

## Corrective Action Plan Preparation Example Release Event for a Gas Station: Part 1

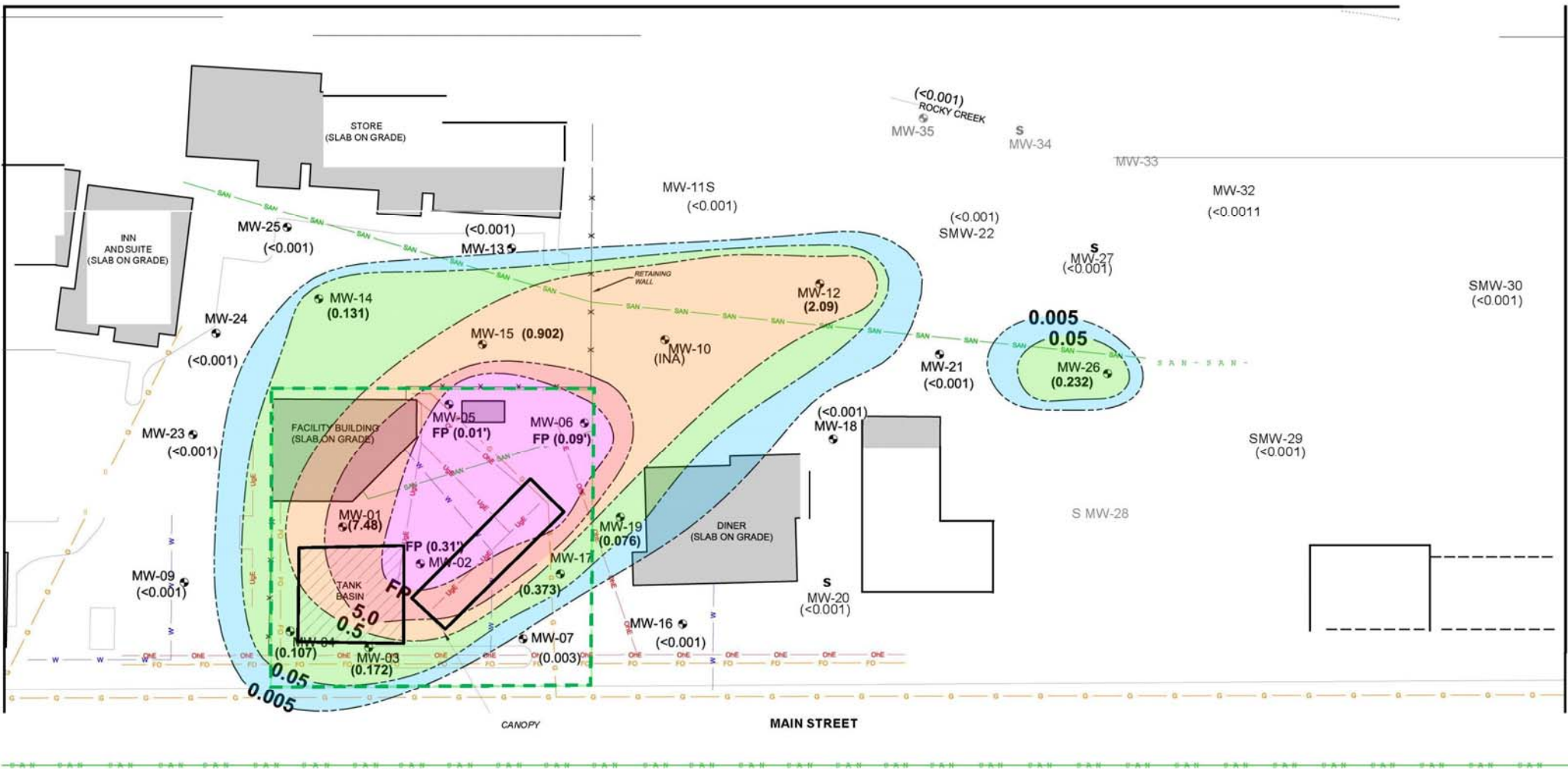
Activity: Familiarize yourself with the attached data for the site whose characteristics are listed below. Use the maps, data and cross-sections to plot and interpret your answers to identify on the CAP Concerns table 1) is a given contaminant concern present? and 2) have you identified the treatment zones? Later today, you will submit the completed CAP Concerns table to [cdle\\_remediation@state.co.us](mailto:cdle_remediation@state.co.us).

