

SITE INVESTIGATION PLAN



Mount Pearl Unit 13-25 API# 05-017-06508

NWSW, Section 25, T13S R48W

Cheyenne County, Colorado

Prepared for:
Citation Oil & Gas Corp.
14077 Cutten Rd.
Houston, TX 77069

Prepared by:
Absaroka Energy and
Environmental Solutions, LLC.
112 High St.
Buffalo, WY 82834

CIT.CO.0518.03



April 2021



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1 INTRODUCTION

Citation Oil & Gas Corp. (Citation) contracted Absaroka Energy and Environmental Solutions, LLC (AE₂), to prepare a Site Investigation Plan (Plan) for the plugging and abandonment of the Mount Pearl Unit 13-25 well (API# 05-017-060508). Plugging and abandonment of the well will involve the removal of the following equipment from the well site: pumping unit, motor, cathodic protection rectifier, buried electric line, and an off-location flowline will be severed from the well prior to plugging.

The following Plan provides an overview and detailed description of the activities to be performed as part of the site investigation, as well as site background, hydrogeology, and surface and groundwater receptors. This Plan also details the soil sampling to be conducted. Maps and other reference materials are also included.

1.1 Site Description and Location

The Mount Pearl Unit 13-25 well is located approximately 9.1 miles northeast of the town of Kit Carson, Colorado in Cheyenne County (**Appendix A**).

The well location may be accessed from Kit Carson by turning north onto CO State Highway 59, and travel north approximately 8.1 miles to CO Road V. Turn east on CO Road V and travel approximately 3.1 miles. Turn north on an unnamed lease road and travel approximately 0.35 miles. The well access road is located at the facility on the east side of the road through an existing central tank battery (**Appendix A**).

1.2 Contact Information

Pertinent contact information regarding the site investigation is shown in Table 1.

Table 1: Contact Information.

<i>Contact</i>	<i>Person</i>	<i>Address</i>	<i>Phone No.</i>
Responsible Party	Citation Oil & Gas Corp.	14077 Cutten Rd. Houston, TX 77069	281-891-1000
EHS & Regulatory Director	Bob Redweik	14077 Cutten Rd. Houston, TX 77069	281-891-1550
Environmental Contractor	Ben Shoup Absaroka Energy and Environmental Solutions, LLC	112 High Street Buffalo, WY 82834	307-299-5950
Landowner	Ronald & Shirley White	23515 County Road W Kit Karson, CO 80825	719-962-3450

1.3 Historic Land Use

The Site is located in a rural setting within the Great Plains physiographic province. Historic land use for the area includes agricultural operations and farming. In addition, the land is currently being used for oil and gas production operations. Prior to oil and gas operations, the area had few uses aside from agriculture.

1.4 High Priority Habitat Review

The Colorado Parks and Wildlife (CPW) High Priority Habitat (HPH) Geodatabase file (found at: <https://cogcc.state.co.us/data2.html#/downloads>) was reviewed to determine if the Site was located within a designated HPH. The Site is partially located within the extents of the *Estimated Occupied Range* and *Connectivity Area* for the Lesser Prairie Chicken, but not within any designated HPH.

2 HYDROGEOLOGICAL CONDITIONS

2.1 Geology

The surface geology of the area is comprised of Quaternary alluvium, eolian deposits, and Holocene slopewash deposits. These deposits overlie the Tertiary Pliocene and Upper Miocene Ogallala Formation which unconformably overlies the Late Cretaceous Pierre Shale. The Ogallala Formation is described as mainly sand and gravel with interbedded silt. The Pierre Shale is described as a dark-gray and brownish clay shale containing calcareous and ferruginous concretions throughout, with some thick bentonite beds.

2.2 Soil

Surface soil texture at the Site is primarily clayey loam. Soil characteristics and type were referenced from the Natural Resources Conservation Service's Web Soil Survey. Soils within the site consist of three primary soil series; the Fort Collins loam soils, the Stoneham loam soils, and the Manzanst clay loam soils. These soils occur in an area with mean annual precipitation of 14 to 16 inches, mean annual air temperature of 46 to 48 degrees, and a frost-free period of 135 to 160 days.

