



P. O. Box 7192
Shreveport, LA 71137
Phone: (318) 222-2424
Fax: (318) 222-2425

PROJECT MEMORANDUM

PROJECT: LDNR – Abandoned Site – Hwy. 3015 (east of Smyrna Road) in DeSoto Parish, LA

TO: Mr. Todd Emmert
Elm Springs, Inc.

FROM: Mark S. Moore

DATE: April 2, 2018

SUBJECT: Hallwood Petroleum – Mason #1 (Serial Number 158546); Section 27; T13 North; R15 West
Project Entrance Coordinates: 32.090039; -93.885934

Todd,

On April 28, 2018, Approach Environmental, Inc. (Approach Environmental) was retained by Elm Springs, Inc. (Elm Springs) to initially document observations regarding surface bubbles in the soils and water and to collect initial surface soil, water, and air samples in/at/near the subject location. According to the LDNR, an abandoned E&P well, Harwood Petroleum's Mason #1 (Serial Number 158546), is located at/near Approach Environmental's GPS point 209 and was confirmed by field measurements from the survey plat for the subject well (please refer to Photograph #8374). As indicated by Elm Springs, the LDNR contractor "hot-tapped" into the abandoned well casing and installed a metal riser with a gauge (please refer to Photograph #8374). For future reference, it should be noted that the latitudinal and longitudinal coordinates in LDNR's SONRIS plot the subject well approximately 250' southeast of the actual location as determined by LDNR's field inspector.

During Approach Environmental's initial site visit on March 29, 2018, Approach Environmental noted bubbles emanating from the surface soils and surface water (please refer to the following photographs) in several areas denoted on the following GoogleEarth aerial excerpt. The points shown within the yellow line are points at which bubbles were noted at the surface. Furthermore, 2 areas, points 208 and 215, exhibited stronger, more prevalent bubbling with water and sediment obviously being produced with the bubbling action (refer to photos shown below). Point 217 exhibited bubbling at the surface, but, from time-to-time, produced a foamy material at the bubbling point surface. Sediment and water was not apparently not produced at point 217.

During Approach Environmental's initial site visit, a rotten egg odor was noticed periodically in the area with a notably stronger odor in the areas of points 215 and 217. In order to gain more information regarding the bubbling

areas, Approach Environmental monitored the ambient air with a Multi-Gas Clip Gas Monitor (by GasClip Technologies) (MGC) to measure combustible gases, O₂ and H₂S. H₂S was not elevated and O₂ and LEL readings were normal in ambient air around the site at approximately 3'-4' above ground level. The meter was held close to the ground at numerous points and detected similar results, except at points 215 and 217 (shown in red on the aerial photo herein). At ground level at these 2 points, H₂S readings of 6.3 ppm to 6.5 ppm were detected and the LEL alarm activated at both points.

For consistency with another similar site/area and situation, LDNR requested that Approach Environmental analyze soil, water and air samples for the same parameters analyzed by Michael Pisani & Associates in their December 1, 2017, "Abandoned Water Well Sampling Letter Report", in the Grand Cane, DeSoto Parish, LA area. The analytical parameters are listed after the following sampling description for each sample media.

On March 29, 2018, two (2) soil samples were collected from at/near point 208: S1 was collected from the light brown sediments immediately adjacent to the prominent bubbling area; and S2 was collected from the dark gray sediments immediately underlying the light brown sediments adjacent to point 208. A third sample, S3, was collected from the light brown sediments adjacent to point 215. The soil samples were collected and analyzed for LDNR's 29-B parameters; Benzene, Toluene, Ethylbenzene, Xylenes (BTEX); Total Petroleum Hydrocarbons – Gasoline Range Organics (TPH-GRO); TPH-Diesel Range Organics (DRO); TPH-Oil Range Organics (ORO); Polynuclear Aromatic Hydrocarbons (PAH); Extractable Petroleum Hydrocarbons (EPH); and Volatile Petroleum Hydrocarbons (VPH). The samples were submitted to Element Materials Technology (Element) for analysis.