### Site Assessment Summary

- Release discovered from failed annual line tightness test
- Source was identified as failed primary RUL line in flex hose at the STP
- Failed line was repaired and passed tightness test
- The precise release date and quantity of gasoline released is unknown
- Utilities range from 3 to 6 feet below ground surface (ft bgs)
- Mountain lithology required ODEX drilling for site assessment
- Lithology is gravelly sand with cobbles and boulders to bedrock at 30 ft bgs
- Depth to GW is 19 to 21 ft bgs with ENE hydraulic gradient
- LNAPL  $T_n$  tests yielded values of 4.19 ft<sup>2</sup>/day for MW-2, 3.83 ft<sup>2</sup>/day for MW-5, and 7.35 ft<sup>2</sup>/day for MW-6 (all above minimum ITRC LNAPL recoverable range)
- No domestic, irrigation, or water supply wells impacted or potentially impacted
- Rocky Creek is a losing stream located north of the facility
- Soil gas data and vapor assessment eliminated both vapor exposure pathways
- MTBE pathway eliminated based on no detections above the Tier I RBSL

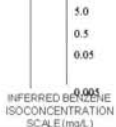
### Exercise Information Provided

- CAP Preparation Table to Define Contaminant Concerns/Remedial Objectives
- LNAPL and Dissolved Benzene Plume Map
- Groundwater Elevation Map
- Site Assessment Data Tables (soil, groundwater/LNAPL, surface water)
- SW-NE Geologic Cross Section
- NW-SE Geologic Cross Section



**LEGEND**

- SMW-01 MONITORING WELL
- INFERRED BENZENE ISOCONCENTRATION CONTOUR (mg/L)
- (INA) INACCESSIBLE
- FP (0.007) FREE PRODUCT THICKNESS



NOTE: **BOLD** VALUES INDICATE CONCENTRATION EXCEEDS THE RISK BASED SCREENING LEVEL

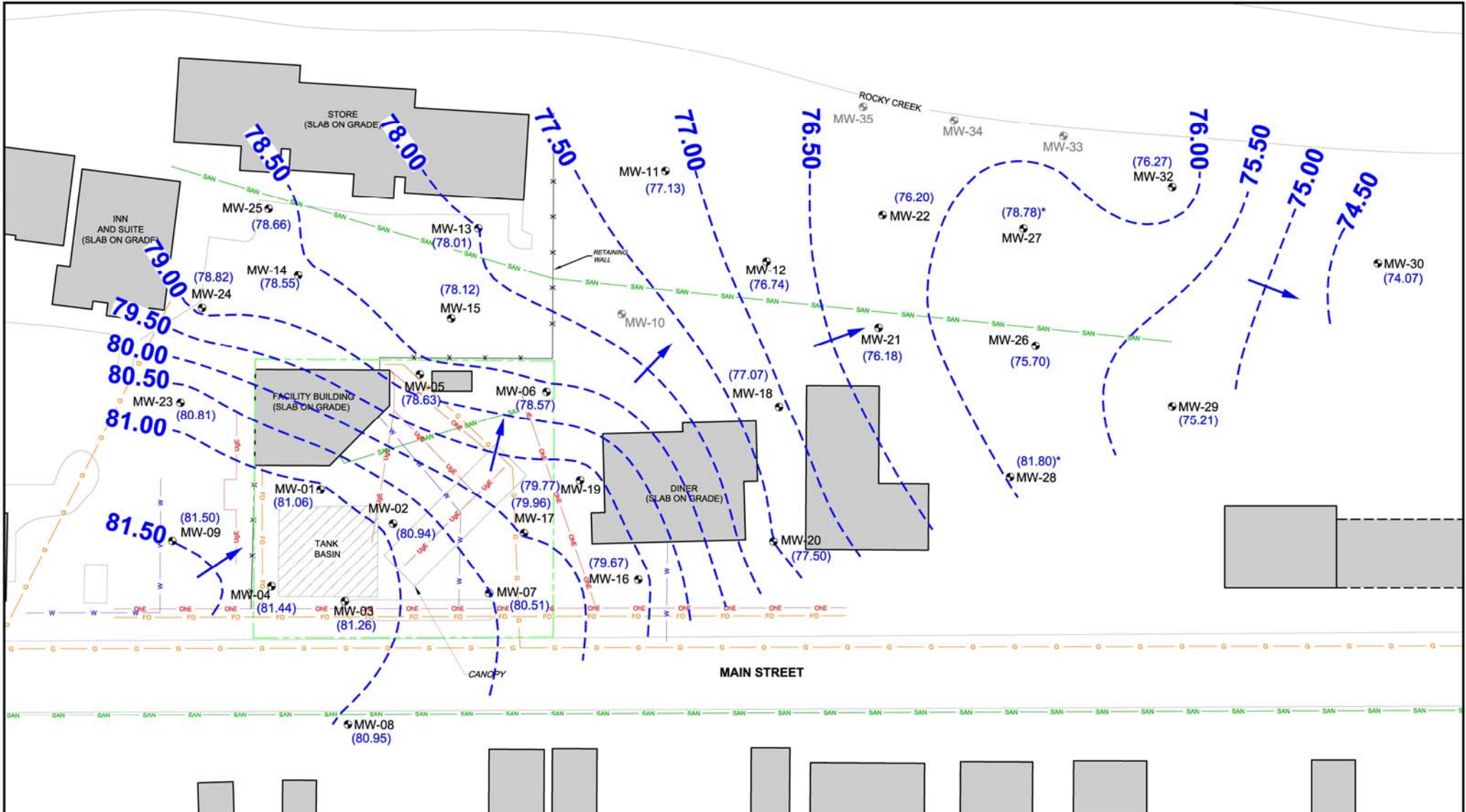
- FENCE LINE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND WATER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND FIBER OPTICS LINE
- UNDERGROUND ELECTRIC



