



September 20, 2013

**APPROVED**

Pamela Green  
Kansas Department of Health and Environment  
Bureau of Environmental Remediation, Site Restoration Unit  
Charles Curtis State Office Building  
1000 SW Jackson Street  
Topeka, Kansas 66612-1367

Re: Addendum to the Revised Groundwater Investigation Work Plan  
NuStar Pipeline Release Site, Quail Crossing Neighborhood  
Consent Agreement and Final Order 12-E-36 BER  
Andover, Kansas  
1641-04

Dear Ms. Green:

This Addendum to the Revised Groundwater Investigation Work Plan (Addendum) was prepared on behalf of NuStar Pipeline Operating Partnership L.P. (NuStar) as part of the continuing response to the pipeline release in the Quail Crossing Neighborhood (the Neighborhood) in Andover, Kansas. Separate-phase hydrocarbons (SPH) were discovered in an irrigation well at 2006 Colt Court (the Site; Figure 1 and Figure 2) on June 9, 2012. NuStar prepared and implemented the Revised Groundwater Investigation Work Plan (2013; Revised Work Plan), in coordination with the Kansas Department of Health and Environment (KDHE), in July and August 2013. Completed work included the installation of 10 groundwater monitoring wells, installation of three soil vapor monitoring points, and collection of water samples from groundwater monitoring wells and irrigation wells in the Neighborhood.

Data collected during the July/August 2013 investigation were presented to KDHE via e-mail and oral communications during the field investigation. Based on the review of the data collected in July and August 2013, it appears that additional investigation is necessary. Consequently, NuStar is proposing a second phase of investigation, consisting of the activities described herein. The activities proposed herein were discussed in detail during a joint meeting with representatives from APEX, NuStar and KDHE on September 11, 2013.

In an effort to minimize work plan preparation time, expedite the investigation, and implement remedial measures as soon as possible, this work plan is prepared as an Addendum to the Revised Work Plan; therefore, the descriptions of activities proposed herein are general in nature. Please refer to the Revised Work Plan for additional details about field and analytical methods, quality assurance/quality control protocols, and health and safety procedures.

### **PROPOSED INVESTIGATION ACTIVITIES**

In accordance with our September 11th joint project meeting discussions, field work will consist of: (1) installation of four to six groundwater monitoring wells; (2) collection and analysis of groundwater samples from the proposed groundwater monitoring wells, 10 previously installed groundwater monitoring wells, and approximately 16 Neighborhood irrigation wells; (3) installation of three soil vapor extraction (SVE) test wells; and (4) collection and analysis of soil vapor samples from three previously installed soil vapor monitoring points. The following sections detail the scope and rationale for the proposed investigation activities.

## PROPOSED WELL LOCATIONS AND PROCEDURES

This section briefly describes the methods that will be used for advancing soil borings, field screening soil samples, installing groundwater monitoring wells, and groundwater sampling. Additional details about these activities are described in the KDHE-approved Revised Work Plan.

**Groundwater Monitoring Wells.** Four to six monitoring wells will be installed to further delineate the extent of groundwater impacts at the Site. The approximate locations of the proposed monitoring wells (MW-11 through MW-16) are shown on Figure 2. Depending on field screening results for well MW-11 and in coordination with KDHE, one or more of proposed wells MW-11, MW-15, and MW-16 may not be installed. The proposed well locations were selected in coordination with KDHE.

**Proposed Soil Vapor Extraction Test Wells.** In accordance with our project discussion on September 11<sup>th</sup>, three soil vapor extraction (SVE) test wells (SVE-1 through SVE-3) will be installed at the locations shown on Figure 3. The SVE test wells will be used during a future mobilization to evaluate the feasibility of SVE as an interim remedial measure at the Site. The SVE test wells: (1) will be installed on property owned by the Quail Crossing Homeowners Association (HOA), per HOA's request; (2) are in proximity to the areas of significant impact; and (3) are expected to be representative of the conditions elsewhere in the Neighborhood. This scope of this Addendum is limited to the activities necessary to install the SVE test wells. Details regarding the protocol for SVE testing will be developed in coordination with KDHE and presented in a subsequent deliverable.

