CORRECTIVE ACTION PLAN ADDENDUM
C-4 TOP STOP
15 SOUTH MAIN STREET
GUNNISON, UTAH
UST FACILITY NO. 2000220, RELEASE SITE EMHB
PROJECT NO. 1241-026A

November 15, 2010

Prepared for:

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November 11, 2010
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SUBJECT: Corrective Action Plan Addendum
C-4 Top Stop
15 South Main Street
Gunnison, Utah
UST Facility No. 2000220
Release Site EMHB

1.0 INTRODUCTION

This Corrective Action Plan (CAP) Addendum identifies the current status and presents additional details pertaining to the implementation of corrective action being conducted at the former C-4 Top Stop facility in Gunnison, Utah. Results from treatment system operations, soil/groundwater/indoor air sampling, and other data collection are submitted in monthly reports and are, therefore, summarized only briefly in this report. Pertinent data are included in historical tables and charts. This Corrective Action Plan Addendum was prepared by Wasatch Environmental, Inc., (Wasatch) for Wind River Petroleum and is supplemental to the September 30, 2008, "Corrective Action Plan." This document was completed in general accordance with the Leaking Underground Storage Tank (LUST) Corrective Action Plan Report Guide. The majority of the prior comments from the Division of Environmental Response and Remediation (DERR), which were included in the "Final Corrective Action Plan and Technical Specifications Requirements" correspondence dated August 26, 2009, have been addressed in subsequent monthly reports, and advised changes, or additions, are reflected in this CAP Addendum. Other remaining issues have also been addressed herein.

The Top Stop facility is located at the southeast intersection of Main and Center Streets in Gunnison, Utah. On August 8, 2007, gasoline vapors were reported in businesses near the Top Stop facility. The release had impacted both the east and west sides of Main Street and a good portion of the residential area between Main Street and 100 West Street, and between Center Street and 300 South Streets (the Site or impacted area). Many of the homes and businesses have basements. Underground utilities include culinary water, sewers, and storm drains.

Between August 2007 and September 2008, Wasatch Environmental, Inc., conducted subsurface investigation of the impacted area. Additional monitoring wells were installed in April and November 2009. A total of 307 direct push borings and 43 groundwater monitoring wells (MW-1 through MW-40, WS-1, WS-2, and WS-3) have been installed at the approximate locations depicted on Figure 1. The groundwater gradient is generally toward the southwest across the impacted area. Groundwater has been encountered in borings and monitoring wells at depths ranging from 7.5 feet to 14 feet below ground surface (bgs). The released gasoline migrated southwest from the Top Stop facility to the residence at 255 South 100 West Street, a distance of approximately 1,500 feet, in approximately 90 days.

Previous documents submitted to Utah DERR have included:

- "Underground Storage Tank Permanent Closure Notice" submitted on September 25, 2007.
- "Emergency Response and Vapor Abatement Report" submitted on December 10, 2007.
- "Additional Emergency Response and Subsurface Investigation Report" submitted on December 24, 2007.
- "Subsurface Investigation Report" submitted on February 12, 2008.
- "Corrective Action Plan Summary Letter" submitted on May 9, 2008.
- "Schedule for Residential and Business Indoor Air Analysis" submitted on July 7, 2008.
- "Corrective Action Plan" submitted on September 30, 2008.
- "Addendum to Corrective Action Plan" submitted on November 7, 2008.
- "Modified Schedule for Residential and Business Indoor Air Analysis" submitted on September 15, 2008.
- "Residential and Business Indoor Air Analysis – Quarterly Report" submitted on October 15, 2008.
- Monthly reports submitted for the months of June 2008 through September 2010.

2.0 CORRECTIVE ACTION AND ABATEMENT MEASURES

2.1 Tank Removal and Excavation of Impacted Soil in Release Area

Upon detection of the release, the remaining fuel in all of the tanks was removed. On August 21 and 22, 2007, two 6,000-gallon tanks and one 12,000-gallon tank were removed. Inspection of the bottom of the 12,000-gallon tank revealed corrosion perforations along a welded seam near the bottom of the tank. A portion of the contaminated soil surrounding the 12,000-gallon tank was removed and transported to the White Hills Landfill. Much of the soil on the south side of the tank was left in place due to its close proximity to the Gunnison Telephone Building and the potential for undermining the foundation of the structure.

During excavation of a soil vapor extraction pipeline near the dispenser island, an older release of petroleum product was discovered. Approximately 100 cubic yards of contaminated soil was removed and disposed of at the White Hills Landfill. Soil samples were analyzed to verify if the material was suitable for disposal at the White Hills Landfill. Analyses included F & D List volatiles, toxic metals, chlorinated solvents, Total Petroleum Hydrocarbons-Gasoline-Range Organics (TPH-GRO), methyl-tert-butyl ether (MTBE), and benzene, toluene, ethylbenzene, total xylenes and naphthalene (MBTEXN). Confirmation soil samples were collected from one side and the bottom of the excavation. Analytical results obtained from these samples indicated that a majority of the contaminated soil from the older release had been removed.

2.2 Soil Vapor Extraction (SVE) Systems

Due to the emergency nature of the project's development, the volatility of the petroleum product, the relatively high permeability of the soils, the high rate of plume migration, large plume dimensions, and the number of structures overlying the plume, SVE was chosen as the primary abatement measure and was granted approval during the emergency response activities via on-site meetings and telephone conversations with Mr. Doug Hansen and Mr. John Menatti of the DERR. In addition, SVE was the primary remediation technology selected in the Corrective Action Plan Summary Letter of May 9, 2008. The SVE systems have been successful in removing vapors from buildings and removing a relatively large amount of petroleum product from the subsurface.

SVE trenches were excavated approximately 12 to 15 feet deep. The SVE trenches were constructed by placing approximately 3 feet of crushed gravel in the bottom of the trench; a horizontal 4-inch diameter, slotted, PVC well screen was installed on the gravel; and approximately 1 foot of gravel was placed over the well screen. The remainder of the trench was backfilled with flow-fill (a lean concrete mix) to within 1 foot of the surface and with native backfill to the surface. The slotted PVC well screen was connected to vacuum blowers that extract the gasoline vapors from the subsurface. The gasoline vapors are incinerated by catalytic oxidizers (catox), or filtered through granular activated carbon (GAC) drums prior to discharge of the airstream to the atmosphere.

SVE treatment systems (Figure 1) were installed across the impacted area during the emergency response and site investigation activities. The treatment systems include the following:

- East Horizontal SVE System – A horizontal SVE trench was installed on the east side of Main Street, and three vertical wells on the former Top Stop site were connected to the SVE System. The system began operation on August 29, 2007. Groundwater sparging was initiated in July 2008 in wells WS-1, WS-2, and WS-3 to enhance biodegradation and soil vapor extraction (See Groundwater Sparging below). No positive PID readings have been detected in system emissions since June 23, 2009. SVE system effluent was originally treated using a catalytic oxidizer. The catalytic oxidizer was removed from the site and replaced with a drum of GAC for treatment of the SVE system effluent on May 25, 2010. A schematic of this system is presented in Appendix A, Figure A-1.

- West A and B Horizontal SVE Systems – The West A system was installed on the west side of Main Street, and the West B system was installed behind the Casino Star Theatre. West A system operation began on September 21, 2007, and West B system operation began on January 17, 2008. In addition, a perforated 2-inch diameter PVC pipe was installed in the basement of the Casino Star Theatre and connected to the West SVE System to extract gasoline vapors. A schematic of this system is presented in Appendix A, Figure A-2.

  Due to reduced concentrations of vapors recovered from the SVE trench on the west side of Main Street and the SVE trench behind the Casino Star Theatre, the West A catalytic oxidizer was turned off in August 2008. Vapors from the two SVE trenches and from the conduit inside the theater basement were then routed to the West B catalytic oxidizer. No positive PID readings have been detected in system emissions since September 16, 2009. The catalytic oxidizers were both removed from the site and replaced with drums of granular GAC for treatment of the SVE system effluent on May 25, 2010.

  On September 25, 2008, during investigation of the Casino Star Theatre basement, an open-ended, 4-inch diameter steel pipe was identified that seemed to be the primary source of the gasoline odor in the basement. The vacuum extraction line from the West SVE system was permanently attached to the open end of the pipe at that time. There has been no additional investigation related to the steel pipe,

and results of the related investigation activities were reported to the client and DERR in a subsurface investigation report dated October 20, 2008.