**INFERRED BENZENE ISOCONCENTRATION FIGURE**

FRONT RANGE GAS STATION  
123 MAIN STREET  
EVERYTO, N, COLORADO

PROJECT:	DRAFT:
DATE:	REVIEW:



**LEGEND**

- MW-01 MONITORING WELL
- - - INFERRED GROUNDWATER CONTOUR
- (5280.10) GROUNDWATER ELEVATION (FEET)
- INFERRED FLOW DIRECTION
- NOTE: \* DENOTES ANOMALOUS DATA NOT USED TO CREATE CONTOURS
- x FENCE LINE
- OHE OVERHEAD ELECTRIC LINE
- W UNDERGROUND WATER LINE
- G UNDERGROUND GAS LINE
- SAN SANITARY SEWER LINE
- APPROXIMATE PROPERTY BOUNDARY
- FO UNDERGROUND FIBER OPTICS LINE
- UGE UNDERGROUND ELECTRIC



**NORTH**  
 0 10 20 30 40  
 SCALE IN FEET

**GROUNDWATER ELEVATION FIGURE**

FRONT RANGE GAS STATION  
 123 MAIN STREET  
 EVERYTOWN, COLORADO

PROJECT:	DRAFT:
DATE:	REVIEW:

## FRONT RANGE GAS STATION

### Soil Data

Sample Location	Sample Date	Sample Rationale	Sample Depth (ft)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl-benzene (mg/Kg)	Xylenes (mg/Kg)	TVPH (mg/Kg)	TEPH (mg/Kg)
MW-01	03/15/16	Define Extent	20.0	<0.010	<0.010	<0.010	0.029	27.5	22.3
MW-02	03/15/16	Define Extent	23.0	<0.010	<0.010	0.247	2.090	129.0	94.5
MW-03	03/16/16	Define Extent	22.0	<0.010	<0.010	<0.010	<0.010	5.5	10.5
MW-04	03/16/16	Define Extent	20.0	<0.010	<0.010	0.012	0.216	119.0	53.1
MW-05	05/09/16	Define Extent	20.0	<0.010	0.032	0.169	1.730	52.9	38.6
MW-06	05/10/16	Define Extent	20.0	<0.010	<0.010	0.027	<0.010	35.6	31.9
MW-07	05/10/16	Define Extent	20.0	<0.010	<0.010	<0.010	0.044	5.3	<10.0
MW-08	05/11/16	Define Extent	20.0	<0.010	<0.010	<0.010	<0.010	<0.50	<10.0
MW-09	05/11/16	Define Extent	20.0	<0.010	<0.010	<0.010	<0.010	<0.50	<10.0
MW-10	05/23/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	<0.50	<10.0
MW-10	05/23/16	Define Extent	25.0	0.022	<0.010	0.014	<0.010	<0.50	<10.0
MW-11	05/23/16	Define Extent	10.0	<0.010	<0.010	<0.010	<0.010	<0.50	<10.0
MW-11	05/23/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	<0.50	14.9
MW-12	06/28/16	Define Extent	20.0	<0.010	<0.010	<0.010	<0.010	<0.50	<10.0
MW-13	06/28/16	Define Extent	10.0	<0.010	<0.010	<0.010	<0.010	<0.50	50.6
MW-14	06/28/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	0.6	20.4
MW-15	06/29/16	Define Extent	15.0	<0.010	0.010	<0.010	0.022	2.6	16.4
MW-16	06/29/16	Define Extent	25.0	<0.010	<0.010	<0.010	<0.010	<0.50	<10.0
MW-17	08/02/16	Define Extent	20.0	<0.010	0.058	0.420	2.360	42.7	
MW-18	08/02/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	7.6	
MW-19	08/03/16	Define Extent	20.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-20	08/03/16	Define Extent	5.0	<0.010	<0.010	<0.010	<0.010	15.8	
MW-20	08/03/16	Define Extent	20.0	<0.010	<0.010	<0.010	<0.010	1.4	
MW-23	08/03/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	2.4	
MW-21	08/04/16	Define Extent	10.0	<0.010	<0.010	<0.010	<0.010	1.6	
MW-21	08/04/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-22	08/04/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	0.6	
<b>Surficial Soil Tier I RBSLs &amp; TPH Threshold (mg/Kg)</b>				<b>2.8</b>	<b>4,000</b>	<b>2,100</b>	<b>10,000</b>	<b>500</b>	<b>500</b>
<b>Subsurface Soil Tier I RBSLs &amp; TPH Threshold (mg/Kg)</b>				<b>0.26</b>	<b>140</b>	<b>190</b>	<b>260</b>	<b>500</b>	<b>500</b>

<b>Sample Location</b>	<b>Sample Date</b>	<b>Sample Rationale</b>	<b>Sample Depth (ft)</b>	<b>Benzene (mg/Kg)</b>	<b>Toluene (mg/Kg)</b>	<b>Ethyl-benzene (mg/Kg)</b>	<b>Xylenes (mg/Kg)</b>	<b>TVPH (mg/Kg)</b>	<b>TEPH (mg/Kg)</b>
MW-24	08/04/16	Define Extent	5.0	<0.010	<0.010	<0.010	<0.010	1.7	
MW-25	08/04/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	1.9	
MW-26	08/22/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-27	08/22/16	Define Extent	15.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-29	11/08/16	Define Extent	20.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-30	11/08/16	Define Extent	5.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-32	11/08/16	Define Extent	5.0	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-33	11/08/16	Define Extent	2.5	<0.010	0.031	0.002	0.014	<0.50	
MW-34	11/08/16	Define Extent	2.5	<0.010	<0.010	<0.010	<0.010	<0.50	
MW-35	11/08/16	Define Extent	2.5	<0.010	<0.010	<0.010	<0.010	<0.50	
<b>Surficial Soil Tier I RBSLs &amp; TPH Threshold (mg/Kg)</b>				<b>2.8</b>	<b>4,000</b>	<b>2,100</b>	<b>10,000</b>	<b>500</b>	<b>500</b>
<b>Subsurface Soil Tier I RBSLs &amp; TPH Threshold (mg/Kg)</b>				<b>0.26</b>	<b>140</b>	<b>190</b>	<b>260</b>	<b>500</b>	<b>500</b>

