FORM 27 Rev 6/99

02452575

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax:(303)894-2109

FOR OGCC USE ONLY
RECEIVED
SEP 07 2016
COGCC
OGCC Employee
Spill Complaint
Inspection NOAV
Tracking No:

SITE INVESTIGATION AND REMEDIATION WORKPLAN

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

☑ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☐ Site/Facility Closure ☐ Other (describe):

OGCC Operator Number: 10598
Name of Operator: SandRidge Exploration & Production, LLC.
Address: 123 Robert S. Kerr Avenue
City: Oklahoma City State: OK Zip: 73102

Contact Name and Telephone:
Ken Raymond
No: 405-429-6630
Fax:

API Number: 05-057-06488
Facility Name: Mutual
Well Name: Mutual
County: Jackson
Facility Number: ~~300271~~
Well Number: 4-30H
Location: (QtrQtr, Sec, Twp, Rng, Meridian): SWSE, 30, 7N, 80W
Latitude: 40.541767 Longitude: -106.414411

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): Crude Oil

Site Conditions: Is location within a sensitive area (according to Rule 901e)? ☐ Y ☑ N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Dry Land - Open, No Use

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Forelle Loam

Potential receptors (water wells within 1/4 mi, surface waters, etc.): None

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
☑ Soils	Unknown	Soil Analysis
☐ Vegetation		
☐ Groundwater		
☐ Surface Water		

REMEDIATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document):

Please see attached Site Investigation Work Plan for additional information.

Describe how source is to be removed:

To be determined based on additional site investigation. Please see attached Site Investigation Work Plan for additional information.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

To be determined based on additional site investigation. Please see attached Site Investigation Work Plan for additional information.

Submit Page 2 with Page 1

FORM 27 Rev 6/99

Page 2

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Tracking Number: _____
Name of Operator: _____
OGCC Operator No: _____
Received Date: _____
Well Name & No: Mutual 4-30H
Facility Name & No: Mutual 300271

REMEDIATION WORKPLAN (Cont.)

Page 2

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

Groundwater was not encountered during the initial site investigation. Please see attached Site Investigation Work Plan for additional information.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

The facility is presently in use. Reclamation activities are not warranted at this time.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☑ Y ☐ N If yes, describe:

Please see attached Site Investigation Work Plan for additional information.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

To be determined based on additional site investigation. Please see attached Site Investigation Work Plan for additional information.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: May 2016 Date Site Investigation Completed: September 2016 Date Remediation Plan Submitted: TBD

Remediation Start Date: TBD Anticipated Completion Date: TBD Actual Completion Date: TBD

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Ken Raymond Signed: Ken Raymond

Title: EHS Manager Date: September 1, 2016

OGCC Approved: Kris Neidel Title: EPS Date: 9/6/16

See Attached for Conditions of Approval

Mutual 4-30H

Form 27, sundry doc number 401103227.

Conditions of Approval

In the event that Monitoring wells are installed, the screened interval should be such that it intersects the surface of ground water.

The vertical and horizontal extent of impact should be determined through the soil investigation. Soil samples should be taken as depths containing native material and suspected to be non-impacted.

The location of proposed samples are adequate, in the event that the “step out” samples indicate the extent of impacted material has not been reached, soil boring should be advanced until no impact is proven (vertically and laterally).

Final Reclamation should comply with 1000 series rules

Work plan is approved; however additional information and remediation may be required during the course of investigation and remediation.

COGCC should be notified immediately, in the event that groundwater is encountered in investigation.

Request for Closure will NOT be approved without Operator providing notice to Environmental staff, Kris Neidel (kris.neidel@state.co.us) or 970-871-1963 72hrs prior to mobilization at begin of work.

COMPLIANCE / ENGINEERING / REMEDIATION

LT Environmental Inc.
4600 West 60th Avenue
Arvada, Colorado 80003
T 303.433.9788 / F 303.433.1432

September 1, 2016

Mr. Alex Fischer
West Environmental Supervisor
Colorado Oil and Gas Conservation Commission
796 Megan Avenue, Suite 201
Rifle, Colorado 81650

Via Email

RE: Site Investigation Work Plan
Mutual 4-30H (API# 05-057-06488)
Jackson County, Colorado

Dear Mr. Fischer:

LT Environmental, Inc. (LTE) has developed this Site Investigation Work Plan (Plan) on behalf of SandRidge Exploration and Production, LLC (SandRidge) to investigate potential subsurface environmental impacts at the Mutual 4-30H (API# 05-057-06488) (Site). The legal location of the Site is the southwest quarter of the southwest quarter of Section 30, Township 7 North, Range 80 West, 6th Principle Meridian. The Site Location Map is included as Figure 1. This Plan provides Site history and Site investigation task summary.

SITE HISTORY

In May 2016, Fremont Environmental, Inc. (Fremont), on behalf of the Colorado Oil and Gas Conservation Commission (COGCC), conducted a limited site investigation (LSI) at the Site. Fremont advanced a total of eight soil borings (A through H) at the Site as part of the initial LSI. Soil samples were collected from four of the soil borings (B, C, D, and F). The laboratory analytical results indicated that TPH concentrations exceeded the COGCC Table 910-1 applicable standard in all four soil samples, ranging from 972 mg/kg (F) to 59,000 mg/kg (C). The benzene, toluene, and total xylenes concentrations exceeded the COGCC Table 910-1 applicable standards in the sample collected from soil boring C, at concentrations of 13 mg/kg, 89 mg/kg, and 290 mg/kg respectively. Electric Conductivity in the soil sample collected from soil boring C exceeded the COGCC Table 910-1 applicable standard at 4.26 millimhos per centimeter (mmhos/cm). Finally, arsenic concentrations exceeded the COGCC Table 910-1 applicable standard in all four soil samples, ranging from 2.38 mg/kg (F) to 3.75 mg/kg (B).

Environmental impacts were observed in six of the eight soil borings including A, B, C, D, E, and F. These impacts included elevated concentrations of COGCC regulated constituents observed in the laboratory analytical results and in elevated volatile organic compound (VOC) concentrations collected in the field using a photoionization detection unit (PID). Fremont terminated the soil borings before the vertical limits of the environmental impacts were properly delineated. Additionally, Fremont did not advance soil borings in cardinal directions from those sample locations demonstrating evidence of environmental impact to properly delineate the lateral extent of impact.

SITE INVESTIGATION WORKPLAN

Based on the LSI data, LTE proposes that a total of 22 soil borings be advanced at the Site in order to adequately delineate the vertical and lateral extent of impact. These soil borings will included:

- 6 Re-drill Soil Borings: The purpose of these soil boring is to delineate the vertical extent of impact discovered during the initial LSI. These re-drill soil borings will be conducted at the sample points A, B, C, D, E, and F of the initial LSI.
- 12 Step-out Soil Borings: The purpose of these soil borings is to delineate the lateral extent of impact discovered during the initial LSI. These step-out soil borings will be conducted approximately 30 to 50 feet in cardinal directions of the sample points that had evidence of environmental impacts.
- 4 Background Soil Borings: The purpose of these soil borings is to collect background EC and arsenic concentrations in order to compare them with the concentrations observed in the soil samples collected during the initial LSI. These soil borings will be collected approximately 10 to 15 feet off of the disturbed well pad.

The sample point locations, PID readings, and analytical data collected during the initial LSI as well as the proposed supplemental LSI borehole locations at the Mutual 4-30H are provided in Figure (with the exception of the background soil sample locations).

Sampling and Analysis Plan – Soil

The soil borings will be advanced with a truck mounted Geoprobe® using direct push drilling technology. Elite Drilling Services, LLC. (Elite) of Denver, Colorado will conduct the drilling activities. LTE will provide a staff level geologist or equivalent, to oversee drilling activities, record general lithology, observe evidence of environmental impacts including soil staining and odor, screen soil samples for VOC concentrations using a PID, and collect soil samples for laboratory analysis.

The soil borings will be advanced to a minimum of 5 feet below any evidence of environmental impacts including soil staining, odor, and elevated field screened VOC concentrations (>1.0 parts per million (ppm)). LTE will collect one soil sample from the soil profile with the highest VOC concentration or greatest evidence of hydrocarbon impacts. The soil samples will be collected in a laboratory provided sample container, properly labeled, placed on ice, and transported to Summit Scientific (Summit) of Golden, Colorado for laboratory for analysis under chain-of-custody protocol.

