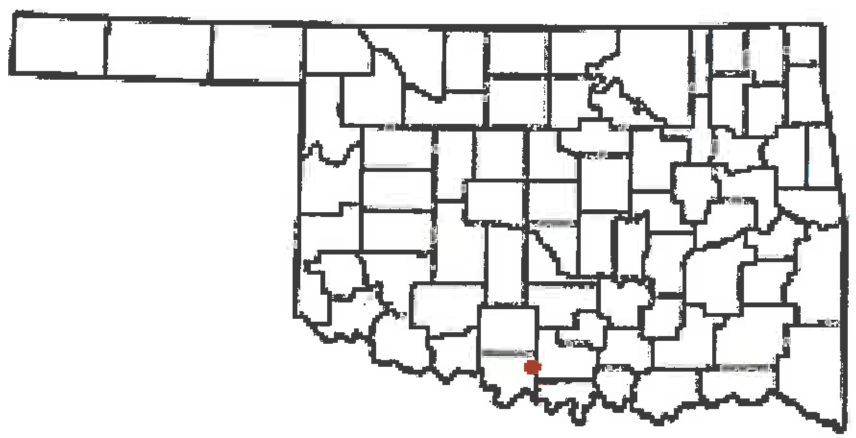
Ringling Fuel Spill
Jefferson County, Oklahoma



Proposed Plan
For Remedial Action

Prepared by

OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY

October 30, 2013

PROPOSED PLAN FOR REMEDIAL ACTION FOR THE RINGLING FUEL SPILL SITE IN RINGLING, JEFFERSON COUNTY, OKLAHOMA

October 30, 2013

This Proposed Plan describes the remedial action alternatives considered for addressing contamination in groundwater and a limited area of subsurface soils at the gasoline fuel spill site (February 23, 2009) located at the intersection of U.S. Highway 70 and Oklahoma State Highway 89 in Ringling, Oklahoma. This proposed plan identifies the preferred remedial alternative for subsurface soils and groundwater selected by the Oklahoma Department of Environmental Quality (DEQ).

This Proposed Plan summarizes information explained in greater detail in the Final Remedial Options Evaluation Report (September 12, 2013) and past site characterization reports submitted by Environmental Claims Management on behalf of Western Transportation, Inc. These documents are available for public review at the DEQ Central Records. The address of the DEQ is listed at the end of this document. We invite you to comment on DEQ's preferred alternative and/or the other remedial action alternatives evaluated in the Remedial Options Evaluation Report. Your comments are important in DEQ's decision making process for selecting a final remedy.

The proposed plan is open for formal public comment from:

> November 13 to December 12, 2013. The comment period may be extended by DEQ up to an additional 30 days upon request by the public.

The DEQ and Western Transportation, Inc. will hold a Public Meeting on the Proposed Plan at:

> 6:30 P.M. on Thursday, December 5, 2013
> Ringling City Hall
> 122 N. 5th Street
> Ringling, OK 73456
> Phone: (580) 662-2264

An opportunity for written and verbal comments and questions will be provided at the public meeting. Written comments on the Proposed Plan and other alternatives should be sent to:

> Jon Reid
> Land Protection Division
> Department of Environmental Quality
> 707 North Robinson, P.O. Box 1677
> Oklahoma City, Oklahoma 73101-1677
> (405) 702-5121
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After evaluating public comments, the DEQ will prepare a responsiveness summary and issue the Proposed Plan, as modified by public comments, if necessary, as a Final Proposed Plan.

THE PROPOSED PLAN FOR REMEDIAL ACTION AT GASOLINE FUEL SPILL SITE, REINGLING, OKLAHOMA

INTRODUCTION

This Proposed plan describes remedial action alternatives considered for addressing contaminant impacts in groundwater and a limited area of at depth subsurface soils at the gasoline fuel spill site (the Site) in Ringling, Oklahoma (Figure 1). It also identifies the preferred alternative selected by the Oklahoma Department of Environmental Quality (DEQ). The remedial action alternatives identified in this plan are a result of a Final Remedial Options Evaluation Report (September 12, 2013) and Site Characterization Investigations conducted by Environmental Claims Management, Inc., on behalf of Western Transportation, Inc. The characterization of the Site was conducted pursuant to a Memorandum of Agreement and Consent Order issued by the DEQ, Case No. 12-184, September 3, 2012. The DEQ is responsible for the oversight of the investigation and remedy selection for the Site.

The purposes of the Proposed Plan are to:

- Describe the remedial action alternatives considered,
- Identify DEQ's preferred alternative for contaminated subsurface soils and groundwater, and
- Solicit public comment on the preferred alternative and other alternatives.

BACKGROUND

On February 23, 2009, at approximately 4:30 A.M., there was a gasoline tanker rollover/spill at the intersection of U.S. Highway 70 and Oklahoma State Highway 89 in Ringling, Jefferson County, Oklahoma. The accident occurred when the driver of a gasoline tanker lost control of the tractor/trailer causing the vehicle to roll over. The truck was carrying 7,500 gallons of gasoline. Emergency crews responded within approximately one hour of the accident. Vacuum trucks were utilized to recover all phase-separated gasoline present along the spill path. Excavation of impacted soils was conducted across the Site. See Figure 1 for a map designating the location of the fuel spill in Ringling, OK.

The gasoline spilling from the tanker flowed north (downhill) on and beside Highway 89. One stream flowed along the east side of the highway, eventually flowing into a bar ditch then through a storm water culvert underneath the highway. The stream of fuel then flowed into a ditch, located along the north side of 713 S. 4th Street (refer to Figure 2). Another stream of fuel flowed down the west side of Highway 89 in front of the former dry cleaner facility (610 S. 5th Street) and onto the driveway of 608 S. 5th Street. That stream then also discharged onto the yard of 713 S. 4th Street. Both streams coalesced on the west side of 713 S. 4th Street. The fuel then flowed back into a culvert and underneath 4th street. The fuel continued downhill in a bar ditch between two unoccupied wood frame houses. The fuel flowed off of those properties onto a sanitary sewer easement. The flow path turned north for 70 feet then the small amount of remaining fuel flowed into a dry creek. The creek was impacted for approximately 70 feet then the fuel came to a stop in a shallow dry depression. The flow path of the fuel and the areas that were impacted by the overland flow of the gasoline are illustrated in Figure 2.

The following are dates and descriptions of significant events that have occurred at the Site:

2/23/2009	Accident resulted in the discharge of 7,500 gallons of gasoline. Emergency activities were taken.
2/23-26/2009	Remediation crews utilized vacuum trucks to recover all phase-separated gasoline present along the spill path.
2/26-3/20/2009	Excavation of impacted soils conducted across the Site.
3/4/2009	Excavation near the Mattor house indicated gasoline migrated beneath the house. Soil samples collected from beneath the Mattor house.
3/16-20/2009	Piping system installed for potential remediation use.
4/2/2009	Majority of backfilling operations completed.
4/3/2009	All excavated areas hydromulched.
4/6-7/2009	Nine monitor wells (MW-1 through MW-9) were installed.
4/8/2009	First round of groundwater samples collected.
4/13/2009	Highway surface removed and replaced.
6/8/2009	Monitor well MW-10 through MW-13 installed.
6/8/2009	Second set of groundwater samples collected.
6/29/2009	First set of quarterly groundwater samples collected.
7/2009	Interceptor trenches installed on the Gray property.
8/14/2009	Vapor intrusion sampling investigation conducted.
9/27/2009	Recovery system brought on-line.
9/28/2009	Second set of quarterly groundwater samples collected.
1/13/2010	Third set of quarterly groundwater samples collected.
4/15/2010	Fourth set of quarterly groundwater samples collected.
7/8/2010	Fifth set of quarterly groundwater samples collected.
8/23/2010	Recovery system shut down due to lack of groundwater.
10/7/2010	Sixth set of quarterly groundwater samples collected.
10/11/2010	Recovery system turned back on.
1/6/2011	Monitor well MW-14 installed.
1/6/2011	Quarterly groundwater samples collected.
4/20/2011	Quarterly groundwater samples collected.
8/14/2011	Semi-Annual groundwater samples collected.
2/17/2012	Semi-Annual groundwater samples collected.
3/1/2012	Five additional soil borings/monitor wells (MW-15 through MW-19) installed.
3/14/2012	The five newly installed monitor wells sampled.
11/17/2012	Monitor wells MW-20 through MW-23 and OW-1/OW-2 installed.
11/30-12/1/2012	Most monitor wells east of 4th street sampled.

12/17/2012	Mobile Dual Phase Extraction (MDPE) system feasibility test conducted.
12/27/2012	Oxidant injection feasibility test conducted.
7/31-8/1/2013	Additional subsurface soil sampling throughout Site to confirm if soils are below DEQ action levels for benzene, toluene, ethylbenzene, xylenes (BTEX) and total petroleum hydrocarbons-gasoline range (TPH-GRO). Surface and subsurface soils in excavated areas along the path of the spill meet the cleanup levels in our spill guidance.

Historical site characterizations have defined a groundwater benzene and TPH-GRO plume that is centered on the northeast corner of the intersection of the two highways. This is the location of the wrecked tanker as its fuel load was spilled. The plumes are approximately 330 feet west to east and 140 feet north to south. The maximum groundwater benzene concentration was 26.4 mg/L on March 14, 2012 (MW-18) and the maximum TPH-GRO concentration was 47.7 mg/L on November 30, 2012 (MW-16). There are some elevated adsorbed hydrocarbon concentrations in soil in the vicinity of the source area. These affected soils are approximately 8 to 9 feet below ground surface at or near the interface of groundwater; therefore, these soils are not a direct threat to human health. Figures 3 and 4 illustrate the most recent groundwater plume maps for benzene and TPH-GRO. The monitoring well network is included in the maps as well. Subsurface soil contamination was found in the area of monitoring wells MW-16, MW-17, and MW-18, but the soil contamination was at depth and is believed to be associated with the groundwater contamination.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are chemical specific and media specific cleanup objectives for protection of human health and the environment and they typically specify the exposure routes, receptors, and risk levels of concern. Remedial Action Objectives provide the basis for deriving Preliminary Remediation Goals (PRGs), which are specific cleanup contaminant concentrations in the different media on site which are protective of human health and the environment.

The remedial action objectives for the hydrocarbons present in the groundwater at the Site are:

- Reduce groundwater BTEX/TPH-GRO concentrations to levels established in the ODEQ Fact Sheet entitled "Risk-Based Cleanup levels for Total Petroleum Hydrocarbons" (ODEQ, 2012) for TPH-GRO and for the BTEX components from the U.S. EPA priority Drinking Water Standards (USEPA, 2009); and
- Provide appropriate protection to construction workers during implementation of the selected remedial measures.

REMEDIATION LEVELS

The Chemicals of Concern (COCs) identified in the site characterization investigations are BTEX and TPH-GRO. The Preliminary Remediation Goals (PRGs) are used to develop draft remediation levels that are presented in this Proposed Plan. PRGs are upper concentration limits for individual chemicals in environmental media and land use combinations that are anticipated to protect human health or the environment. There are two general sources of PRGs: 1) concentrations based on the Applicable or Relevant and Appropriate Requirements (ARARs), and 2) concentrations based on risk assessment results. ARARs include concentrations set by other environmental regulations such as maximum contaminant levels (MCLs) promulgated under the Safe Drinking Water Act. Risk-based calculations set human health remediation goals using carcinogenic or non-carcinogenic toxicity values and site-specific exposure conditions.

Presently, the following PRGs are the proposed cleanup levels.

- There are some adsorbed-phase concentrations in soil in excess of ODEQ default (conservatively low) cleanup levels. These soils are subsurface soil where the groundwater contamination is concentrated. The at depth soil contamination is believed to be associated with the contaminated groundwater. Soil remediation goals are for groundwater protection, to be protective of MCLs in groundwater. Cleanup of the contaminated groundwater to levels below the MCL is expected to address the residually contaminated soil.

- Cleanup levels for groundwater were obtained from the ODEQ Fact Sheet entitled "Risk-Based Cleanup levels for Total Petroleum Hydrocarbons" (ODEQ, 2012) for TPH-GRO and for the BTEX components from the U.S. EPA Priority Drinking Water Standards (USEPA, 2009). The cleanup level for TPH-GRO in groundwater is 1.0 mgL. The cleanup levels for BTEX are as follows: benzene 5 micrograms per liter (µg/L), toluene 1000 µg/L, ethylbenzene 700µg/L, and xylenes 10000 µg/L.

Human health based standards were not determined for sediments, surface water, or vapor-phase hydrocarbons since there are either no measurable concentrations in the media or there is no existing potential exposure pathway. The DEQ will consider and respond to public comments, and remediation levels will be finalized and documented in a final site cleanup plan referred to as the Record of Decision (ROD).

EVALUATION OF REMEDIAL ACTION ALTERNATIVES

The site wide action alternatives were compared with eight evaluation criteria: Overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements (ARARs), cost, long-term effectiveness and permanence, short-term effectiveness, reduction of toxicity, mobility and volume through treatment, implementability, and community acceptance. These criteria are defined below:

EVALUATION CRITERIA

Threshold Criteria

1. Overall Protection of Human Health and the Environment – How well does the alternative protect human health and the environment both during and after construction?

2. Compliance with Federal and State Environmental Standards – Does the alternative meet all applicable or relevant and appropriate local, State and Federal standards and laws?

Balancing Criteria

3. Long-Term Effectiveness and Performance – How well does the alternative protect human health and the environment after completion of cleanup? What, if any, risks remain at the site?

4. Reduction of Toxicity, Mobility, or Volume through Treatment – Does the alternative effectively treat the contamination to significantly reduce the toxicity, mobility, or volume of the hazardous substances?

5. Short-Term Effectiveness – Are there potential adverse effects to either human health or the environment during construction or implementation of the alternative? How fast does the alternative reach the cleanup goals?

6. Implementability – Is the alternative both technically and administratively feasible? Has the technology been used successfully on other similar sites?

7. Cost – What are the estimated costs of the alternative?

Modifying Criteria

8. Community Acceptance – What are the community's comments or concerns about the preferred alternative? Does the community generally support or oppose the preferred alternative?

Note: These eight criteria are used to evaluate the remedial action alternatives. With the exception of the no action alternative, all alternatives must meet the first two "threshold" criteria. The next five criteria are used as "balancing" criteria for comparing alternatives and selecting a preferred alternative. After public comment, DEQ may alter its preference on the basis of the last "modifying" criteria.

Both the Remedial Actions Objectives (RAOs) and the Preliminary Remediation Goals (PRGs) are used during the evaluation of the remedial action alternatives. The development of general response actions and technologies/process options are combined to produce alternatives for evaluation in the context of specific evaluation criteria. The technologies/process options are combined to address the affected media in one alternative that meets the remedial action goals for each media. Alternatives were developed to span the range of possible remedies for the site from "no action" to "clean closure" with intermediate options providing varying degrees of protectiveness for human health and the environment. The evaluation criterion identifies differences between the alternatives with respect to reliability, technical feasibility, and economic feasibility.

ALTERNATIVES CONSIDERED

Alternative 1 – No Action

This alternative involves no treatment or actions to remediate the subsurface soil and groundwater contamination. The no action alternative is always shown to create a base-line for comparison.

Alternative 2 – Natural Attenuation

Alternative 2 involves allowing natural processes to degrade hydrocarbons over time. Periodic sampling of organic and inorganic groundwater parameters would be conducted to document effectiveness. The estimated volume of water and soil that would have to be remediated is 15,700 cubic yards (cy). This area includes the impacted material beneath the dry cleaner building and the two highways. Figures 3 and 4 illustrate the approximate area of benzene and TPH-GRO contamination at the Site. The estimated minimum time to naturally reduce the hydrocarbons is 10 years.

Reliability – Natural attenuation is the naturally occurring degradation of organic compounds in the environment. Monitored natural attenuation (MNA) is a widely utilized remediation technology used in many environments to achieve target contaminant levels. MNA can be used as a treatment method for many organic contaminants in the environment.

Technical Feasibility – MNA is normally used at sites where the initial organic contaminant levels are low or as an additional remediation method after contaminant levels have been reduced to low levels. The costs are low with remedial activities consisting primarily of periodic sampling of organic and inorganic environmental parameters. MNA is a slow process and is not normally suitable at sites with elevated organic contamination.

Economic Feasibility – The prime benefit of MNA is the low cost. The method consists of periodically measuring environmental parameters and reporting. At sites where contaminant levels are low, MNA is an economically effective remediation method.

Alternative 3 – Excavate/Landfill/Backfill

This alternative would include the following:

- Removal of the former dry cleaner building;
- Excavate, load out and dispose of the excavated material at a licensed landfill;
- Collect confirmation soil samples from the excavated area;
- Backfill, compact and test replacement material for compaction; and

- Perform at least a year of post backfilling groundwater monitoring.

The estimated volume of material that would have to be removed is 15,700 cubic yards (cy). This area includes the groundwater beneath the former dry cleaner building and the impacted soil and groundwater beneath the two highways (refer to Figures 3 and 4).

Reliability – Excavation of material that was heavily impacted by the initial release was successful in removing almost all of the adsorbed-phase hydrocarbons along the fuel flow path. Since groundwater was so shallow, excavation of the soil also removed much of the impacted groundwater in the soil. Removal of soil and entrained groundwater would be a concrete step to removing residual hydrocarbons. It is possible that if the entire impacted area could be excavated, most of the hydrocarbons could be removed from the Site and disposed at an appropriate landfill.

Technical Feasibility – This alternative could be very difficult to implement and would be impractical. Disruption in traffic, residents, and businesses would be significant. At least three months would be required to excavate and backfill the area. Soil cannot be excavated from beneath the highways or from areas adjacent to them. The Oklahoma Department of Transportation (ODOT) will not allow excavation beneath or adjacent to the two highways. The risk of damaging the highway is too great. Both highways are heavily travelled with heavy truck traffic and any highway damage could severely impede traffic flow. During the initial spill incident, ODOT would not allow the contractor to excavate along the southwest corner of the gas station property east of Highway 89 where the accident occurred. Well logs of MW-18 and MW-23 located in the southwest corner of the gas station property were shown to have limited subsurface soil contamination at 8-9 feet below ground surface where groundwater is located. The source area, which is located beneath the north intersection of the highways, would have to be left in place. If the source under the highway is not removed, it will continue to feed any replaced soil, re-contaminating the soil and groundwater plume.

The excavation of soil containing contaminated groundwater from beneath the dry cleaner building is not possible without razing the building. Soil contamination has not been detected under the building. If there is subsurface soil contamination at depth, it would only be at the leading edge of the groundwater plume. Hydrocarbon concentrations in monitor well MW-1, which is located 40 feet north of the dry cleaner, have been non-detect for two years. We believe that concentrations in the down gradient edge of the plume are diminishing naturally.

Economic Feasibility – Costs to complete the excavation/landfilling/backfilling are based on USEPA, 2000 and engineering judgment based on experience at comparable sites. The estimated cost to remove, dispose and backfill the area is $1,750,000.

Alternative 4 – Excavate/Thermal Desorption/Backfill

This alternative would include the following:

- Removal of the former dry cleaner building;
- Excavate, heat treat and replace the excavated/treated excavated material;

- Collect confirmation soil samples from the excavated area; and
- Perform at least a year of post backfilling groundwater monitoring.

The estimated volume of material that would have to be removed is 15,700 cubic yards (cy). This area includes the impacted groundwater beneath the former dry cleaner building and subsurface soil and groundwater beneath the two highways (refer to Figures 3 and 4).

Reliability – As in Alternative 3, excavation of the entire impacted area might serve to remove most or all of the hydrocarbons in soil and groundwater. Thermal desorption is a method where impacted soil is treated by heating the excavated soil to the point that hydrocarbons are driven out of the soil and destroyed in a secondary heating process. The treated material, now free of hydrocarbons, is placed back into the excavated areas.

Technical Feasibility – The primary technical problem with desorption is that again the soil beneath the former dry cleaner building cannot be excavated and the large volume of soil beneath the highways, including the source area, cannot be removed. Secondary, non-technical issues include the large quantity of equipment that is necessary to process the estimated volume of soil and the same disruptions and inconveniences as listed for Alternative 3.

Economic Feasibility – Costs to complete the excavation/thermal desorption and backfilling are based on USEPA, 2000 and engineering judgment based on experience at comparable sites. Costs are heavily influenced by an economy of scale. Most desorption projects are for large scale military or industrial sites. The estimated cost to remove, treat and backfill the area is $2,686,000.

Alternative 5 – Soil Vent and Pump & Treat

This alternative would include the following:

- Install a matrix of wells whose spacing will capture all of the contaminants;
- Pipe all extraction wells together and extend the system back to a treatment compound;
- Install the subsurface recovery equipment, the surface recovery equipment and the waste treatment systems;
- Operate and maintain the recovery system for a period of one to five years; and
- Perform at least a year of post remediation groundwater monitoring.

The estimated volume of material that would have to be treated is 15,700 cubic yards (cy). This area includes the impacted groundwater beneath the former dry cleaner building and the groundwater and soil beneath the two highways (refer to Figures 3 and 4).

Reliability – Remediation of hydrocarbons utilizing soil venting and groundwater pump and treat systems has a long history in remediation technology. The technology requires a matrix of extraction wells that are piped together and a large mechanical system to extract media from the subsurface and then treat the impacted material before discharging to the environment. Low pressure blowers, on the surface, draw air from the subsurface. If entrained air contains contaminants, the air must be treated prior to discharging to the atmosphere. Water pumps, located in the extraction wells, recover and pump impacted groundwater to the surface where the water is treated then discharged to a city waste water system. The cleanup process is accomplished by flushing clean water through the water bearing unit, lowering the groundwater table then venting the dewatered soil profile with the venting system.

Technical Feasibility – Extraction wells have been used at the Site in the two recovery trenches located on the dry cleaner property. The purpose of the trenches was to create a barrier to contaminants migrating westward beneath the residential neighborhood. No contaminants have migrated west of 4th Street. A recently conducted, limited vapor extraction test indicated that vapor flow rates in the subsurface may be lower than acceptable for vapor extraction systems. In order to treat the areas beneath the highways, horizontal extraction wells would have to be placed beneath the highways. A primary function of this type of system is to dewater the affected area and then dry out the soils allowing more efficient volatilization of adsorbed-phase hydrocarbons. There is a strong concern that dewatering the soils beneath the highways could lead to settling. Both highways are heavily travelled by truck traffic. Any settling would create very serious problems for transportation.

Beyond the need for numerous extraction wells and the associated piping system, a surface treatment system would be required. The equipment consists of extraction and treatment equipment located in a separate building. Operation and maintenance of these large engineered systems is costly. Equipment deteriorates quickly. The system would have to operate for at least three years and perhaps longer.

Economic Feasibility – The cost to complete the installation of the engineered system is estimated to be $300,000. Annual operation and maintenance cost is estimated to be $120,000 a year. If the system ran for five years, that would create a total cost of $900,000. Costs to complete the installation and operation of a soil vent and pump and treat system are based on USEPA, 2000 and engineering judgment based on experience at comparable sites.

Alternative 6 – Dual –Phase Extraction

This alternative includes the following:

- Install a matrix of wells whose spacing will capture all of the contaminants;
- Pipe all extraction wells together and extend the system back to a treatment compound;
- Install the surface recovery equipment and the waste treatment systems;
- Operate and maintain the recovery system for a period of one to five years; and
- Perform at least a year of post remediation groundwater monitoring.

The estimated volume of material that would have to be treated is 15,700 cubic yards (cy). This area includes the impacted groundwater beneath the dry cleaner building and the two highways (refer to Figures 3 and 4).

Reliability – Dual-phase extraction (DPE) technology is similar to pump and treat technology. The primary difference is that rather than using separate low flow vapor extraction and down-hole pumps to remove affected groundwater air vapor, DPE utilizes large high-vacuum pumps located on the surface. Water and air are extracted from the extraction wells using very high vacuum. Air and water are treated on the surface and the treated air is discharged to the atmosphere. The treated water would be discharged to the city waste water system. The primary advantage of DPE is that there is no mechanical subsurface equipment. DPE has also been successfully used at sites similar to the Site.

Technical Feasibility – DPE also requires the matrix of extraction wells and piping to transmit the recovered media back to a treatment system. The primary objective is to dewater the water saturated soils and to then vent the affected area volatilizing the residual hydrocarbons. This dewatering and subsequent venting leads to desiccation and contraction of soils. This could lead to soil compaction and damage to the highways and any other surface structures. A limited DPE pilot test was conducted at the Site on December 12, 2012. The test indicated that subsurface flow rates are low suggesting that high-vacuum extraction may be limited

The DPE pilot test determined that given sufficient time, groundwater drawdown at the site would be possible; however a large number of extraction points would be required to achieve drawdown within a reasonable time frame. Furthermore, the observed well vapor flow indicates that DPE might not be an effective remedial strategy for the Site. A more detailed investigation of the DPE pilot test can be found in the Remedial Options Evaluation Report.

Economic Feasibility – Cost to complete the installation of the engineered system is estimated to be $300,000. Annual operation and maintenance cost is estimated to be $120,000 a year. If the system ran for five years, that would create a total cost of $900,000. Costs to complete the installation and operation of soil vent and pump and treat system are based on USEPA, 2000 and engineering judgment based on experience at comparable sites.

Alternative 7 – In-Situ Chemical Oxidation (ISCO)

This alternative includes the following:

- Inject oxidants and oxygenates into the subsurface to facilitate degradation of contaminants;
- Routinely measure groundwater chemistry to determine effectiveness of the ISCO;
- If necessary, spot treat areas with residual oxidant/oxygenates to treat hot spots; and
- Perform at least a year of post-remediation groundwater monitoring.

The estimated volume of material that would have to be treated is 15,700 cubic yards (cy). This area includes the impacted groundwater beneath the dry cleaner building and the soil and groundwater beneath the two highways (refer to Figures 3 and 4).

Reliability – In-situ chemical oxidation (ISCO) is a newer, less invasive technology where oxidizing materials are injected into the subsurface to treat groundwater and subsurface soils. The oxidant degrades organic materials, including hydrocarbons, breaking the hydrocarbons into harmless constituent materials. Benefits of ISCO include a smaller "footprint" since no equipment is left in the ground or on the surface, much less long-term maintenance costs than an engineered system and a faster, initial reduction of hydrocarbon concentrations.

Drawbacks of ISCO include a high chemical cost, risks associated with transporting and handling the oxidants, temporary alteration of the groundwater geochemistry and the potential need for subsequent treatments.

Technical Feasibility – An in-situ chemical oxidation pilot test was completed at the Site on December 27, 2012 to determine if ISCO technology was a viable remediation technology. ISCO is an environmental remediation technique used for soil and/or groundwater remediation to reduce the concentrations of targeted environmental contaminants to acceptable levels. ISCO is accomplished by injecting or otherwise introducing strong chemical oxidizers directly into the contaminated medium (soil or groundwater) to destroy chemical contaminants in place. It can be used to remediate a variety of organic compounds, including some that are resistant to natural degradation.

In the pilot test, the Regenesis product PersulfOx, a sodium persulfate based oxidant, was used to break down hydrocarbons in groundwater and the adsorbed soils. This material mixed with water was injected into five injection points located in a semi-circle around observation well OW-2 (Figure 3). Two sets of confirmatory groundwater samples were collected from monitor wells MW-12, OW-1 and OW-2 following the oxidant injection. The first set of samples was collected on January 25, 2013, approximately four weeks after the injection and the second set was collected February 15, 2013, approximately seven weeks after the injection. The table below shows the initial and subsequent benzene and TPH-GRO concentrations. A more detailed investigation of the DPE pilot test can be found in the Remedial Options Evaluation Report.

Monitor Well	Benzene Pre-Injection Concentration (mg/L)	Benzene Post-Injection Concentration (mg/L)	Percent Reduction	
MW-12	4.16 (12/17/12)	0.005 (2/15/13)	99.9	
OW-1	0.647 (12/27/12)	0.143 (2/15/13)	77.8	
OW-2	6.58 (12/27/12)	2.91 (2/15/13)	55.7	
			77.8	**AVG**
Monitor Well	**TPH Pre-Injection Concentration (mg/L)**	**TPH Post-Injection Concentration (mg/L)**	**Percent Reduction**	
MW-12	39.6 (12/1/12)	0.432 (2/15/13)	98.9	
OW-1	2.38 (12/27/12)	0.465 (2/15/13)	80.4	
OW-2	28.1 (12/27/12)	6.31 (2/15/13)	77.5	
			85.6	**AVG**

Economic Feasibility – The proposed ISCO treatment consist of three separate treatments using two different chemicals. The cost of the initial treatments including chemical, contractor and consulting costs is approximately $300,000. If the treatment is as effective as the feasibility tests indicate, this initial set of treatments might suffice to clean the affected media to acceptable levels. More likely, some spot treatments would be necessary followed by a period of rebound monitoring.

DEQ's PREFERRED REMEDIAL ALTERNATIVE

The DEQ's preferred remedy for the Ringling gasoline fuel spill is Alternative 7: In-Situ Chemical Oxidation. This alternative will protect human health and the environment, meet ARARs and provide the best balance of long-term reliability, short-term reliability, technical feasibility and economic feasibility among the alternatives analyzed. The table below summarizes the relative rankings of each technology (excluding Alternative 1) in the terms of reliability, technical feasibility and economic feasibility using a scale of 1-5 with 5 respectively the highest score and 1 respectively the lowest.

Alternative	Reliability	Technical Feasibility	Economic Feasibility	Score	Comments
2 - Natural Attenuation	3	2	5	10	Requires Too Long
3 - Excavate/Landfill/Backfill	4	1	2	7	Cannot Excavate All Material
4 - Excavate/Desorption/Replace	4	1	1	6	Cannot Excavate All Material
5 - Soil Vent and Pump & Treat	3	2	3	8	High Maintenance/Risk of Subsidence
6 - Dual Phase Extraction	3	2	3	8	High Maintenance/Risk of Subsidence/May not work
7 - In-Situ Chemical Oxidation	4	4	4	12	Less Intrusive/Field Scale Proven

Alternative 7, in-situ chemical oxidation has been shown to be an effective remediation measure in a small scale pilot test at the Site. ISCO is presently being utilized at many similar sites around the world. The method would create less disruption and would create virtually no footprint. A proposed plan would call for three initial injection events. It is possible that subsequent injection events will be necessary.

The proposal calls for the treatment of three separate areas. Figure 5 illustrates the locations of the areas. Due to the presence of the highways, it is not possible to inject throughout the full area of the central portion of the plume. However, as the pilot test documented, the material does appear to disperse well in the subsurface. The proposal calls for the injection of 9,092 pounds of PersulfOx, in two applications, approximately 3-4 weeks apart, into Area 1. Four to six weeks after the second PersulfOx application, the proposal recommends the injection of 1,708 pounds of Oxygen Release Compound (ORC)-Advanced.

The Proposal calls for the injection of 5,730 pounds of PersulfOx, in two applications, approximately 304 weeks apart, into Area 2 and the injection of 2,424 pounds of ORC-Advanced, in a single application, in Area 3, four to six weeks after the second PersulfOx injection in Area 2.

If data show that the first PersulfOx application has been satisfactorily effective, the second treatment may not be necessary.

The DEQ believes that the preferred alternative will adequately satisfy the evaluation criteria. DEQ's preferred alternative for the Ringling Fuel Spill Site is presented in this document in order to solicit public comment. The final remedial action alternative will be developed in detail as part of the Remediation Action Plan and will be documented in the final Record of Decision (ROD) for the Site. The remedy presented here is presented in greater detail in the Final Remedial Option Evaluation Report, dated September 12, 2013 compiled by Environmental Claims Management for Western Transportation, Inc. which can be reviewed at the DEQ location listed on Page 16.

Community Acceptance

The acceptance of the preferred alternative and/or other alternatives by the Ringling Community will be evaluated through the public participation process and any comments received during the formal public comment period.

WHAT'S NEXT?

This Proposed Plan is open for formal public comment from November 13 to December 12, 2013. Requests to extend the public comment period should be addressed to Jon Reid, of the DEQ, at the address given on page 2 of this document.

Western Transportation, Inc. and the DEQ will host an informal meeting at the Ringling City Hall on Thursday, December 5, 2013 at 6:30 P.M. The meeting will be an opportunity for people to ask questions about the Proposed Plan and to make comments in person. After the public comment period closes, DEQ will make the decision regarding the final remedy for the Ringling Fuel Spill Site and will respond to written and verbal comments on the Proposed Plan in the final Record of Decision (ROD). The DEQ expects to issue the ROD for remediation of the subsurface soils and groundwater at the Ringling Fuel Spill Site within sixty days after the public comment period ends. After the ROD is issued, the final Remedial Action Plan for the site cleanup is expected to be completed within 60 days. The ROD and Remedial Action Plan will also be available for review at the repositories listed below.

Ringling City Hall
122 N. 5th Street
Ringling, OK 73456
Phone: (580) 662-2264

Department of Environmental Quality
http://www.deq.state.ok.us/lpdnew/VCPIndex.htm
Ringling Spill link in Gallery of VCP Sites

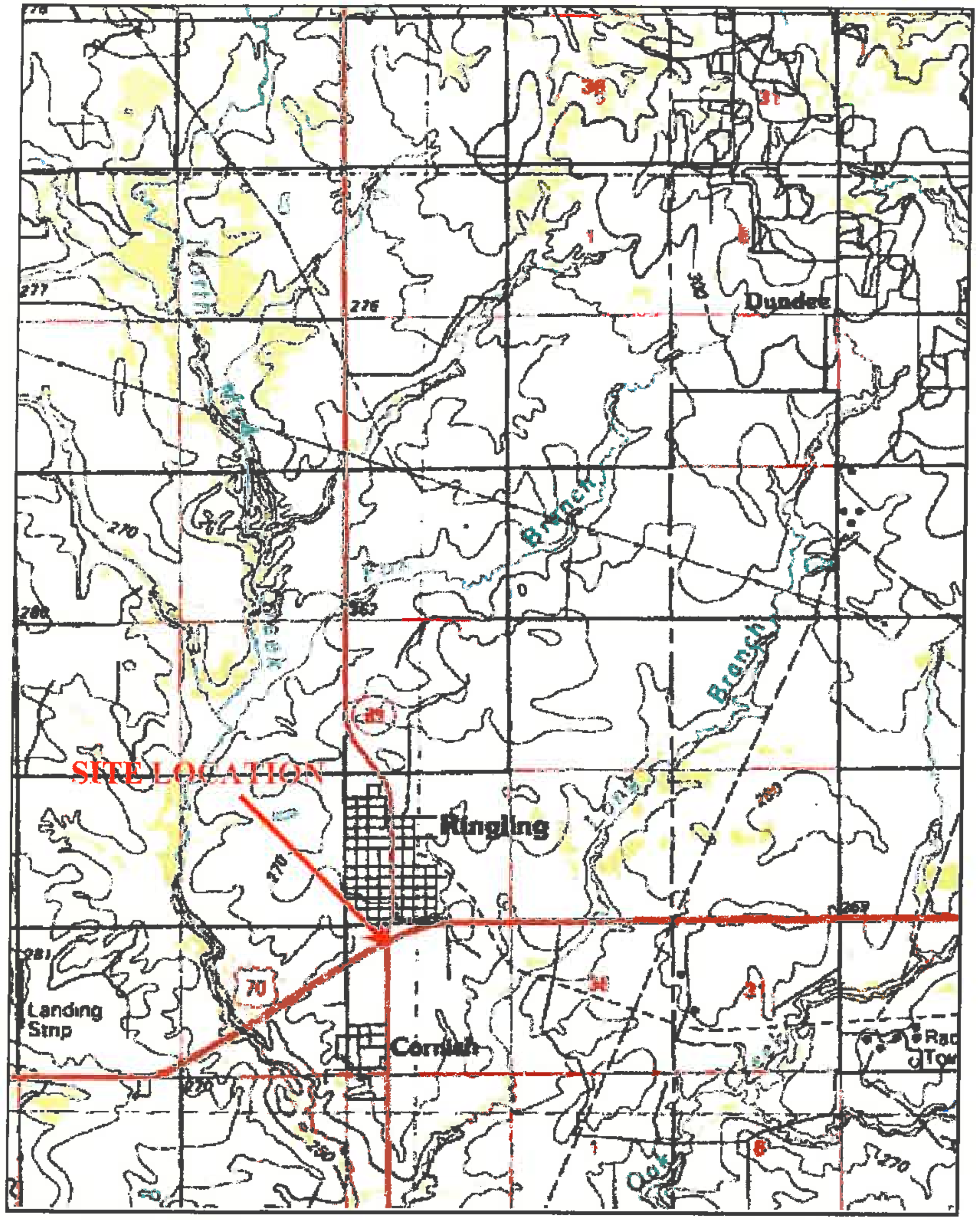
or,

Department of Environmental Quality
Central Records Division
707 N. Robinson, P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

FOR MOR INFORMATION

If you would like to review the reports or any other documents related to the Ringling Fuel Spill, Ringling, Jefferson County, Oklahoma, please visit the information repository listed above. If you have any questions about DEQ's Proposed Plan, please call:

Mr. Jon Reid at (405) 702-5121



SOURCE
USGS Topographic Map, 7.5 Minute Series, Ringling, Oklahoma Quadrangle, 1986

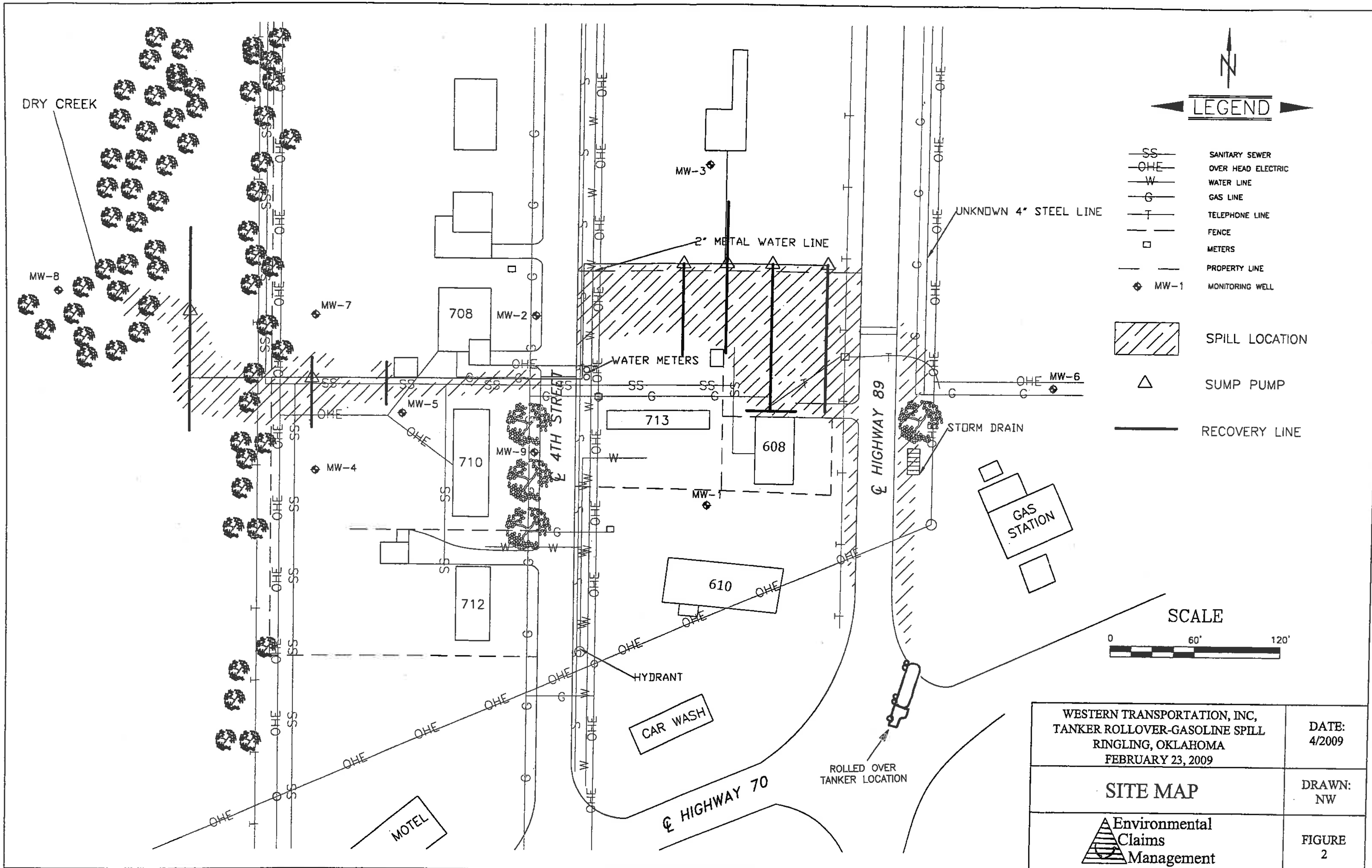
SCALE=1:24,000

N

Site Location Map
Western Transportation, Inc.
February 23, 2009 Tanker Rollover/Spill
US Hwy 70 & SH 89
Ringling, Jefferson County, Oklahoma

Figure
1

Environmental Claims Management



WESTERN TRANSPORTATION, INC,
TANKER ROLLOVER-GASOLINE SPILL
RINGLING, OKLAHOMA
FEBRUARY 23, 2009

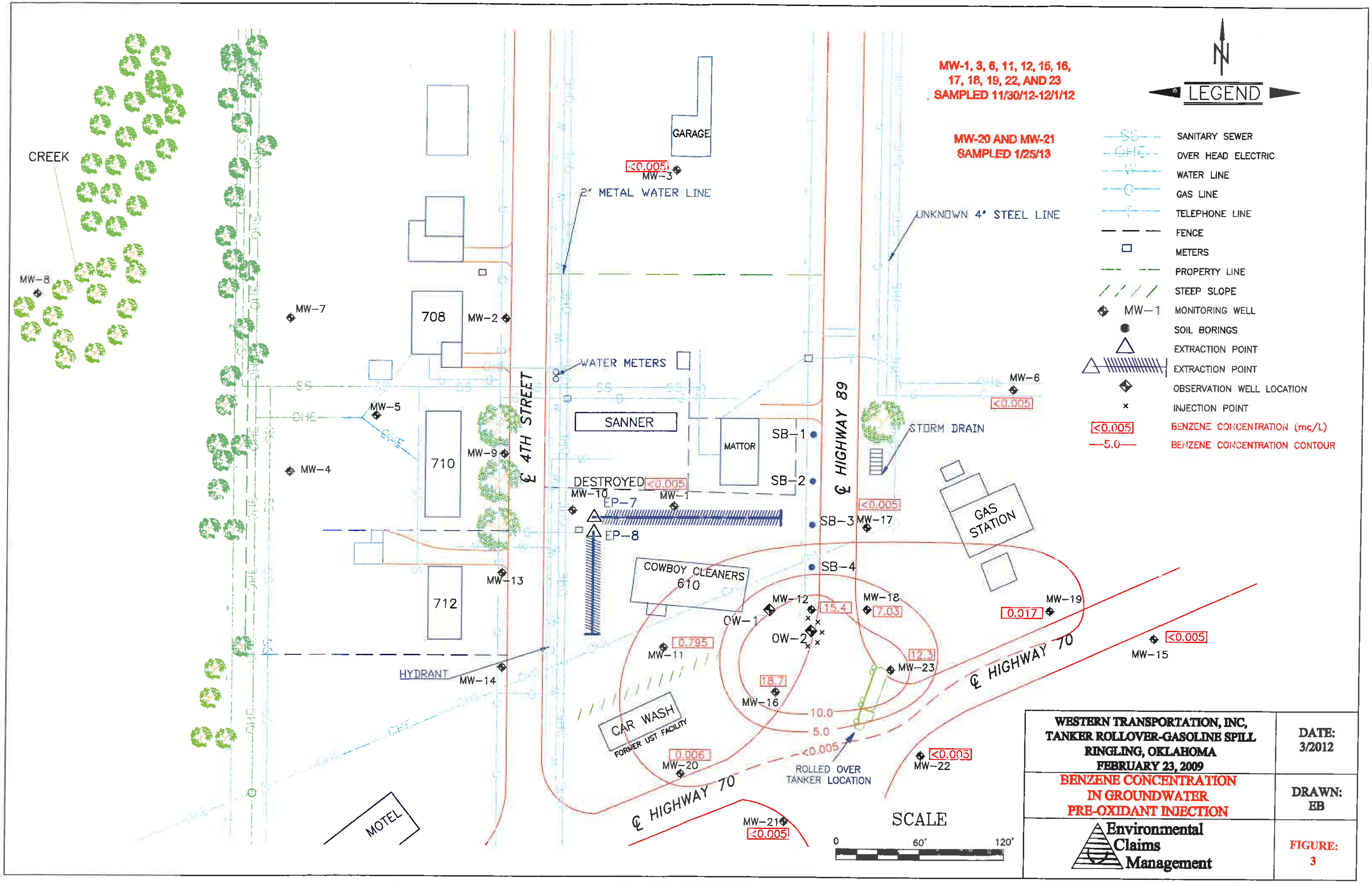
DATE: 4/2009

SITE MAP

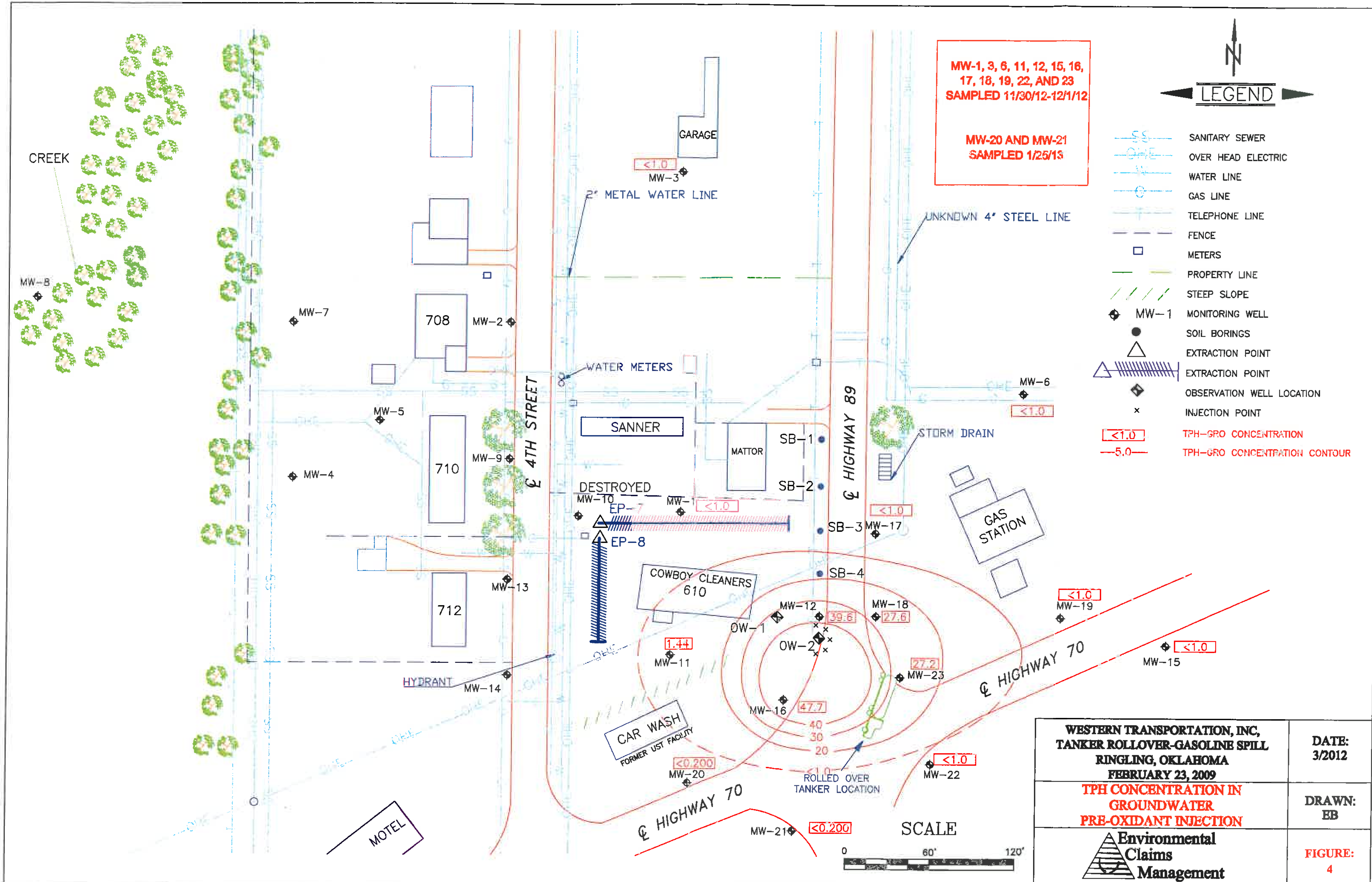
DRAWN: NW

Environmental Claims Management

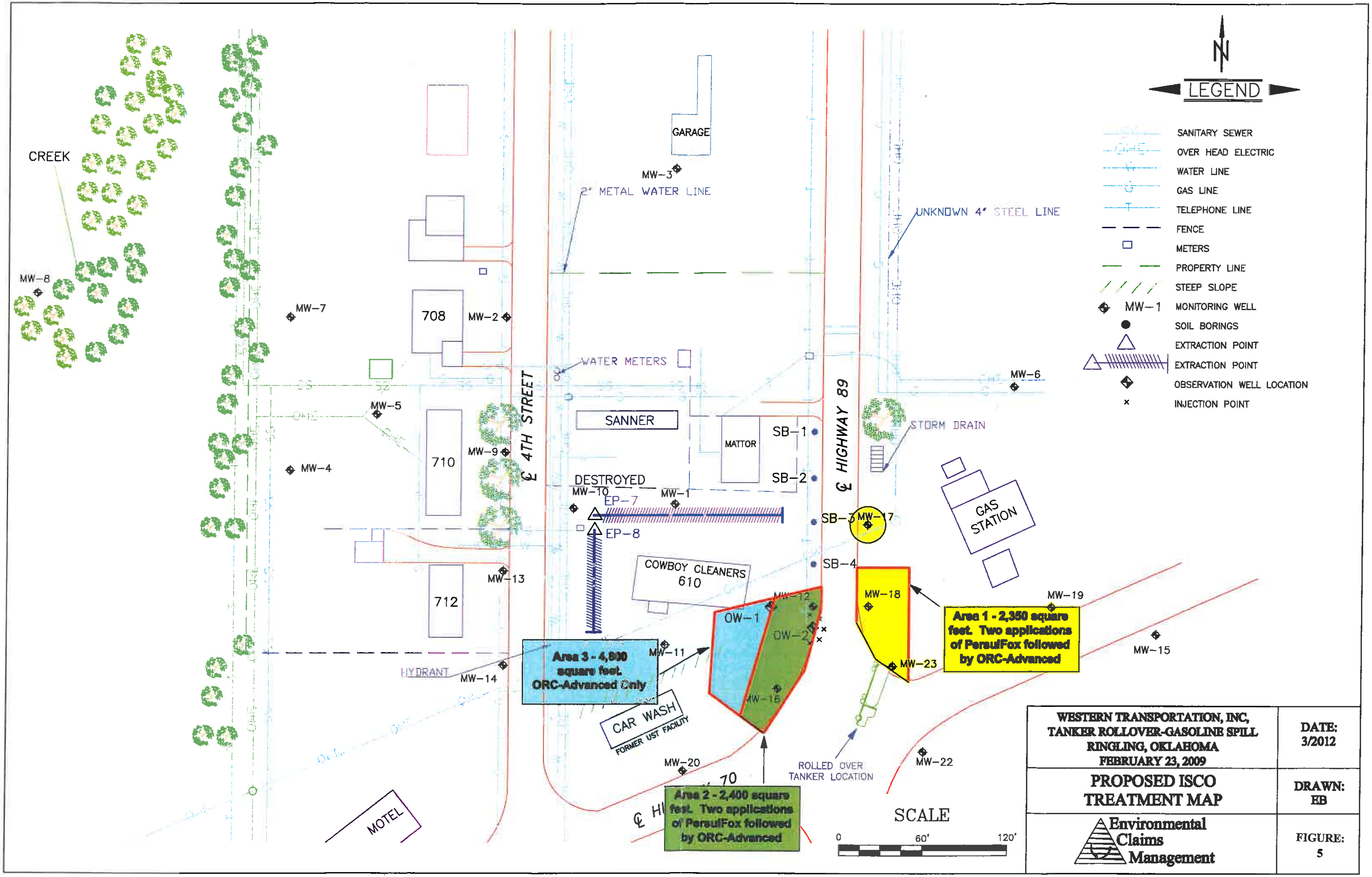
FIGURE 2



MW-1, 3, 6, 11, 12, 15, 16, 17, 18, 19, 22, AND 23 SAMPLED 11/30/12-12/1/12
MW-20 AND MW-21 SAMPLED 1/25/13
N
LEGEND
SANITARY SEWER
OVER HEAD ELECTRIC
WATER LINE
GAS LINE
TELEPHONE LINE
FENCE
METERS
PROPERTY LINE
STEEP SLOPE
MW-1 MONITORING WELL
SOIL BORINGS
EXTRACTION POINT
EXTRACTION POINT
OBSERVATION WELL LOCATION
INJECTION POINT
<0.005 BENZENE CONCENTRATION (mg/L)
5.0 BENZENE CONCENTRATION CONTOUR
CREEK
MW-8
MW-7
MW-5
MW-4
MW-2
MW-9
MW-13
MW-14
HYDRANT
708
710
712
GARAGE
<0.005 MW-3
2" METAL WATER LINE
UNKNOWN 4" STEEL LINE
WATER METERS
SANNER
MATTOR
℄ 4TH STREET
℄ HIGHWAY 89
DESTROYED <0.005
MW-10
MW-1
EP-7
EP-8
SB-1
SB-2
SB-3
SB-4
MW-6 <0.005
STORM DRAIN
<0.005 MW-17
GAS STATION
COWBOY CLEANERS 610
OW-1
OW-2
MW-12 15.4
MW-18 7.03
0.017 MW-19
<0.005 MW-15
0.795 MW-11
12.3 MW-23
18.7 MW-16
10.0
5.0
<0.005
CAR WASH
FORMER UST FACILITY
0.006 MW-20
ROLLED OVER TANKER LOCATION
<0.005 MW-22
MW-21 <0.005
℄ HIGHWAY 70
℄ HIGHWAY 70
MOTEL
SCALE
0 60' 120'
WESTERN TRANSPORTATION, INC,
TANKER ROLLOVER-GASOLINE SPILL
RINGLING, OKLAHOMA
FEBRUARY 23, 2009
BENZENE CONCENTRATION
IN GROUNDWATER
PRE-OXIDANT INJECTION
Environmental Claims Management
DATE: 3/2012
DRAWN: EB
FIGURE: 3



MW-1, 3, 6, 11, 12, 15, 16, 17, 18, 19, 22, AND 23 SAMPLED 11/30/12-12/1/12
MW-20 AND MW-21 SAMPLED 1/25/13
LEGEND
SANITARY SEWER
OVER HEAD ELECTRIC
WATER LINE
GAS LINE
TELEPHONE LINE
FENCE
METERS
PROPERTY LINE
STEEP SLOPE
MW-1 MONITORING WELL
SOIL BORINGS
EXTRACTION POINT
EXTRACTION POINT
OBSERVATION WELL LOCATION
INJECTION POINT
<1.0 TPH-GRO CONCENTRATION
5.0 TPH-GRO CONCENTRATION CONTOUR
CREEK
GARAGE
2" METAL WATER LINE
UNKNOWN 4" STEEL LINE
708
710
712
SANNER
MATTOR
WATER METERS
DESTROYED
COWBOY CLEANERS 610
CAR WASH
FORMER UST FACILITY
GAS STATION
STORM DRAIN
MOTEL
HYDRANT
℄ 4TH STREET
℄ HIGHWAY 89
℄ HIGHWAY 70
ROLLED OVER TANKER LOCATION
MW-2
MW-3 <1.0
MW-4
MW-5
MW-6 <1.0
MW-7
MW-8
MW-9
MW-10
MW-1 <1.0
MW-11 1.44
MW-12 39.6
MW-13
MW-14
MW-15 <1.0
MW-16 47.7
MW-17 <1.0
MW-18 27.6
MW-19 <1.0
MW-20 <0.200
MW-21 <0.200
MW-22 <1.0
MW-23 27.2
OW-1
OW-2
EP-7
EP-8
SB-1
SB-2
SB-3
SB-4
40
30
20
<1.0
SCALE
0
60'
120'
WESTERN TRANSPORTATION, INC.
TANKER ROLLOVER-GASOLINE SPILL
RINGLING, OKLAHOMA
FEBRUARY 23, 2009
TPH CONCENTRATION IN GROUNDWATER PRE-OXIDANT INJECTION
Environmental Claims Management
DATE: 3/2012
DRAWN: EB
FIGURE: 4



LEGEND
SANITARY SEWER
OVER HEAD ELECTRIC
WATER LINE
GAS LINE
TELEPHONE LINE
FENCE
METERS
PROPERTY LINE
STEEP SLOPE
MW-1 MONITORING WELL
SOIL BORINGS
EXTRACTION POINT
EXTRACTION POINT
OBSERVATION WELL LOCATION
INJECTION POINT
CREEK
MW-8
MW-7
MW-5
MW-4
708
710
712
MW-2
MW-9
MW-13
MW-14
HYDRANT
GARAGE
MW-3
2" METAL WATER LINE
WATER METERS
SANNER
MATTOR
DESTROYED
MW-10
MW-1
EP-7
EP-8
4TH STREET
HIGHWAY 89
UNKNOWN 4" STEEL LINE
MW-6
STORM DRAIN
SB-1
SB-2
SB-3
SB-4
MW-17
GAS STATION
COWBOY CLEANERS 610
OW-1
OW-2
MW-12
MW-11
MW-16
MW-18
MW-19
MW-15
MW-23
MW-20
MW-22
CAR WASH
FORMER UST FACILITY
MOTEL
ROLLED OVER TANKER LOCATION
Area 1 - 2,350 square feet. Two applications of PersulFox followed by ORC-Advanced
Area 2 - 2,400 square feet. Two applications of PersulFox followed by ORC-Advanced
Area 3 - 4,800 square feet. ORC-Advanced Only
SCALE
0
60'
120'
WESTERN TRANSPORTATION, INC, TANKER ROLLOVER-GASOLINE SPILL RINGLING, OKLAHOMA FEBRUARY 23, 2009
DATE: 3/2012
PROPOSED ISCO TREATMENT MAP
DRAWN: EB
Environmental Claims Management
FIGURE: 5