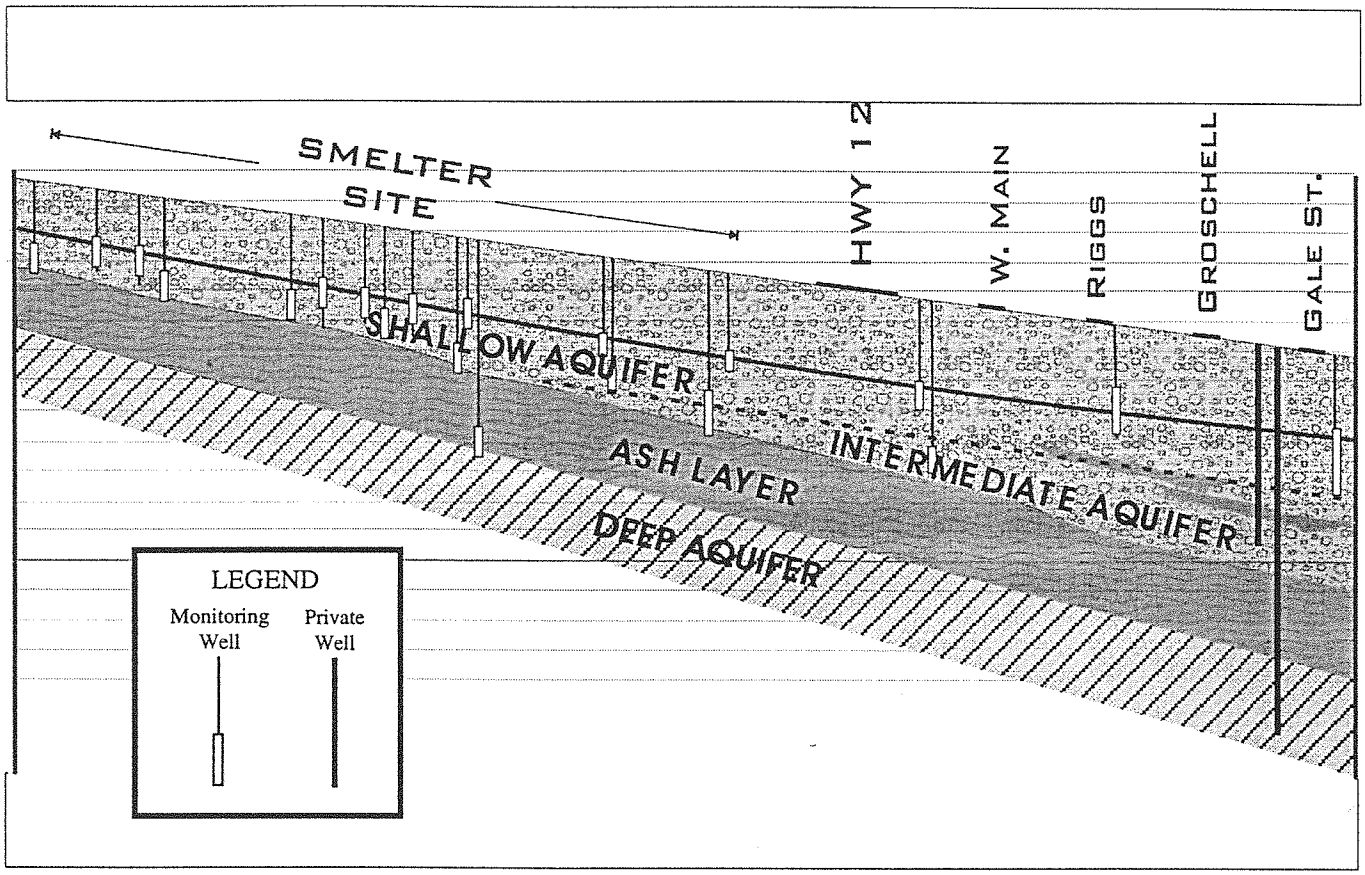

Figure 2. GENERALIZED GEOLOGIC CROSS SECTION