COMPLIANCE / ENGINEERING / REMEDIATION

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July 14, 2017

Mr. Randolph Bayliss
Hydrologist, Districts III and IV
New Mexico Oil Conservation Division
1220 South Street Francis Drive
Santa Fe, New Mexico 87505

RE: Proposed Groundwater Delineation
Florance #40
Environmental Order #3RP-315-0
Williams Four Corners LLC
San Juan County, New Mexico

Dear Mr. Bayliss:

LT Environmental, Inc. (LTE), on behalf of Williams Four Corners LLC (Williams), proposes the following work plan in response to the requirements of your letter dated May 26, 2017, following review of the 2016 Annual Groundwater Monitoring Report for the Florance #40/Environmental Order #3RP-315-0. This work plan is intended to address impacted groundwater at the Florance #40 natural gas well (Site) located in Unit G of Section 21 in Township 30 North, Range 8 West, near Gobernador Canyon in San Juan County, New Mexico.

BACKGROUND

Groundwater at the Site is impacted by petroleum hydrocarbons due to releases from two separate source areas: a former earthen separator pit and a former dehydrator pit. BP America Production Company (BP) is responsible for impacts from the former earthen separator pit and Williams retains remedial responsibility for the former dehydrator pit. The former operator of the dehydrator pit excavated source material and installed monitoring wells MW-1 through MW-7 between 1996 and 2000. Monitoring well MW-2 was installed in the source area, but replaced by monitoring well MW-6 after MW-2 was damaged by a truck. The locations of the monitoring wells are depicted on Figure 1. Williams acquired the asset in 2000 and has monitored groundwater quality in monitoring wells MW-3, MW-4, MW-6, and MW-7. BP is responsible for monitoring groundwater quality in monitoring wells AMOCO, MW-1, and MW-5. Currently, monitoring wells MW-3, MW-6, and MW-7 contain insufficient water to collect representative groundwater quality data. Additionally, the groundwater plume is not delineated west of the source area.

PROPOSED DELINEATION AND MONITORING WELL REPLACEMENT

LTE proposes to install a new monitoring well southwest of the source area and replace damaged monitoring wells MW-3, MW-6, and MW-7 (Figure 1). The existing damaged wells will be plugged and abandoned in accordance with New Mexico Office of the State Engineers (NMOSE)

requirements to prevent movement of water within the boreholes and prevent the annular space surrounding the monitoring well casings from becoming a conduit to the groundwater supply.

Each new monitoring well be installed by Cascade Drilling (Cascade) using sonic drilling techniques. Continuous soil samples will be logged by an LTE geologist and described using the Unified Soil Classification System (USCS) to delineate hydrocarbon impacts. The intervals from immediately beneath the ground surface and then every five feet thereafter will be screened for volatile aromatic hydrocarbons as well as any soil that is stained or has a hydrocarbon odor using a photo-ionization detector (PID). If PID concentrations exceed 1,000 parts per million (ppm) in any of the soil samples, the sample will be submitted to a certified laboratory for analysis of BTEX by United States Environmental Protection Agency (EPA) Method 8021 and total petroleum hydrocarbons (TPH) – gasoline range organics (GRO), diesel range organics (DRO), and motor oil range organics (MRO) by EPA Method 8015. Additional soil borings will be advanced radially in approximately 50-foot steps from any soil boring demonstrating significant evidence of hydrocarbon impacts.

The monitoring wells will be installed to depth of approximately 60 feet below ground surface (bgs). Monitoring wells will be constructed of schedule 40, 2-inch diameter polyvinyl chloride (PVC) and include 15 feet of 0.01-inch machine slotted flush-threaded PVC well screen. LTE will set at least 10 feet of screen beneath the water table and approximately 5 feet above to allow for seasonal fluctuations and a proper seal during well construction. A clean 10-20 grade silica sand gravel pack will be placed from the bottom of the boring to one foot above the top of the screen. At least two feet of 3/8-inch natural bentonite chips will be set above the gravel pack to set a seal and the well will be grouted to the ground surface. A concrete surface completion with a steel well protector and locking cap will be installed around the PVC stick-up.

