Project Management of Release Sites under (MRBCA)

- Site Characterization
- Risk Assessment (Human & Eco Receptors)
- Corrective Action
- Neighbor Notification
- Free Product Recovery
- Data base entry
- Deadline Tracking
- Answering phone calls

Step #1: Site Characterization

- Compile information about tank system
  - Installation dates, #s, sizes, materials, contents
- Compile chronology/summary of site events
  - Release discovery date, sampling dates, cleanup
- Conduct sampling to delineate contamination
  - Soil samples
  - Groundwater samples
  - Surface water samples
  - Soil vapor samples

Site Characterization (continued)

- **Soil sampling**

  - **Generally collected using split spoon or macro core**
  - **check boring logs for lithological descriptions, PID readings, well construction information, well registration, etc. Check for sampling from the correct depths**
  - **Check for analysis for all contaminants of concern (COCs) using proper analytical methods, & QA/QC**

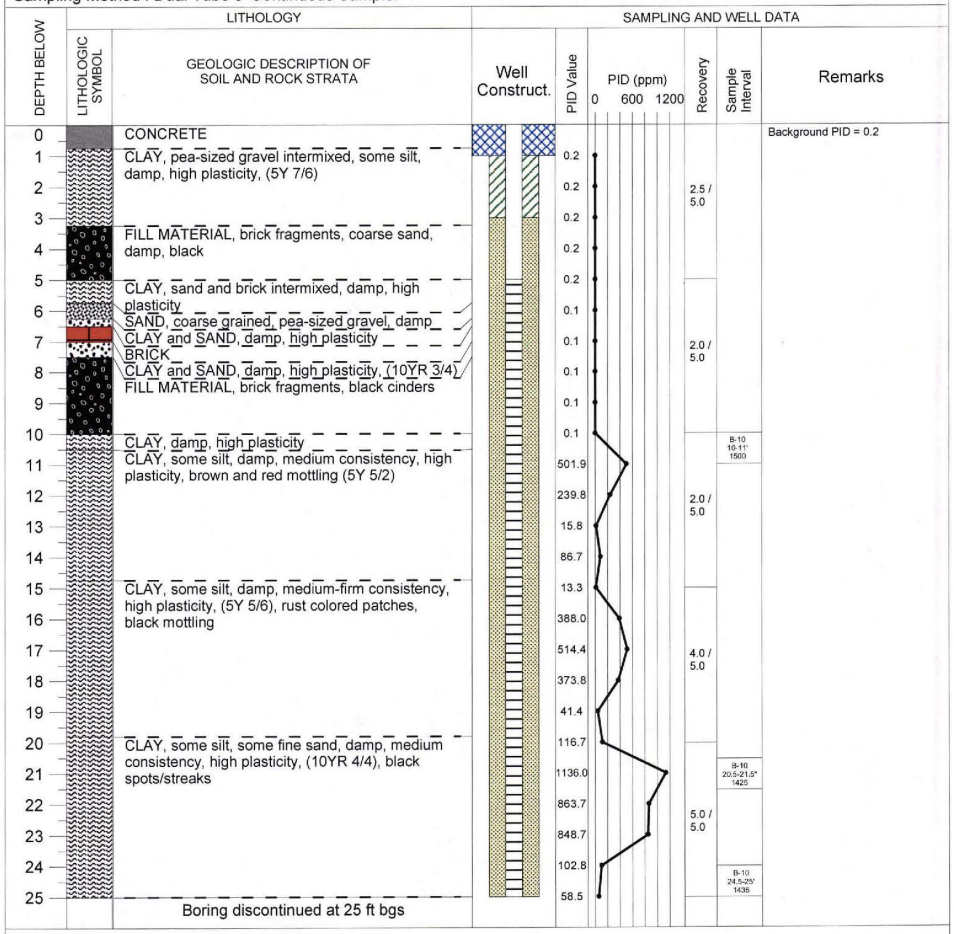
Soil Boring Log

ENVIRONMENTAL WORKS INC.
1731 Locust Street
Kansas City, Missouri 64108
Phone: 816-285-8410 Fax: 816-285-8409
www.environmentalworks.com

Boring Number: B-10 / MW-8

Project : Royal Liquors
Location : 801 Southwest Blvd.
City/State : Kansas City, Jackson, Missouri
Drilled By : Bill Platte, Paul Feld
Logged By : Jake Pfannenstiel
Drilling Method: 6620DT Geoprobe
Sampling Method : Dual Tube 5' Continuous Sampler