Background soil samples will be collected a minimum of 15 feet off disturbed areas for arsenic and electric conductivity (EC) analysis. LTE will advance the soil auger to a total depth of 3 feet bgs and collect a composite sample comprised of soil gathered in 6-inch intervals. The soil samples will be collected in a laboratory provided sample container, properly labeled, placed on ice, and transported to Summit for analysis. The laboratory analysis and analytical methods will include:

Re-Drill, Step-Out, and Exploration Soil Samples

- BTEX and TPH – GRO: EPA Method 8260
- TPH – DRO – EPA Method 8015

Background Soil Samples

- Arsenic – EPA Method 6020
- EC – Method SM2510B

LTE, on behalf of SandRidge, will provide the COGCC with a report summarizing the LSI field activities and provide proposed remediation strategies. This summary report will include:

- Field activity summary;
- Borehole Completion Logs;
- Figures:
  - Site Location Map,
  - Site Map
  - Borehole and Monitoring Well Locations,
  - Groundwater Level and Potentiometric Surface,
  - Laboratory BTEX, DRO-TPH, GRO-TPH, EC, and arsenic results, and
  - Impact Delineation.;
- Laboratory Analytical Results Summary Table; and
- Proposed Remediation Strategies.

Sampling and Analysis Plan – Groundwater Monitoring

LTE has researched the Colorado Department of Natural Resources – Division of Water Resources (DWR) registered groundwater wells within the vicinity of the facilities in order to determine the depth to phreatic surface of the upper unconfined aquifer within this region. Based on our observations, the depth to groundwater in this region, ranges from 20 to 80 feet bgs and it is unlikely that historical impacts have intercepted the groundwater below these facilities.

In the event that groundwater is encountered, LTE will complete the soil borings as groundwater monitoring wells. The groundwater monitoring wells will be comprised of 1-inch diameter, schedule 40, polyvinyl chloride (PVC), flush threaded well materials with 0.010-inch factory milled screen. The groundwater monitoring wells will be screened across the phreatic surface with a minimum of 5 feet of screen placed below the groundwater table. The annulus of the boreholes will be backfilled with 10/20 filter sand from the bottom of the soil boring to approximately 2 feet above the top of the screened interval. Medium sized bentonite chips will be placed on top of the sand to surface. The groundwater monitoring wells will be completed at surface with a 2 to 3 foot stickup and no protective casing. In the event that the groundwater monitoring wells are completed in a high traffic area, they will be completed as flush mount with a 6-inch diameter protective casing, set in a 2 foot by 2 foot cement pad.

Elite will complete the groundwater monitoring well installation and LTE will provide a staff level geologist or equivalent, to oversee the installation. LTE will direct the groundwater monitoring well construction based on observed hydrogeological conditions, and record the construction details.

Upon completion of the groundwater monitoring well installation, LTE will return to the facilities to conduct groundwater monitoring activities. LTE will survey the top of casing and collect depth to

groundwater in order to determine relative groundwater elevation and flow direction. LTE will develop the groundwater monitoring wells within 48 hours of completion. Prior to well development, LTE will measure the depth to groundwater and total well depth in order to calculate the well volume. Well development will be conducted using either a dedicated 3/4-inch diameter bailer or a peristaltic pump to remove 10-times the calculated well volume. LTE will collect groundwater samples no sooner than 24 hours after well development. Prior to sampling, LTE will measure the depth to groundwater and total well depth in order to calculate total well volume. LTE will purge 3-times the well volume prior to collecting a groundwater sample. The groundwater samples will be collected in laboratory provided sample containers, properly labeled, placed on ice, and transported, under waste-manifest-protocol, to Summit for laboratory analysis. The laboratory analysis and analytical methods will include BTEX by EPA Method 8260.

In the event that groundwater monitoring is required as part of this investigation, LTE will include a summary of the groundwater monitoring as part of the Summary Reports defined above. These summaries will include a the work tasks completed, findings, and recommendations for remediation. The analytical data will be summarized in the text, tabulated, and presented on figures.

CLOSING

LTE appreciates the opportunity to provide the COGCC with this Site Investigation Work Plan on behalf of SandRidge. If you have questions or comments regarding the content of this proposal, please contact the undersigned at 303-433-9788. We look forward to assisting SandRidge with addressing potential environmental impacts associated with this Site.

Sincerely,

LT ENVIRONMENTAL, INC.

Jess Alexander
Project Manager

Steve Kahn, P.E.
Vice President

Attachments:

Figure 1 – Site Location Map
Figure 2 – Site Map: Mutual 4-30H

ATTACHMENTS

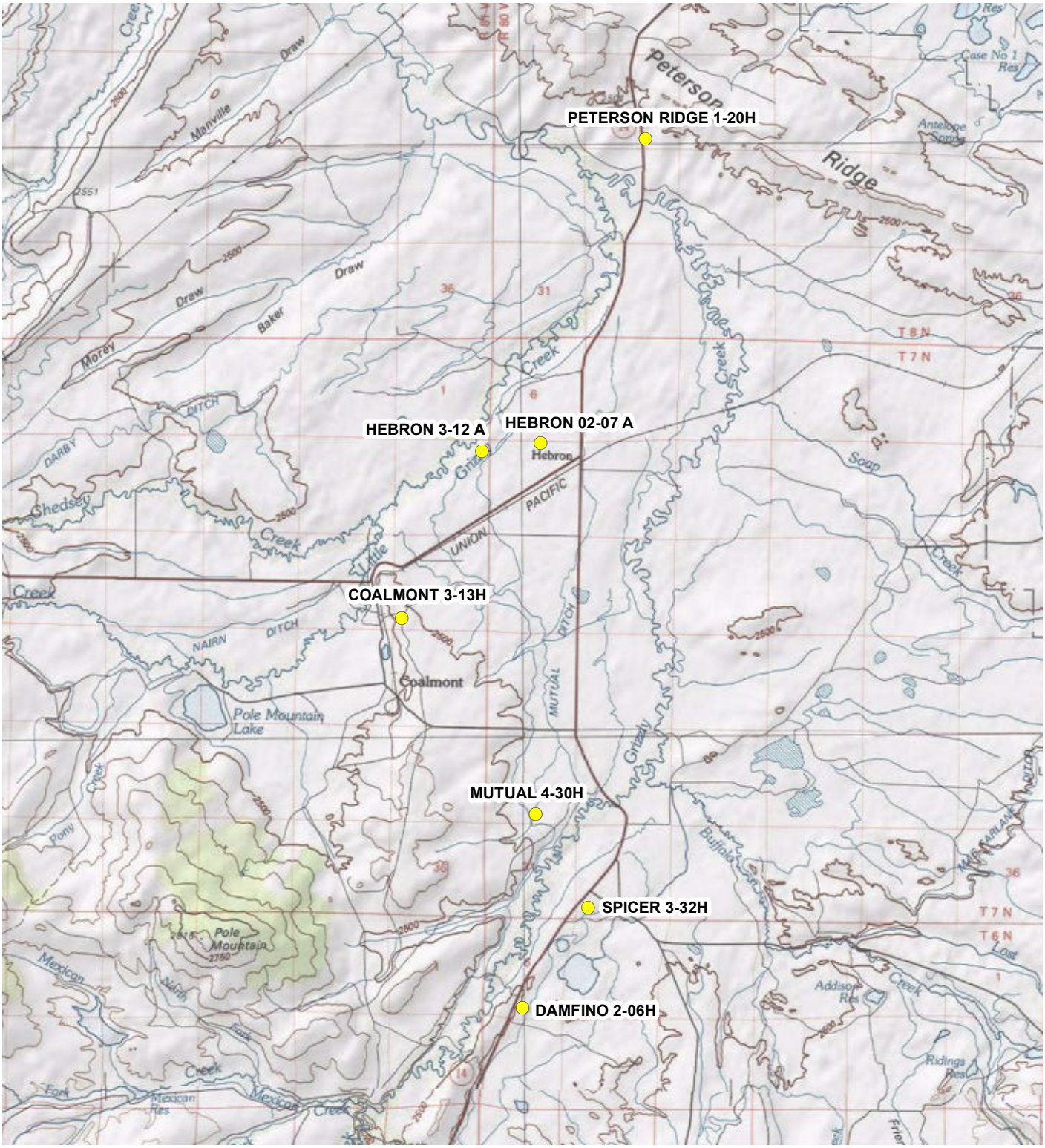

IMAGE COURTESY OF ESRI/USGS

LEGEND

- SITE LOCATION

0 1.5 3

Miles

N

COLORADO

FIGURE 1
SITE LOCATION MAP
SANDRIDGE WELLSITES
JACKSON COUNTY, COLORADO

SANDRIDGE EXPLORATION AND PRODUCTION, LLC

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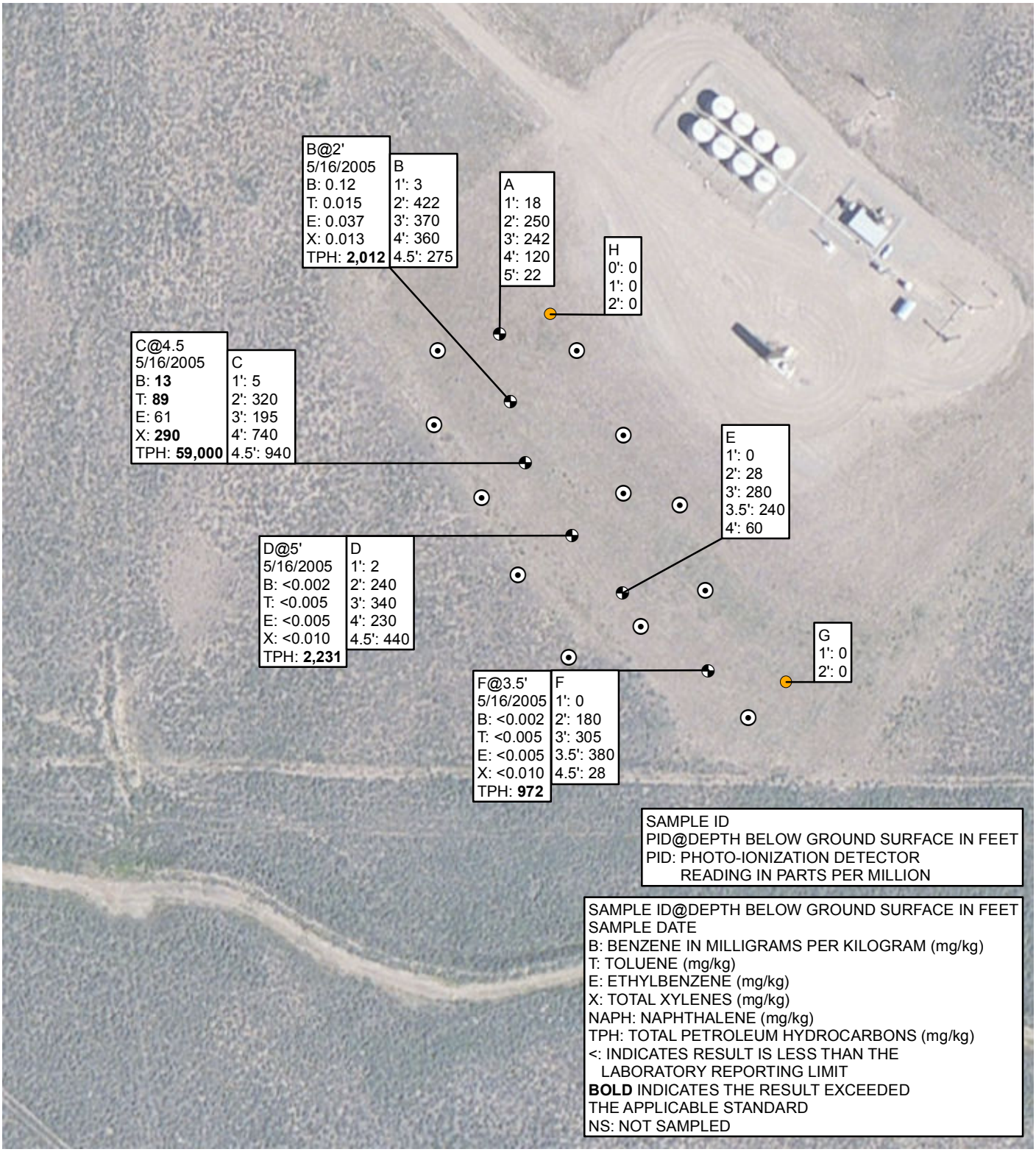

LEGEND

- SAMPLE LOCATION
- PROPOSED RE-DRILL SOIL BORING
- PROPOSED STEP-OUT SOIL BORING
- DISTURBED AREA
- FORMER PIT LOCATION

IMAGE COURTESY OF ESRI

0 100 200
Feet

N

FIGURE 2
MUTUAL 4-30H
SOIL ANALYTICAL RESULTS
JACKSON COUNTY, COLORADO

SANDRIDGE EXPLORATION AND PRODUCTION, LLC

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