At least 24 hours after installation, the new monitoring wells will be developed utilizing an electrical submersible pump. LTE personnel will remove a minimum of 10 saturated well casing volumes of water while monitoring the pH, electrical conductivity, and temperature until these parameters stabilize and turbidity is reduced to the greatest extent possible.

LTE will complete all work in accordance with industry-accepted practices. LTE will survey the new groundwater monitoring wells after construction with a Trimble® GeoExplorer® 3000 series Global Positioning System (GPS) to determine the latitude and longitude. Top-of-casing elevations will be surveyed to an accuracy of no less than plus or minus (±) 0.01 feet so that groundwater flow direction and gradient can be determined. Field activities will be documented in a bound field book and soil descriptions will be documented on a boring log. Observations to be noted on the boring log will include, but not be limited to, lithology, moisture content, staining, soil boring depth, latitude, longitude, project number, and comments. Monitoring well construction details will be documented on a well completion log. All down-hole drilling equipment will be thoroughly decontaminated prior to each use. If impacted soil is identified within a borehole, cuttings will be drummed and transported to the Envirotech, Inc. Landfarm in Hilltop, New Mexico.

MONITORING AND REPORTING

At least two weeks after completion of monitoring well installation and development, groundwater sampling will be conducted using an electric submersible pump with variable frequency drive for low-flow sampling. All new wells and existing monitoring wells within Williams' area of responsibility will be sampled.

LTE will measure depth to groundwater and total depth of the monitoring wells with a Keck® oil/water interface probe prior to sampling. The submersible pump will be decontaminated prior to use and tubing will be decontaminated or new. As water is removed from the monitoring wells, pH, electric conductivity, and temperature will be monitored utilizing an in-line flow cell. Biological process parameters will also be monitored, including dissolved oxygen, oxidation-reduction potential, and ferrous iron.

Once monitoring wells are properly purged, groundwater samples for laboratory analysis will be collected by filling pre-cleaned vials with zero headspace to prevent degradation of the sample and plastic bottles with appropriate preservatives. All groundwater samples will be labeled with the date and time of collection, well designation, project name, collector's name, and parameters to be analyzed. The samples will be immediately chilled by placing them in a cooler with ice. The cooler will be delivered to a certified laboratory following proper chain-of-custody procedures for analysis of BTEX according to United States Environmental Protection Agency Method 8021 and attenuation parameters including nitrate, sulfate, alkalinity, and dissolved manganese.

All activities and results will be included in the annual report required for 2017. The report will include a description of well installation methods and all sampling and analysis results. Additional recommendations will be made based on results of sampling activities.

LTE appreciates the opportunity to provide this proposed work plan to the NMOCD. If you have any questions or comments regarding this plan, do not hesitate to contact me at (970) 385-1096 or via email at bherb@ltenv.com or Aaron Galer at Williams at (801) 584-6746 or Aaron.Galer@Williams.com.

Sincerely,

LT ENVIRONMENTAL, INC.