## FRONT RANGE GAS STATION

### Groundwater and LNAPL Data

Bold type indicates exceedence of Tier I RBSL

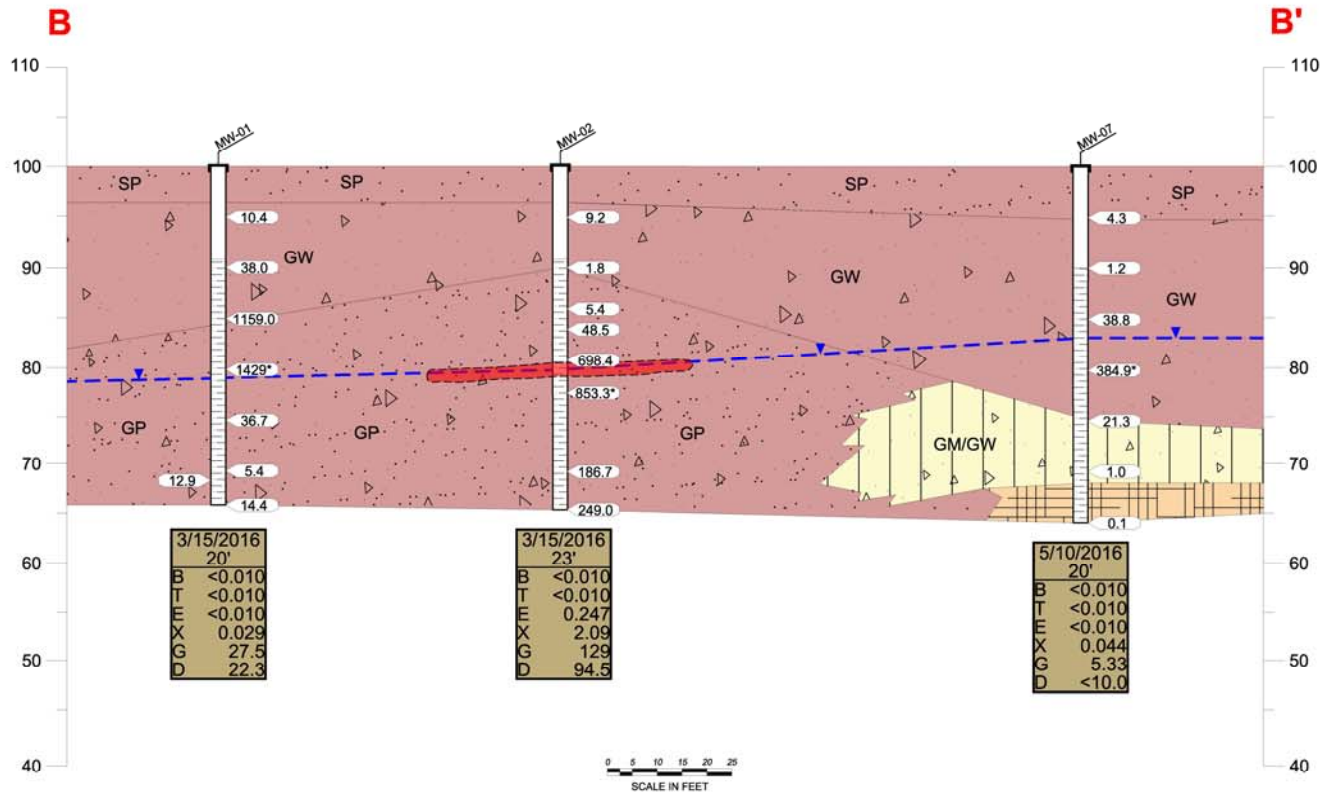
Well ID	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	TVPH (mg/L)	TEPH (mg/L)	GW Elev (ft)	Depth to GW (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	LNAPL Transmissivity [Tn] (ft <sup>2</sup> /day)
MW-01	03/16/16	<b>1.4300</b>	<b>2.2700</b>	0.6460	<b>3.5900</b>	<0.001	29.40	19.70	80.62	19.38			
MW-01	05/19/16								82.10	17.90			
MW-01	07/26/16	<b>7.4800</b>	<b>4.1400</b>	<b>0.7170</b>	<b>4.2500</b>	<0.001	44.60		81.06	17.38			
MW-02	03/16/16	<b>1.2400</b>	<b>2.4900</b>	<b>1.3200</b>	<b>6.0900</b>	<0.001	42.60	27.10	80.13	19.79			
MW-02	05/19/16								81.84	18.09	18.08	0.01	4.19
MW-02	07/26/16								80.94	17.66	17.35	0.31	
MW-02	08/22/16								81.63	18.31	18.28	0.03	
MW-03	03/16/16	<b>0.0340</b>	0.1020	0.0340	0.1680	<0.001	2.56	5.04	80.67	20.17			
MW-03	05/19/16								82.21	18.63			
MW-03	07/26/16	<b>0.1720</b>	0.0030	<0.001	0.0610	<0.001	1.05		81.26	18.06			
MW-04	03/16/16	<b>0.1740</b>	0.6470	0.5340	3.2000	<0.001	18.20	16.10	80.57	20.34			
MW-04	05/19/16								82.43	18.48			
MW-04	07/26/16	<b>0.1070</b>	0.0650	0.1120	0.6380	<0.001	6.78		81.44	17.93			