### *Drilling Procedures*

Solid-stem auger drilling equipment will be used to advance the borings. Solid-auger drilling equipment proved to be the most effective drilling method during the July / August investigation; therefore, it is proposed for the activities described herein. Continuous soil cores cannot be collected using solid-stem auger drilling equipment; therefore, subsurface observations will be based on drill cuttings. Lithologic descriptions will be made in general accordance with ASTM 2487/2488. Soil samples will be extracted at approximately 5-foot intervals for field screening using a photoionization detector (PID) and sheen tests. Based upon field indications of volatile organic compound (VOC) impacts, at least one soil sample from each boring will be submitted to an accredited analytical laboratory for analysis of gasoline-range hydrocarbons (GRO) and VOCs by Iowa Method OA-1 and Environmental Protection Agency (EPA) Method 8260B, respectively. If indications of petroleum impacts are observed (e.g., sheen, staining, or headspace vapors), a soil sample will be collected from the interval that exhibits the maximum impact; and a second soil sample will be collected from apparently non-impacted soil overlying the impacted soil. If field indications of petroleum impacts are absent from a boring, a soil sample will be collected approximately from the soil-water interface. Drilling, sampling and field screening are described in more detail in the KDHE-approved Revised Work Plan.

### *Well Construction Procedures*

A 2-inch-diameter polyvinyl chloride (PVC) well will be installed in each completed boring. Well construction details are described below and summarized in Table 1.

- The soil borings for proposed SVE test wells SVE-1 through SVE-3 will be advanced to first encountered groundwater. The SVE test well screen intervals will target the area of maximum observed impacts in the vadose zone. Based on data obtained to date, we expect that the SVE test wells will have 15-foot screen intervals, from approximately 20 to 35 feet bgs. The length and depth of the SVE test well screens may be modified based on field observations.
- Soil borings for the proposed monitoring wells will be advanced to approximately 10 feet below first encountered groundwater. Monitoring wells will be constructed with 15-foot screen intervals that intersect

the first encountered groundwater. The monitoring well screen intervals may be modified based on field observations. NuStar will coordinate with KDHE regarding monitoring well construction details.

**Groundwater Sampling.** Groundwater samples will be collected from monitoring wells and irrigation wells, following the methods described in the Revised Work Plan.

- New groundwater monitoring wells will be allowed to set for at least 24 hours prior to initiating well development. Wells will be developed by over-pumping to remove excess turbidity and improve hydraulic communication with the adjacent water-bearing zone.
- Following installation of the new wells, NuStar will perform a comprehensive groundwater sampling event that includes all monitoring wells at the Site and approximately 16 irrigation wells. Monitoring and irrigation wells scheduled for sampling<sup>1</sup> are shown on Figure 2. If additional irrigation wells are identified in the investigation area, NuStar will attempt to obtain permission to collect a water samples from those wells.
- During the monitoring event, groundwater levels will be measured in monitoring wells and selected inactive irrigation wells. The groundwater samples will be analyzed for GRO by Method IA OA-1 and VOCs using EPA Method 8260B.

**Well Location and Surveying.** The horizontal locations and elevations of the new monitoring wells and select irrigation wells will be surveyed by a Kansas-licensed land surveyor. Top-of-well casing and cap elevations will be reported to the nearest hundredth of a foot, relative to mean sea level (MSL).

### SOIL VAPOR SAMPLING

In accordance with our project discussion on September 11<sup>th</sup>, one round of soil vapor samples will be collected from soil vapor monitoring points VP-1 through VP-3; the locations of the vapor points are shown on Figure 3. Soil vapor monitoring point construction and sampling methodology are consistent with previously KDHE-approved work plans (Apex, 2013); additional detail will be provided to KDHE in a subsequent deliverable. In general, the sampling methodology will consist of:

- Leak detection, which will include a pressure test and helium tracer test.
- Soil gas samples will be collected in 1-liter Summa canisters at an approximate rate of 30 milliliters/minute over a period of less than approximately 30 minutes. Split samples may be collected by KDHE; in that case, the total flow rate must remain less than 200 milliliters/minute.
- The soil vapor samples will be analyzed for VOCs (benzene, 1,2-dichloroethane, ethylbenzene, naphthalene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, xylenes, n-butylbenzene, and n-propylbenzene) using EPA Method TO-15. Analytical results will be used for a preliminary evaluation of petroleum hydrocarbon impacts to soil gas at the site.

### REPORTING

In accordance with our project discussion on September 11<sup>th</sup>, if it is determined that sufficient data has been collected with this phase of field work, a comprehensive investigation report will be prepared. The methods and

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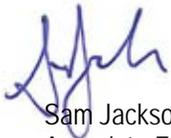
<sup>1</sup> Irrigation well sampling is contingent on access being granted by property owners. Water samples will be collected from irrigation wells at the following properties: 2006 N Colt Court; 2004 N Colt Court; 2002 N Colt Court; 2001 N Colt Court; 2005 N Colt Court; 2007 N Colt Court; 1211 W Quail Crossing Court; 1910 N. Quail Crossing; HOA-1 (located on Quail Crossing Homeowner Association Property); 2019 N Ruger Circle; 2020 N Ruger Circle; 2028 N Ruger Circle; 2032 N Ruger Circle; 2021 N Ruger Court; 2025 N Ruger Court; 2009 N Mountain Court; and 1009 W Mountain Street.

results of the activities proposed herein will be presented in a report to be prepared within 60 days after receipt of analytical data. The report will present data collected during the July/August investigation, as well as the work proposed as part of this Addendum.

### **SCHEDULE**

The work described herein will be initiated on approximately September 23, 2013, pending KDHE's approval of this Addendum and barring delays beyond the control of NuStar. If additional investigation is necessary to define the nature and extent of contamination following implementation of this Addendum, NuStar will coordinate with KDHE regarding follow-up activities and schedule.

Sincerely,



Sam Jackson  
Associate Engineer

### **REFERENCES**

Apex, 2013. *Revised Vapor Intrusion Work Plan. Easter Addition Neighborhood, Andover, Kansas.* March 3, 2013.

Apex, 2013. *Revised Groundwater Investigation Work Plan. Quail Crossing Neighborhood, Andover, Kansas.* July 2, 2013.

### **ATTACHMENTS**

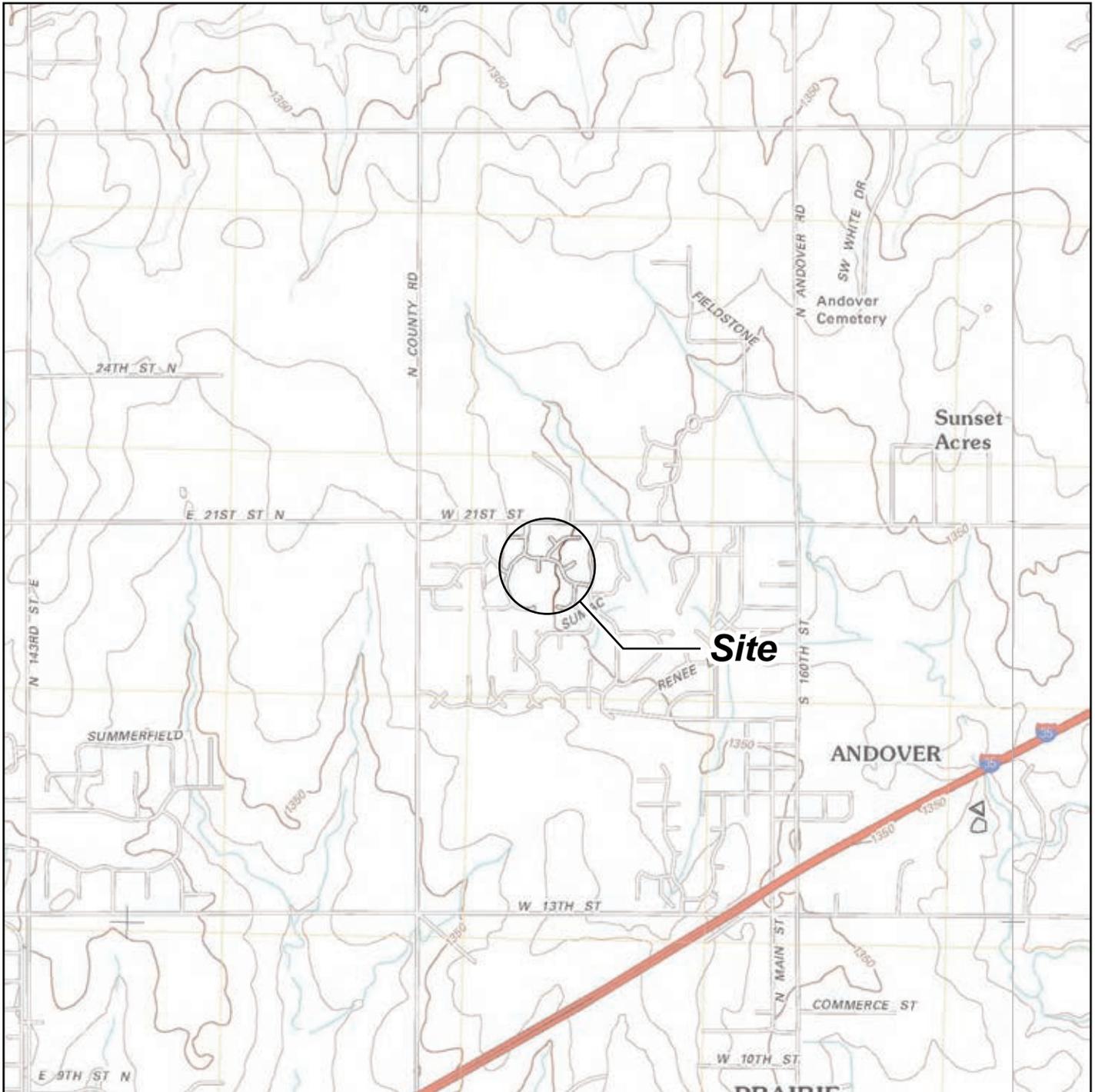
- |          |   |
|----------|---|
| Table 1  | Well Construction Table                                   |
| Figure 1 | Site Location Map   |
| Figure 2 | Site Vicinity Plan and Proposed Monitoring Well Locations |
| Figure 3 | Proposed Soil Vapor Extraction Test Well Locations        |

Table 1  
Proposed Well Construction Details  
Andover Release Site  
Andover, Kansas

Well ID	Well Casing Diameter (inches)	Total Depth (feet bgs)	Top of Screen Interval (feet bgs)	Bottom of Screen Interval (feet bgs)
MW-11	2	40	25	40
MW-12	2	45	30	45
MW-13	2	30	15	30
MW-14	2	35	20	35
MW-15	2	40	25	40
MW-16	2	40	25	40
SVE-1	2	35	20	35
SVE-2	2	35	20	35
SVE-3	2	35	20	35

*Notes:*

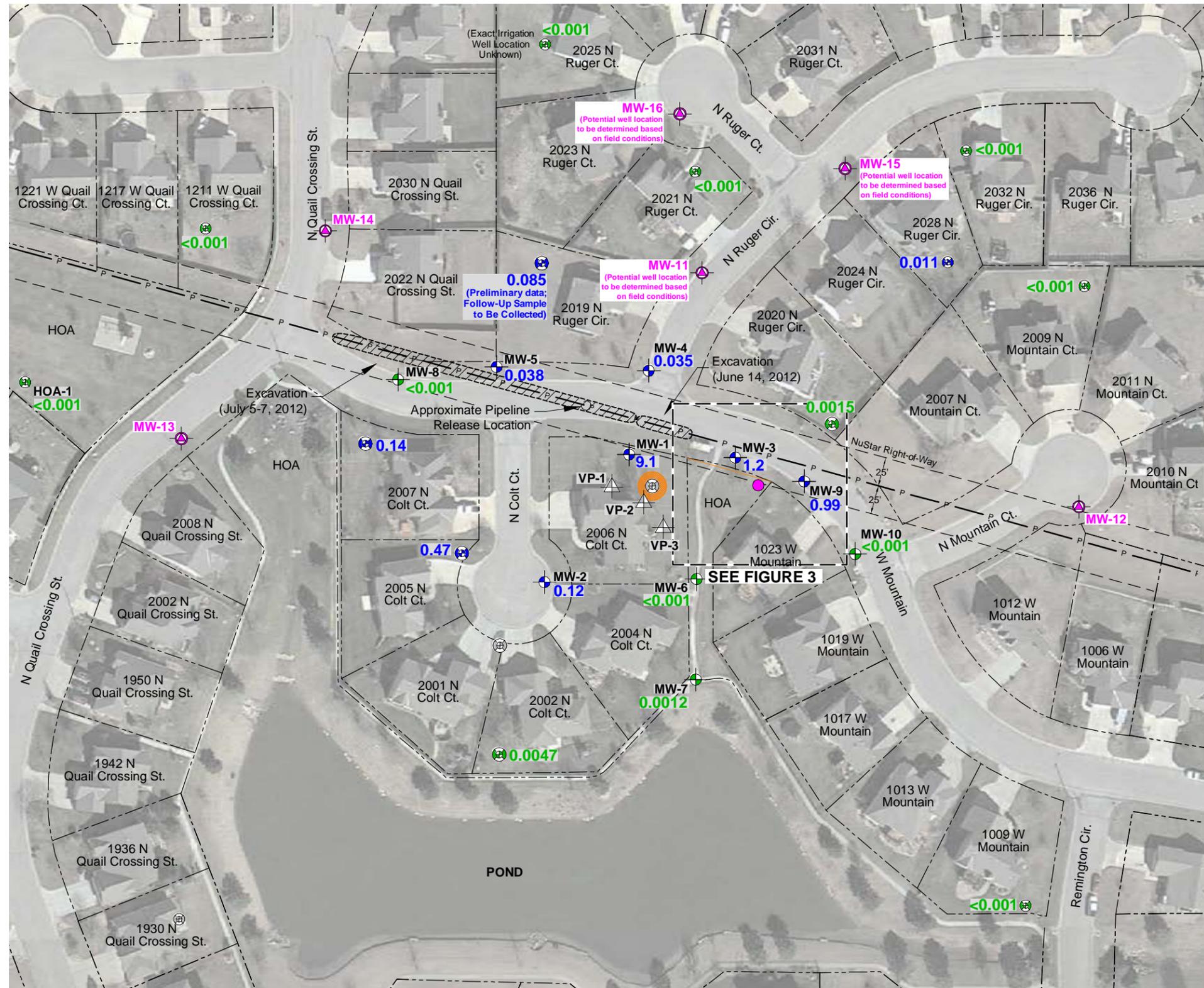
1. feet bgs = Feet below ground surface.
2. Well construction may be modified based on field observations
3. "MW" wells are groundwater monitoring wells; "SVE" wells are soil vapor extraction pilot test wells.