On March 29, 2018, three (3) water samples were collected: W1 at/near point 208; W2 at/near point 214; and W3 at/near point 215. The water samples were collected for analysis of: Chlorides; TDS; RCRA Metals; Sulfate; Calcium; Magnesium; Potassium; Sodium; BTEX; TPH-GRO; TPH-DRO; TPH-ORO; PAH; EPH; VPH; and Alkalinity (Carbonate and Bicarbonate). The samples were submitted to Element for analysis.

On March 30, 2018, three (3) air samples were collected: A1 at/near point 208; A2 at/near point 214; and A3 at/near point 217. During air sampling, the MGC gas monitor was used to measure the air from the sampling inlet at each air sampling point. Accordingly, the highest H₂S was 37.6 ppm at point 217. The air samples were collected for Hydrocarbon analysis according to GPA 2261-13 Hydrocarbon analysis and Sulfur analysis according to GPA 2199. The samples were submitted to Element for analysis.

The following aerial photo illustrates the majority of the GPS points from Approach Environmental initial site visit on March 29, 2018, along with the sample points for soil, water and air.

The following photographs illustrate our findings during Approach Environmental's initial site visit (March 29, 2018) and our second site visit for air sampling (March 30, 2018).



Photo #: 8374 – Photo Date: 3/29/2018 – Photo Time: 10:49am – Photo By: Mark S. Moore
GPS Points 207 – 211
Sample Points for: S1, W1 & A1
View Generally to the West
Surface Sediments from the Bubbling/Aeration Action
at/near Steel Well Riser for Abandoned Well (Serial Number 158546)



Photo #: 8394 – Photo Date: 3/29/2018 – Photo Time: 2:06 pm – Photo By: Mark S. Moore
Between GPS Points 211 & 212

View Generally to the Southeast from near GPS Point 212

Light Brown Surface Sediments from the Bubbling/Aeration Down-Gradient (topographically)
from GPS Points 207 & 208 at/near Steel Well Riser for Abandoned Well (Serial Number 158546)



Photo Number 8378 – Photo Date: 3/29/2018 – Photo Time: 11:24 am – Photo By: Mark S. Moore
GPS Points 214, 216, 217, 238

Photos Shows Sample Point W2 and Surface Water with Bubbling Throughout
View Generally to the North-Northeast



Photo #8403– Photo Date: 3/29/2018 – Photo Time: 2:40 pm – Photo By: Mark S. Moore
GPS Point 214

Photo Shows Sample Point W2 and Bubbling in the Surface Water
View Generally to the Southeast



Photo #8380– Photo Date: 3/29/2018 – Photo Time: 11:25 am – Photo By: Mark S. Moore
Photo Shows GPS Point 215 & Sample Points S3, W3 & A2; Light Brown Sediments From the Bubbling Action



Photo #8383– Photo Date: 3/29/2018 – Photo Time: 11:31am – Photo By: Mark S. Moore
Photo Shows Bubble/Air Holes from the Bubbling Action Near GPS Points 223, 224 & 238



Photo #8375– Photo Date: 3/29/2018 – Photo Time: 11:10am – Photo By: Mark S. Moore
Photo Shows Gas/Air Holes in the Pond Approximately 240' Southeast of Water Sample W2 and GPS Point 214



Photo #8376– Photo Date: 3/29/2018 – Photo Time: 11:10am – Photo By: Mark S. Moore
Photo Shows Gas/Air Holes in the Pond Approximately 250' Southeast of Water Sample W2 and GPS Point 214

Approach Environmental will send a hard copy of this narrative with videos of the site during observations, soil, water and air sampling activities.

Should you have any questions and/or comments or should you need any additional information, please contact me at (318) 222-2424 (ext. 100), via my cell phone at (318) 401-0085, or via e-mail at marksm@approachenv.com.

Sincerely,

Mark S. Moore, P.G.
Louisiana Professional Geoscientist #490
Approach Environmental, LLC