MW-05	05/11/16								79.30	20.20	20.08	0.12	3.83
MW-05	05/19/16								79.64	19.78	19.77	0.01	
MW-05	07/26/16								78.63	20.06	19.65	0.41	
MW-05	08/22/16								79.23	20.20	20.18	0.02	
MW-06	05/11/16								78.79	19.71	18.91	0.80	7.35
MW-06	05/19/16								79.27	19.23	18.43	0.80	
MW-06	07/26/16								78.57	18.34	18.25	0.09	
MW-06	08/22/16								79.09	19.10	18.72	0.38	
MW-07	05/11/16	<b>0.1640</b>	0.0880	0.0310	0.1950	<0.001	1.63	<1.0	81.11	18.93			
MW-07	05/19/16								81.38	18.66			
MW-07	07/26/16	0.0030	<0.001	<0.001	0.0010	<0.001	<0.50		80.51	18.16			
MW-08	05/11/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50	<1.0	81.49	18.16			
MW-08	05/19/16								81.77	17.88			
MW-08	07/26/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50		80.95	17.36			
MW-09	05/11/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50	<1.0	82.49	17.42			
MW-09	05/19/16								82.73	17.18			
MW-09	07/26/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50		81.50	16.63			
MW-10	05/23/16	<b>2.1800</b>	0.0730	0.1110	0.0070	<0.001	5.42		78.84	17.68			
<b>Tier I RBSLs (mg/L)</b>		<b>0.005</b>	<b>1.0</b>	<b>0.7</b>	<b>1.4</b>	<b>0.020</b>	<b>N/A</b>	<b>N/A</b>	<b>Minimum Tn recoverable range: 0.2-0.8 ft<sup>2</sup>/day</b>				