- South Horizontal SVE System – The South Horizontal SVE System was installed in an open field adjacent to the north of the 255 South 100 West property. System operation began on November 20, 2007. Groundwater sparging was initiated in August 2008, in wells TW-1 and TW-2, in combination with soil vapor extraction. The air stream was passed through a catalytic oxidizer. The catalytic oxidizer was removed from the site and replaced with a drum of GAC for treatment of the SVE system effluent on May 25, 2010; however, the south SVE system was shut off in early May 2010 and the GAC has not been used. A schematic of this system is presented in Appendix A, Figure A-3.

  An SVE well was installed beneath the basement floor slab of the residence at 255 South 100 West to mitigate the gasoline vapors beneath the building. The well was connected to the South SVE System and began operation on November 21, 2007. No positive PID readings have been detected in system emissions since May 26, 2009.

- 255 South 100 West SVE System – On August 8, 2008, two additional SVE wells (EW-1 and EW-2) were drilled east of the building. The above noted basement well was disconnected from the South Horizontal SVE System and was connected with EW-1 and EW-2 to an independent blower system, identified as the 255 South 100 West SVE System. The SVE air stream was passed through carbon filtration. No positive PID readings have been detected in system emissions since June 23, 2009. A schematic of this system is presented in Appendix A, Figure A-4.

  On July 20 and 23, 2009, a ventilation system was installed in the garage at the residence. On August 11, an X-shaped trench was installed in the garage beneath the concrete floor. Perforated piping was installed in the trench and connected to a vacuum blower. A more detailed report regarding the 255 South 100 West residence will be submitted separately.

- Central Horizontal SVE System – The Central Horizontal SVE System was installed on the 60 West 200 South Street property near its north boundary. The system began temporary operation on November 27, 2007, utilizing a mobile generator-powered catalytic oxidizer for emissions treatment. In February 2008, additional horizontal SVE trenches were installed on properties lying adjacent to the north, west, and east of the 60 West 200 South Street property.

  The temporary catox was replaced with a flame oxidizer and utility power source on March 4, 2008. Groundwater sparging was initiated in July 2008 in wells TW-4 and TW-6 in combination with soil vapor extraction.

  Due to reduced concentrations of vapors recovered by the Central SVE System, the flame oxidation unit was shut off in August 2008, and SVE system effluent is being treated using GAC. The catalytic oxidizer and flame oxidizer units were removed from the site on May 11, 2010. No positive PID readings have been detected in system emissions since June 23, 2009. A schematic of this system is presented in Appendix A, Figure A-5.

- West Alley Horizontal SVE System – The West Alley Horizontal SVE System was installed in a pre-existing garage building located near the west boundary of the 36 West 100 South Street property. The extraction trench extends from north to south along the east side of the property.

Extracted vapors are treated using GAC. The system began operation on May 16, 2008. No positive PID readings have been detected in system emissions since June 23, 2009. A schematic of this system is presented in Appendix A, Figure A-6.

2.3 Groundwater Extraction from Distal Zone

In December 2007, groundwater extraction wells GWE-1 and GWE-2 (Figure 1) were installed in the plume's distal zone. Mobile water storage tanks (frac tanks) were staged on the west side of 100 West Street just north of 300 South Street. Fifty four thousand gallons of water were extracted from the groundwater extraction wells and stored in the three storage tanks for treatment. Treatment consisted of injecting air into the water and volatizing the gasoline constituents.

Wasatch obtained a Utah Pollutant Discharge Elimination System (UPDES) permit with the Utah Division of Water Quality to allow the discharge of water stored in the frac tanks into the San Pitch River. As part of requirements under the permit (UTG790022), the water was analyzed for the following parameters:

Benzene	Toluene
Ethylbenzene	Xylenes
Naphthalene	Oil and Grease
Total Suspended Solids	Total Dissolved Solids
Total Lead	pH
Total Toxic Organics	Organic chemicals > 0.01 mg/L
MTBE	

Water samples collected from each storage tank were submitted to American West Analytical Laboratory for analysis. Analytical results indicated that all listed constituents were in compliance with the UPDES permit. Discharge of the treated water was completed in March and April 2008. A final confirmatory sample was collected during the discharge of each tank.

2.4 Product Recovery

Only minor amounts of free product were encountered during the SVE trenching operations. No free product was present in any of the soil probe borings or in any of the monitoring wells. The most significant area of free product accumulation was in the vicinity of TW-6. Free product recovery in this location consisted of placing sorbent booms into the SVE trench excavation and absorbing the product. An estimated 80 gallons of product was recovered.

2.5 Sparge Curtain

Wasatch Environmental and Riding & Associates (R&A) installed a groundwater remediation system (Sparge Curtain) between the southwest extent of the contamination plume and the San Pitch River. The Sparge Curtain was installed in a corral located on the west side of 100 West Street and adjacent to the south of the 220 South 100 West Street residence. System operation began on January 22, 2008. The system is the proprietary design of R&A. The design follows accepted sparging and fugitive vapor recovery principles with emphasis on a large surface area per unit volume of air through the system for the efficient exchange of volatiles and oxygen. The movement of air through the contaminated groundwater allows the volatile compounds that are dissolved in the water to be stripped out. This airflow also allows for the transfer of oxygen into the groundwater stimulating microbial degradation of residual petroleum compounds. A schematic of this system is presented in Appendix A, Figure A-7.

The sparge curtain trench was excavated 13 to 14 feet deep or to refusal on dense riverbed cobbles, and the emitters were bedded at the bottom of the trench and covered with approximately six feet of washed gravel. The vapor recovery piping was installed on the gravel backfill and in turn covered with a foot of washed gravel backfill. The remainder of the trench excavation was backfilled with native material. Nine of these 10-foot long emitter cells were installed end-to-end forming a sparge curtain to intercept the migrating petroleum contaminant plume.

Operation of the sparge curtain system was discontinued on August 21, 2009. Additional details are provided in Section 4.3.

2.6 Groundwater Sparging

The rise in groundwater elevation of 1 to approximately 2.5 feet across the plume area in 2008 resulted in adequate water in the wells to evaluate the effectiveness of air sparging to reduce dissolved hydrocarbon concentrations in groundwater. In July and August 2008, groundwater sparging was initiated on the Top Stop property, in the Central SVE area, and in the South SVE area.

Wells WS-1, WS-2, and WS-3 (East SVE System), trench wells TW-4 and TW-6 (Central SVE System), and trench wells TW-1 and TW-2 (South SVE System) were converted to groundwater sparge wells.

2.7 Building Ventilation Systems

Twelve Building Ventilation Systems are currently operating in two businesses and 10 residences across the site (See Figure 1). These ventilation systems were designed and installed by J&J Environmental Engineering during the emergency abatement; therefore, no "as built" design or installation drawing was created. The systems consist of sub-membrane depressurization and basement/crawl space ventilation.

- Sub-Membrane Depressurization (SMD): A high-density polyethylene sheet is laid on the earthen crawlspace area and affixed to the walls. Soil gases are drawn from beneath the polyethylene sheet via a minimum 3-inch diameter, schedule 40 PVC perforated pipe connected and routed to a depressurization fan that exhausts through a non-perforated pipe at the exterior of the building.

- Basement/Crawl Space Ventilation System: If a basement or a portion of a crawl space is not appropriate or accessible for plastic sheeting, then the air within the basement or crawl space is withdrawn by the depressurization fan that exhausts the air outside.

- Fans were selected based on building and soil conditions. Regardless of the type of fuel utilized, all of the fans are rated for handling moist air streams, for location in non-hazardous locations (regardless of indoor or outdoor location), and sub-freezing weather conditions. The fans have sealed housings and junction boxes and carry a minimum five-year manufacturer's warranty.

PID measurements have been taken monthly from the exhaust stacks of the ventilation systems, but will be taken quarterly beginning in September 2010. PID data obtained between May 14, 2008, and April 14, 2010, are presented in Table 1, which indicate no vapor is currently being removed from below any of the structures. Monthly system O&M will continue as long as the systems are in use.

Table 1. Building Ventilation Systems Emissions – PID Data (PPM)												
Date of PID Measurement	26 W 100 S St.	36 W 100 S St.	29 W 100 S St.	39 W 100 S St.	59 W 200 S St. (Side)	59 W 200 S St. (Rear)	60 W 200 S St.	70 W 200 S St.	96 W 200 S St.	255 S 100 W St. (Garage)	Hls N Hers	White Hills Trading Co
5/14/2008	0.0	10.2	18.3	92	NS	NS	0.0	NS[1]	0.0	NS[2]	16.8	NS
5/23/2008	0.0	0.9	16.8	85	0.0	2.6	0.0	NS[1]	0.0	NS	24.5	NS
6/3/2008	0.1	0.2	11.0	41	0.0	0.9	0.0	NS[1]	0.0	NS	18.0	NS
6/11/200S	0.0	0.2	12.0	35	0.0	1.1	0.0	NS[1]	0.0	NS	19.9	NS
6/18/2008	0.0	0.0	9.0	29	0.0	0.6	0.0	NS[1]	0.0	NS	NS	NS
6/25/2008	0.0	0.4	7.0	20.5	0.0	0.0	0.0	NS[1]	0.0	NS	NS	NS
7/1/2008	0.0	0.0	5.6	16.4	0.0	0.0	0.0	NS[1]	0.0	NS	17	NS
7/8/2008	0.0	0.0	3.0	12.1	0.0	0.0	0.1	NS[1]	0.0	NS	NS	NS
7/16/2008	0.1	0.0	2.2	11.4	0.0	0.0	0.0	NS[1]	0.0	NS	11	NS
7/31/2008	0.0	0.0	1.5	8.3	0.0	0.0	0.0	NS[1]	0.0	NS	7.6	NS
8/26/2008	NS	NS	1.0	8.0	NS	NS	NS	NS[1]	NS	NS	NS	NS
9/16/2008	0.0	0.0	0.0	5.7	0.0	0.0	0.0	NS[1]	0.0	NS	3.7	0.0
10/21/200S	0.0	NS	0.0	3.3	0.0	0.0	0.0	NS[1]	0.0	NS	1.8	0.0
11/13/2008	0.0	0.0	0.0	2.1	0.0	0.0	0.0	NS[1]	0.0	NS	NS	0.0
12/19/2008	0.0	0.0	2.9	6.4	0.0	0.0	0.0	NS[1]	0.0	NS	3.9	0.0
1/20/2009	0.0	0.0	1.5	3.8	0.0	0.0	0.0	NS[1]	0.0	NS	3.6	0.0
2/17/2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	NS	2.2	0.0
3/17/2009	0.0	0.0	4.2	12.0	0.0	0.0	0.0	NS[1]	0.0	NS	3.4	0.0
4/15/2009	0.0	0.0	1.4	1.9	0.0	0.0	0.0	NS[1]	0.0	NS	1.2	0.0
5/20/2009	0.0	0.0	2.7	2.8	0.0	0.0	0.0	NS[1]	0.0	NS	1.9	0.0
6/18/2009	0.0	0.0	0.7	0.0	0.0	0.0	0.0	NS[1]	0.0	NS	1.3	0.0
7/21/2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	1.3	0.36	0.0
8/12/2009	0.03	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	0.1	0.2	0.0
9/16/2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	0.0	0.0	0.0
10/15/2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	0.0	0.0	0.0
11/11/2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	0.0	0.0	0.0
12/23/2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	0.0	0.0	0.0
1/27/2010	0.0	0.0	0.2	0.0	0.0	0.0	0.0	NS[1]	0.0	0.0	0.2	0.0
2/24/2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	NS[3]	0.1	0.0
3/16/2010	0.0	0.0	0.3	0.0	NS[4]	NS[4]	0.0	NS[1]	0.0	NS[3]	0.0	0.0
4/14/2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	NS[3]	0.0	0.0
5/4/2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	NS[3]	0.0	0.0
5/26/2010	0.0	0.0	0.0	0.0	2.02	0.0	0.0	NS[1]	0.0	NS[3]	0.0	0.0
7/13/2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	NS[3]	0.0	0.0
S/3/2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NS[1]	0.0	NS[3]	0.0	0.0
9/21/2010	0.0	0.0	0.0	0.0	0.0	0.0	NS[4]	NS[1]	0.0	NS[3]	0.0	0.0

[1] Not sampled because the ventilation piping is inside residence and the discharge is on the roof.

[2] The 255 South 100 West Street Garage Ventilation System was installed in on July 20 and 23, 2009.

[3] The 255 South 100 West Street Garage Ventilation System was turned off on February 2, 2010.

[4] Not sampled because the property owner denied access to the property.

NS - Not Sampled

2.8 Microbial Degradation and Natural Attenuation

The physical processes utilized in the SVE treatment systems have been discussed in previous reports. Calculations derived from catox operation have been utilized to assess the amount of product that has been physically removed by the SVE systems and destroyed by catalytic oxidation. However, other remedial processes are provided through the operation of the treatment systems.

Our opinions and conclusions regarding natural attenuation processes presented in this section are based on prior experience with similar sites and on information presented in *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface* (Wiedemeier, et al., 1999). Natural biological activity in the subsurface is enhanced through the operation of SVE and air sparge systems. SVE creates a continuous flow of air through the soil; therefore, it often promotes biodegradation of organic compounds that may be present. Air sparging further enhances biological activity by introducing air (oxygen) into groundwater.

The subsurface contamination is further mitigated through natural attenuation processes, which include biodegradation; dispersion; dilution; sorption; volatilization; and chemical or biological stabilization, transformation, or destruction of contaminants. Though insufficient as a sole remedial alternative under current conditions, these natural processes further contribute to the reduction of contaminant concentrations.

Geochemical parameters (Appendix B) were collected in February 2008 and March/April 2009 to evaluate the potential biodegradation process for petroleum products. These geochemical parameters included temperature, dissolved oxygen (DO) concentration, pH, and oxygen reduction potential (ORP) measurements using a multi-parameter Troll 9000 meter from monitoring wells MW-1, MW-5, MW-6, and MW-7. In addition, groundwater samples were collected from monitoring wells MW-1, MW-5, MW-7, MW-9, and MW-12, and analyzed for the following parameters:

- Alkalinity, Method 2320B,
- Carbon dioxide, Method SM4500CO2D,
- Nitrate, Method 353.2
- Sulfate, sulfide, and chloride, Method 300
- Total organic carbon, Method 5310B
- Methane, ethane, and ethene, Method 8015
- Soluble ferrous iron and manganese, Method 6010B

Monitoring well MW-5 was originally located within the boundary of the petroleum product plume, and monitoring wells MW-1, MW-6, and MW-7 were located in a down-gradient portion of the plume where lower petroleum impacts had been detected in groundwater. Monitoring wells MW-9 and MW-12 were located cross-gradient of the plume, where no petroleum impacts to groundwater have ever been detected in laboratory samples.

- Dissolved oxygen content of the groundwater within the original center of the plume around MW-5 ranged from 0.37 to 0.40 mg/L. Dissolved oxygen content of the groundwater down-gradient of the center of the plume, in monitoring wells MW-1, MW-6, and MW-7, which had been impacted by petroleum products, ranged from 1 to 1.5 mg/L. All of these measurements indicated moderately aerobic conditions within the aquifer, with decreased oxygen content in the center of the plume where bacteria had used oxygen in the biodegradation process, creating moderately anaerobic conditions.

- The pH of the groundwater ranged from 6.5 to 7.2, which is in the optimal range for the biodegradation process.

- The temperature of the groundwater ranged from 56 to 60 degrees Fahrenheit, which is the optimal range for biodegradation process.

- The oxidation reduction potential of the groundwater within and down gradient of the plume ranged from approximately 75 to 170 millivolts, indicating only moderately aerobic conditions. Decreased oxidation reduction potential within a dissolved phase petroleum plume is an indication of biodegradation processes taking place at that time.

- Background alkalinity concentrations ranged from 470 to 540 mg/L, while concentrations within and down-gradient of the center of the dissolved phase petroleum plume ranged from 610 to 630 mg/L. An increase in alkalinity would be expected in areas of high biodegradation activity due to the interaction of carbon dioxide, the final petroleum biodegradation product, with aquifer minerals.

- Background nitrate concentrations measured in MW-9 and MW-12 ranged from 15 to 16 mg/L, while concentrations within and down gradient of the center of the dissolved phase petroleum plume were substantially less, ranging from below detection levels to 3.6 mg/L. Decreases in nitrate concentrations within a petroleum product plume are a geochemical indicator of the biodegradation process.

- Background manganese concentrations ranged from 0.37 to 2.2 mg/L, while concentrations within and down-gradient of the center of the petroleum product plume were 0.13 to 1.6 mg/L. These manganese concentrations are not indicative of whether or not biodegradation is occurring.

Overall, the geochemical data suggest that biodegradation of the dissolved phase petroleum constituents is occurring.

In March 2009, natural attenuation parameters were obtained from 20 monitoring wells. In wells located inside plume boundaries, the concentration of dissolved oxygen in groundwater ranged from 0.6 to 0.9 mg/L. The concentration of dissolved oxygen in wells located outside plume boundaries ranged from 2.3 to 7.5 mg/L.

Compared with the February 2008 data, the March 2009 data indicated an increase of oxygen concentrations in wells located outside the plume boundary, which represent background oxygen levels. However, while the March 2009 oxygen levels were elevated above the February 2008 levels, depletion levels in contaminated zones were similar to the February 2008 levels, indicating that bacterial activity inside plume boundaries was augmented by the increase of available oxygen.

3.0 TREATMENT SYSTEM COVERAGE

The initial directive of the emergency response was to protect human health and to mitigate the gasoline vapors migrating into businesses and residences. Accordingly, the initial installations of SVE systems (East System, West A System, South System, and the portion of the Central System on the north side of the 60 West and 68 West 200 South Street properties) were constructed up-gradient and proximal to the impacted buildings. Subsequent SVE trench installation in the Central SVE System and South SVE System and the installation of the West Alley SVE System were completed to provide more complete coverage of the impacted area.

3.1 Zones of SVE System Influence

The condition in which groundwater acts as a "conveyor belt" to transport groundwater contamination from up-gradient sources to the treatment systems has been referenced multiple times in previous reports. For this reason, Wasatch has focused more upon the breadth of SVE system influence rather than the radius of influence. SVE systems were installed before the plume was fully defined as emergency response measures to remove vapors from buildings and eliminate further vapor intrusion. The importance of extending the SVE trenches to treat accessible portions of the plume was the primary

focus of trench expansion, which was completed for each system as soon as the surrounding plume boundaries were identified.

Plume migration is channeled along permeable pathways. Permeable sediments are also amenable to soil vapor extraction. As a rule, sediments that are conducive to the flow of water (and contaminants) are conducive to the flow of air. The influence of each SVE system is, therefore, relatively high and generally consistent across the site.

Given the discussions above, it should be clearly understood that the SVE systems were not designed to provide complete coverage throughout the area occupied by the groundwater plume, but rather to intercept and remove contaminants transported in groundwater at strategic and accessible locations. The fact that the remediation systems are protective of human health and the environment is substantiated by the consistently decreasing contaminant concentrations observed, documented, and reported from the groundwater, SVE effiuent, and building ventilation system monitoring activities.

SVE system influence has been verified by vacuum testing selected sub-slab air sample probes, which are located at various distances from SVE trenches. Vacuum measurements obtained in the Lotsa Motsa Pizza Restaurant, the Body Barn Fitness Center, and the Casino Star Theatre on September 29, 2009, were 0.008, 0.015, and 0.064 inch water column (inch WC), respectively. The sample probes tested for vacuum were located between 30 feet (Casino Star Theatre) and 90 feet (Lotsa Motsa Pizza) from the West SVE System's Main Street and West Alley trenches. Vacuum was tested by turning the West SVE System off and back on, while observing the vacuum gauge. In the theater, the gauge would immediately drop to zero when the system was turned off and quickly rebound to 0.064 inch WC when the system was restarted. In the Lotsa Motsa Restaurant, an initial reading of 0.015 fell to 0.000 inch WC when the system was turned off and rebounded to 0.015 inch WC when it was restarted. The Body Barn sample probe recorded a vacuum reading of 0.008 to 0.009 inch WC regardless of whether the SVE system was on or off.

On July 20, 2009 vacuum was tested in 3/8-inch borings in the northeast and northwest corners of the garage at the 255 South 100 West residence. Readings of 0.001 and 0.002 inch WC were obtained. The two readings resulted from the South SVE System, the only system in operation, which indicated an approximate 60-foot influence from the nearest South SVE System trench.

Quarterly groundwater analytical data obtained from monitoring wells at various locations across the impacted area has provided information to determine if more coverage or additional remediation measures are necessary to treat contaminated groundwater and/or soil. Considering the large volume of product removed by the SVE systems, and the current residual plume concentrations, the treatment systems as currently configured have removed (through both breadth of influence and plume interception) the majority of the contamination from the site. Prior to the closing of the Site, confirmatory soil and groundwater samples will be collected from areas inside and outside of each SVE system's immediate zone of influence to verify that remedial target levels have been attained.

4.0 ESTIMATES OF CONTAMINANT MASS REMOVAL

4.1 Data from SVE Systems Operation

The utilization of catalytic oxidizers to treat SVE vapor emissions has facilitated the calculation of the quantity of gasoline removed by the SVE treatment systems. Calculation factors include: the amount of heat generated in the combustion of the gasoline vapors drawn through the catox units, the amount of airflow, and the duration of system operation.

The rise in temperature of the air stream across the catox due to the combustion of gasoline vapors is utilized to calculate the percentage of vapors (and thereby the quantity of product) per volume of air in standard cubic feet (scf). The amount of product per volume of air is then multiplied by the air stream flow rate (scfm) and hours of operation for each **SVE** system to calculate the amount of fuel extracted and burned by each system during the total period of operation. The quantities removed by all **SVE** systems are then combined to calculate the total amount of product removed during the course of the project.

Catalytic Combustion Corporation, the manufacturer of the catalytic oxidizer (catox) units, calculated the per-day quantities of fuel combusted. The calculations were based on data from temperature charts recorded by each catox unit during operation.

The flame-ox quantities are estimated using a formula provided by the flame-ox manufacturer. It is based on the average percent lower explosive limit (LEL), which was monitored frequently when the system was in operation.

In cases where the catox and flame-ox units are shut off, and granular activated carbon drums (GAC) are used to treat the system effluent, then the mass removal is calculated based on PID readings obtained before the effluent passes through the GAC drums, effluent flow rates, and time of operation.

Examples of mass removal calculations are presented in Appendix C.

4.2 Estimates of Contaminant Mass Removal

As of August 3, 2010, the estimated quantity of gasoline removed from the subsurface by six soil vapor extraction systems was 12,954 gallons (See Table 2 below).

Table 2. Estimated Mass Removal

TIME OF OPERATION	West A SVE CATOX	West B SVE CATOX	East SVE CATOX	Central SVE Flame-OX	South SVE CATOX	West Alley SVE	Gallons Combusted
8/29/07 TO 11/13/07	---	---	887[c]	---	---	---	---
9/21/07 TO 11/21/07	580[c]	---	---	---	---	---	---
STARTUP DATE	11-21-07	12-05-07	11-13-07	3-04-08	12-12-07	5-16-08	
STARTUP TO 06/11/08	3,069	1,293	2,863	3,166	452	---	10,843
06/11/08 TO 07/15/08	49	34	16	117	10	172	398
07/15/08 TO 12/10/08	NM/NC	NM/NC	NM/NC	NM/NC[d]	NM/NC	NC	NM/NC
12/10/08 TO 01/07/09	System Off	5	NM/NC	NM/NC[d]	NM/NC	NC	5
01/10/08 TO 02/03/09	System Off	13	NM/NC	<1[d]	NM/NC	<1	13
2/03/09 TO 3/10/09	System Off	18	NM/NC	NM/NC[d]	NM/NC	<1	18
3/10/09 TO 4/08/09	System Off	81	NM/NC	7[d]	NM/NC	4	92
4/08/09 TO 5/01/09	System Off	60	NM/NC	7[d]	NM/NC	7	74
5/01/09 TO 5/27/09	System Off	35	NM/NC	4[d]	NM/NC	2	41
5/27/09 TO 6/23/09	System Off	2	NM/NC	1[d]	NM/NC	<1	3
6/23/09 TO 7/21/09	System Off	NM/NC	NM/NC	NC[d]	NM/NC	NC	NM/NC
7/21/09 TO 9/21/10	System Off	NM/NC	NM/NC	NC[d]	System Off	NC	NM/NC
TOTALS BY SYSTEM	3,118	1,541	2,879	3,302	462	185	12,954

a) NM: Not Measurable – No temperature increase across Catox and Flame oxidizer units
b) NC: Not calculated due to insignificant concentrations
c) The gallons removed by the east and west SVE systems before catalytic oxidizers were installed has been added.
d) The flame-ox unit was shut down in August 2008. Since this time, effluent from the central SVE system has been treated using granular activated carbon (GAC). Mass removal estimates after the flame-ox unit was shut down are based on PID readings from the central SVE system effluent (before the effluent passes through the GAC drums), effluent flow rates, and time of operation.

4.3 Sparge Curtain Deactivation

The Sparge Curtain Treatment System was turned off on August 21, 2009. Groundwater monitoring wells MW-2, MW-3, MW-9, MW-14, and MW-17 are in the vicinity of the Sparge Curtain Treatment System. As indicated by chemical analysis of groundwater samples from these wells, MW-9 and MW-14 have met the benzene groundwater remediation goal of 0.005 mg/L since their installation in January 2008. The benzene remediation goal has been met in MW-3 since November 2008 and in MW-2 and MW-17 since February 2009. Accordingly, the Sparge Curtain Treatment System was turned off to begin one year of quarterly monitoring. If significant benzene concentrations are detected above regulatory action levels in subsequent monitoring rounds, the system will be restarted.

5.0 NITRATE AMENDMENT

There is evidence of petroleum hydrocarbon decomposition through natural bacterial activity in subsurface zones of contaminant concentration (See Section 2.8). The bacterial activity may be enhanced through the injection of nitrates into areas of contaminated groundwater through selected horizontal and vertical wells.

An Underground Injection Control (UIC) Permit Application was submitted to the Utah Division of Water Quality (DWQ) on October 13, 2009, requesting approval to inject nitrates at nine selected injection locations (See Appendix D, Figure D-1). Nitrate Injection schematics are presented in Appendix D, Figure D-2. The nitrates would mix with groundwater and provide nutrients for bacterial growth. Over time, the nitrates would be used as an electron acceptor by the naturally occurring bacteria. Written approval of the UIC Permit Application was issued on November 19, 2009.

Wasatch planed to inject a maximum of 30,000 gallons of nitrate amendment per year. The nitrate amendments were to be injected into existing SVE system trenches including: the East SVE system, the West A and B SVE system (west alley trench and Main Street trench), West Alley SVE, and Central SVE system, as well as trench wells TW-4 and TW-6 and monitoring wells WS-1 and WS-3. Nitrate concentrations were monitored using Hach® Nitraver test kits. Baseline nitrate monitoring was conducted prior to the first injection event. Monitoring locations included monitoring wells MW-2, MW-3, MW-5, MW-20, MW-22, MW-23, MW-26, MW-27, MW-29, MW-36, MW-37, WS-2, and trench wells TW-4 and TW-6. The monitoring locations were generally chosen for their positions down-gradient with respect to the injection locations. Injection and monitoring protocols ensured that residual nitrate concentrations in groundwater remained below the MCL of 44.3 mg/L.

An additional benefit of the nitrate amendments is that the injection and monitoring data may be used as a tracer study to evaluate the groundwater flow velocity beneath the site. Based on nitrate injection into the West Alley SVE system on March 2, 2010, the detection of nitrate in MW- 36 at a concentration of 11 mg/L on March 9, 2010, and a distance of 158 feet from the injection location to the monitoring well, the minimum groundwater flow velocity is approximately 22 feet per day. Based on nitrate injection into the West Alley SVE system on March 2, 2010, the detection of nitrate in MW- 22 at a concentration of 8.8 mg/L on March 24, 2010, and a distance of 435 feet from the injection location to the monitoring well, the minimum groundwater flow velocity is approximately 20 feet per day.

After two nitrate injection events (March 2, 2010 and April 8, 2010) and a review of groundwater monitoring analytical data from the May and August 2010 groundwater sampling events, Wasatch discontinued nitrate injection and associated monitoring effective beginning September 2010. While the nitrate amendments appear to have had a positive effect with regard to remediation of groundwater at the site, the progress was still not adequately accelerated.

6.0 MONITORING WELLS

Monitoring wells MW-1 through MW-5 and MW-19 through MW-40 were completed using a hollow-stem auger drill rig. Monitoring wells WS-1, WS-2, and WS-3, MW-6 through MW-18, and extraction wells EW-

1 and EW-2 were completed by pit installation. Trench wells TW-1, TW-2, TW-3, TW-4, and TW-6 were installed in open SVE trenches. Wells TW-1, TW-2, and TW-3 were placed in an SVE trench of the South Horizontal SVE System. Wells TW-4 and TW-6 were placed in an SVE trench of the Central Horizontal SVE System. The methods of installation were described in Section 5.1.4 of the Site Investigation Report previously submitted in February 2008.

Five monitoring wells (MW-1 through MW-5) were installed in November 2007. Thirteen wells (MW-19 through MW-31) were installed between August 4 and 13, 2008; six wells (MW-32 through MW-37) were installed on April 27 and 28, 2009; and three wells (MW-38, MW-39, and MW-40) were installed on November 9, 2009. The wells were placed both inside and outside plume boundaries to verify the plume configuration, as projected in the February 2008 Site Investigation Report.

Groundwater samples are collected and tested periodically from selected monitoring wells. Historical groundwater analytical results are presented in Table 3, Appendix E.

6.1 Soil Samples from Monitoring Wells

During monitoring well installation activities in August 2008, April 2009, and November 2009, soil samples were obtained at 5-foot intervals from each of 22 borings. One soil sample from each boring was submitted for laboratory analysis based on PID screening results. Fifteen of the 22 wells (MW-19, MW-20, MW-24, MW-25, MW-28, and MW-31 through MW-40) were below detection limits for gasoline constituents.

In seven of the 22 wells (MW-21, MW-22, MW-23, MW-26, MW-27, MW-29 and MW-30), gasoline range organics and various combinations of benzene, toluene, ethylbenzene, total xylenes, and naphthalene (BTEXN) constituents were detected. Historical soil analytical results are presented in Appendix F, Table 4. A site map showing historical soil sampling locations is presented as Figure 2.

7.0 VAPOR IMPACTS INSIDE BUILDINGS

Initially, gasoline vapor concentrations were detected in the basements of a number of buildings at various locations within the plume boundaries. All reports of vapors have been responded to with the collection of indoor air Summa canister samples. Additional investigation has been undertaken at several locations both inside and outside the plume boundaries through the completion of borings and sub-slab/subsurface air probes. Where warranted, building ventilation systems have been installed to remove vapors.

7.1 Sub-Slab Vapor Sampling

The sub-slab vapor sampling protocol was developed by RMEC Environmental, Inc. (RMEC) and was documented in their proposal dated March 9, 2009 (presented in Appendix Q). RMEC implemented sub-slab vapor sampling for affected properties and reported the results to the DERR in status reports. The RMEC status report dated January 4, 2010, is presented in Appendix Q. Laboratory analytical results are compared to the proposed sub-slab vapor standard of 3.9 pg/m^3 benzene. This standard was proposed based on an assumed slab attenuation factor of 10, and an indoor air standard of 0.39 pg/m^3 benzene (1E-6 cancer risk). The assumed slab attenuation factor and, therefore, the sub-slab vapor standard of 3.9 pg/m^3 benzene, are highly conservative considering that research has shown that slab attenuation factors can range from 10 to 10,000. In addition, the Record of Decision for the Bountiful/Woods Cross 5th South PCE Plume NPL Site, dated September 2007, the United States Environmental Protection Agency (EPA) approved a risk-based concentration (RBC) based on a cancer risk factor of 1E-4, assuming a reasonable maximum exposure through ingestion of contaminated groundwater and inhalation of vapors from contaminated soil and groundwater via the vapor intrusion exposure pathway. Even though the EPA applied a very conservative attenuation factor of 10 to the sub-slab benzene concentrations, the target risk based sub-slab benzene concentration for the site was determined to be 312 pg/m^3. The development of the sub-slab vapor standard, and complete rationale are presented in RMECs report titled "Summary of

Indoor Air and Sub-slab Soil Vapor Sampling Resuits – Gunnison, Utah" dated August 25, 2010, and presented in Appendix Q.

7.2 Schedule of Summa Tests

Monitoring of homes and businesses affected by the plume was conducted for three consecutive months in July, August, and September 2008. Analytical results were presented in two separate reports: The "Modified Schedule for Residential and Business Indoor Air Analysis" report, submitted September 15, 2008, and the "Residential and Business Indoor Air Analysis – Quarterly Report," submitted on October 15, 2008.

The selection criteria for evaluating the ambient air in residences and businesses was based on an initial report of gasoline odors, followed by an emergency response in which the residence or business was inspected for gasoline odor and was scanned with a PID as a preliminary determination. Subject residences and businesses were then tested through the placement of eight-hour time-lapse Summa canisters that collect air samples from inside the subject building and are laboratory tested for the presence of gasoline vapor constituents. In cases where a direct connection to the release was not apparent from the results of previous subsurface investigation activities, additional subsurface investigation was conducted around the subject location.

In February 2009, RMEC proposed a vapor intrusion study of the soil beneath each residence overlying or adjacent to the plume. Previously, residences had been tested through the collection of indoor air samples in six-liter Summa canisters. RMEC submitted a work plan to the DERR to evaluate sub-slab, or sub-soil vapor concentrations for homes and businesses within the impacted area, as well as additional periodic indoor air samples. The work plan was approved and was implemented in April 2009.

Indoor and sub-slab laboratory air samples were collected across the site in April, June, and September 2009. Between April and July 2009, RMEC evaluated indoor air and sub-slab/subsurface soil vapor concentrations within, beneath, and adjacent to nine businesses and 13 residences through the collection and laboratory analyses of air samples.

7.3 255 South 100 West Residence

A separate report detailing the remedial actions, investigations, and monitoring results for the 255 South 100 West residence was submitted to the DERR on September 15, 2010. As a result of the settlement agreement between Wind River Petroleum and the home owner, the residence was demolished on September 10, 2010. In lieu of direct compensation for alternative housing, the mortgage on the property was paid by Wind River Petroleum from a short time prior to the owners vacating the property until the time the settlement agreement was reached. It is our understanding that all claims are resolved within the settlement agreement, which is confidential.

7.4 White Hills Trading Company

Following positive indoor air laboratory results from samples obtained on July 15, 2008, a building ventilation system was installed in the basement/crawl space of White Hills Trading Company building. The building was retested on July 31, 2008, and the reported concentrations had significantly decreased when compared to the previous sample.

7.5 Casino Star Theatre

On September 25, 2008, due to reports of vapors in the Casino Star Theatre, subsurface investigation and indoor air testing was completed in the basement of the building. A report, "Subsurface Investigation Report – Casino Star Theatre," was submitted to the DERR on October 20, 2008.

7.6 Body Barn Fitness Center

In RMEC's vapor intrusion study, laboratory results from sub-slab samples obtained at the Body Barn

Fitness Center (Body Barn) located at 62 South Main Street indicated benzene concentrations of 22, 5.7, and 2.3 ug/m^3, respectively for the three months. These readings, in combination with previous readings, present an enigma, because laboratory samples from adjacent businesses (Lotsa Motsa and Lila Lee's) have shown reducing concentrations over the past two years, and below action levels or below detection levels for petroleum constituents in the April, June, and September quarterly monitoring samples.

It was noted in further observations at the Body Barn that a rubberized floor mat, which extends throughout the entire facility, was found to emit a strong "tire-like" odor. It is our understanding that these mats were made from shredded, recycled tires. A sample from the floor covering was tested by headspace analysis and found to emit petroleum vapors (benzene, toluene, ethylbenzene, and xylenes).

Subsequently, the permanently installed sub-slab air monitoring wells, from which the previous quarterly air samples were obtained, were tested for vacuum to determine if influence of nearby SVE systems could be detected. Vacuum was measured in sub-slab vapor wells beneath the Body Barn and beneath the Lotsa Motsa Pizza Restaurant, which is located adjacent to the north of the fitness center. A vacuum reading of 0.008-inch water column was detected in the Body Barn and a reading of 0.013-inch water column was detected in Lotsa Motsa. The presence of a vacuum beneath the Body Barn building creates a strong potential that vapors emitted from the floor covering may be drawn into the underlying soil through joints and cracks in the concrete floor slab.

As indicated in Table 5 (Appendix G), the indoor air benzene concentrations consistently exceed the sub-slab concentrations. Accordingly, this indicates that the floor mats are likely the major source of indoor benzene concentrations and may be contributing to sub-slab concentrations as well. Determining the dates the floor mats were installed in the front and back portions of the building would be helpful in this evaluation.

Based on the preceding discussion, it is our opinion that additional remediation beneath the Body Barn is not warranted.

8.0 OLD SEWER LINE

In late 2007 or early 2008, references were made to an old sewer line extending westward along the north side of 100 South Street from the alley to 100 West Street, and then north along the east side of 100 West Street toward Center Street.

According to Don Childs of Gunnison City Public Works, the former sewer system was replaced because it was non-functional from being crushed and broken through a number of excavations over the years. Indications are that it is fragmented and non-continuous, a result of subsequent excavations to install the current utility networks. Also, Mr. Childs has said that the old sewer line was backfilled with native soil and that he had never observed gravel or sand bedding in the old sewer line trench.

The old sewer line was considered by some as a possible conduit to transport vapors from the plume to the residences along 100 South and Center Street. Wasatch investigated by excavating test pits at three locations along the sewer line. Mr. Childs, who has knowledge of the former sewer line, assisted in the placement of the excavations. Test Pit 1 was located just west of the alley behind the Casino Star Theatre. Test Pit 2 was located near the northeast corner of 100 South and 100 West. Test Pit 3 was located on the east side of 100 West just south of the 89 West Center Street residence. Test Pits 1 and 2 were approximately 5 feet deep and 7 feet long. Test Pit 3 was 10 to 12 feet long, but penetration was stopped short of 5 feet depth when a French Drain was encountered near the 89 West Center Street property. The approximate locations of the test pits are shown in Appendix H.

The sewer line was not encountered in any of the three test pits. No gasoline odors were observed, and no PID readings were detected. As a result of the foregoing observations, and in the absence of any supporting physical data, Wasatch concluded that due to the fractured condition of the sewer line and native soil backfill, it would not serve as a conduit to transport vapors.

8.1 89 West Center Street Residence

The sewer line references were made in connection with reports of gasoline vapors in the residence at 89 West Center Street. The initial reports of vapor odors at the residence were received in November 2007. Indoor air Summa canister samples were collected on November 19 and December 3, 2007. On December 5, 2008, after positive results for benzene, toluene, ethyl-benzene and xylenes were reported in an air sample obtained from the kitchen table location, the resident at 89 West Center Street requested that borings be completed on the property. On the same day, borings B-232, B-233, B-234, and B-235 were completed to 15 feet depth along the eastern edge of the lawn (Figure 1). No PID readings were measured from recovered soil samples.

it was subsequently discovered that the fresh air vent for one of the furnaces was drawing air from the garage which housed numerous gasoline containers.

8.2 44 South 100 West Street Property

During the July 2008 residential indoor air sampling, Wasatch obtained a sample from the residence at 44 South 100 West. The July sample was not sent to the laboratory, as it was compromised by the presence of pooled gasoline, which had leaked from an ATV onto the garage floor. Therefore, the first sample to be submitted for analysis was obtained from the residence on August 7, 2008. Following positive laboratory results for benzene, toluene, ethylbenzene, and xylenes (81, 330, 27, and 226 ug/m^3, respectively), eight borings (B-300 through B-307) were completed along the east side of the property. Boring locations are illustrated on Figure 1.

Boring logs for the eight borings were included in the August 2008 Monthly Report of Corrective Action. Soil and groundwater analytical results were presented in Attachment C of the "Modified Schedule for Residential and Business Indoor Air Analysis" report submitted to the DERR on September 15, 2008.

A PID reading of 29 ppm was detected in the soil sample from 10 feet depth in boring B-304. In boring B-305, a PID reading of 6.1 ppm was detected in the sample obtained at 5 feet depth. Therefore, two laboratory soil samples collected from the borings at the specified depths were submitted to American West Analytical Laboratory and analyzed using U.S. EPA Method 8260B. The analytical results indicated low detections of toluene in both wells (0.014 and 0.009 mg/kg, respectively). No other gasoline constituents were detected in either of the soil samples analyzed.

A temporary monitoring well was installed in boring B-304, where the highest PID reading was obtained, and a groundwater sample was collected on August 22, 2008. This sample was submitted to American West Analytical Laboratory and analyzed using U.S. EPA Method 8260B. No analytes were detected in the sample.

Based on these results, it is our opinion that the volatile organic compounds detected in the indoor air sample are not a result of underground migration of contaminants from the Top Stop release, and therefore, no additional indoor air testing or subsurface investigation is recommended.