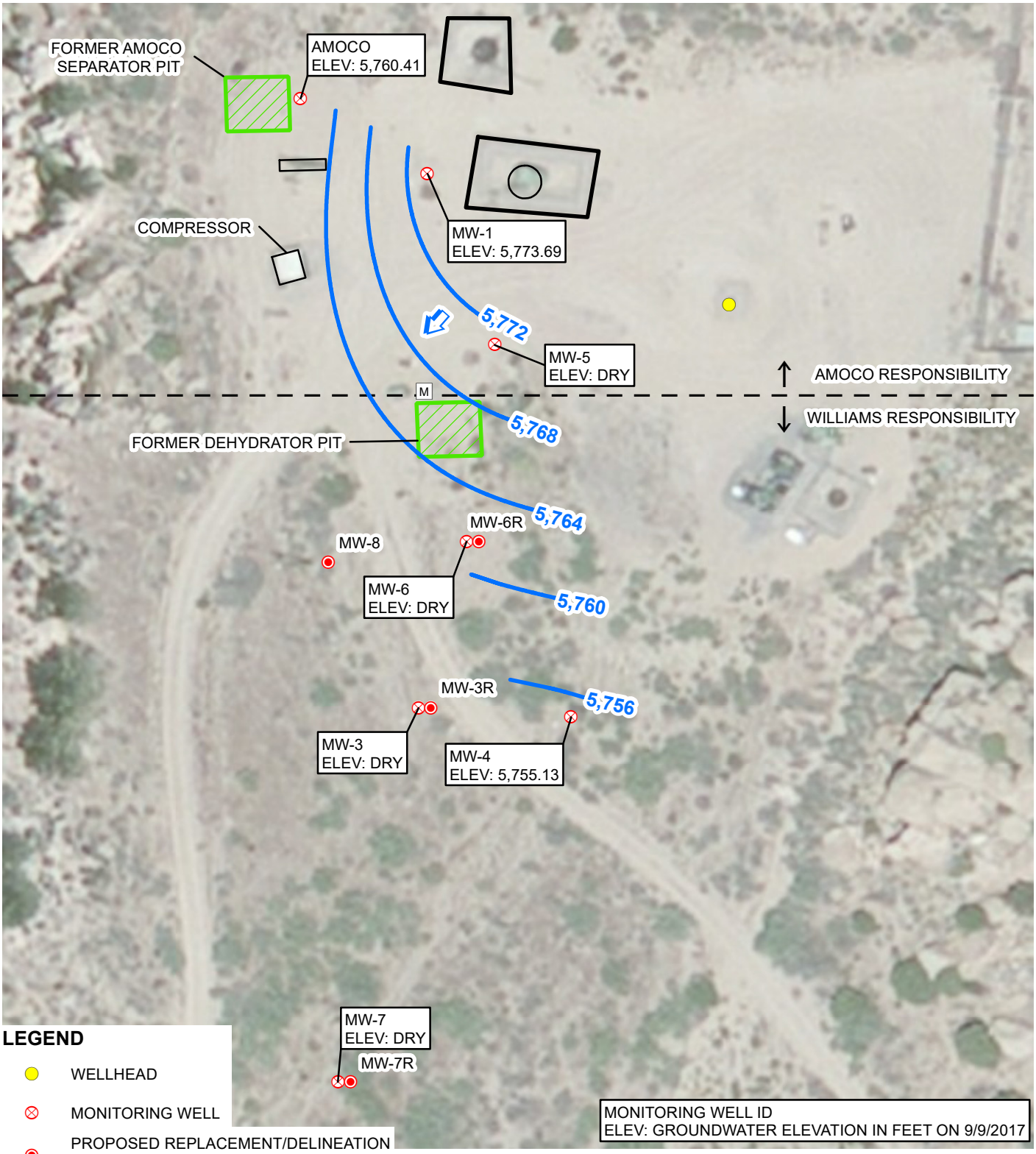
Brooke Herb
Project Geologist

Ashley L. Ager, M.S., P.G.
Senior Geologist

Attachments:

Figure 1 – Proposed Work Plan Site Map

FIGURE



LEGEND

- WELLHEAD
- MONITORING WELL
- PROPOSED REPLACEMENT/DELINEATION MONITORING WELL
- M METER HOUSE
- ESTIMATED GROUNDWATER FLOW DIRECTION
- BERM
- RELATIVE GROUNDWATER ELEVATION CONTOUR
  CONTOUR INTERVAL = 4 FEET

BGT: BELOW GRADE TANK

FIGURE 1
PROPOSED WORK PLAN SITE MAP
FLORANCE #40
SAN JUAN COUNTY, NEW MEXICO

WILLIAMS FOUR CORNERS, LLC

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