Well ID	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	TVPH (mg/L)	TEPH (mg/L)	GW Elev (ft)	Depth to GW (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	LNAPL Transmissivity; Tn (ft <sup>2</sup> /day)
MW-10	07/26/16												
MW-11	05/23/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50		78.45	15.91			
MW-11	07/26/16	<0.001	0.0010	<0.001	0.0030	<0.001	<0.50		77.13	16.21			
MW-12	06/29/16	<b>0.8870</b>	<b>3.3900</b>	<b>0.7330</b>	<b>3.8000</b>	<0.001	33.10	2.80	78.94	16.65			
MW-12	07/26/16	<b>2.0900</b>	<b>5.9700</b>	<b>1.0100</b>	<b>4.0400</b>	<0.001	54.00		76.74	17.86			
MW-13	06/29/16	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50	<1.0	80.20	12.60			
MW-13	07/26/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50		78.01	13.67			
MW-14	06/29/16	<b>1.3800</b>	<b>16.5000</b>	<b>2.4700</b>	<b>15.1000</b>	<0.001	160.00	17.20	80.72	12.70			
MW-14	07/26/16	<b>0.1310</b>	<b>12.9000</b>	<b>2.0100</b>	<b>13.4000</b>	<0.001	112.00		78.55	13.69			
MW-15	06/29/16	<b>2.7400</b>	<b>6.8900</b>	<b>1.0600</b>	<b>6.5000</b>	<0.001	74.70	15.30	80.33	13.42			
MW-15	07/26/16	<b>0.9020</b>	<b>1.1300</b>	0.3490	0.8080	<0.001	21.70		78.12	14.45			
MW-16	06/29/16	0.0040	<0.001	<0.001	<0.001	<0.001	<0.50	<1.0	81.07	17.75			
MW-16	07/26/16	<0.001	<0.001	<0.001	0.0010	<0.001	<0.50		79.67	17.98			
MW-17	07/26/16	<b>0.3730</b>	0.0960	0.2530	0.7530	<0.001			79.96	17.44			
MW-18	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001			77.07	18.66			
MW-19	07/26/16	<b>0.0760</b>	0.0030	0.0180	0.0060	<0.001			79.77	18.21			
MW-20	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001			77.50	19.27			
MW-21	07/26/16	<0.001	0.2450	0.0160	0.3180	<0.001			76.18	18.10			
MW-22	07/26/16	<0.001	0.3830	0.0670	0.5020	<0.001			76.20	15.13			
MW-23	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001			80.81	13.72			
MW-24	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001			78.82	14.08			
MW-25	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001			78.66	14.06			
MW-26	07/26/16	<b>0.2320</b>	0.0260	0.0160	0.0930	<0.001	0.88		75.70	16.47			
MW-27	07/26/16	<0.001	<0.001	<0.001	0.0090	<0.001	<0.50		78.78	15.72			
MW-29	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50		75.21	16.76			
MW-30	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50		74.07	2.83			
MW-32	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50		76.27	5.13			
MW-35	07/26/16	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50			4.16			
<b>Tier I RBSLs (mg/L)</b>		<b>0.005</b>	<b>1.0</b>	<b>0.7</b>	<b>1.4</b>	<b>0.020</b>	<b>N/A</b>	<b>N/A</b>	<b>Minimum Tn recoverable range: 0.2-0.8 ft<sup>2</sup>/day</b>				