Fort Collins loam soils occur on 0 to 3% slopes in interfluvial areas and stream terraces. These soils are clayey, loam, well drained, with a depth to groundwater that is typically greater than 80 inches. They are considered non-saline to very slightly saline (0.1 to 2.0 mmhos/cm) with a typical maximum sodium adsorption ratio of 0.0. These soils have a typical depth to restrictive features more than 80 inches.

The Stoneham loam soils occur on 0 to 3% slopes on plains. These soils are clayey-sandy loam, well drained, with a depth to groundwater that is typically greater than 80 inches. They are considered non-saline to very slightly saline (0.0 to 2.0 mmhos/cm) with a typical maximum sodium adsorption ratio of 0.0. These soils have a typical depth to restrictive features (bedrock) of generally more than 80 inches.

The Manzanst clay loam soils occur in drainageways and stream terraces. These soils are clayey, loam, well drained, with a depth to groundwater that is typically greater than 80 inches. They are considered slightly saline (4.0 to 7.0 mmhos/cm) with a typical maximum sodium adsorption ratio of 5.5. These soils have a typical depth to restrictive features more than 80 inches.

2.3 Hydrogeology

2.3.1 Potential Groundwater Receptors

Alluvial groundwater may be present in the Project area at depths of approximately 20 - 30 feet below ground surface, evidenced from two stock wells (**Appendix C**) less than one mile away. Shallow groundwater flow typically follows topography but may also be controlled by bedrock geology and geological structures.

A review of Colorado's DWR Well Permit Resource data identified one geophysical log well within 1.0 mile of the Site, indicating depth to non-alluvial groundwater to be 1790 feet bgs (no download file available) hosted by the Dakota Formation. Based on the small size of the site and no major facilities having ever been present, and the depth to groundwater being greater than 20 feet, the potential for groundwater impact is not considered a concern for this investigation.

2.3.2 Potential Surface Water Receptors

Surface water is present in the area in the form of ephemeral streams and small reservoirs. The closest surface water feature to the Site is an unnamed ephemeral drainage to Little Spring Creek, which is an ephemeral stream. This drainage feature is approximately 800 feet to the east of the well site. The closest downstream perennial water body is the Arkansas River which is more than 55 miles down-gradient of the site.

3 SITE CHARACTERIZATION SAMPLING METHODS

3.1 General Sampling Methods

3.1.1 Site Soil Sampling

Field screening will be conducted prior to collection of soil samples. This will be accomplished with olfactory and visual observations, probing using an electrical conductivity (EC) meter, and a calibrated Photoionization Detector (PID). Soil sampling will follow industry accepted sampling procedures. Soil samples will be collected with a soil bucket auger or stainless-steel trowel. Samples will be collected from 0-6 inches in the soil profile. Deeper samples may be collected separately from deeper intervals (e.g., 6"-12", 12"-18", etc.) if hydrocarbon and/or salinity impacts are readily detected during field screening at depths greater than six (6) inches. Soil will be transferred directly into soil sample containers provided by the laboratory. Each sample will be transferred immediately to a cooler and preserved with ice for transport

to the laboratory. Sampling personnel will don nitrile gloves during the sampling activities; donning new gloves between each sample location to prevent cross-contamination. Each soil sample will be analyzed in accordance with Table 915-1. The COGCC cleanup concentrations for soil are provide in Table 915-1, including provisions for comparison to naturally occurring background levels for specific parameters.

3.1.2 Groundwater Sampling

No shallow groundwater is anticipated to be present at this site based on local water well data, and therefore no groundwater sampling is planned.

3.1.3 Background Reference Samples

One background sample will be collected for baseline comparative and reference purposes. The sample will be collected from an adjacent, upgradient or cross-gradient, unaffected area (approximate location identified on the Sampling Map – **Appendix B**). The background sample will be analyzed for the following constituents:

- Electrical conductivity
- Sodium absorption ratio (SAR)
- pH
- Boron
- Metals

3.2 Field Screening

Field screening will be conducted during the sampling effort to aid in determining if there is any contamination at the Site and determine its extent. An EC meter and a PID will be used to field screen soil sample locations. EC meter readings thresholds will be 4 mmhos/cm or within 5% of the background readings. PID thresholds will be 100 ppm. In addition, the PID readings will also be collected for background samples. The sample will be collected into a Ziploc bag and allowed to rest for one minute. After one minute, the PID sampling probe will be used to puncture the head space of the Ziploc bag and collect a PID reading.