Project Number : 181669
Date Drilled : 10/25/2019
Inspected by : Jake Pfannenstiel
Drafted by : Teresa Beck
Boring Depth : 25 ft bgs



Notes :

Site Charcterization (Continued)

- Groundwater sampling
  - **Check for proper installation of monitoring wells (check well construction diagrams for screen placement & static water level)**
  - Check for well registration & variances
  - (Show example of a well construction diagram)
  - Check for all COCs, MDLs/RRLs, and data quality same as for soil samples
  - Check for disposal of well development and purge water

Well Certification/Construction Log

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY
(573) 368-2165

MONITORING WELL CERTIFICATION RECORD

REF NO 01008425	DATE RECEIVED 11/22/2019
CR NO	CHECK NO. ONLINE
STATE WELL NO A225234 12/04/2019	REVENUE NO. 112219
ENTERED 006620 PH1 PH2 PH3 11/22/2019 11/22/2019 11/22/2019	APPROVED BY
ROUTE	

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR
NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME ROYAL LIQUORS	CONTACT NAME ROYAL LIQUORS ROYAL LIQUORS		VARIANCE GRANTED BY DNR
OWNER ADDRESS 801 SOUTHWEST BLVD	CITY KANSAS CITY	STATE MO / ZIP 64108	NUMBER
SITE NAME ROYAL LIQUORS		WELL NUMBER MW-8	COUNTY JACKSON
SITE ADDRESS 801 SOUTHWEST BLVD		CITY KANSAS CITY	STATIC WATER LEVEL FT

SURFACE COMPLETION
TYPE: [ ] ABOVE GROUND [X] FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 1.0 FT. DIAMETER 8.0 IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 14.0 IN. LENGTH 1.0 FT.

SURFACE COMPLETION GROUT: [X] CONCRETE [ ] OTHER

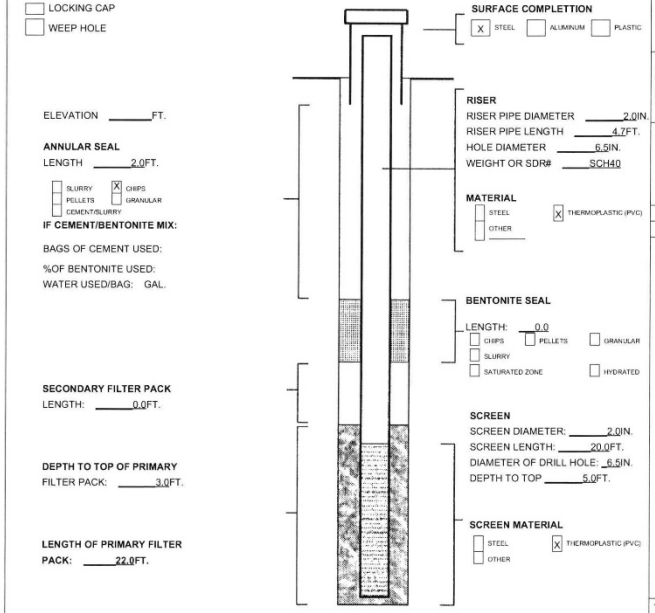
COPY

LOCATION OF WELL
LAT. 39 ° 5' 2.1"
LONG. 94 ° 35' 39.78"

SMALLEST ____ 1/4 ____ 1/4 LARGEST ____ 1/4
SEC. 7 TWN. 49 NORTH
RANGE 33 Direction W

MONITORING FOR:
[ ] RADIONUCLIDES [ ] PETROLEUM PRODUCTS ONLY
[ ] EXPLOSIVES [ ] METALS [ ] VOC
[ ] SVOCS [ ] PESTICIDES/HERBICIDES

PROPOSED USE OF WELL
[ ] GAS MIGRATION WELL [X] OBSERVATION
[ ] EXTRACTION WELL [ ] OPEN HOLE
[ ] PIEZOMETERS
[ ] DIRECT PUSH



DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0.0	0.8	CONCRETE - FILL
0.8	3.2	CLAY WITH GRAVEL SOME SILT
3.2	5.0	FILL - BRICK AND COARSE SAND
5.0	5.8	CLAY WITH SAND AND BRICK MATERIAL
5.8	6.2	COARSE SAND WITH GRAVEL
6.2	6.5	CLAY WITH SAND
6.5	6.9	FILL - BRICK
6.9	7.5	SANDY CLAY
7.5	10.5	CLAY WITH BLACK CINDER FILL
10.5	14.8	CLAY SOME SILT BROWN-RED
14.8	19.9	CLAY SOME SILT
19.9	25.0	CLAY SOME SILT AND SAND
TOTAL DEPTH:		25.0 FEET

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE AND SIZE OF ALL CASING, HOLE DIAMETER AND GROUT USED.

SIGNATURE (PRIMARY CONTRACTOR) x ENRIQUE CHAVEZ	PERMIT NUMBER 006620	DATE WELL DRILLING WAS COMPLETED 10/25/2019
I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS		[ ] PUMP INSTALLED

SIGNATURE (WELL DRILLER) x PAUL FELD	PERMIT NUMBER 004094	SIGNATURE (APPRENTICE) x WILLIAM PLATT	APPRENTICE PERMIT NUMBER 006459

Site Characterization (Continued)

- Surface water sampling
  - Streams
  - Springs & seeps
  - Wetlands & impoundments

Site Characterization (continued)

- Soil Vapor Sampling
  - Check installation of Soil Vapor Probes
  - Check sampling protocols
  - Check for analysis of leak check (tracer) compound
  - Check for proper determination of Soil vapor targets

Site Characterization (continued)

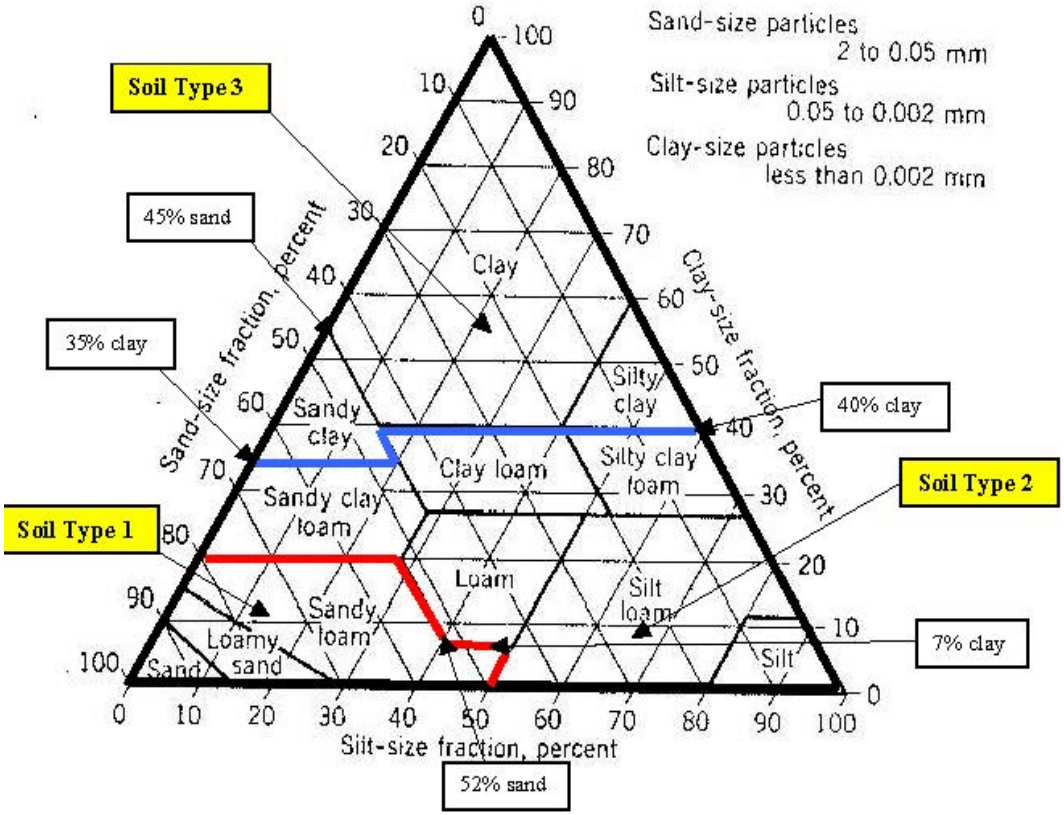
- Delineation Criteria in most cases are Tier 1, Soil Type 1, residential risk-based target levels (RBTLs)
- Delineation is to Maximum Contaminate Levels (MCLs) & soil protective of groundwater if domestic use pathway is complete

Site Characterization (Continued)

- **Soil Type Determination (check results of particle size analysis - sieve analysis & hydrometer as well as plotting of results on Soil Textural Triangle)**

- **(in-class examples for illustration)**

Figure 1: USDA Textural Classification Chart



Soil Descriptions Using Figure 1

- Sand: >85% sand
- Loamy sand: 70 to 91% sand
- Sandy loam: 7 to 20% clay, >52% sand, or <7% clay, <50% silt, and >43% sand
- Sandy clay loam: 20 to 35% clay, <28% silt, >45% sand
- Loam: 7 to 27% clay, 28 to 50% silt, and 52% or less sand
- Silt loam: 50% or more silt and 12 to 27% clay, or 50 to 80% silt and <12% clay
- Silt: 80% or more silt and <12% clay
- Silty clay loam: 27 to 40% clay and 20% or less sand
- Clay loam: 27 to 40% clay and 20 to 46% sand
- Sandy clay: 35% or more clay and 45% or more sand
- Silty clay: 40% or more clay and 40% or more silt
- Clay: 40% or more clay, 45% or less sand, and <40% silt

Soil Type Determination

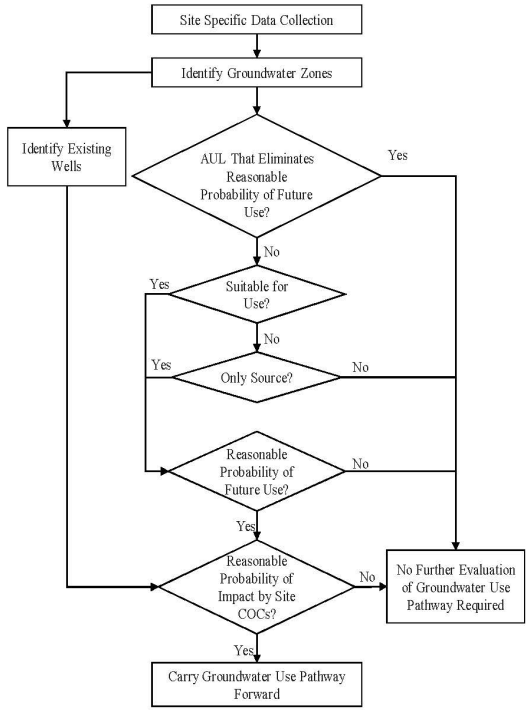
Table 1

Soil type	Soil (SCS Classification)	Porosity (avg.)	Water content (avg.)
1	Sand	0.38	0.08
	Loamy sand		
	Sandy loam		
2	Clay loam	0.44	0.17
	Silt		
	Loam		
	Silty clay loam		
	Sandy clay loam		
	Silt loam		
3	Clay	0.44	0.21
	Silty clay		
	Sandy clay		

Site Characterization (continued)

- **Land Use Determination (current & future) - they need to provide sufficient justification**
- **Property Boundaries – they need to be identified and located on the maps and labeled**
- **Groundwater Use Determination – they need to look at all groundwater zones beneath site**

Figure 6.1 Domestic use Pathway Flowchart



NOTE:

1. In this chart, "use" refers to domestic consumption.
2. The analysis embodied in the chart is performed for each groundwater zone of interest. The conclusion of the analysis (the groundwater use pathway is either carried forward for additional consideration, or no further evaluation of the pathway is required) applies to the individual groundwater zone under analysis. Different conclusions may apply to different groundwater zones at a given site.
3. The attributes of an AUL must be sufficient to "eliminate reasonable probability of future use", and, by that, allow a conclusion that "no further evaluation of groundwater use pathway required."

Figure 6-1. Site Conceptual Model for Domestic Consumption of Groundwater Exposure Pathway Analysis

Site Characterization (continued)

- **Geotechnical Samples for use at Tier 2**
  - **porosity,**
  - **dry bulk density,**
  - **fractional organic carbon, from clean area**
  - **volumetric water content**

- **Utility evaluations**
  - **for impact**
  - **for preferential migration pathways**

Site Characterization (continued)

- Other sampling methods (MIP, LIF)
- Geophysical Investigation Technologies
  - Electrical Resistivity Imaging (ERI)
  - Electromagnetic Offset Logging (EOL)
  - Ground Penetrating Radar (GPR)
  - Seismic Refraction

Break

Step # 2: Risk Evaluation (Tier 1)

- Identification of Complete Exposure Pathways current & future (hypothetical building) check exposure model and data points
- Calculation of Representative Concentrations
  - Elevated detection levels
  - Maximum for surface soils for residential land use
  - Make sure soil data is dry weight
  - Make sure they use all appropriate data points
  - Watch for averaging within borings
  - Can't average soil vapor samples across sampling events
  - Look for data gaps
- Comparison of RCs to Soil-Type Dependent Risk-Based Target Levels (RBTLs)
  - Watch out for buildings (hypothetical) over excavations/former tank pits

Exposure Model (example)