**FRONT RANGE GAS STATION**  
**Surface Water Data for Rocky Creek**

<b>Sample ID</b>	<b>Sample Date</b>	<b>Benzene (mg/L)</b>	<b>Toluene (mg/L)</b>	<b>Ethyl- benzene (mg/L)</b>	<b>Xylenes (mg/L)</b>	<b>TVPH (mg/L)</b>
Rocky Creek	05/19/16	<0.001	<0.001	<0.001	0.0010	<0.50
Rocky Creek	07/26/16	<0.001	<0.001	<0.001	0.0010	<0.50
Rocky Creek	11/09/16	<0.001	<0.001	<0.001	0.0010	<0.50
Rocky Creek	02/06/17	<0.001	<0.001	<0.001	0.0010	<0.50





**LEGEND**

- APPROXIMATE GROUNDWATER TABLE AVERAGE ELEVATION
- 0.0 PID READING (ppm)

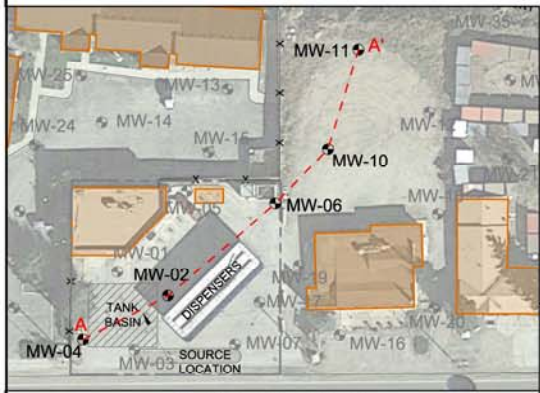
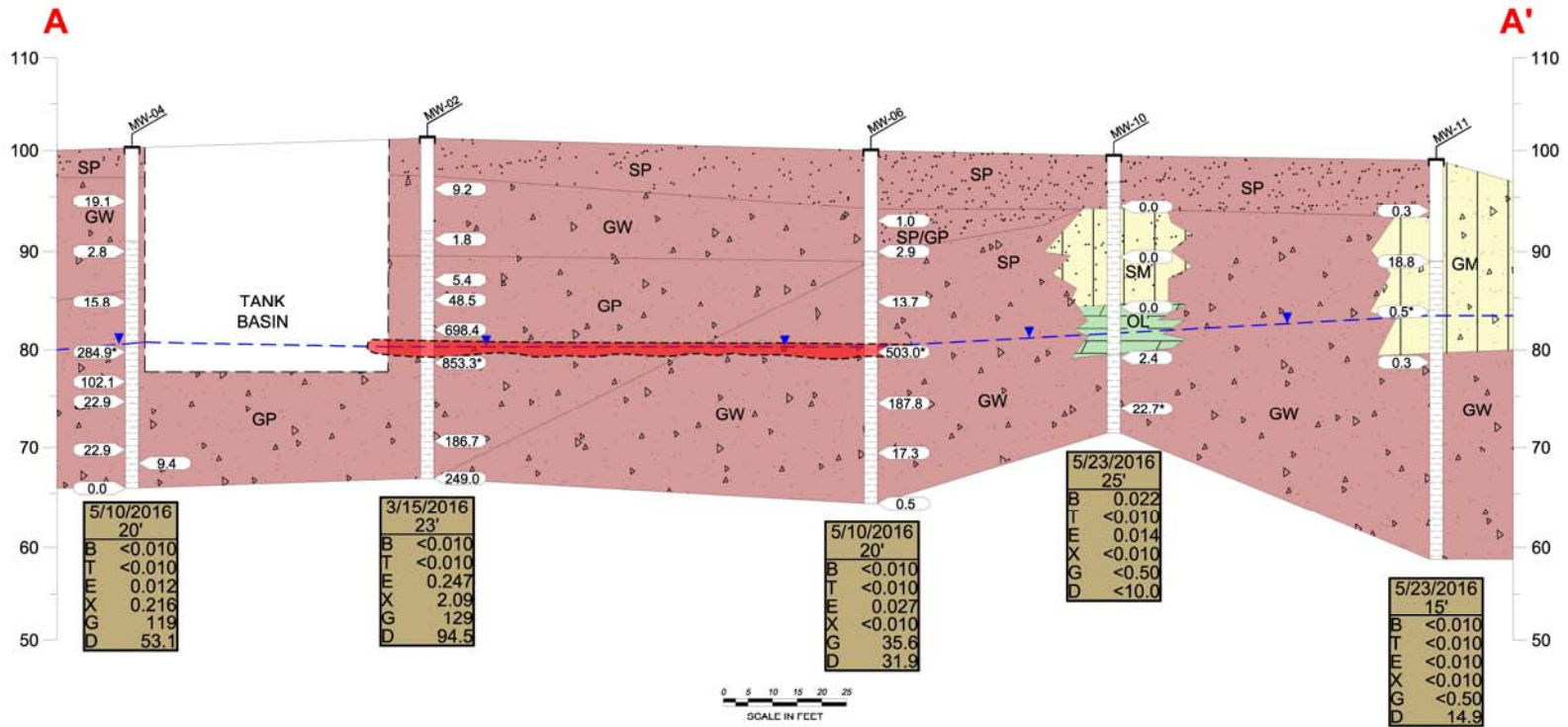
NOTE: \* DENOTES SAMPLE RETAINED FOR ANALYSIS

SAMPLE DATE	
B	BENZENE (mg/kg)
T	TOLUENE (mg/kg)
E	ETHYLBENZENE (mg/kg)
X	TOTAL XYLENES (mg/kg)
G	TOTAL VOLATILE PETROLEUM HYDROCARBONS AS GASOLINE (mg/kg)
D	TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS AS DIESEL (mg/kg)