**Note:** Base map prepared from USGS 7.5-minute quadrangles of Andover and Santa Fe Lake, KS, dated 2009 as provided by USGS.gov.



<h2 style="margin: 0;">Site Location Map</h2> <p style="margin: 0;">Revised Groundwater Investigation Work Plan Addendum NuStar Pipeline Operating Partnership L.P. Andover, Kansas</p>		
Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1641-04
	September 2013	
		Figure <b>1</b>



**Legend:**

- MW-14 (pink circle with crosshair) Proposed Monitoring Well Location
- MW-1 (blue circle with crosshair) Monitoring Well Location
- (circle with crosshair) Irrigation Well
- VP-1 (triangle with crosshair) Soil Vapor Monitoring Point
- (pink circle) Proposed Soil Vapor Extraction Pilot Test Location (See Figure 3)
- (dashed line) Property Line
- (line with 'P') Pipeline
- (dashed line with 'P') Pipeline Easement Boundary
- HOA Lot Owned by Quail Crossing Homeowner's Association
- (blue circle with crosshair) Benzene Concentration Greater than KDHE Screening Level (>0.005 mg/L)
- (green circle with crosshair) Benzene Not Detected or Less than KDHE Screening level (<0.005 mg/L)
- (orange circle) Irrigation Well Impacted by Separate-Phase Hydrocarbons