9.0 QUARTERLY GROUNDWATER MONITORING

Twenty-nine wells (WS-2, MW-2, MW-3, MW-5, MW-9, MW-14, MW-17, and MW-19 through MW-40) were originally designated for quarterly monitoring. However, the monitoring network has been reduced due to the reduction of analyte concentrations and shrinking plume boundary; and as of September 2010 twelve wells are designated for quarterly monitoring (WS-2, MW-5, MW-20, MW-22, MW-23, MW-25, MW-26, MW-27, MW-29, MW-37, MW-39, and MW-40). Quarterly monitoring provides periodic evaluation of the groundwater plume's outer perimeter, and provides quantitative data to assess the progress of the subsurface remediation. Historical laboratory results from the chemical analyses of collected groundwater samples are presented in Appendix E, Table 3. Historical depths to groundwater in the monitoring wells

are presented in Appendix I, Table 6. Graphs depicting historical groundwater depths for select wells are presented in Appendix J.

The groundwater plume configuration as currently projected, based on August 2010 groundwater data, is presented on Figure 3.

The location and extent of the benzene plume shown on Figure 3 was generated manually based on groundwater monitoring data and our understanding of subsurface conditions at the Gunnison site. Computer generated isoconcentration maps would be misleading because the assumptions built into the contouring algorithms of programs such as Surfer do not accurately account for the vertical (perched groundwater) and horizontal (buried stream channel) constraints imposed on contaminant transport at this site. Computer-generated isoconcentration contour lines may accurately represent contaminant distribution where soils are homogenous and the aquifer is unconfined, however, neither of these conditions exists at the Gunnison site.

10.0 CONFIRMATION SOIL SAMPLING

Confirmation soil samples will be collected at locations pertinent to each property impacted by the plume. Sample locations and depths will be agreed upon between Wasatch and DERR and will be selected on the basis of:

- Boring locations and depths where high contaminant concentrations were identified during previous investigations.
- Analytical results obtained from groundwater monitoring well samples.
- Reasonable requests from property owners.

11.0 SECURITY ISSUES

All systems housed inside buildings are secured by lock and key. Trench valves in systems are enclosed within fenced compounds and the compound fences are secured by lock and key. Alarm systems are installed on each system that notify maintenance personnel if any system shuts down.

12.0 REPORTING REQUIREMENTS

As outlined by Utah DERR, the following items have, in the past, been reported on a monthly to bi-monthly basis:

- A summary of system performance,
- A discussion of zones treated,
- Contaminant mass (and estimated volume) removal, and
- Operating conditions.

As outlined by Utah DERR, the following items have, in the past, been reported on a quarterly basis:

- Groundwater monitoring (conducted pursuant to Utah Administrative Code rule R311-205).
- Air sampling data (summarized on a comprehensive data table and documented with laboratory data sheets and chain-of-custody) quarterly indoor and sub-slab air sampling and reporting is currently performed by RMEC. However, this work is to be discontinued following the May 2010 sampling event.

Because the corrective action is maturing, and changes in status are less frequent and less dramatic; beginning in September 2010, Wasatch began reporting all groundwater monitoring results and corrective action status on a quarterly basis following each of the quarterly monitoring events.

13.0 CLEANUP STANDARDS

The target cleanup levels for the proposed Corrective Action were determined in accordance with Utah Administrative Code R311-211-6. The initial screening levels (See Appendix K) will be followed according to site parameters (i.e., the distance from the contaminant plume to buildings, site boundaries, utility lines, and water wells).

14.0 CONTINGENCY PLANS

The following contingencies are based upon progress or development of the site remediation.

14.1 System Modifications

The current installed systems were designed to mitigate vapors in crucial locations, to address the areas of contamination, and to intercept future plume migration. At present, the installed systems have reduced vapors in commercial and residential buildings and in other subsurface locations where comparative testing has been conducted. System modifications will be considered if any of the following developments occur:

- Detection of gasoline vapors at additional locations.
- Additional areas of contamination discovered through further site investigation.
- The groundwater plume moves beyond the influence of the treatment systems.

The SVE treatment systems and the sparge curtain can be expanded and modified through the installation of additional trenching to address areas outside the present zone of influence. Other modifications can be made by changing valve configurations to focus system operation at specific locations within each trench system.

As a contingency, nitrate amendment of groundwater was implemented between March and April 2010, and nitrate concentrations in groundwater were monitored between February 2010 and August 2010 (see Section 5.0). A UIC Permit Application was submitted to the Utah DWQ on October 13, 2009, requesting approval to inject nitrates at nine selected injection locations (See Appendix D, Figure D-1). Nitrate Injection schematics are presented in Appendix D, Figure D-2. Written approval of the UIC Permit Application was issued on November 19, 2009. As the nitrate injection made use of equipment already installed at the site, no additional permits or approvals were required. However, nitrate amendment and monitoring was discontinued effective September 2010.

Installation of oxygen diffusion systems has also been discussed as a possible contingency to accelerate the groundwater remediation process. Installation of these systems would require Temporary Use Zoning Permits from the City of Gunnison and access agreements with the owners of the properties where the systems would be installed. The DERR would also have approval authority for the installation of these systems. Wasatch would also contact the DWQ regarding the need for a UIC permit. Drawings showing system construction details; and showing proposed boring, trench, and systems enclosure locations would be provided to the DERR, DWQ, City of Gunnison, and affected property owners for review.

14.2 Protocol for Responding Quickly to Reports of Vapors in Buildings

It is Wasatch's opinion that the residents within or adjacent to the impacted area have been adequately informed, through public meetings as well as personal contacts, as to the appropriate procedures to

report gasoline odors within a home or business. During the public meetings and personal contacts, residents were advised to vacate buildings if gasoline odors were detected and report the odors to Wasatch Environmental. In some instances, reports of gasoline odors were reported to Remedy, LLC, the Utah Department of Environmental Quality, Division of Environmental Response and Remediation, the Gunnison City Fire Department, and the Sanpete County Hazmat Team.

Wasatch Environmental will respond as rapidly as possible to reports of gasoline odors from home occupants or businesses, or any reports relayed through Remedy, LLC, or state or local government agencies that are then relayed to Wasatch.

14.3 Plan for Evaluation of Utilities

Figure 1 denotes the location of water meter boxes and sewer manhole locations. During the initial phases of the emergency response, some of these structures were monitored, and detections of organic vapors were recorded in the water meter box at 29 West 100 South Street (30 ppm), and in sewer manholes along 100 South Street (up to 300 ppm). The installation and operation of the West SVE System and the West Alley SVE System have mitigated these vapors.

Between October 2008 and August 2009, sewer manholes and water meter boxes were scanned monthly with a PiD. The iocation, date, time, and any vapor reading were recorded.

There were no readings above background levels (generally less than one ppm) detected in the water meter boxes or sewer manhole locations.

Past experience with similar sites indicates that there is a low probability that a petroleum release will permeate utility water lines. To evaluate this potential, tap water samples were collected on December 1, 2008, from the residences located at 26 West 200 South, 60 West 200 South, and 255 South 100 West for laboratory analysis under the condition that "if petroleum hydrocarbon constituents should be detected in the tap water samples collected from any of these residences, then tap water from all residences within the vapor plume would be evaluated."

The samples were collected in laboratory supplied sample jars, transported in an iced cooler under chain-of-custody to Salt Lake City, and delivered on December 2, 2008, to American West Analytical Laboratories for analysis of BTEXN and Total TPH-GRO using U.S. EPA Method 8260B. Analytical results implicated no analytes were detected in the samples.

14.4 Site Maintenance

Operations and maintenance (O&M) entails the maintenance of SVE systems, which includes checking oil, air filters, and system vacuum levels, as well as observing system operation. PID readings of SVE system emissions and groundwater elevations are obtained periodically. Maintenance also includes the clearing of wind-blown debris and other refuse from the remediation equipment sites. The Top Stop property and the Central SVE System have been sprayed as necessary to reduce weed growth. These efforts wili continue as necessary.

14.5 Burning Eye Syndrome

Symptoms of "burning eyes, irritated throats, irritated skin and metallic taste" were previously reported by several individuals. A site map (Appendix L) was completed previously by Remedy that denotes the locations of individuals who in the past have reported such symptoms to Remedy. The map was completed by Remedy eariy during the site investigation. Approximate plume boundaries are depicted by blue lines, which according to Remedy represent "the high marks of the channel." Remedy identified the change from black to green in contour lines as "representing a shift in groundwater gradient." According to the map, there were eight such complaints within the plume area. Wasatch attempted to interview residents that complained of the above symptoms, as outlined in the Corrective Action Plan, but discontinued the

interviews after being refused by several individuals on the advice of their attorneys. The map was created by Remedy and the quality of the map cannot be improved by Wasatch.

15.0 PERMITS

The following permits and approvals were obtained during the emergency response, site investigation, and during the installation of treatment systems:

1) Utah Division of Environmental Response and Remediation, Closure Plan Approval for Underground Storage Tanks – Top Stop C-4, Gunnison, Utah

2) Utah Department of Transportation, Highway Right of Way Encroachment, Permit Numbers: 4R-072756-0, 4R-082852-0

3) Utah Pollutant Discharge Elimination System General Permit for the Discharge of Treated Ground Water – Permit No. UTG790022

4) Blue Stakes Utility Locating Approval

5) Air Quality Permit (Exempt under R307-401-15, Air Strippers and Soil Venting Projects) (See Appendix M)

6) Two permits from Gunnison City have not yet been issued.

On November 17, 2009, Wasatch attended the Gunnison City Council meeting to discuss the status of the temporary use permits for the treatment systems. Three of the systems have been approved for temporary use: The Top Stop property, the West A and B systems, and the sparge curtain on the 220 South 100 West property. The temporary use for these systems was issued December 6, 2009, and the renewal process started in September 2010.

Copies of the temporary use permits are presented in Appendix N. The permit for the Top Stop property was approved by Wind River Petroleum. The permit for the West A and B systems was approved by the owner of the White Hills Trading Company. The permit for the sparge curtain system was signed under protest by the 220 South 100 West property owner (see attachment to permit).

The property owners of the property for the Central SVE System and the South SVE System have declined to sign the temporary use permits.

16.0 SITE RESTORATION

During the site investigation and treatment system installation, the landscaping of a number of the affected properties was damaged. Most of the affected areas have been restored. Appendix O lists all properties identified and the nature and status of repairs completed. The settlement agreement between Wind River Petroleum and the claimants formerly settles any and all claims including the cost associated with property restoration. There is some additional restoration work that will be performed at the property located at 60 West 200 South, after remediation has been completed, as specified in the settlement agreement. The terms of the settlement agreement are confidential.

As the remediation effort matures and equipment at the site becomes unnecessary to furthering the remediation progress, equipment will be decommissioned and removed from the site. Associated subsurface piping will be terminated below the ground surface, abandoned in place, the terminations buried. Wasatch anticipates that the system sheds used for the sparge curtain system and south SVE system will be removed, but system sheds used for the west SVE system and the central SVE system will remain in place. The remediation system trailer will be removed from the former Top Stop site.

The groundwater monitoring program is expected to extend for a period of time after active remediation has been concluded at the site. As the groundwater monitoring programs draws to a close, monitoring wells will be properly abandoned once authorization to abandon the wells has been provided by the DERR.

16.1 Plan for Inspecting Trenches

The SVE trenches were backfilled with gravel and a lean concrete mix (flow fill), and 1 foot of native soil at the top. Little, if any, settlement should occur. The trenches are inspected for backfill settlement during O&M activities.

16.2 Plan for Noise Reduction

Slats have been installed in the fence around the Central SVE System and the Top Stop property to reduce the noise level of the system. The Central SVE System Flame Oxidizer, however, is not currently operating. All systems in operation at the present time are housed inside treatment system sheds or trailers, which greatly reduces the noise level related to system operation.

17.0 PLUME TREND ANALYSIS

Mann-Kendall and linear regression trend analytical methods were applied to time-series analytical data sets obtained from select monitoring wells to assess the data sets for statistically significant trends with respect to benzene concentrations in groundwater. The analyses were performed using Monitoring and Remediation Optimization Systems (MAROS) software, Version 2.2, for Microsoft Office 2003 (GSI Environmental, Inc., 2006). This software package was developed for the Air Force Center for Environmental Excellence (AFCEE) in accordance with the AFCEE Long-Term Monitoring Optimization Guide (AFCEE, 2006), and is widely used and accepted within the environmental industry.

Eleven monitoring wells were selected for the statistical analyses that:

1) have at least four rounds of groundwater monitoring data, and
2) exhibit at least one detectable benzene concentration.

The selected wells include one monitoring well located in the source area (WS-2), four monitoring wells located proximal to the source area (MW-5, MW-25, MW-26, and MW-27), two monitoring wells located near the center of the groundwater plume (MW-22 and MW-23), and four distally located monitoring wells (MW-2, MW-3, MW-20, and MW-29). To accommodate the requirements of the software, the wells were designated as either "Source Area" wells (WS-2, MW-5, MW-25, MW-26, and MW-27), or "Tail Area" wells (MW-2, MW-3, MW-20, MW-22, MW-23, and MW-29).

For statistical purposes, non-detectable concentrations were assigned a value equal to one-half of the reporting limit. No data consolidation was performed, and neither "J" flagged values nor duplicate samples were used in the analyses.

Results of the statistical analyses indicate that monitoring well WS-2 (located in the source area) exhibits no statistically significant trends by either of the analytical methods. Monitoring wells MW-5 and MW-25 (located proximal to the source area) exhibit decreasing trends according to both the Mann-Kendall analysis and the linear regression analysis. Monitoring well MW-26 (located proximal to the source area) is stable according to the Mann-Kendall analysis and exhibits a decreasing trend according to the linear regression analysis. Monitoring well MW-27 (located proximal to the source area) is stable according to both the Mann-Kendall analysis and the linear regression analysis. Monitoring well MW-22 (located near the center of the plume) is stable according to the Mann-Kendall analysis and exhibits no trend according to the linear regression analysis. Monitoring well MW-23 (located near the center of the plume) is stable according to the Mann-Kendall analysis and exhibits a decreasing trend according to the linear regression analysis. Monitoring wells MW-2, MW-20, and MW-29 (located distal from the source area) exhibit

decreasing trends according to both the Mann-Kendall analysis and the linear regression analysis. Monitoring well MW-3 (located distal from the source area) exhibits a probably decreasing trend according to the Mann-Kendall analysis, and a decreasing trend according to the linear regression analysis. Thus, the overall conclusion reached through the Mann-Kendall and linear regression statistical analyses is that benzene concentrations in groundwater are stable to decreasing, with strong evidence for decreasing concentrations in the distal portions of the plume.

Reports presenting the output from the MAROS software are presented in Appendix P. The MAROS reports in Appendix P include:

- MAROS Statistical Trend Analysis Summary,
- MAROS Mann-Kendall Statistics Summary,
- Graphs and data tables for the Mann-Kendall analysis of the data set from each monitoring well,
- MAROS Linear Regression Statistics Summary, and
- Graphs and data tables for the linear regression analysis of the data set from each monitoring well.

18.0 TENTATIVE SCHEDULE OF MONITORING ACTIVITIES

The following schedule of monitoring activities for 2010 is tentative and is subject to change:

Groundwater Monitoring – Quarteriy

February 2010
May 2010
August 2010
November 2010

The quarterly groundwater monitoring schedule has been planned so as to document changes in analyte concentrations due to seasonal variations, such as those due the fluctuations in groundwater elevations, as well as those changes that are due to the remediation progress. As the seasonal variations are better understood and documented, and changes in groundwater analyte concentrations due to the remediation progress become less dramatic, the groundwater monitoring schedule may be revised. Proposed changes to the groundwater monitoring schedule will be presented in the quarteriy groundwater monitoring reports for DERR approval.

Groundwater monitoring has been performed in those monitoring wells where detections of petroleum hydrocarbons have been documented during the initial sampling event for each monitoring well. Individual monitoring wells will be removed from the groundwater monitoring program after four consecutive monitoring events (one year of monitoring) wherein no petroleum hydrocarbons are detected in the monitoring wells. Monitoring wells will not, however, be abandoned until such time as the remediation has been completed, or by approval of the DERR. Monitoring wells may be added back into the groundwater monitoring program if changes in groundwater analyte concentrations or the apparent geometry of the dissolved-phase groundwater plume warrant the additions. Proposed changes to the monitoring well network will be presented in the quarteriy groundwater monitoring reports for DERR approval.

- Nitrate Monitoring – was performed weekly to monthly following injection events until nitrate concentrations stabilize. Nitrate monitoring was discontinued effective September 2010.

- Building Ventilation System (Sub-slab) Emissions Monitoring – has been performed monthly, but will be performed on a quarterly basis beginning September 2010.

Our services consist of professional opinions and recommendations made in accordance with generally accepted environmental engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. Should you have any questions, please do not hesitate to contact us.

Sincerely,

WASATCH ENVIRONMENTAL, INC.

Michael S. Cronin, P.G.
Utah Certified UST Consultant #CC 0232

Les Pennington, P.E.
Principal Engineer

Copies: (2) Addressee
(1) DERR
(1) Library
(1) Gunnison City