- APPROXIMATE AREA OF FREE PHASE PLUME
- SILTY SAND WITH GRAVEL (GM/GW)
- BEDROCK
- SAND (SP)
- GRAVELLY SAND (GW)
- GRAVELLY SAND (GP)

**GEOLOGIC TRANSECT DIAGRAM (B-B')**

FRONT RANGE GAS STATION 123 MAIN STREET EVERYTOWN, COLORADO	
PROJECT:	DRAFT:
DATE:	REVIEW:



**LEGEND**  
 APPROXIMATE GROUNDWATER TABLE AVERAGE ELEVATION  
 0.0 PID READING (ppm)  
 NOTE: \* DENOTES SAMPLE RETAINED FOR ANALYSIS

SAMPLE DATE	SAMPLE DEPTH
B	BENZENE (mg/kg)
T	TOLUENE (mg/kg)
E	ETHYLBENZENE (mg/kg)
X	TOTAL XYLENES (mg/kg)
G	TOTAL VOLATILE PETROLEUM HYDROCARBONS AS GASOLINE (mg/kg)
D	TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS AS DIESEL (mg/kg)

- APPROXIMATE AREA OF FREE PHASE PLUME
- SILTY SAND WITH GRAVEL (GM)
- SAND SILT (OL)
- SAND (SP)
- GRAVELLY SAND (GW/GP)
- FINE SAND (SM)

**GEOLOGIC TRANSECT DIAGRAM (A-A')**

FRONT RANGE GAS STATION  
123 MAIN STREET  
EVERYTOWN, COLORADO

PROJECT:	DRAFT:
DATE:	REVIEW: