Environmentally Friendly Drilling Systems

Technology Integration Program

Case Study

Chalk Hill Ranch/Dewitt County Field Trial 3, Texas

Nov 2013

Personnel Present

Roxanne Elder – Chalk Hill Ranch Owner

Terry Elder – Chalk Hill Ranch Owner

Monty Dozier – TAMU Agrilife Extension Service

Carolyn LaFleur – HARC

Susan Stuver – TAMU Agrilife/IRNR

Jesse Alonzo – TAMU Agrilife/IRNR

Gerald Ogumerem – TAMUK (Kingsville)

Sheena Neizer – TAMUK (Kingsville)

Vic Cherubini & Assistant –Video & Photography (Epic Software Group)

Soil Study – Sampling for Salinity and Boron changes

Team Members – Monty Dozier - Texas A&M Agrilife Extension Services, Susan Stuver - Texas A&M Institute of Renewable Natural Resources

Objective – To conduct field trials from a rural community health perspective by sampling soil at ranches that are in proximity to drilling and fracturing.

Field Trial Location – Chalk Hill Ranch in Dewitt County

Field Trial Date – November 6, 2013

Field Trial Duration – 3 years with sampling every quarter

Discussion – The sampling of soil will continue for 3 years to establish a background data point. Soil concentrations will be compared to determine if changes have occurred over time and if impacts are likely to have occurred from adjacent natural gas extraction activities. Soil samples will also be compared to water concentrations and cattle fecal concentrations which will be sampled at the same time as the soil (see fecal and water trials). Soil sampling will focus on salinity and boron changes that could indicate potential contamination from oil and gas drilling and production. They will be compared to ground and surface water sampling that will check salinity, arsenic, and lead as indicators of potential oil and gas field related contamination. The soil data will also be compared to the fecal samples that will be subjected to a hydrocarbon screen to determine if cattle have had exposure to petroleum-based substances.

Next Steps – Data from the previous field trial (June 2013) was analyzed. The results will be published by Dr. Dozier in a separate report. Data collected during this field trial has been returned from the lab and is being analyzed. The next quarterly field trial is scheduled for February 2013. Work plans are being developed and include coordinating with the Colorado School of Public Health who will be developing a risk assessment to determine potential pathways for contaminates.

Fecal Study – Sampling for Hydrocarbon in Cattle Manure

Team Members – Monty Dozier - Texas A&M Agrilife Extension Services, Susan Stuver - Texas A&M Institute of Renewable Natural Resources

Objective – To conduct field trials from a rural agricultural health perspective by sampling cattle manure at ranches that are in proximity to drilling and fracturing.

Field Trial Location – Chalk Hill Ranch in Dewitt County

Field Trial Date – November 6, 2013

Field Trial Duration – 3 years with sampling every quarter

Discussion – The sampling of manure will continue for 3 years to establish a background data point. Hydrocarbon concentrations in manure will be compared to determine if changes have occurred over time and if impacts are likely to have occurred from adjacent oil and gas activities. Fecal samples will also be compared to water concentrations and soil concentrations which will be sampled at the same time as the manure (see soil and water trials). The fecal samples will be subjected to a hydrocarbon screen to determine if cattle have had exposure to petroleum-based substances. Blood sampling is not recommended due to trace or no hydrocarbon concentrations detected thus far.

Next Steps – Data from the previous field trial (June 2013) was analyzed. The results will be published by Dr. Dozier in a separate report. Data collected during this field trial has been returned from the lab and is being analyzed. The next quarterly field trial is scheduled for February 2013. Work plans are being developed and include coordinating with the Colorado School of Public Health who will be developing a risk assessment to determine potential pathways for contaminates.

Manure samples being collected

Water Treatment – Low Cost Field Water Sampling Kit

Team Members – Jesse Alonzo (for David Burnett & Omar Ghannoum)

Objective – To utilize "Omar's Kit" to screen for potential sources of contamination in the Chalk Hill Ranch water well and stock pond. The results of the screening will be used as a basis for deciding which parameters require more quantitative sampling and analysis.