3.3 Decontamination

All sampling equipment will be decontaminated between each sample by first removing any remaining soil, then washing with an Alconox solution, then rinsing with distilled water. Equipment will be allowed to air dry prior to subsequent sampling. Sampling personnel will don nitrile gloves during the sampling activities, donning new gloves between each sample location.

3.4 Chain of Custody

Chain of Custody (COC) protocol will follow generally accepted methods. Sample containers will be sealed and placed on ice in coolers for shipment. Prior to shipping, the COC will be signed and dated by the sampler. The COC will be sealed in a Ziploc bag and taped to the inside of the cooler lid. The cooler is sealed and taped shut for shipment. Lab personnel, upon receipt of the coolers, removes the tape, breaks the cooler seal, retrieves the COC, and then fills in the appropriate lab receipt information and signs the document. Documentation of the completed COC is sent to AE₂ via email.

3.5 Documentation

Each sample location will be fully documented. At minimum, documentation includes the following items:

- Collector name
- Sample name
- Sample date/time
- Sample type (discreet, composite)
- PID reading
- EC reading
- Coordinates
- Photographs
- Visual/olfactory observations
- Soil description
- Other notes

To assist with the documentation effort, a GPS enabled digital device, sample log forms, and sample log table will be utilized to track and record data. Sample locations will be photo documented.

4 QUALITY ASSURANCE / QUALITY CONTROL

All sampling documentation will be reviewed for any errors or omissions prior to completing the field activities for each sampling location.

4.1 Data

Data collected for each sample will be documented by several methods. Each sample location will be documented using a digital device equipped with a GPS receiver. In addition, each sample will be documented on a sample log form. Finally, a sampling log table will be completed as samples are collected ensuring that all the required samples and attribute data are collected and recorded. Each sample location will also be photo-documented, and a photographic log will be prepared.

Sample log forms, log tables, and GPS waypoint data will be cross-checked daily to ensure accurate data.

4.2 Cross-contamination

To eliminate the possibility of cross-contamination of samples during the sampling activities, all sampling equipment will be decontaminated between each sample location. The decontamination procedures are discussed above in Section 3. In addition, sampling personnel will don new nitrile gloves for each sample to be collected.

5 SAMPLING DEVIATIONS

Additional sampling containers will be available in the event that additional sampling is warranted. Conditions that may warrant additional sampling include discovery of potentially contaminated soil areas, discovery of contamination at depths greater than anticipated, or discovery of significant differences in soil type/texture in areas across the site. Although not anticipated to be necessary, sampling containers for water samples will be available for collecting groundwater, if encountered.

6 IMPLEMENTATION AND REPORTING SCHEDULE

The site investigation will begin as soon as this plan has been approved by the COGCC. A follow-up report with the results of the site investigation will be submitted as soon as possible after activities have concluded. If determined necessary based on the site investigation results, a remediation design will be developed and implemented to address any confirmed contamination.

7 POTENTIAL REMEDIATION ACTIVITIES

Remediation activities for substantial impacts, if required, will likely involve excavation of impaired soils for transport to an approved disposal facility. Following excavation and removal of any impaired soils, confirmation sampling will be conducted to confirm successful remediation. Excavated areas will then be backfilled with clean soil as necessary and seeding of the remediated area to re-establish a proper seedbed will be conducted.

Remediation activities for minor impacts may include *in situ* treatment methods to reduce contaminants of concern below regulatory limits and to foster successful reclamation. *In situ* treatment may include scarification of the soil and addition of amendments to breakdown hydrocarbons or modify soil geochemistry to mitigate brine-related impacts which result in increased EC and SAR. Amendments may include manure, straw, specialty hydrocarbon remediation products (e.g., MicroBlaze, DualZorb, etc.), gypsum, or fertilizers. Application rates would be based on need to treat the affected area. Following *in situ* treatment (usually at least 6 months), confirmation sampling will be conducted to confirm successful remediation.

Mount Pearl Unit 13-25

The results of any remediation activities will be summarized in a report along with confirmation soil sample data and submitted to the COGCC.

APPENDICES

Appendix A – Project Location Map



Map Key
 * Project Location



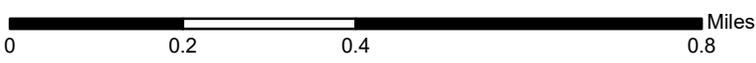
112 High Street
 Buffalo, Wyoming 82834
 855.684.5891

www.absarokasolutions.com

CIT.CO.0518.01

**MPU 13-25
 Project Location**

Cheyenne County, State of Colorado



Coordinate System: WGS 1984 UTM Zone 13N



Date: 4/20/2021

Scale: 1:14,000

Appendix B – Sampling Map



MPU Background ●

MPU SS 1 ●

MPU SS 3 ●

MPU SS 2 ●



Appendix C – Hydrologic Data

Index No.	377
IDWD	3-67
Use	Stock
Registered	1-8-62
Cards Typed	

STATE OF COLORADO
DIVISION OF WATER RESOURCES
OFFICE OF THE STATE ENGINEER
GROUND WATER SECTION

RECEIVED
JAN 8 1962
GROUND WATER SECT.
COLORADO
STATE ENGINEER

LOG AND HISTORY OF WELL
PERMIT [REDACTED]

Drilled by Getman Bros No. 106

10395 WELL LOCATION

Owner Getman Bros

Cheyenne County

Address Kit Carson Cole

NE 1/4 of SE 1/4 of Sect. 25

Tenant Owners

Twp. 13S, Rge. 48W, 63M

Used for Stock

LOCATE WELL ACCURATELY
IN THE SMALL SQUARES REPRESENTING 40 ACRES

on or by _____
(description of site or land)

Date Started 12-16, 1961

Date Completed 12-16, 1961

Date Tested 12-16, 1961

Yield 5 1/2 gpm _____ cfs

Pump type 3" cyl. Outlet Size _____

Driven by _____ HP @ RPM _____

Depth to Water 18 Ft. Draw down 1 1/2 Ft.

Depth to Inlet _____ Ft.; Bowl _____ Ft.

Size and Kind of Casing:

From 0 to 17 1/2 Type galv Wt. 20 ga.

From _____ to _____ Type _____ Wt. _____

From _____ to _____ Type _____ Wt. _____

Perforations: Size and Type

From 17 1/2 to 23 1/2 Type galv Size 6"

From _____ to _____ Type _____ Size _____

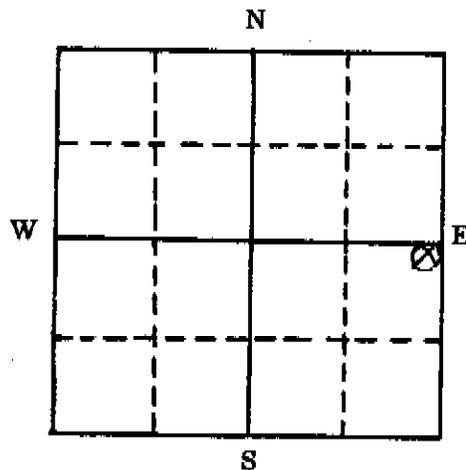
From _____ to _____ Type _____ Size _____

Well description: Total Depth 24 23 1/2 Ft.

Hole (from 0 to 23 1/2, 6 in.

Diam. (from _____ to _____, _____ in.

(from _____ to _____, _____ in.



If the above is not applicable fill in:

Town or Subdivision _____

Street Address or Lot & Block _____

Ground elevation _____
(if known)

How Drilled:
Rotary

REMARKS

Cementing, Packing, Type of Shut-off, Depth to Shut-off, etc.
PUT LOG OF WELL ON REVERSE SIDE

LOG OF WELL
(ADD SPACES AS NEEDED)

From	<u>0</u> ft.	to	<u>4</u> ft.	Adobe soil
	<u>4</u> ft.	to	<u>18</u> ft.	Sand
	<u>18</u> ft.	to	<u>21</u> ft.	Clay and sand rock
	<u>21</u> ft.	to	<u>23</u> ft.	Water sand
	<u>23</u> ft.	to	<u>23 1/2</u> ft.	Shale

Form C (Rev.)
7-58/5M

STATE OF COLORADO
APPLICATION FOR USE OF GROUND WATER
(Use Indelible Pencil or Typewriter)

RECEIVED

DEC 11 1961
GROUND WATER SECT.
COLORADO
STATE ENGINEER

Applicant Getman Bros

P. O. Address Kit Carson Colo

Quantity applied for _____ gpm or _____ AF Storage

Used for stock Purposes

on/at _____
(legal description of land site)

Total acreage irrigated and other rts.
ESTIMATED DATA OF WELL

Hole size: 6 in. to 23 ft.
_____ in. to _____ ft.