**NOTES:**

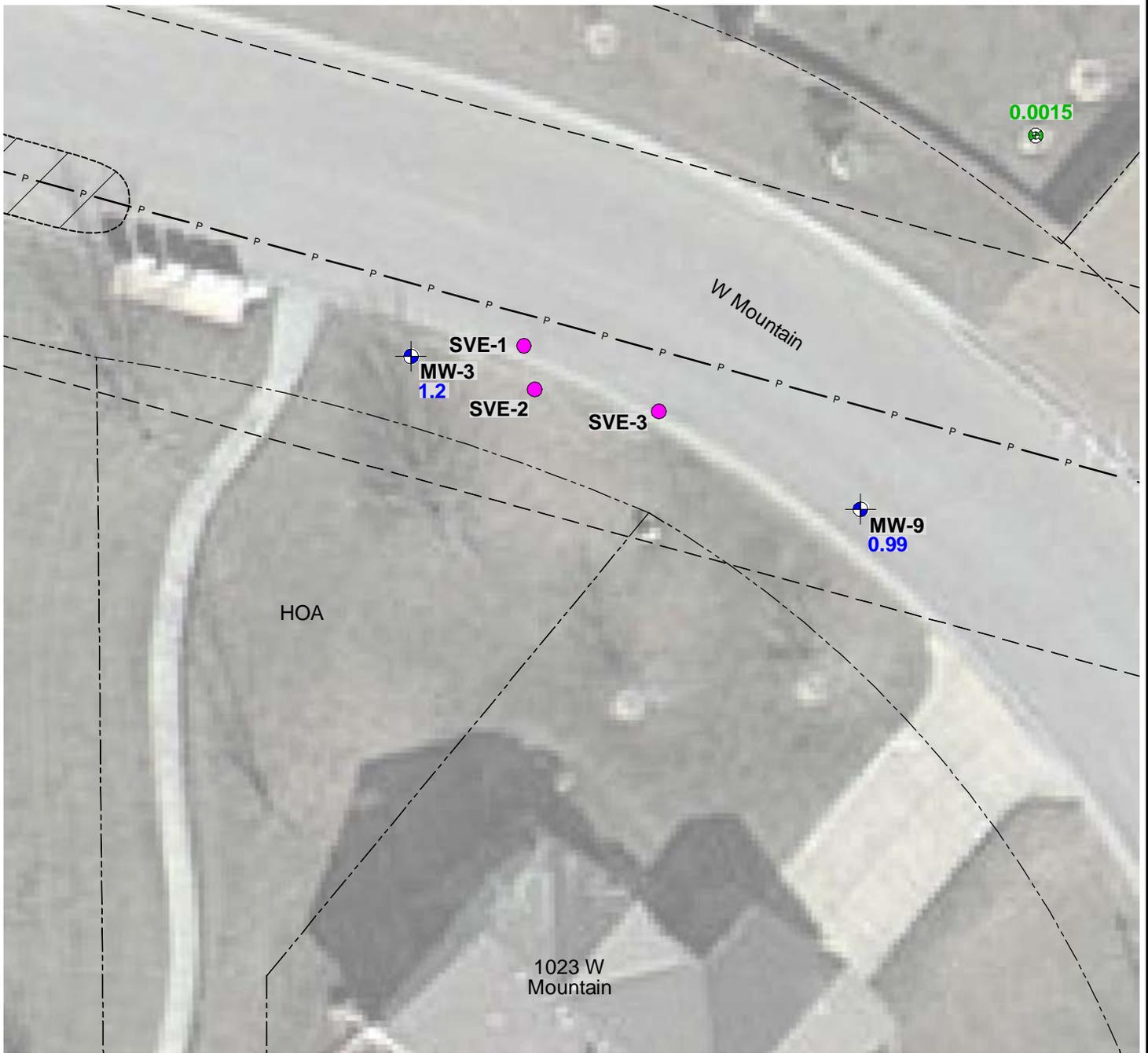
- 1) Data are preliminary and subject to revision.
- 2) A well survey has been performed to identify irrigation wells shown on this map; however, additional irrigation wells may be present.
- 3) Listed benzene concentrations are based on samples collected in July and August 2013.



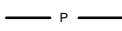
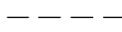
**Proposed Monitoring Well Locations and Benzene Concentrations in Groundwater (July and August 2013)**  
 Revised Groundwater Investigation Work Plan Addendum  
 NuStar Pipeline Operating Partnership L.P.  
 Andover, Kansas

Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1641-04	Figure
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Aerial photograph provided by Google Maps.com (dated February 25, 2012).



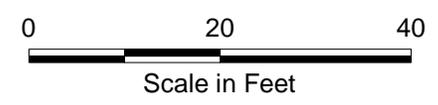
**Legend:**

- MW-1  Monitoring Well Location
-  Irrigation Well
- SVE-1  Proposed Soil Vapor Extraction Pilot Test Well
-  Property Line
-  Pipeline
-  Pipeline Easement Boundary
- HOA Lot Owned by Quail Crossing Homeowner's Association
-  Benzene Concentration in Groundwater Greater than KDHE Screening Level (>0.005 mg/L)
-  Benzene in Groundwater Not Detected or Less than KDHE Screening Level (<0.005 mg/L)



**NOTES:**

- 1) Data are preliminary and subject to revision.
- 2) Listed benzene concentrations are based on samples collected in July and August 2013.



<h2>Soil Vapor Extraction Test Well Locations</h2>			
Revised Groundwater Investigation Work Plan Addendum NuStar Pipeline Operating Partnership L.P. Andover, Kansas			
 Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1641-04	Figure
	September 2013		<b>3</b>