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June 7, 2012

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Mr. Glenn von Gonten
New Mexico Energy, Minerals & Natural Resources
Department - Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Attn: Jim Griswold

**Re: Supplemental Site Investigation & Corrective Action Work Plan
K-51 Pipeline Release Site
Off County Road 537
NE 1/4 Section 34 & NW 1/4, Sec 35, T26N, R6W
Rio Arriba County, New Mexico**

Dear Mr. Von Gonten:


Enterprise Field Services, LLC (Enterprise) is submitting two (2) copies of the enclosed report entitled: *Supplemental Site Investigation & Corrective Action Work Plan*, dated April 23, 2012. This report documents the results of a March 2012 site investigation conducted near the location of a former drip valve at the site. This drip valve was identified during the initial response actions and pipeline repair performed following an estimated 10 bbl condensate release occurring at this location during April 2010. The valve is located approximately 75 feet west of the condensate release site, and is a suspected historical release source.


Three (3) monitor wells (MW-18, MW-19 and MW-20) were installed during the supplemental site investigation documented in this report. This investigation supplements previous site investigations conducted during 2010 and 2011. Groundwater constituent concentrations at two of the new well locations (MW-19 and MW-20) exceeded applicable New Mexico Water Quality Control Commission (WQCC) *Groundwater Quality Standards* during the March 2012 groundwater monitoring event. Enterprise recommends performing additional *insitu* remedial actions at this location in accordance with the recommendations in the enclosed report. These additional remedial actions will supplement initial remedial actions performed during May 2011.

Unless the NM OCD has any comments concerning the remediation recommendations provided in the attached report, we will schedule this activity. Quarterly groundwater monitoring will be continued at the site to evaluate the effectiveness of the site remedial actions.

If you have any questions concerning the enclosed report, please do not hesitate to contact me at (713) 381-2286, or via email at: drsmith@eprod.com.

Sincerely,


David R. Smith, P.G.
Sr. Environmental Scientist


Rodney M. Sartor, REM
Manager, Remediation

/dep

Enclosures (2) – *Supplemental Site Investigation & Corrective Action Work Plan*, dated April 23, 2012

Mr. Glenn von Gonten
New Mexico Oil Conservation Division
June 7, 2012
Page 2

cc: Brandon Powell, New Mexico Oil Conservation Division, Aztec, NM
Bill Liess, Bureau of Land Management, Farmington, NM

ec: Jim Griswold – New Mexico Oil Conservation Division, Santa Fe, NM
Sherrie Landon – Bureau of Land Management, Farmington, NM
Chris Mitchell - Southwest Geoscience, San Antonio, TX
Kyle Summers - Southwest Geoscience, Farmington, NM

**SUPPLEMENTAL SITE INVESTIGATION &
CORRECTIVE ACTION WORK PLAN**

Property:

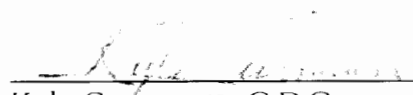
**K-51 Pipeline Release
Sections 34 and 35, T26N, R6W
Rio Arriba County, New Mexico**

**April 23, 2012
SWG Project No. 0410003**

Prepared for:

**Enterprise Field Services, LLC
1100 Louisiana Street
Houston, Texas 77002-5227
Attn: Mr. Rodney Sartor**

Prepared by:



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TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	SITE LOCATION AND HISTORY	1
1.2	CONSTITUENTS OF CONCERN	2
1.3	OBJECTIVES OF SUPPLEMENTAL SITE INVESTIGATION & CORRECTIVE ACTION.....	3
2.0	SITE CHARACTERIZATION	3
2.1	GEOLOGY & HYDROGEOLOGY.....	3
2.1.1	GROUNDWATER FLOW.....	4
2.1.2	GROUNDWATER CLASSIFICATION	4
2.2	LAND USE & CLASSIFICATION	4
2.3	SITE RANKING & PROPOSED CLEANUP GOALS	5
3.0	SUPPLEMENTAL SITE INVESTIGATION	6
3.1	SOIL BORINGS & MONITORING WELLS	6
3.2	INVESTIGATION SAMPLING PROGRAM	7
3.2.1	SOIL SAMPLING PROGRAM.....	7
3.2.2	GROUNDWATER SAMPLING PROGRAM.....	7
3.3	LABORATORY ANALYTICAL PROGRAM	8
3.4	QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)	8
3.5	DATA EVALUATION.....	8
4.0	CORRECTIVE ACTION	9
4.1	INFILTRATION TRENCH INSTALLATION.....	9
4.2	IN-SITU CHEMICAL OXIDATION.....	10
5.0	CORRECTIVE ACTION EFFECTIVENESS.....	11
5.1	GROUNDWATER MONITORING	11
5.2	LABORATORY ANALYTICAL PROGRAM	11
5.3	CORRECTIVE ACTION REPORT	12
6.0	FINDINGS	12

LIST OF APPENDICES

Appendix A: Figures

- Figure 1: Topographic Map
- Figure 2: Site Vicinity Map
- Figure 3: Site Map
- Figure 4: Groundwater Gradient Map (March 20, 2012)
- Figure 5: GQS Exceedance Zone for Benzene

Appendix B: Soil Boring/Monitoring Well Logs

Appendix C: Tables

- Table 1: Groundwater Analytical Summary
- Table 2: Groundwater Elevations

Appendix D: Laboratory Data Reports & Chain of Custody Documentation

SUPPLEMENTAL SITE INVESTIGATION &
CORRECTIVE ACTION WORK PLAN

K-51 Pipeline Release
Sections 34 and 35, T26N, R6W
Rio Arriba County, New Mexico

SWG Project No. 0410003

1.0 INTRODUCTION

1.1 SITE LOCATION AND HISTORY

The K-51 pipeline release site is located at the boundary of Sections 34 and 35, Township 26 North, Range 6 West, in Rio Arriba County, New Mexico, referred to hereinafter as the "Site" or "subject Site". The Site consists of silty/sandy canyon bottomland with native grasses, and is crossed by a natural gas pipeline operated by Enterprise Field Services, LLC (Enterprise).

On April 13, 2010, approximately 10 barrels of natural gas condensate were released from the Enterprise natural gas gathering pipeline at the Site, due to internal corrosion. Subsequent to the completion of excavation and off-site disposal of petroleum hydrocarbon affected soils, confirmation soil samples were collected from the excavation by Souder, Miller and Associates (SMA). In addition, one (1) groundwater sample was collected from the groundwater which recharged into the excavation. The excavation was then backfilled with unaffected soils.

In June 2010, eight (8) soil borings (BH-1 through BH-8) were advanced on-site by LT Environmental (LTE). Subsequent to advancement, four (4) of the soil borings were converted to groundwater monitoring wells (MW-1 through MW-4). Based on the results of soil and groundwater sampling activities, constituent of concern (COC) concentrations were identified in soil above the New Mexico Energy, Minerals and Natural Resources Department (EMNRD), Oil Conservation Division (OCD) *Remediation Action Levels* (RALs) and in groundwater above the New Mexico Water Quality Control Commission (WQCC) *Groundwater Quality Standards* (GQSS).

During the completion of supplemental investigation activities in April 2011, Southwest Geoscience (SWG) advanced nine (9) soil borings (SB-9, SB-10, MW-11 through MW-14, SB-15, MW-16, and MW-17) at the Site. Subsequent to advancement, soil borings MW-11, MW-12, MW-13, MW-14, MW-16, and MW-17 were converted to permanent groundwater monitoring wells. The groundwater samples collected from monitoring wells MW-1, MW-3, MW-4 and MW-14 during the April 2011 sampling event exhibited benzene concentrations ranging from 52 µg/L to 2,800 µg/L which exceed the WQCC *Groundwater Quality Standard* of 10 µg/L.

Fifteen (15) injection points were advanced in and around the release source area during April 2011. SWG injected an estimated 10,500 gallons of aqueous reagent (VeruSolve-HP™), proportionately, through the 15 injection wells during May 2011. Due to the presumed aquifer properties, the aqueous solution of oxidant reagent was

injected at a low flow rate and pressure (<30 psi at the well head) to ensure an effective distribution of oxidant in the subsurface.

To evaluate the effectiveness of the VeruSolve-HP™ aqueous reagent on the COCs identified in groundwater at the Site, SWG collected groundwater samples from the ten (10) monitoring wells in June, September and December of 2011. Benzene concentrations were identified in groundwater samples collected from monitoring wells MW-1, MW-4 and MW-14; however, the benzene concentrations were significantly reduced from the April 2011 concentrations.

During the completion of initial corrective actions, Enterprise replaced the section of pipeline affected by internal corrosion. During pipeline replacement activities, a drip¹ valve or pot was identified in the vicinity of soil boring/monitoring well MW-14, approximately 75 feet to the west of the release source. A drip valve is typically installed in low areas along the pipeline where drip accumulates, which allows for the removal of the liquids from the line as necessary. Based on the distribution of COCs in groundwater, the former drip valve may have been a historic source of petroleum hydrocarbon impact to groundwater in the vicinity of monitoring well MW-14.

The Site is subject to regulatory oversight by the New Mexico EMNRD OCD. To address activities related to condensate releases, the New Mexico OCD utilizes the *Guidelines for Remediation of Leaks, Spills and Releases* as guidance, in addition to the OCD rules, specifically NMAC 19.15.30 Remediation. These guidance documents establish investigation and abatement action requirements for sites subject to reporting and/or corrective action.

A topographic map is included as Figure 1, a 2005 aerial photograph of the Site vicinity is included as Figure 2, and a Site plan is included as Figure 3 of Appendix A.

1.2 CONSTITUENTS OF CONCERN

The soil and groundwater samples collected during initial corrective action and site investigation activities were analyzed for total petroleum hydrocarbons (TPH) gasoline range organics (GRO)/diesel range organics (DRO) utilizing EPA method SW-846 #8015M and benzene, toluene, ethylbenzene and xylenes (BTEX) using EPA SW-846 method #8021B.

- Based on the laboratory analytical results from the initial corrective action and site investigation activities, TPH GRO/DRO concentrations were identified in soil samples collected from soil boring BH-1 in exceedance of the New Mexico OCD *Remediation Action Level*.
- Based on the laboratory analytical results from the initial corrective action and site investigation activities, benzene, toluene and xylenes concentrations were identified in the groundwater samples collected from the excavation completed during initial corrective actions and from monitoring wells MW-1, MW-2, MW-3, MW-4 and MW-14 in exceedance of the NMWQCC *Water Quality Standards*.

¹ Condensate is often referred to as "drip".

Figure 3 indicates the approximate locations of the soil borings/monitoring wells in relation to pertinent Site features and general Site boundaries. Figure 5 presents the *Groundwater Quality Standard* Exceedance in groundwater based on the March 20, 2012 analytical data. Comprehensive groundwater analytical results for the Site are included in Tables 1 and 2, respectively (Appendix C).

1.3 OBJECTIVES OF SUPPLEMENTAL SITE INVESTIGATION & CORRECTIVE ACTION

The primary objective of the supplemental site investigation activities was to further evaluate the magnitude and extent of dissolved phase COCs in groundwater in the vicinity of the former pipeline drip valve location near monitoring well MW-14.

The primary objective of the proposed corrective actions will be to further reduce COC concentrations in groundwater at the Site to levels below the NMWQCC *Water Quality Standards* utilizing in-situ chemical oxidation (ISCO).

2.0 SITE CHARACTERIZATION

2.1 GEOLOGY & HYDROGEOLOGY

According to the New Mexico Bureau of Geology and Mineral Resource (Geologic Map of New Mexico 2003), the Site overlies the upper Nacimiento or lower San Jose geologic formation. The Nacimiento geologic formation is a heterogeneous non-marine formation composed of sandstone, siltstone, and shale, comprised of sediment eroded from the San Juan and Brazos-Sangre de Cristo uplifts. The Paleocene-age Nacimiento Group includes the Puerco and Torrejon Formations. The Eocene age San Jose geologic formation contains a mixture of clastic sedimentary rocks varying from siltstone to conglomerate, dominated by rocks containing sand-sized particles. The lithology encountered at the Site during boring activities were composed of Quaternary alluvial deposits derived from erosion of the parent San Jose sandstones and siltstones which comprise the canyon walls. Based on the data collected during the completion of soil borings, the alluvia generally consist of brown silty sands and silty clays from the ground surface to at least 20 feet below ground surface (bgs).

The lithology observed during the advancement of soil boring MW-18 at the Site included a tan sandy silt from the surface to approximately 4.0 feet bgs. The sandy silt stratum was underlain by a medium brown silty clay from 4.0 feet bgs to 10.0 feet bgs. A tan sand was encountered from 10.0 feet bgs to the terminus depth of 16.0 feet bgs. The lithologies observed in the remaining soil borings at the Site were similar to soil boring MW-18. Detailed lithologic descriptions are presented on the soil borings logs included in Appendix B.

The major aquifer underlying the Site vicinity is listed as the Colorado Plateaus Aquifer, which is made up of four smaller aquifers, the Uinta-Animas, the Mesa Verde, the Dakota-Glen, and the Coconino-De Chelly. The Uinta-Animas is the shallowest of these aquifers, and is present in the San Juan Basin. The general composition of the aquifers is moderately to well-consolidated sedimentary rocks of an age ranging from Permian to Tertiary. Each aquifer is separated from the others by an impermeable confining unit.

Two of the confining units are completely impermeable and cover the entire area of the aquifers. The other two confining units are less extensive and are thinner. These units allow water to flow between the principal aquifers. There are countless streams, rivers, and lakes that overlay the Colorado Plateaus Aquifers. The surface water bodies in this region provide a place for the aquifers to discharge. Some of the high altitude rivers and lakes may also provide recharge.

The initial groundwater-bearing unit (GWBU) at the Site was encountered at depths ranging from 12 to 25 feet bgs during the supplemental investigation activities.

2.1.1 GROUNDWATER FLOW

Monitoring well top-of-casing (TOC) elevations were surveyed and referenced to Section corner benchmarks. Groundwater measurements were collected utilizing an interface probe capable of detecting the presence of light non-aqueous phase liquids (NAPL). NAPL was not observed in the monitoring wells during the completion of gauging activities.

Based on the groundwater elevations identified in association with each of the monitoring wells, the groundwater gradient at the Site slopes generally to the west-northwest at an average gradient of 0.009 ft/ft.

Figure 4 is a Groundwater Gradient Map which depicts the groundwater elevations identified during the most recent gauging event. Table 2 (Appendix C) includes the gauging date, depth to groundwater and groundwater elevations for the gauging event(s) performed at the Site.

2.1.2 GROUNDWATER CLASSIFICATION

In accordance with 19.15.30 NMAC *Remediation*, a groundwater-bearing unit is classified as an "Underground Source of Drinking Water" provided the groundwater-bearing unit is capable of producing water for human consumption or that contains ground water having a total dissolved solids (TDS) concentration of 10,000 mg/l or less and that is not an exempted aquifer".

2.2 LAND USE & CLASSIFICATION

Due to the absence of land use classification guidelines in the OCD *Guidelines for Remediation of Leaks, Spills and Releases* and/or NMAC 19.15.30 *Remediation*, land use was determined by comparison of existing land use of the Site to the definitions for residential and non-residential land use published in the available New Mexico Environment Department (NMED) regulatory guidance. Based on the available NMED guidance, non-residential land use encompasses all commercial and industrial land uses.

The Site, adjacent, and surrounding (beyond adjacent) properties, are currently utilized as undeveloped agricultural rangeland. Based on SWG's review of the available information and visual inspection of the Site and vicinity, the Site appears to meet the non-residential land use classification.

2.3 SITE RANKING & PROPOSED CLEANUP GOALS

The Site is subject to regulatory oversight by the New Mexico EMNRD OCD. To address activities related to condensate releases, the New Mexico EMNRD OCD utilizes the *Guidelines for Remediation of Leaks, Spills and Releases* as guidance, in addition to the OCD rules, specifically NMAC 19.15.30 *Remediation*. These guidance documents establish investigation and abatement action requirements for sites subject to reporting and/or corrective action.

In accordance with the OCD's *Guidelines for Remediation of Leaks, Spills and Releases*, SWG utilized the general site characteristics to determine the appropriate "ranking" for the Site. The ranking criteria and associated scoring are provided in the following table:

Ranking Criteria			Ranking Score
Depth to Groundwater	<50 feet	20	20
	50 to 99 feet	10	
	>100 feet	0	
Wellhead Protection Area • <1,000 feet from a water source, or; <200 feet from private domestic water source.	Yes	20	0
	No	0	
Distance to Surface Water Body	<200 feet	20	20
	200 to 1,000 feet	10	
	>1,000 feet	0	
Total Ranking Score			40

Based on SWG's evaluation of the scoring criteria, the Site would have a Total Ranking Score of 40. This ranking is based on the following:

- The depth to the initial groundwater-bearing zone is <50 feet at the Site.
- Nearby drinking water sources were not identified within 1,000 feet of the Site.
- Tapicito Creek is adjacent to the Site.

Based on a Total Ranking Score of 40, cleanup goals for soil located at the Site include: 10 mg/Kg for benzene, 50 mg/Kg for total BTEX and 100 mg/Kg for TPH GRO/DRO.

In addition, cleanup goals for groundwater located at the Site include the NMWQCC *Water Quality Standards* of: 10 µg/L for benzene, 750 µg/L for toluene, 750 µg/L for ethylbenzene, and 620 µg/L for xylenes.

3.0 SUPPLEMENTAL SITE INVESTIGATION

3.1 SOIL BORINGS & MONITORING WELLS

As part of the approved scope of work, three (3) soil borings (MW-18, MW-19 and MW-20) were advanced in and around the former drip valve during March 2012. Soil boring MW-18 was advanced to the west of the former drip valve, hydrogeologically cross-gradient, and soil borings MW-19 and MW-20 were advanced to the northwest of the drip valve, hydrogeologically down-gradient.

Figure 3 of Appendix A is a Site Map which depicts the location of the soil boring in relation to pertinent land features.

Soil samples were collected continuously, utilizing four-foot core barrel samplers to the termination depth of each soil boring. Soil samples were observed to document soil lithology, color, moisture content, and visual and olfactory evidence of petroleum hydrocarbons. Field headspace analysis was conducted by placing the portion of the soil sample designated for field screening into a plastic Ziplock® bag. The plastic bag was sealed, and the sample allowed to volatilize. The air above the sample, the headspace, was then evaluated using a photoionization detector (PID) capable of detecting volatile organic compounds (VOCs). The PID was calibrated utilizing an isobutylene standard prior to use in the field.

During the completion of each soil boring, an on-Site geoscientist documented the lithology encountered and constructed a continuous profile of the soil column from the surface to the boring terminus. Soil samples from each boring location were visually inspected and classified in the field. The lithology observed during the advancement of soil boring MW-18 at the Site included a tan sandy silt from the surface to approximately 4.0 feet bgs. The sandy silt stratum was underlain by a medium brown silty clay from 4.0 feet bgs to 10.0 feet bgs. A tan sand was encountered from 10.0 feet bgs to the terminus depth of 16.0 feet bgs. The lithologies observed in the remaining soil borings at the Site were similar to soil boring MW-18. Detailed lithologic descriptions are presented on the monitoring well soil boring logs included in Appendix B.

PID readings were not identified above the instrument detection limit in the soils screened from borings MW-18 and MW-20. PID readings ranged from below instrument detection to 698 part per million (ppm) in the soils screened from boring MW-19. The PID readings identified in association with soils from boring MW-19 were generally confined to the capillary fringe zone. Field screening results are presented on the soil boring logs included in Appendix B.

Subsequent to advancement, each of the soil borings (MW-18, MW-19 and MW-20) were converted to permanent groundwater monitoring wells. The monitoring wells were completed using the following methodology:

- Installation of 10 feet of 2-inch inside diameter, 0.010-inch machine slotted PVC well screen with a threaded bottom cap;

- Installation of 2-inch inside diameter, threaded flush joint PVC riser pipe to the ground surface;
- Addition of a pre-sieved 10/20 grade annular silica sand pack from the bottom of the soil boring to 2-feet above the top of the well screen;
- Addition of a hydrated bentonite seal above the sand pack filter zone;
- Addition of grout to the surface; and,
- Installation of a locking well cap and protective steel riser.

Monitoring well construction details are presented on the monitoring well logs included in Appendix B.

3.2 INVESTIGATION SAMPLING PROGRAM

3.2.1 SOIL SAMPLING PROGRAM

Soils identified in exceedance of the New Mexico OCD *Remediation Action Levels* during the initial corrective actions and site investigation activities were limited to soil boring BH-1, near the former point of release. The remaining soil samples did not exhibit TPH GRO/DRO or total BTEX concentration in exceedance of the New Mexico OCD *Remediation Action Levels*, therefore, analytical soil samples were not collected from soil borings MW-18 through MW-20.

3.2.2 GROUNDWATER SAMPLING PROGRAM

Prior to sample collection, each monitoring well (MW-1 through MW-4 and MW-11 through MW-20) was micro-purged utilizing low-flow sampling techniques. Low-flow refers to the velocity with which groundwater enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen. It does not necessarily refer to the flow rate of water discharged at the surface which can be affected by flow regulators or restrictions. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective was to pump in a manner that minimizes stress (drawdown) to the system to the extent practical taking into account established site sampling objectives. Flow rates on the order of 0.1 to 0.5 L/min were maintained during the sampling activities using dedicated sampling equipment.

The utilization of low-flow minimal drawdown techniques enables the isolation of the screened interval groundwater from the overlying stagnant casing water. The pump intake is placed within the screened interval such that the groundwater recovered is drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone.

The monitoring wells were purged until produced groundwater was consistent in color, clarity, pH, dissolved oxygen (DO), oxidation/reduction potential (ORP), temperature, and conductivity.

3.3 LABORATORY ANALYTICAL PROGRAM

The groundwater samples were analyzed for TPH GRO/DRO using EPA method SW-846 #8015B and BTEX using EPA method SW-846 method #8021B.

Laboratory results are summarized in the tables included in Appendix C. The executed chain-of-custody form and laboratory data sheets are provided in Appendix D.

3.4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

All non-disposable sampling equipment was cleaned using an Alconox® wash and potable water rinse prior to the beginning of the project and before the collection of each sample.

Groundwater samples were collected and placed in laboratory prepared glassware, sealed with custody tape and placed on ice in a cooler, which was secured with a custody seal. The sample coolers and completed chain-of-custody forms were relinquished to Hall Environmental Analysis Laboratory (HEAL) in Albuquerque, New Mexico for standard turnaround.

HEAL performed the analyses of samples under an adequate and documented quality assurance program to meet the project and data quality objectives. The laboratory's quality assurance program is generally consistent the quality standards outlined in the National Environmental Laboratory Accreditation Program, as amended. In addition, the data generated by HEAL meet the intra-laboratory performance standards for the selected analytical method and the performance standards are sufficient to meet the bias, precision, sensitivity, representativeness, comparability, and completeness, as specified in the project data quality objectives.

3.5 DATA EVALUATION

The Site is subject to regulatory oversight by the New Mexico EMNRD OCD. To address activities related to crude oil/condensate related releases, the New Mexico EMNRD OCD utilizes the *Guidelines for Remediation of Leaks, Spills and Releases* as guidance, in addition to the EMNRD/OCD rules, specifically New Mexico Administrative Code (NMAC) 19.15.30 *Remediation*. These guidance documents establish investigation and abatement action requirements for sites subject to reporting and/or corrective action.

SWG compared BTEX concentrations or practical quantitation limits (PQLs) associated with the groundwater samples collected from the monitoring wells to the New Mexico WQCC *Groundwater Quality Standards*.

The groundwater samples collected from monitoring wells MW-2, MW-3, MW-11, MW-12, MW-13, MW-16, MW-17 and MW-18 during the March 2012 sampling event did not exhibit benzene, toluene, ethylbenzene or xylenes concentrations above the respective WQCC *Groundwater Quality Standards*.

The groundwater samples collected from monitoring wells MW-1 and MW-14 during the March 2012 sampling event did not exhibit toluene, ethylbenzene or xylenes concentrations above the WQCC *Groundwater Quality Standards*.

The groundwater sample collected from monitoring well MW-4 during the March 2012 sampling event did not exhibit a toluene concentration above the WQCC *Groundwater Quality Standards*.

The groundwater samples collected from monitoring wells MW-1, MW-4, MW-14, MW-19 and MW-20 during the March 2012 sampling event exhibited benzene concentrations ranging from 35 µg/L to 660 µg/L, which exceed the WQCC *Groundwater Quality Standard* of 10 µg/L.

The groundwater sample collected from monitoring well MW-4 during the March 2012 sampling event exhibited an ethylbenzene concentration of 1,000 µg/L, and a xylenes concentration of 1,400 µg/L, which exceed the applicable WQCC *Groundwater Quality Standards* of 750 µg/L and 620 µg/L for ethylbenzene and xylenes, respectively.

The results of the groundwater sample analyses are summarized in Table 2 of Appendix C. Figure 5 presents the *Groundwater Quality Standard Exceedance Zone* for Benzene based on the March 2012 groundwater analytical data.

4.0 CORRECTIVE ACTION

The proposed supplemental corrective actions include additional ISCO using a hydrogen peroxide-based chemical oxidant along with a field-proven combination of sodium percarbonate, sodium persulfate, and/or permanganate, which is an active (vs. passive) remediation alternative.

4.1 INFILTRATION TRENCH INSTALLATION

An infiltration trench will be installed within the central portion of the benzene *GQS Exceedance Zone* identified in the vicinity of monitoring wells MW-14 and MW-19. The infiltration trench will extend an estimated 45 feet from near monitoring well MW-14 to the northwest, near monitoring well MW-19. The infiltration trench will be completed using the following methodology:

- Installation of 45 feet of 4-inch inside diameter, 0.010-inch machine slotted PVC screen along the floor of the infiltration trench, which will be completed to an estimated depth of fourteen (14) feet bgs;
- Installation of 4-inch inside diameter, PVC riser pipe from the slotted PVC to the ground surface;
- Installation of pea gravel surrounding the slotted PVC to an approximate depth of 11 to 14 feet bgs;

- Installation of a geocloth or similar fabric to impede the infiltration of finer grain sediment into the gravel pack surrounding the slotted PVC; and,
- Backfilling of unaffected overburden soils from 11 feet bgs to the ground surface.

Please note, petroleum hydrocarbon affected soil, which will likely be encountered from a depth of 11 to 14 feet bgs during the installation of the infiltration trench, will be characterized and disposed in accordance with applicable state and federal regulation.

4.2 IN-SITU CHEMICAL OXIDATION

The petroleum hydrocarbon impacted soil and groundwater identified in the immediate vicinity of the source area and the drip valve will be addressed utilizing ISCO through the direct application of a hydrogen peroxide-based chemical oxidant along with a field-proven combination of sodium percarbonate, sodium persulfate, and/or permanganate, depending on the reagent ultimately selected for use at the Site.

Transitioning non-aqueous phase organics into an aqueous phase and producing persistent contact between the organic contaminant and the oxidant reagent is critical for achieving adequate destruction for reaching the treatment goals. Lateral propagation of an aqueous reagent can be controlled without much difficulty through adequate injection point placement, proper fluid flow rate, and injection pressure. This will ensure adequate macro scale contact. However, micro-scale contact is much more difficult to achieve. Petroleum hydrocarbons sequestered within the interstitial pore space must be adequately contacted with an appropriate oxidant reagent dose for complete destruction. Aromatics and some straight chain alkanes have a particular affinity for strong sequestration between clay platelets (vander Waals force within the lattice structure). Inoculation of an oxidant reagent without proper adjustments for surface tension or ionization will result in inefficient oxidant-contaminant contact. The proposed in-situ oxidation inoculation sequencing is intended to maximize oxidative persistence, penetration into interstitial pore space and partially de-ionize clay platelets easing contaminant desorption. A reduction-oxidation (redox) reaction that reaches third order kinetics can be highly exothermic, quickly driving aqueous phase contaminants into the vapor phase. Controlling the reaction kinetics is essential in maximizing contaminant contact persistence. The proposed in-situ oxidation procedures will form Windsor Type 1 micro-emulsion with petroleum hydrocarbons and the aqueous reagent, maximizing destruction efficiency.

Subsurface Product Delivery

The aqueous reagent will be injected through the infiltration trench and six (6) of the previously installed injection points located within the New Mexico WQCC GQS Exceedance Zone in Groundwater. SWG will inject an estimated 10,500 gallons of aqueous reagent through the infiltration trench and injection points. The reagent will be proportionally distributed through the trench and each of the injection points. Due to the presumed aquifer properties, the aqueous solution of oxidant reagent will be injected at a low flow rate and pressure (<30 psi at the injection well head). In our experience, these application procedures provide the greatest control of oxidant distribution. In

similar lithologic and hydrologic settings, these techniques have yielded homogeneous oxidant distribution and maximum contact with the contaminants.

Groundwater will be continuously monitored during injection activities for temperature, electrical conductance, total dissolved solids, dissolved oxygen, pH, oxidation-reduction potential and depth during injection through adjacent injection wells using YSI 556 multi-probe monitors and oil/water inter-phase probes. This real-time data will assist in monitoring reaction kinetics and subsurface reagent propagation allowing for fluid flow rate and pressure adjustments during injection.

Figure 5 depicts the proposed location of the injection trench along with the injection points relative to the *Groundwater Quality Standard Exceedance Zone* for Benzene in groundwater at the Site.

5.0 CORRECTIVE ACTION EFFECTIVENESS

To evaluate the effectiveness of the ISCO reagent on the COCs identified in groundwater at the Site, SWG will collect groundwater samples from each of the monitoring wells during four (4) quarterly groundwater monitoring events.

5.1 GROUNDWATER MONITORING

To evaluate the effectiveness of the proposed corrective actions, SWG will conduct four (4) quarterly groundwater monitoring events at the Site subsequent to the completion of injection activities. SWG's groundwater sampling program will consist of the following:

1. Collection of one (1) groundwater sample from each monitoring well (MW-1 through MW-4, MW-11 through MW-14, and MW-16 through MW-20) utilizing low-flow minimal drawdown sampling techniques during each of the quarterly groundwater sampling events.

The monitoring wells will be purged until produced groundwater is consistent in color, clarity, pH, DO, ORP, temperature and conductivity.

The groundwater samples will be collected in laboratory prepared glassware and placed on ice in a cooler, which will be secured with a custody seal. The samples will be transported to a selected analytical laboratory along with a completed chain-of-custody form.

5.2 LABORATORY ANALYTICAL PROGRAM

The groundwater samples collected from the monitoring wells will be analyzed for TPH GRO/DRO utilizing EPA method SW-846 #8015B and BTEX utilizing EPA Method SW-846 #8021B.

A summary of the analysis, sample type, sample frequency and EPA-approved methods are presented below:

Analysis	Sample Type	No. of Samples	EPA Method
BTEX	Groundwater	52	SW-846#8021B

5.3 CORRECTIVE ACTION REPORT

Upon completion of corrective action and groundwater monitoring activities, a Corrective Action Report will be prepared that will include documentation of corrective action activities, groundwater monitoring activities, a site plan detailing pertinent Site features, laboratory analytical results, an evaluation of sampling results and recommendations concerning further action, if necessary.

6.0 FINDINGS

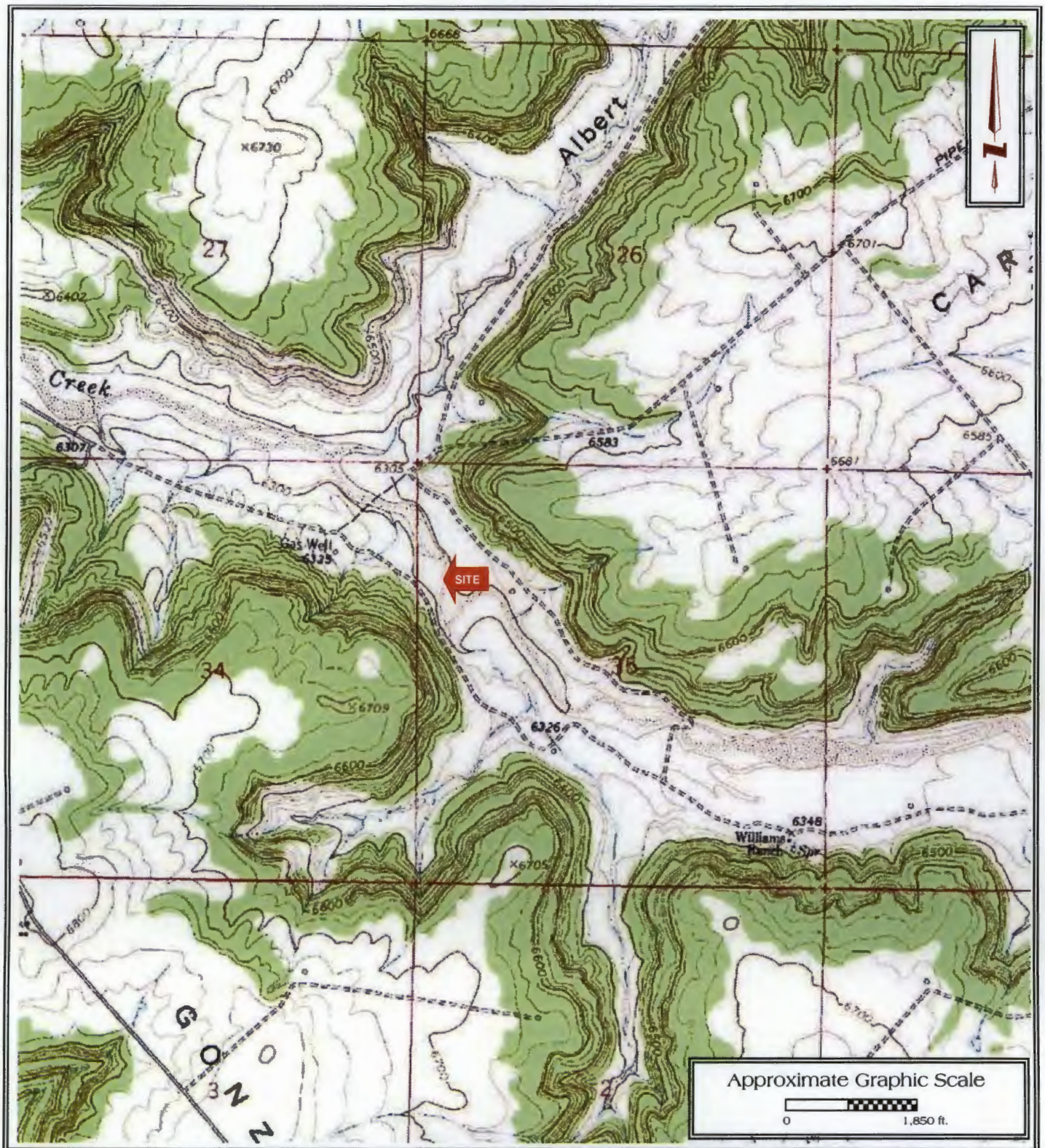
The primary objective of the supplemental site investigation activities was to further evaluate the magnitude and extent of dissolved phase COCs in groundwater in the vicinity of the former pipeline drip valve location near monitoring well MW-14. The primary objective of the proposed corrective actions will be to further reduce COC concentrations in groundwater at the Site to levels below the NMWQCC *Water Quality Standards* utilizing ISCO.

- SWG installed three (3) soil borings/monitoring wells (MW-18, MW-19 and MW-20) in and around the former drip valve. Soil boring MW-18 was advanced to the west of the former drip valve, hydrogeologically cross-gradient, and soil borings MW-19 and MW-20 were advanced to the northwest of the drip valve, hydrogeologically down-gradient.
- Based on the groundwater elevations identified in association with each of the monitoring wells, the groundwater gradient at the Site slopes generally to the west-northwest at an average gradient of 0.009 ft/ft.
- The groundwater samples collected from monitoring wells MW-1, MW-4, MW-14, MW-19 and MW-20 during the March 2012 sampling event exhibited benzene concentrations ranging from 35 µg/L to 660 µg/L, which exceed the WQCC *Groundwater Quality Standard* of 10 µg/L.
- The groundwater sample collected from monitoring well MW-4 during the March 2012 sampling event exhibited an ethylbenzene concentration of 1,000 µg/L, and a xylenes concentration of 1,400 µg/L, which exceed the applicable WQCC *Groundwater Quality Standards* of 750 µg/L and 620 µg/L for ethylbenzene and xylenes, respectively.
- An infiltration trench will be installed within the central portion of the benzene *GQS Exceedance Zone* identified in the vicinity of monitoring wells MW-14 and MW-19. The infiltration trench will extend as estimated 45 feet from near monitoring well MW-14 to the northwest, near monitoring well MW-19.

- The petroleum hydrocarbon impacted soil and groundwater identified in the immediate vicinity of the source area and the drip valve will be addressed utilizing ISCO through the direct application of a hydrogen peroxide-based chemical oxidant along with a field-proven combination of sodium percarbonate, sodium persulfate, and/or permanganate. The aqueous reagent will be delivered into the subsurface through an infiltration trench and six (6) of the previously installed injection points in the vicinity of the former point of release and the former drip valve. SWG will inject an estimated 10,500 gallons of aqueous reagent, proportionately, through the infiltration point and injection points. Due to the presumed aquifer properties, the aqueous solution of oxidant reagent was injected at a low flow rate and pressure (<30 psi at the well head) to ensure an effective distribution of oxidant in the subsurface.
- To evaluate the effectiveness of the ISCO aqueous reagent on the COCs identified in groundwater at the Site, SWG will conduct four (4) quarterly groundwater sampling events following the completion of the proposed supplemental ISCO activities.

APPENDIX A

Figures



K-51 Pipeline Release

N36° 26' 47.77"; W107° 26' 46.04"

Off County Road 537

Rio Arriba, New Mexico

SWG Project No. 0410003

Southwest
GEOSCIENCE

FIGURE 1

Topographic Map

Gonzales Mesa, NM Quadrangle

Contour Interval - 10 Feet



K-51 Pipeline Release

N36° 26' 47.77"; W107° 26' 46.04"

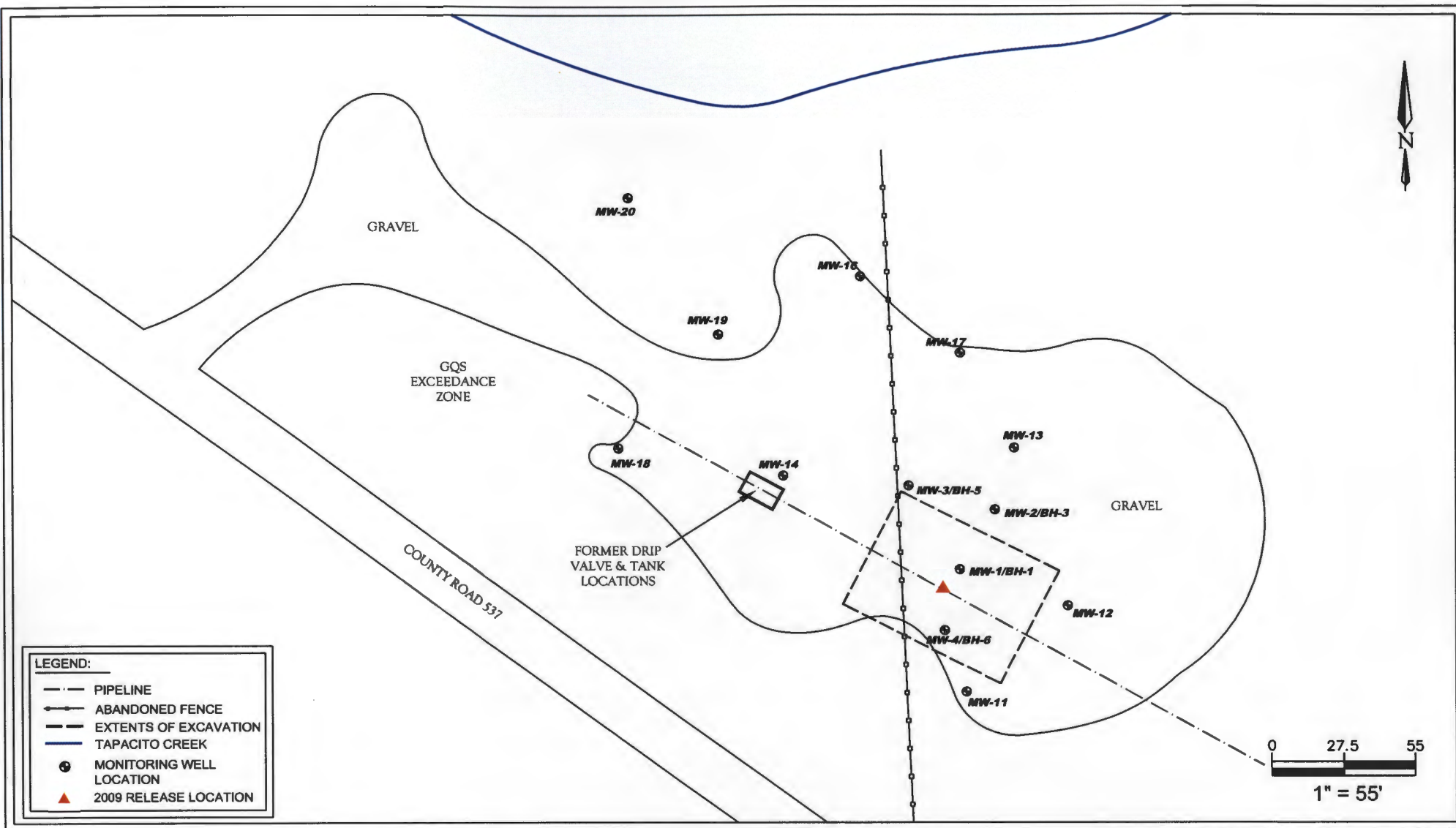
Off County Road 537

Rio Arriba, New Mexico

SWG Project No. 0410003

Southwest
GEOSCIENCE

FIGURE 2
Site Vicinity Map
2005 Aerial Photograph

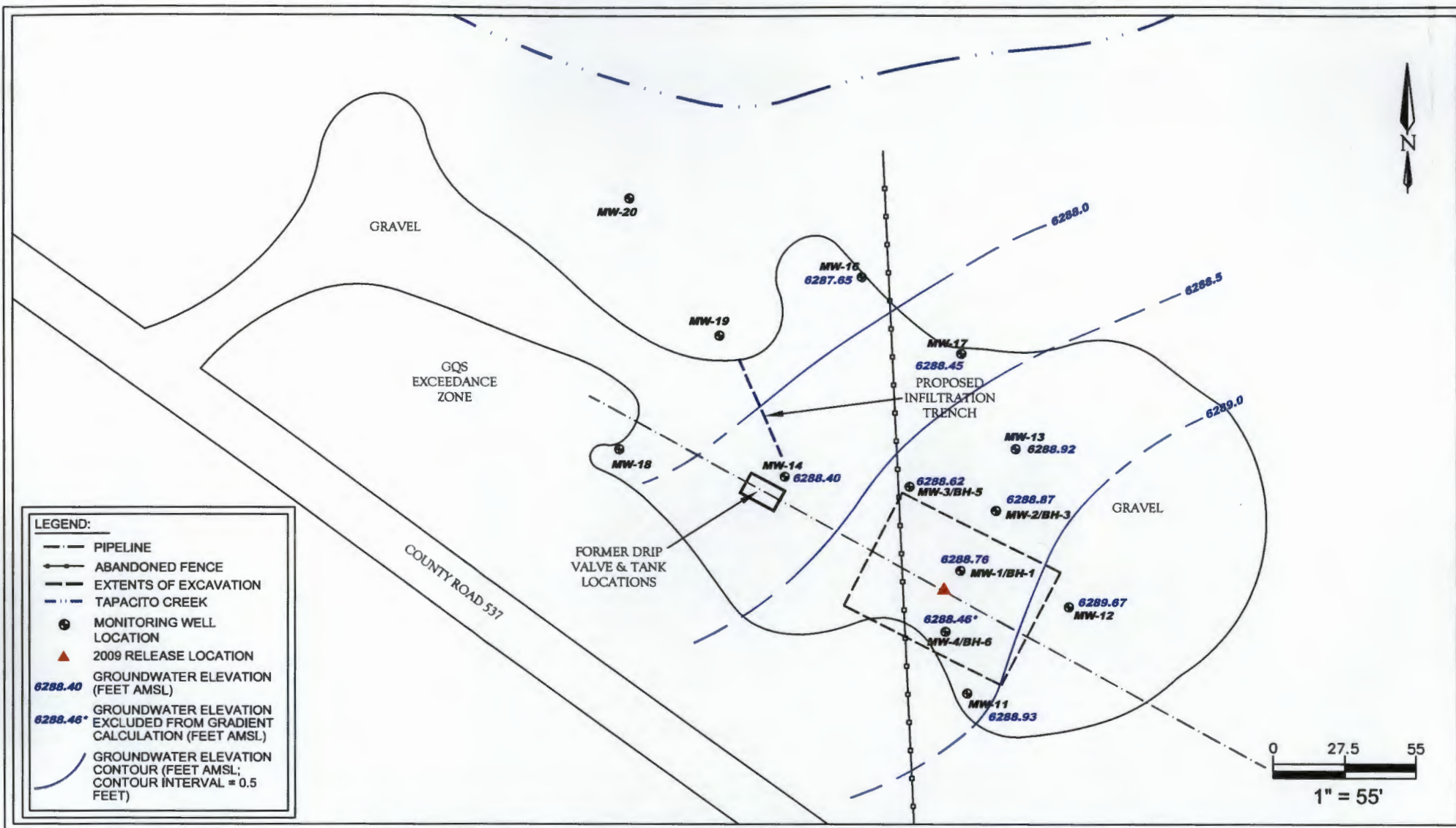


K-51 Pipeline Release
 N36° 26' 47.77"; W107° 26' 46.04"
 Off County Road 537
 Rio Ariba County, New Mexico

SWG Project No. 0410003

Southwest
 GEOSCIENCE

FIGURE 3
SITE MAP

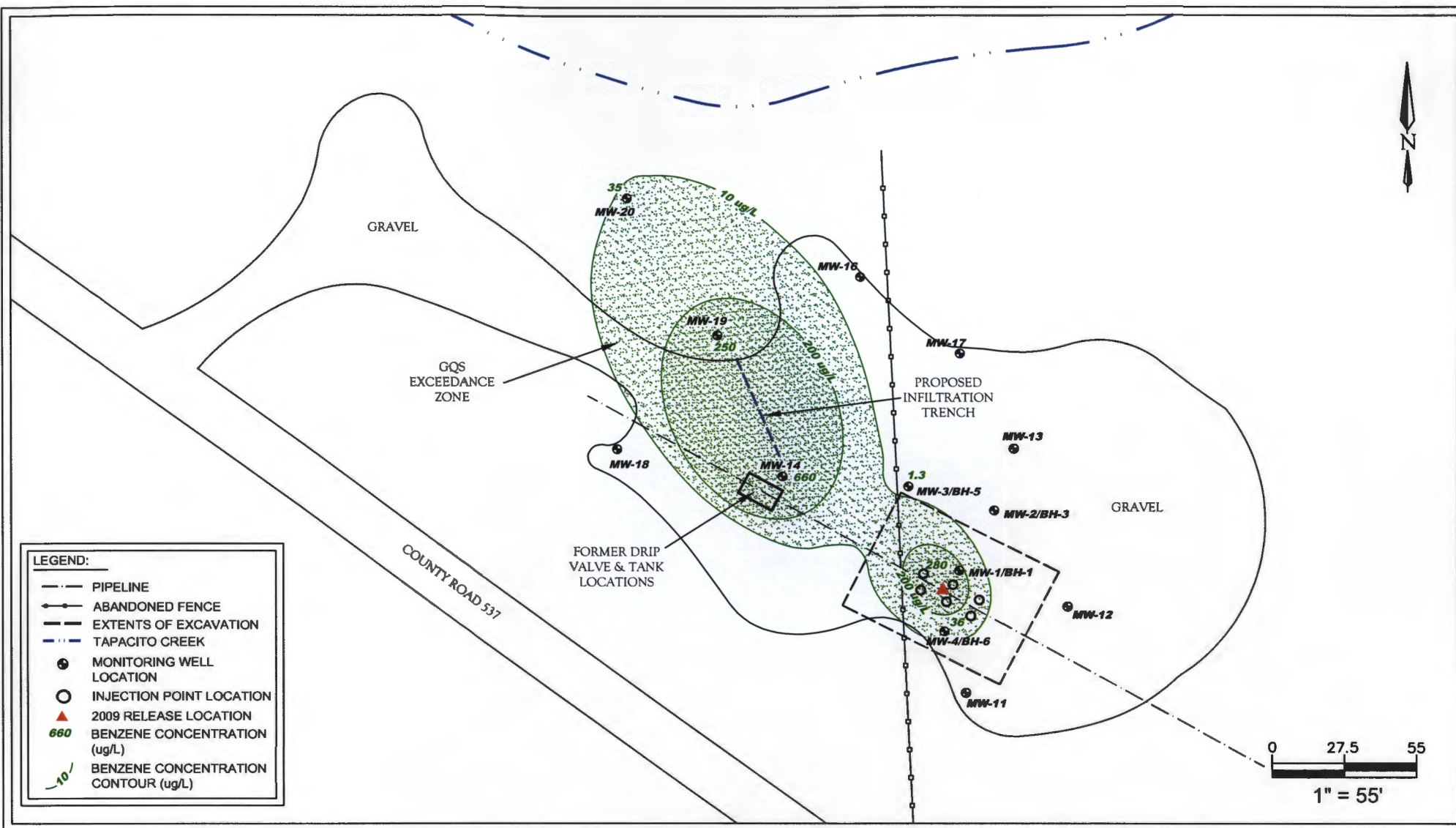


K-51 Pipeline Release
 N36° 26' 47.77"; W107° 26' 46.04"
 Off County Road 537
 Rio Arriba County, New Mexico

SWG Project No. 0410003

Southwest
 GEOSCIENCE

FIGURE 4
GROUNDWATER
GRADIENT MAP
 MARCH 20, 2012



K-51 Pipeline Release
 N36° 26' 47.77"; W107° 26' 46.04"
 Off County Road 537
 Rio Arriba County, New Mexico

SWG Project No. 0410003

Southwest
 GEOSCIENCE

FIGURE 5
 GROUNDWATER QUALITY
 STANDARD EXCEEDANCE ZONE
 FOR BENZENE

APPENDIX B

Soil Boring/Monitoring Well Logs

SOIL BORING / MONITORING WELL LOG

Soil Boring / Monitoring Well Number: MW-18

Project #: 0410003
 Drawn By: BCM
 Approved By: BCM

Sample Interval	<p style="text-align: center;">BORING AND SAMPLING NOTES</p>
% Recovery	
Groundwater Depth	
FID/PID Readings (ppm)	

BORING METHOD

HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
GP - GEOPROBE
AR - AIR ROTARY

SAMPLER TYPE

CB - FIVE FOOT CORE BARREL
SS - DRIVEN SPLIT SPOON
ST - PRESSED SHELBY TUBE

GROUNDWATER DEPTH

▼ AT COMPLETION

▼ AT WELL STABILIZATION

SURFACE ELEVATION:

SANDY SILT, Tan, Dry, No Odor

SILTY CLAY, Medium Brown, Dry, No Odor

SAND, Tan, Moist to Wet, No Odor

Bottom of Boring @ 16'

Wet @ 11.5'

Client: Enterprise Field Services LLC

Project Name: K-51 Release

Project Location: Rio Arriba County, NM

Project Manager: Kyle Summers

SOIL BORING / MONITORING WELL LOG

DRILLING & SAMPLING INFORMATION

Soil Boring / Monitoring Well Number: MW-19

Date Started: 3.19.12

Project #: 0410003

Date Completed: 3.19.12

Drawn By: BCM

Drilling Company: Earthworx

Approved By: BCM

Driller: Louis Trujillo

Geologist: B. Chris Mitchell Well Diam: _____

Well Diam: 1"

Boring Method: Geoprobe Screen Size:

Screen Size: 0.010"

Bore Hole Dia: 3.25" Screen Length: _____

Screen Length: 10'

Casing Length:

Casing Length: 10'

BORING METHOD

SAMPLER TYPE

GROUNDWATER DEPTH

HSA - HOLLOW STEM AUGERS

CB - FIVE FOOT CORE BARREL

▼ AT COMPLETION

CFA - CONTINUOUS FLIGHT AUGERS

SS - DRIVEN SPLIT SPOON

▼ AT WELL STABILIZATION

GP - GEOPROBE

ST - PRESSED SHELBY TUBE

AR - AIR ROTARY

ST-THINLED SHEET TUBE

BORING AND SAMPLING NOTES

SOIL CLASSIFICATION

SURFACE ELEVATION:

SAND, Tan, Dry, No Odor

CLAYEY SAND, Tan, Moist, Petroleum Hydrocarbon Odor

Bottom of Boring @ 20'

Some Staining @ 12' - 14'

SOIL BORING / MONITORING WELL LOG

Soil Boring / Monitoring Well Number: MW-20

Project #: 0410003
 Drawn By: BCM
 Approved By: BCM

BORING AND SAMPLING NOTES

Monitor Well Detail	SOIL CLASSIFICATION	Stratum Depth	Depth Scale	Sample No.	Sample Interval % Recovery	Groundwater Level	FID/FID Ratio
	SURFACE ELEVATION:						

Stratum Depth	Depth Scale	Sample No.	Sample Int.	% Recovery	Groundwater	FID/PID Res.
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24 - 25

Slight Staining @ 24' - 25'

Southwest GEOSCIENCE

APPENDIX C

Tables

TABLE 1
K-51 PIPELINE RELEASE
GROUNDWATER ANALYTICAL SUMMARY

Sample ID	Date	Benzene (µg/L)	Toluene (µg/L)	Engineerene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
BMA Sample - Open Excavation							
Excavation	4.21.10	7,000	13,000	540	5,200	NA	NA
Monitoring Wells							
MW-1	6.21.10	8,400	1,300	560	4,200	NA	NA
	9.24.10	2,300	28	200	520	8.4	<1.0
	4.21.11	430	<20	120	60	2.1	<1.0
	6.21.11	820	370	33	140	5.1	130
	9.22.11	690	1,200	120	1,200	8.9	30
	12.13.11	290	250	54	650	3.4	<1.0
MW-2	3.20.12	280	230	94	550	3.5	<1.0
	6.21.10	200	53	14	96	NA	NA
	9.24.10	2.3	<1.0	<1.0	<2.0	<0.050	<1.0
	4.21.11	3.3	<1.0	<1.0	<2.0	0.065	<1.0
	6.21.11	2.2	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
MW-3	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.10	640	57	72	1,000	NA	NA
	9.24.10	150	<1.0	16	28	0.48	<1.0
	4.21.11	52	<1.0	17	10	0.25	<1.0
	6.21.11	62	14	13	160	0.67	<1.0
MW-4	9.22.11	3	<1.0	8.7	<2.0	0.066	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	1.3	<1.0	1.9	<2.0	<0.050	<1.0
	6.21.10	3,600	10,000	600	6,600	NA	NA
	9.24.10	870	870	260	1,600	12	1
	4.21.11	670	<20	520	790	6.3	<1.0
MW-11	6.21.11	17	22	36	77	0.64	1.1
	9.22.11	62	140	220	820	3.8	1.2
	12.13.11	84	<20	430	490	2.6	<1.0
	3.20.12	36	<20	1,100	1,400	6.5	<1.0
	4.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
MW-12	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.21.11	1.9	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	4.6	<1.0	<1.0	<2.0	0.063	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
MW-13	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
MW-14	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.21.11	2,800	<100	280	720	8.7	<1.0
	6.21.11	470	<10	37	210	1.9	<1.0
	9.22.11	540	<10	100	36	1.7	<1.0
	12.13.11	220	<10	110	<20	1.0	<1.0
	3.20.12	660	<5.0	240	15	2.9	<1.0
MW-16	4.21.11	4.4	<2.0	<2.0	<4.0	<0.10	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	0.065	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	0.12	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.21.11	<2.0	<2.0	<2.0	<4.0	<0.10	<1.0
MW-17	6.21.11	<2.0	<2.0	<2.0	<4.0	<0.10	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
MW-18	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
MW-19	3.20.12	250	56	310	3,900	16	5.3
MW-20	3.20.12	35	<1.0	1.1	3.3	0.14	<1.0

Note: Concentrations in bold and yellow exceed the applicable OGD Remediation Action Level

NA = Not Analyzed

NE = Not Established

TABLE 2
K-51 Pipeline Release
GROUNDWATER ELEVATIONS

Well I.D.	Date	Depth to Product (feet BTOC)	Depth to Water (feet BTOC)	Product Thickness	TOC Elevations (feet AMSL)	Groundwater Elevation* (feet AMSL)
MW-1	4.21.11	ND	11.80	ND	6300.89	6289.09
	6.21.11	ND	12.16	ND		6288.73
	9.22.11	ND	12.92	ND		6287.97
	12.13.11	ND	12.45	ND		6288.44
	3.20.12	ND	12.13	ND		6288.76
MW-2	4.21.11	ND	10.55	ND	6299.82	6289.27
	6.21.11	ND	11.87	ND		6287.95
	9.22.11	ND	11.86	ND		6287.96
	12.13.11	ND	11.38	ND		6288.44
	3.20.12	ND	10.95	ND		6288.87
MW-3	4.21.11	ND	11.30	ND	6300.22	6288.92
	6.21.11	ND	11.64	ND		6288.58
	9.22.11	ND	12.45	ND		6287.77
	12.13.11	ND	11.89	ND		6288.33
	3.20.12	ND	11.60	ND		6288.62
MW-4	4.21.11	ND	11.90	ND	6300.91	6289.01
	6.21.11	ND	12.18	ND		6288.73
	9.22.11	ND	12.90	ND		6288.01
	12.13.11	ND	12.41	ND		6288.50
	3.20.12	ND	12.45	ND		6288.46
MW-11	4.21.11	ND	11.98	ND	6301.19	6289.21
	6.21.11	ND	12.40	ND		6288.79
	9.22.11	ND	13.07	ND		6288.12
	12.13.11	ND	12.55	ND		6288.64
	3.20.12	ND	12.26	ND		6288.93
MW-12	4.21.11	ND	8.96	ND	6299.08	6290.12
	6.21.11	ND	9.42	ND		6289.66
	9.22.11	ND	10.82	ND		6288.26
	12.13.11	ND	10.13	ND		6288.95
	3.20.12	ND	9.41	ND		6289.67
MW-13	4.21.11	ND	9.07	ND	6298.27	6289.20
	6.21.11	ND	9.51	ND		6288.76
	9.22.11	ND	10.15	ND		6288.12
	12.13.11	ND	9.59	ND		6288.68
	3.20.12	ND	9.35	ND		6288.92
MW-14	4.21.11	ND	12.54	ND	6301.20	6288.66
	6.21.11	ND	12.88	ND		6288.32
	9.22.11	ND	13.53	ND		6287.67
	12.13.11	ND	13.11	ND		6288.09
	3.20.12	ND	12.80	ND		6288.40
MW-16	4.21.11	ND	12.06	ND	6299.89	6287.83
	6.21.11	ND	12.26	ND		6287.63
	9.22.11	ND	12.57	ND		6287.32
	12.13.11	ND	12.28	ND		6287.61
	3.20.12	ND	12.24	ND		6287.65
MW-17	4.21.11	ND	9.90	ND	6298.57	6288.67
	6.21.11	ND	9.56	ND		6289.01
	9.22.11	ND	10.83	ND		6287.74
	12.13.11	ND	10.31	ND		6288.26
	3.20.12	ND	10.12	ND		6288.45
MW-18	3.20.12	ND	16.60	ND	NOT SURVEYED	-
MW-19	3.20.12	ND	15.69	ND	NOT SURVEYED	-
MW-20	3.20.12	ND	25.82	ND	NOT SURVEYED	-

BTOC - below top of casing

AMSL - above mean sea level

TOC - top of casing

* - corrected for presence of phase-separated hydrocarbon using a site-specific density correction factor of 0.63

ND - Not Detected

APPENDIX D

Laboratory Data Reports & Chain of Custody
Documentation



*Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com*

March 30, 2012

Kyle Summers

Southwest Geoscience
606 S. Rio Grande Unit A
Aztec, NM 87410
TEL: (214) 350-5469
FAX: (214) 350-2914

RE: K-51 Release

OrderNo.: 1203855

Dear Kyle Summers:

Hall Environmental Analysis Laboratory received 3 sample(s) on 3/22/2012 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman".

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203855

Date Reported: 3/30/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-3

Project: K-51 Release

Collection Date: 3/20/2012 3:40:00 PM

Lab ID: 1203855-001

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 1:04:26 PM
Surr: DNOP	111	61.3-164		%REC	1	3/23/2012 1:04:26 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/28/2012 1:21:47 AM
Surr: BFB	105	69.3-120		%REC	1	3/28/2012 1:21:47 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	1.3	1.0		µg/L	1	3/28/2012 1:21:47 AM
Toluene	ND	1.0		µg/L	1	3/28/2012 1:21:47 AM
Ethylbenzene	1.9	1.0		µg/L	1	3/28/2012 1:21:47 AM
Xylenes, Total	ND	2.0		µg/L	1	3/28/2012 1:21:47 AM
Surr: 4-Bromofluorobenzene	106	55-140		%REC	1	3/28/2012 1:21:47 AM

Qualifiers: */X Value exceeds Maximum Contaminant Level.
 E Value above quantitation range
 J Analyte detected below quantitation limits
 R RPD outside accepted recovery limits
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.**Analytical Report**

Lab Order 1203855

Date Reported: 3/30/2012

CLIENT: Southwest Geoscience**Client Sample ID:** MW-19**Project:** K-51 Release**Collection Date:** 3/20/2012 4:25:00 PM**Lab ID:** 1203855-002**Matrix:** AQUEOUS**Received Date:** 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	5.3	1.0		mg/L	1	3/23/2012 1:25:48 PM
Surr: DNOP	110	61.3-164		%REC	1	3/23/2012 1:25:48 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	16	2.5		mg/L	50	3/28/2012 1:52:00 AM
Surr: BFB	109	69.3-120		%REC	50	3/28/2012 1:52:00 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	250	50		µg/L	50	3/28/2012 1:52:00 AM
Toluene	56	50		µg/L	50	3/28/2012 1:52:00 AM
Ethylbenzene	310	50		µg/L	50	3/28/2012 1:52:00 AM
Xylenes, Total	3,900	100		µg/L	50	3/28/2012 1:52:00 AM
Surr: 4-Bromofluorobenzene	113	55-140		%REC	50	3/28/2012 1:52:00 AM

Qualifiers: */X Value exceeds Maximum Contaminant Level.
 E Value above quantitation range
 J Analyte detected below quantitation limits
 R RPD outside accepted recovery limits
 S Spike Recovery outside accepted recovery limits

 B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203855

Date Reported: 3/30/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-14

Project: K-51 Release

Collection Date: 3/20/2012 5:05:00 PM

Lab ID: 1203855-003

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 1:47:21 PM
Surr: DNOP	111	61.3-164		%REC	1	3/23/2012 1:47:21 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	2.9	0.25		mg/L	5	3/28/2012 2:52:21 AM
Surr: BFB	78.9	69.3-120		%REC	5	3/28/2012 2:52:21 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	660	20		µg/L	20	3/28/2012 11:46:41 PM
Toluene	ND	5.0		µg/L	5	3/28/2012 2:52:21 AM
Ethylbenzene	240	5.0		µg/L	5	3/28/2012 2:52:21 AM
Xylenes, Total	15	10		µg/L	5	3/28/2012 2:52:21 AM
Surr: 4-Bromofluorobenzene	88.2	55-140		%REC	5	3/28/2012 2:52:21 AM

Qualifiers: * / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203855

30-Mar-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID: MB-1212	SampType: MBLK	TestCode: EPA Method 8015B: Diesel Range								
Client ID: PBW	Batch ID: 1212	RunNo: 1634								
Prep Date: 3/23/2012	Analysis Date: 3/23/2012	SeqNo: 46371		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Diesel Range Organics (DRO)

ND

1.0

Surr: DNOP

1.2

1.000

119

61.3

164

Sample ID: LCS-1212	SampType: LCS	TestCode: EPA Method 8015B: Diesel Range								
Client ID: LCSW	Batch ID: 1212	RunNo: 1634								
Prep Date: 3/23/2012	Analysis Date: 3/23/2012	SeqNo: 46373		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Diesel Range Organics (DRO)

5.4

1.0

5.000

0

108

74

157

Surr: DNOP

0.55

0.5000

111

61.3

164

Sample ID: LCSD-1212	SampType: LCSD	TestCode: EPA Method 8015B: Diesel Range								
Client ID: LCSS02	Batch ID: 1212	RunNo: 1634								
Prep Date: 3/23/2012	Analysis Date: 3/23/2012	SeqNo: 46374		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Diesel Range Organics (DRO)

5.4

1.0

5.000

0

109

74

157

Surr: DNOP

0.58

0.5000

115

61.3

164

0.473

23

0

Qualifiers:

* / X Value exceeds Maximum Contaminant Level.

E Value above quantitation range

J Analyte detected below quantitation limits

R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203855

30-Mar-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID: 5ML RB	SampType: MBLK	TestCode: EPA Method 8015B: Gasoline Range								
Client ID: PBW	Batch ID: R1744	RunNo: 1744								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49064		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	0.050								
Surr: BFB	19		20.00		93.2	69.3	120			

Sample ID: 2.5UG GRO LCS	SampType: LCS	TestCode: EPA Method 8015B: Gasoline Range								
Client ID: LCSW	Batch ID: R1744	RunNo: 1744								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49065		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.56	0.050	0.5000	0	113	101	123			
Surr: BFB	16		20.00		79.3	69.3	120			

Sample ID: 1203798-002AMS	SampType: MS	TestCode: EPA Method 8015B: Gasoline Range								
Client ID: BatchQC	Batch ID: R1744	RunNo: 1744								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49127		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	350	25	250.0	117.5	94.6	75.4	121			
Surr: BFB	9,700		10,000		97.0	69.3	120			

Sample ID: 1203798-002AMSD	SampType: MSD	TestCode: EPA Method 8015B: Gasoline Range								
Client ID: BatchQC	Batch ID: R1744	RunNo: 1744								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49128		Units: mg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	350	25	250.0	117.5	93.2	75.4	121	0.965	10.5	
Surr: BFB	8,200		10,000		81.8	69.3	120	0	0	

Qualifiers:

*X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203855

30-Mar-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID: 5ML RB	SampType: MBLK	TestCode: EPA Method 8021B: Volatiles								
Client ID: PBW	Batch ID: R1745	RunNo: 1745								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49132	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	2.0								
Surr: 4-Bromofluorobenzene	19		20.00		95.1	55	140			

Sample ID: 100NG BTEX LCS	SampType: LCS	TestCode: EPA Method 8021B: Volatiles								
Client ID: LCSW	Batch ID: R1745	RunNo: 1745								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49133	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	103	80	120			
Toluene	22	1.0	20.00	0	111	80	120			
Ethylbenzene	22	1.0	20.00	0	109	80	120			
Xylenes, Total	65	2.0	60.00	0	109	80	120			
Surr: 4-Bromofluorobenzene	18		20.00		91.8	55	140			

Sample ID: 1203740-001AMS	SampType: MS	TestCode: EPA Method 8021B: Volatiles								
Client ID: BatchQC	Batch ID: R1745	RunNo: 1745								
Prep Date:	Analysis Date: 3/27/2012	SeqNo: 49148	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	210	10	200.0	4.500	103	70.1	118			
Ethylbenzene	270	10	200.0	53.50	107	73.5	117			
Xylenes, Total	840	20	600.0	194.7	107	73.1	119			
Surr: 4-Bromofluorobenzene	220		200.0		110	55	140			

Sample ID: 1203740-001AMSD	SampType: MSD	TestCode: EPA Method 8021B: Volatiles								
Client ID: BatchQC	Batch ID: R1745	RunNo: 1745								
Prep Date:	Analysis Date: 3/28/2012	SeqNo: 49149	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	200	10	200.0	4.500	99.6	70.1	118	2.95	16.4	
Ethylbenzene	270	10	200.0	53.50	107	73.5	117	0.613	13.5	
Xylenes, Total	830	20	600.0	194.7	106	73.1	119	0.682	12.9	
Surr: 4-Bromofluorobenzene	220		200.0		111	55	140	0	0	

Sample ID: 5ML RB	SampType: MBLK	TestCode: EPA Method 8021B: Volatiles								
Client ID: PBW	Batch ID: R1774	RunNo: 1774								
Prep Date:	Analysis Date: 3/28/2012	SeqNo: 49788	Units: µg/L							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Qualifiers:

*/X Value exceeds Maximum Contaminant Level.

E Value above quantitation range

J Analyte detected below quantitation limits

R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203855

30-Mar-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID: 5ML RB	SampType: MBLK	TestCode: EPA Method 8021B: Volatiles								
Client ID: PBW	Batch ID: R1774	RunNo: 1774								
Prep Date:	Analysis Date: 3/28/2012	SeqNo: 49788		Units: µg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Surr: 4-Bromofluorobenzene	15		20.00		76.7	55	140			

Sample ID: 100NG BTEX LCS	SampType: LCS	TestCode: EPA Method 8021B: Volatiles								
Client ID: LCSW	Batch ID: R1774	RunNo: 1774								
Prep Date:	Analysis Date: 3/28/2012	SeqNo: 49789		Units: µg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	105	80	120			
Surr: 4-Bromofluorobenzene	22		20.00		111	55	140			

Sample ID: 1203995-001AMS	SampType: MS	TestCode: EPA Method 8021B: Volatiles								
Client ID: BatchQC	Batch ID: R1774	RunNo: 1774								
Prep Date:	Analysis Date: 3/28/2012	SeqNo: 49812		Units: µg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1,200	50	1,000	156.1	103	70.1	118			
Surr: 4-Bromofluorobenzene	1,100		1,000		105	55	140			

Sample ID: 1203995-001AMSD	SampType: MSD	TestCode: EPA Method 8021B: Volatiles								
Client ID: BatchQC	Batch ID: R1774	RunNo: 1774								
Prep Date:	Analysis Date: 3/28/2012	SeqNo: 49814		Units: µg/L						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1,200	50	1,000	156.1	104	70.1	118	0.747	16.4	
Surr: 4-Bromofluorobenzene	900		1,000		90.1	55	140	0	0	

Qualifiers:

* / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit



Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87105
TEL: 505-345-3975 FAX: 505-345-4105
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name:	Southwest Geoscience	Work Order Number:	1203855
Received by/date:	<i>mg</i> 03/22/12		
Logged By:	Michelle Garcia	3/22/2012 9:30:00 AM	<i>Michelle Garcia</i>
Completed By:	Michelle Garcia	3/22/2012 3:22:12 PM	<i>Michelle Garcia</i>
Reviewed By:	<i>[Signature]</i>	03/22/12	

Chain of Custody

1. Were seals intact? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? UPS

Log In

4. Coolers are present? (see 19. for cooler specific information) Yes ☒ No ☐ NA ☐
5. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
6. Were all samples received at a temperature of $>0^{\circ}\text{C}$ to 6.0°C ? Yes ☒ No ☐ NA ☐
7. Sample(s) in proper container(s)? Yes ☒ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
10. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
11. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
12. Were any sample containers received broken? Yes ☐ No ☒
13. Does paperwork match bottle labels?
(Note discrepancies on chain of custody) Yes ☒ No ☐
14. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
15. Is it clear what analyses were requested? Yes ☒ No ☐
16. Were all holding times able to be met?
(If no, notify customer for authorization.) Yes ☒ No ☐

of preserved
bottles checked
for pH: _____

(<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: _____

Date: _____

By Whom: _____

Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks:

19. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.5	Good	Yes			

[illegible]

Matrix	WW - Wastewater	W - Water	S - Soil	SD - Solid	L - Liquid	A - Air Bag	C - Charcoal tube	SL - sludge	O - Oil
Container	VOA - 40 ml vial	A/G - Amber / Or Glass	1 Liter	250 ml - Glass wide mouth	P/O - Plastic or other				



*Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com*

April 03, 2012

Kyle Summers

Southwest Geoscience
606 S. Rio Grande Unit A
Aztec, NM 87410
TEL: (214) 350-5469
FAX (214) 350-2914

RE: K-51 Release

OrderNo.: 1203858

Dear Kyle Summers:

Hall Environmental Analysis Laboratory received 10 sample(s) on 3/22/2012 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-20

Project: K-51 Release

Collection Date: 3/20/2012 9:15:00 AM

Lab ID: 1203858-001

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 3:56:06 PM
Surr: DNOP	112	61.3-164		%REC	1	3/23/2012 3:56:06 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	0.14	0.050		mg/L	1	3/29/2012 12:47:19 AM
Surr: BFB	79.4	69.3-120		%REC	1	3/29/2012 12:47:19 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	35	1.0		µg/L	1	3/29/2012 12:47:19 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 12:47:19 AM
Ethylbenzene	1.1	1.0		µg/L	1	3/29/2012 12:47:19 AM
Xylenes, Total	3.3	2.0		µg/L	1	3/29/2012 12:47:19 AM
Surr: 4-Bromofluorobenzene	82.6	55-140		%REC	1	3/29/2012 12:47:19 AM

Qualifiers:

- *X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-18

Project: K-51 Release

Collection Date: 3/20/2012 9:50:00 AM

Lab ID: 1203858-002

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 4:17:32 PM
Surr: DNOP	113	61.3-164		%REC	1	3/23/2012 4:17:32 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 1:17:24 AM
Surr: BFB	91.1	69.3-120		%REC	1	3/29/2012 1:17:24 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 1:17:24 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 1:17:24 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 1:17:24 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 1:17:24 AM
Surr: 4-Bromofluorobenzene	92.6	55-140		%REC	1	3/29/2012 1:17:24 AM

Qualifiers: */X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-16

Project: K-51 Release

Collection Date: 3/20/2012 10:25:00 AM

Lab ID: 1203858-003

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 4:39:08 PM
Surr: DNOP	106	61.3-164		%REC	1	3/23/2012 4:39:08 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 1:47:39 AM
Surr: BFB	93.7	69.3-120		%REC	1	3/29/2012 1:47:39 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 1:47:39 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 1:47:39 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 1:47:39 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 1:47:39 AM
Surr: 4-Bromofluorobenzene	89.1	55-140		%REC	1	3/29/2012 1:47:39 AM

Qualifiers: * / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-17

Project: K-51 Release

Collection Date: 3/20/2012 11:00:00 AM

Lab ID: 1203858-004

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 5:00:37 PM
Surr: DNOP	111	61.3-164		%REC	1	3/23/2012 5:00:37 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 2:17:49 AM
Surr: BFB	88.8	69.3-120		%REC	1	3/29/2012 2:17:49 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 2:17:49 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 2:17:49 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 2:17:49 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 2:17:49 AM
Surr: 4-Bromofluorobenzene	89.0	55-140		%REC	1	3/29/2012 2:17:49 AM

Qualifiers: * / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-13

Project: K-51 Release

Collection Date: 3/20/2012 11:35:00 AM

Lab ID: 1203858-005

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 5:22:15 PM
Surr: DNOP	108	61.3-164		%REC	1	3/23/2012 5:22:15 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 2:47:48 AM
Surr: BFB	86.6	69.3-120		%REC	1	3/29/2012 2:47:48 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 2:47:48 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 2:47:48 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 2:47:48 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 2:47:48 AM
Surr: 4-Bromofluorobenzene	86.1	55-140		%REC	1	3/29/2012 2:47:48 AM

Qualifiers: *X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-2

Project: K-51 Release

Collection Date: 3/20/2012 12:30:00 PM

Lab ID: 1203858-006

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 5:43:52 PM
Surr: DNOP	112	61.3-164		%REC	1	3/23/2012 5:43:52 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 3:17:53 AM
Surr: BFB	81.6	69.3-120		%REC	1	3/29/2012 3:17:53 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 3:17:53 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 3:17:53 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 3:17:53 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 3:17:53 AM
Surr: 4-Bromofluorobenzene	81.6	55-140		%REC	1	3/29/2012 3:17:53 AM

Qualifiers: * / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-12

Project: K-51 Release

Collection Date: 3/20/2012 1:05:00 PM

Lab ID: 1203858-007

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 6:05:39 PM
Surr: DNOP	107	61.3-164		%REC	1	3/23/2012 6:05:39 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 4:18:25 AM
Surr: BFB	86.8	69.3-120		%REC	1	3/29/2012 4:18:25 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 4:18:25 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 4:18:25 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 4:18:25 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 4:18:25 AM
Surr: 4-Bromofluorobenzene	87.4	55-140		%REC	1	3/29/2012 4:18:25 AM

Qualifiers: */X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-11

Project: K-51 Release

Collection Date: 3/20/2012 1:40:00 PM

Lab ID: 1203858-008

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 6:27:15 PM
Surr: DNOP	106	61.3-164		%REC	1	3/23/2012 6:27:15 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	3/29/2012 4:48:31 AM
Surr: BFB	82.8	69.3-120		%REC	1	3/29/2012 4:48:31 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	1.0		µg/L	1	3/29/2012 4:48:31 AM
Toluene	ND	1.0		µg/L	1	3/29/2012 4:48:31 AM
Ethylbenzene	ND	1.0		µg/L	1	3/29/2012 4:48:31 AM
Xylenes, Total	ND	2.0		µg/L	1	3/29/2012 4:48:31 AM
Surr: 4-Bromofluorobenzene	83.2	55-140		%REC	1	3/29/2012 4:48:31 AM

Qualifiers: */X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-4

Project: K-51 Release

Collection Date: 3/20/2012 2:25:00 PM

Lab ID: 1203858-009

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 6:48:56 PM
Surr: DNOP	111	61.3-164		%REC	1	3/23/2012 6:48:56 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	6.5	1.0		mg/L	20	3/30/2012 2:27:10 AM
Surr: BFB	103	69.3-120		%REC	20	3/30/2012 2:27:10 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	36	20		µg/L	20	3/30/2012 2:27:10 AM
Toluene	ND	20		µg/L	20	3/30/2012 2:27:10 AM
Ethylbenzene	1,100	20		µg/L	20	3/30/2012 2:27:10 AM
Xylenes, Total	1,400	40		µg/L	20	3/30/2012 2:27:10 AM
Surr: 4-Bromofluorobenzene	114	55-140		%REC	20	3/30/2012 2:27:10 AM

Qualifiers:	*X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1203858

Date Reported: 4/3/2012

CLIENT: Southwest Geoscience

Client Sample ID: MW-1

Project: K-51 Release

Collection Date: 3/20/2012 3:05:00 PM

Lab ID: 1203858-010

Matrix: AQUEOUS

Received Date: 3/22/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: JMP
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	3/23/2012 7:32:11 PM
Surr: DNOP	105	61.3-164		%REC	1	3/23/2012 7:32:11 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	3.5	1.0		mg/L	20	3/30/2012 3:57:57 AM
Surr: BFB	90.4	69.3-120		%REC	20	3/30/2012 3:57:57 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	280	20		µg/L	20	3/30/2012 3:57:57 AM
Toluene	230	20		µg/L	20	3/30/2012 3:57:57 AM
Ethylbenzene	94	20		µg/L	20	3/30/2012 3:57:57 AM
Xylenes, Total	550	40		µg/L	20	3/30/2012 3:57:57 AM
Surr: 4-Bromofluorobenzene	98.0	55-140		%REC	20	3/30/2012 3:57:57 AM

Qualifiers: */X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203858

03-Apr-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID	MB-1212	SampType:	MBLK	TestCode:	EPA Method 8015B: Diesel Range					
Client ID:	PBW	Batch ID:	1212	RunNo:	1634					
Prep Date:	3/23/2012	Analysis Date:	3/23/2012	SeqNo:	46371	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Diesel Range Organics (DRO)

ND

1.0

Surr: DNOP

1.2

1.000

119

61.3

164

Sample ID	LCS-1212	SampType:	LCS	TestCode:	EPA Method 8015B: Diesel Range					
Client ID:	LCSW	Batch ID:	1212	RunNo:	1634					
Prep Date:	3/23/2012	Analysis Date:	3/23/2012	SeqNo:	46373	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Diesel Range Organics (DRO)

5.4

1.0

5.000

0

108

74

157

Surr: DNOP

0.55

0.5000

111

61.3

164

Sample ID	LCSD-1212	SampType:	LCSD	TestCode:	EPA Method 8015B: Diesel Range					
Client ID:	LCSS02	Batch ID:	1212	RunNo:	1634					
Prep Date:	3/23/2012	Analysis Date:	3/23/2012	SeqNo:	46374	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Diesel Range Organics (DRO)

5.4

1.0

5.000

0

109

74

157

Surr: DNOP

0.58

0.5000

115

61.3

164

0.473

23

0

Qualifiers:

* / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203858

03-Apr-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID	5ML RB	SampType:	MBLK	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	PBW	Batch ID:	R1772	RunNo:	1772					
Prep Date:		Analysis Date:	3/28/2012	SeqNo:	49768	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Gasoline Range Organics (GRO)	ND	0.050								
Surr: BFB	15		20.00		74.5	69.3	120			

Sample ID	2.5UG GRO LCS	SampType:	LCS	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	LCSW	Batch ID:	R1772	RunNo:	1772					
Prep Date:		Analysis Date:	3/28/2012	SeqNo:	49769	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Gasoline Range Organics (GRO)	0.58	0.050	0.5000	0	117	101	123			
Surr: BFB	20		20.00		98.3	69.3	120			

Sample ID	1203858-001AMS	SampType:	MS	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	MW-20	Batch ID:	R1772	RunNo:	1772					
Prep Date:		Analysis Date:	3/28/2012	SeqNo:	49780	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Gasoline Range Organics (GRO)	0.73	0.050	0.5000	0.1362	119	75.4	121			
Surr: BFB	19		20.00		97.3	69.3	120			

Sample ID	1203858-001AMSD	SampType:	MSD	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	MW-20	Batch ID:	R1772	RunNo:	1772					
Prep Date:		Analysis Date:	3/28/2012	SeqNo:	49781	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Gasoline Range Organics (GRO)	0.74	0.050	0.5000	0.1362	122	75.4	121	1.68	10.5	S
Surr: BFB	20		20.00		99.4	69.3	120	0	0	

Sample ID	5ML RB	SampType:	MBLK	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	PBW	Batch ID:	R1802	RunNo:	1802					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50387	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Gasoline Range Organics (GRO)	ND	0.050								
Surr: BFB	20		20.00		98.4	69.3	120			

Sample ID	2.5UG GRO LCS	SampType:	LCS	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	LCSW	Batch ID:	R1802	RunNo:	1802					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50388	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Gasoline Range Organics (GRO)	0.57	0.050	0.5000	0	115	101	123			
Surr: BFB	19		20.00		97.0	69.3	120			

Qualifiers:

* / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203858

03-Apr-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID	1203909-001AMS	SampType:	MS	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	BatchQC	Batch ID:	R1802	RunNo:	1802					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50404	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	1.1	0.10	1.000	0	110	75.4	121			
Surr: BFB	37		40.00		92.9	69.3	120			

Sample ID	1203909-001AMSD	SampType:	MSD	TestCode:	EPA Method 8015B: Gasoline Range					
Client ID:	BatchQC	Batch ID:	R1802	RunNo:	1802					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50405	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	1.1	0.10	1.000	0	113	75.4	121	2.15	10.5	
Surr: BFB	34		40.00		84.1	69.3	120	0	0	

Qualifiers:

*X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203858

03-Apr-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID	5ML RB	SampType: MBLK			TestCode: EPA Method 8021B: Volatiles					
Client ID:	PBW	Batch ID: R1774			RunNo: 1774					
Prep Date:		Analysis Date: 3/28/2012			SeqNo: 49788		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	2.0								
Surr: 4-Bromofluorobenzene	15		20.00		76.7	55	140			

Sample ID	100NG BTEX LCS		SampType:	LCS		TestCode:	EPA Method 8021B: Volatiles				
Client ID:	LCSW		Batch ID:	R1774		RunNo:	1774				
Prep Date:			Analysis Date:	3/28/2012		SeqNo:	49789		Units: µg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Benzene	21	1.0	20.00	0	105	80	120				
Toluene	23	1.0	20.00	0	113	80	120				
Ethylbenzene	23	1.0	20.00	0	113	80	120				
Xylenes, Total	68	2.0	60.00	0	113	80	120				
Surr: 4-Bromofluorobenzene	22		20.00		111	55	140				

Sample ID	1203995-001AMS		SampType:	MS		TestCode:	EPA Method 8021B: Volatiles				
Client ID:	BatchQC		Batch ID:	R1774		RunNo:	1774				
Prep Date:			Analysis Date:	3/28/2012		SeqNo:	49812		Units: µg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Benzene	1,200	50	1,000	156.1	103	70.1	118				
Toluene	1,400	50	1,000	329.6	105	72.3	117				
Ethylbenzene	1,100	50	1,000	28.60	105	73.5	117				
Xylenes, Total	3,400	100	3,000	193.2	106	73.1	119				
Surr: 4-Bromofluorobenzene	1,100		1,000		105	55	140				

Sample ID	1203995-001AMSD		SampType: MSD		TestCode: EPA Method 8021B: Volatiles					
Client ID:	BatchQC		Batch ID: R1774		RunNo: 1774					
Prep Date:			Analysis Date: 3/28/2012		SeqNo: 49814		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1,200	50	1,000	156.1	104	70.1	118	0.747	16.4	
Toluene	1,400	50	1,000	329.6	108	72.3	117	2.22	13.9	
Ethylbenzene	1,100	50	1,000	28.60	108	73.5	117	2.51	13.5	
Xylenes, Total	3,500	100	3,000	193.2	109	73.1	119	2.51	12.9	
Surr: 4-Bromofluorobenzene	900		1,000		90.1	55	140	0	0	

Qualifiers:

* / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1203858

03-Apr-12

Client: Southwest Geoscience

Project: K-51 Release

Sample ID	5ML RB	SampType:	MBLK	TestCode:	EPA Method 8021B: Volatiles					
Client ID:	PBW	Batch ID:	R1804	RunNo:	1804					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50456	Units:	µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	2.0								
Surr: 4-Bromofluorobenzene	20		20.00		101	55	140			

Sample ID	100NG BTEX LCS	SampType:	LCS	TestCode:	EPA Method 8021B: Volatiles					
Client ID:	LCSW	Batch ID:	R1804	RunNo:	1804					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50457	Units:	µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	104	80	120			
Toluene	22	1.0	20.00	0	112	80	120			
Ethylbenzene	22	1.0	20.00	0	111	80	120			
Xylenes, Total	68	2.0	60.00	0	113	80	120			
Surr: 4-Bromofluorobenzene	18		20.00		88.5	55	140			

Sample ID	1203909-002AMS	SampType:	MS	TestCode:	EPA Method 8021B: Volatiles					
Client ID:	BatchQC	Batch ID:	R1804	RunNo:	1804					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50478	Units:	µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	40	2.0	40.00	0	99.1	70.1	118			
Toluene	42	2.0	40.00	0	106	72.3	117			
Ethylbenzene	42	2.0	40.00	0	104	73.5	117			
Xylenes, Total	130	4.0	120.0	0	105	73.1	119			
Surr: 4-Bromofluorobenzene	42		40.00		104	55	140			

Sample ID	1203909-002AMSD	SampType:	MSD	TestCode:	EPA Method 8021B: Volatiles					
Client ID:	BatchQC	Batch ID:	R1804	RunNo:	1804					
Prep Date:		Analysis Date:	3/29/2012	SeqNo:	50479	Units:	µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	39	2.0	40.00	0	98.7	70.1	118	0.334	16.4	
Toluene	42	2.0	40.00	0	105	72.3	117	0.171	13.9	
Ethylbenzene	42	2.0	40.00	0	105	73.5	117	0.479	13.5	
Xylenes, Total	130	4.0	120.0	0	105	73.1	119	0.461	12.9	
Surr: 4-Bromofluorobenzene	35		40.00		86.6	55	140	0	0	

Qualifiers:

* / X Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
RL Reporting Detection Limit



Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87105
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Southwest Geoscience

Work Order Number: 1203858

Received by/date:

MG

03/22/2012

Logged By: Lindsay Mangin

3/22/2012 9:30:00 AM

Judy Hago

Completed By: Lindsay Mangin

3/22/2012 3:41:02 PM

Judy Hago

Reviewed By:

[Signature]

03/22/12

Chain of Custody

- | | | | | |
|----------------------------------|----------------|------|-------------|---|
| 1. Were seals intact? | Yes | No | Not Present | ✓ |
| 2. Is Chain of Custody complete? | Yes | ✓ No | Not Present | |
| 3. How was the sample delivered? | <u>Courier</u> | | | |

Log In

- | | | | |
|--|-----|------|--|
| 4. Coolers are present? (see 19. for cooler specific information) | Yes | ✓ No | NA |
| 5. Was an attempt made to cool the samples? | Yes | ✓ No | NA |
| 6. Were all samples received at a temperature of $>0^{\circ}\text{C}$ to 6.0°C | Yes | ✓ No | NA |
| 7. Sample(s) in proper container(s)? | Yes | ✓ No | |
| 8. Sufficient sample volume for indicated test(s)? | Yes | ✓ No | |
| 9. Are samples (except VOA and ONG) properly preserved? | Yes | ✓ No | |
| 10. Was preservative added to bottles? | Yes | No | ✓ NA |
| 11. VOA vials have zero headspace? | Yes | ✓ No | No VOA Vials |
| 12. Were any sample containers received broken? | Yes | No | ✓ |
| 13. Does paperwork match bottle labels?
(Note discrepancies on chain of custody) | Yes | ✓ No | # of preserved bottles checked for pH: |
| 14. Are matrices correctly identified on Chain of Custody? | Yes | ✓ No | (<2 or >12 unless noted) |
| 15. Is it clear what analyses were requested? | Yes | ✓ No | Adjusted? |
| 16. Were all holding times able to be met?
(If no, notify customer for authorization.) | Yes | ✓ No | Checked by: |

Special Handling (if applicable)

- | | | | | |
|---|-----|----|----|---|
| 17. Was client notified of all discrepancies with this order? | Yes | No | NA | ✓ |
|---|-----|----|----|---|

Person Notified:

Date

By Whom:

Via:

eMail

Phone

Fax

In Person

Regarding:

Client Instructions:

18. Additional remarks:

19. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.5	Good	Yes			

CHAIN OF CUSTODY RECORD

Southwest GEOSCIENCE Environmental & Hydrogeologic Consultants										Laboratory: <u>HALL</u> Address: <u>Albuquerque, NM</u>		ANALYSIS REQUESTED		Lab use only Due Date:			
Office Location <u>Artec, NM</u>										Contact: <u>Andy Freeman</u> Phone: <u>(505) 345-3975</u>		Temp. of coolers when received (C°): <u>2.5</u>		1 2 3 4 5			
Project Manager <u>K. Summers</u>										PO/SO #: <u></u>		Page <u>1</u> of <u>2</u>					
Sampler's Name <u>J. Dubuisson</u>										Sampler's Signature <u>Jordan Dubuisson</u>							
Proj. No. <u>0410003</u>										Project Name <u>K-51 Release</u>							
Matrix	Date	Time	G	C	Identifying Marks of Sample(s)	Depth	Depth	VOA	AG	250 ml	P/O	Lab Sample ID (Lab Use Only)					
W	3/20/12	0915	X		MW-20	-	-	4				X	X	1208858	-001		
		0950			MW-18										-002		
		1025			MW-16										-003		
		1100			MW-17										-004		
		1135			MW-13										-005		
		1230			MW-2										-006		
		1305			MW-12										-007		
		1340			MW-11										-008		
		1425			MW-4										-009		
		1505			MW-1										-010		
Turn around time <input checked="" type="checkbox"/> Normal <input type="checkbox"/> 25% Rush <input type="checkbox"/> 50% Rush <input type="checkbox"/> 100% Rush																	
Relinquished by (Signature) <u>Jordan Dubuisson</u>												Date: <u>3/21/12</u>		Time: <u>13:39</u>		NOTES:	
Relinquished by (Signature) <u>Shirley Labaton</u>												Date: <u>3/21/12</u>		Time: <u>15:52</u>		Date: <u>03/22/12</u> Time: <u>15:52-0930</u>	
Relinquished by (Signature) <u>Jordan Dubuisson</u>												Date: <u>3/21/12</u>		Time: <u>15:52</u>			
Relinquished by (Signature) <u>Jordan Dubuisson</u>												Date: <u>3/21/12</u>		Time: <u>15:52</u>			
Relinquished by (Signature) <u>Jordan Dubuisson</u>												Date: <u>3/21/12</u>		Time: <u>15:52</u>			