Field Trial Location – Chalk Hill Ranch/Dewitt County

Field Trial Date – November 6, 2013

Field Trial Duration – 3 years with sampling every quarter

Discussion –
Nine parameters were screened during this field trial: chlorides, phosphorus, sulfate, nitrate, turbidity, total dissolved solids, conductivity, acidity (pH), and total dissolved salts. The results of this testing will be included in a separate report by Mr. Ghannoum

Two samples were collected by Mr. Alonzo from a water well and one sample from a livestock pond. Results have been received and are being analyzed. The results of the testing will provide the landowner with information required to determine if further sampling is required and narrow the range of parameters that should be investigated.

Next Steps – The portable lab kit will continue to be refined and customized for Texas A&M county extension agents located in the Eagle Ford Shale region of Texas. The water team is developing a plan to monitor changes in water well depth below the surface of the water well as an indication of changes in aquifer height near the adjacent drilling locations.

Water samples being collected

Air Emissions – Wireless Sensor Testing

Team Members – Gerald Ogumerem, and Sheena Neizer – Texas A&M University/Kingsville, Susan Stuver (observer) – Texas A&M University/Institute for Renewable Natural Resources

Objective – Evaluate wireless sensor network for monitoring Volatile Organic Compounds (VOC) at hydraulic fracturing sites. Integrate network with Sensorpedia to share and visualize real-time ambient air data. Correlate sensor VOC measurements with concentrations determined using GC-MS. Perform dispersion modeling to assess degree to which measured VOC concentrations agree with emissions estimated using emissions inventory.

Field Trial Location – Chalk Hill Ranch/Dewitt County

Field Trial Date – November 6, 2013

Field Trial Duration – 3 years with 8 hour measurements every quarter

Discussion – A third air emission session was conducted at the Dewitt County Field Trial by Mechanical and Electrical Engineering students who have developed a working prototype for powering the wireless sensors with solar panels. This system can track the sun to provide optimal power generation. Discussions with Oakridge National Lab (ORNL) regarding sensor data transmission in near-real-time from drilling sites to the TAMUK and then to the Sensorpedia platform at ORNL are on-going. TAMUK are developing work plans to conceptualize sensor data and geographical information via a dashboard page. Hydrocarbon/VOC samples were taken utilizing a photo-ionization detector (PID) and summa canister. The summa canister sample will be taken back to the lab for analysis of VOC species by GC/MS.

Next Steps – The next step is getting the solar and wireless sensor systems ready for long-term, on-site deployment. Rainy conditions led to challenges with the air monitoring equipment but the team was able to work around the rainy periods and keep the equipment covered during intermittent rain showers. Next steps will be to coordinate with the land owner for long term deployment averaging from 7 to 10 days.

Air Sampling Equipment - Photo-Ionization Detector (PID) Summa Canister and Solar Panel

Air Monitoring Equipment

Remote Power w/Solar

Risk Assessment - Potential Human Receptors and Exposure Pathways

Team Members – Dr. John Adgate and Dr. Lisa McKenzie, Colorado School of Public Participation

Objective – Identify and verify potential human receptors and exposure pathways of relevance to human health associated with shale gas development in Dewitt County. To determine which field tests/measurements are applicable to human exposure evaluations. To investigate signs of community benefits and or determents associated with shale gas developments.

Field Trial Location – Chalk Hill Ranch/Dewitt County

Field Trial Date – Not available

Field Trial Duration – 3 years with 8 hour measurements every quarter

Discussion – Drs. Adgate and McKenzie were unable to attend Field Trial No. 3 due to scheduling conflicts. The data collection from this Field Trial will be provided (water, soil, fecal (cattle), and air sampling) along with and distance from shale development sites was documented and provided for inclusion in this element of the report.

Next Steps – The next step will be the identification of potential exposure pathways for human receptors and obtain specific information for data analysis.

Other Activity and Notes:

Video and Photography – Vic Cherubini and an assistant were present to film interviews of the environmental scientist conducting the sampling activities. The film footage was used to produce a short video for the Environmental Friendly Drilling (EFD) Program. The final video can be located on the EFD website (link provided below).

http://www.efdsystems.org/index.php/field-trials?utm_source=December%2C+2013&utm_campaign=EFD+December+Newsletter&utm_medium=email

Stuck in the Mud:

The team encountered rainy weather which caused several of the smaller vehicles to get stuck in muddy ruts on the path to and from the compound area. Lessons learned are that smaller vehicles should park at the entrance to the site and not attempt to drive to the compound area in rainy/muddy conditions. Also be prepared to assist with getting larger vehicles out the muddy trenches.