ON-SITE RESIDENT						
	CURRENT CONDITIONS			FUTURE CONDITIONS		
ROUTES OF EXPOSURE	C/NC	**JUSTIFICATION FOR C/NC**	**REPRESENTATIVE CONCENTRATION BASED ON**	C/NC	**JUSTIFICATION FOR C/NC**	**REPRESENTATIVE CONCENTRATION BASED ON**
SURFICIAL SOIL						
Outdoor inhalation of vapors and particulate matter, ingestion, and dermal contact with surficial soil.	*C*	*The Site is operating as a fuel station and c-store, and there are two residential rental homes on-site.*		*C*	*Same as current.*	
SUBSURFACE SOIL						
Indoor inhalation of vapors		*The Site is operating as a fuel station and c-store, and there are two residential rental homes on-site.*			*Same as current.*	
GROUNDWATER						
Indoor inhalation of vapors		*The Site is operating as a fuel station and c-store, and there are two residential rental homes on-site.*			*Same as current.*	
Dermal contact with water	*NC*	*There is no surface water on-site.*	*N/A*	*NC*	*Same as current.*	*N/A*
Current Drinking Water Well	*C*	*There is a drinking water well on-site; therefore, the drinking water pathway is complete.*	*On-site Well*	*C*	*Same as current.*	*On-site Well*

What if they don't pass at Tier 1?

- Clean up to Tier 1 RBTLs
- Implement Institutional Controls to address risks
- Conduct Tier 2 Risk Assessment
- Conduct Soil Vapor sampling (for indoor inhalation of vapors pathway)

Tier 2 Risk Evaluation

- **Use Software to calculate Site-Specific Target Levels (SSTLs)**
  - **Check all values used to replace defaults & verify appropriateness**
- **Compare RCs to SSTLs**

Options if they don't pass Tier 2

- Clean Up to SSTLs (can't go back to RBTLs)
- Implement Institutional Controls to address risks
- Perform a Tier 3 Risk Evaluation
- Soil vapor sampling if not already done at Tier 1 for indoor inhalation of vapors pathway

Tier 3 Risk Assessment

- Unlimited options must get work plan approval from DNR upfront

- Can use other fate and transport models, can change exposure parameters

Free Product/LNAPL

- Must recover to extent practicable
- Must use effective solubility or results of product sample for risk evaluation
- Sites can be closed with free product if:

1. The extent of free product has been characterized vertically and horizontally.
2. The technology that was used for free product recovery was the method most appropriate for the geology/hydrogeology of the site and the recovery efforts have reached asymptotic mass recovery conditions.
3. The thickness of free product will not increase over time due to groundwater fluctuations or plume movement.
4. Leaving the free product in place will not pose an explosion risk.
5. The free product is not migrating or causing a dissolved phase plume that is expanding or in which the concentrations of contaminants of concern are increasing.
6. A deed notice has been placed on the property indicating the location of the free product plume.

Corrective Action

Remediation of contamination to appropriate target levels

Some of the options for soil contamination are to:

- Excavation & treatment or disposal (landfill, landfarm, thermal desorption)
- Soil vapor extraction (good for gasoline & for coarser grained soil types, & less effective on diesel or small grained soil types)
- Injection of Oxygen Releasing Compounds (typically in the saturated zone)

Some options for cleanup of groundwater are:

- Pump & treat
- Injection of Oxygen Releasing Compounds
- Air Sparging

Some options for cleanup of free product:

- Hand Bailing
- Multiphase (or Dual) Phase Extraction
- Product Skimmers
- Absorbent Socks

Activity and Use Limitations (AULs)

Public Participation & Neighbor Notification

- Public Participation is required by federal and state law whenever the release requires a corrective action plan.

- If there is sufficient interest, we can hold a public meeting (or for any other reason)

Plume stability

- Stability of the groundwater plume must be demonstrated before a NFA letter can be issued.
- Typically requires at least 4 monitoring events
- Can’t use data collected while remediation is being conducted.

Long Term Stewardship (LTS)

- Restrictive Covenants
- Data base

Correspondence

- Letters
  - To Remediating Party, copy consultant & PSTIF
  - format
- Emails
  - Not appropriate for response to reports
  - Electronic reports should be followed up with hard copy by regular mail
  - Email messages public records
- Phone calls (you will get lots)
  - When you have questions about something in the report, it is ok and often a good idea to pick up the phone and call the consultant and ask
  - It is also often appropriate to call the consultant and give them a heads up

Other

- Placeholder for what ever else we think needs to be covered.

Break

Questions?