Casing Plain 6 in. from 0 to 18 ft.
_____ in. from _____ to _____ ft.

Perf. 6 in. from 18 to 25 ft.
_____ in. from _____ to _____ ft.

PUMP DATA: Type windmill HP _____ Outlet Size _____

Use initiation date Dec 15 1961
(Use Supplemental pages for additional data)

THIS APPLICATION APPROVED
NO. 10395
DATE DEC 11 1961 19 _____

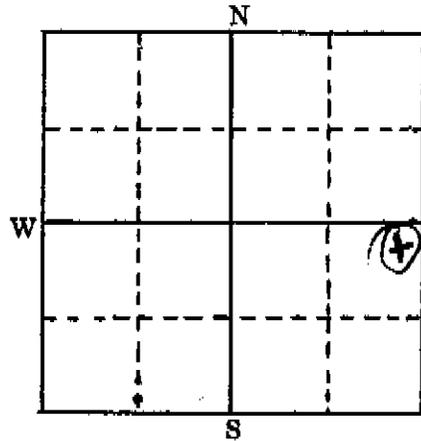
LOCATION OF WELL
County Cheyenne

NE, $\frac{1}{4}$, SE, $\frac{1}{4}$ Sect. 25 Twp. 135

Rge. 48W, 6th M. OR

Street Address or Lot & Block No. _____

Town or Subdivision _____



Locate well in 40 acre (small) square as near as possible.

\$25.00 fee required for Industrial, Commercial or Irrigation uses.

Applicant Frank Getman
Agent or Driller Getman Bros No. 106
Address Kit Carson Colo

NOTE -- SATISFACTORY COMPLETION REQUIRED FOR APPROVAL OF APPLICATION

JUN 22 1962

Form E (Rev.)

57
 Index No. 478
 IDWD 2-67
 Use Stocks
 Registered 5-29-62
 Cards Typed _____

STATE OF COLORADO
 DIVISION OF WATER RESOURCES
 OFFICE OF THE STATE ENGINEER
 GROUND WATER SECTION

LOG AND HISTORY OF WELL
 PERMIT NO. 11576

RECEIVED
 MAY 24 1962
 GROUND WATER SECT.
 COLORADO
 STATE ENGINEER

Drilled by Getman Bros Lic. No. 106

WELL LOCATION

Owner Getman Bros.

Cheyenne County 09

Address Kit Carson Colo.

SE 1/4 of NE 1/4 of Sect. 25

Tenant owners

Twp. 13 S, Rge. 48 W 6 M

Used for stock

LOCATE WELL ACCURATELY
 IN THE SMALL SQUARES REPRESENTING 40 ACRES

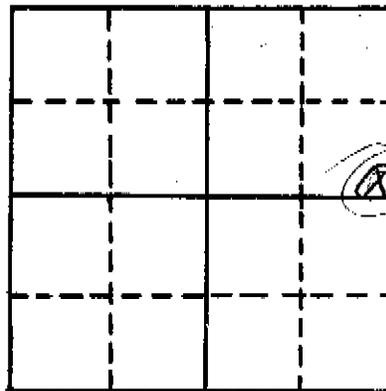
on or by _____

(description of site or land)

Date Started May 16, 1962

N

Date Completed May 16, 1962



Date Tested May 16, 1962

Yield 8 gpm _____ cfs

Pump type Windmill Outlet Size _____

Driven by _____ HP @ RPM _____

Depth to Water 18 Ft. Draw down 1' 10"

Depth to Inlet _____ Ft.; Bowl _____ Ft.

Size and Kind of Casing:

If the above is not applicable fill in:

From 0 to 2.3 Type galv. Wt. 20ga

From _____ to _____ Type _____ Wt. _____

From _____ to _____ Type _____ Wt. _____

Perforations: Size and Type

From 23 to 26 Type galv Size 6 in.

From _____ to _____ Type _____ Size _____

From _____ to _____ Type _____ Size _____

Well description: Total Depth 26 Ft.

(from 0 to 26, 6 in.

Hole (from _____ to _____, _____ in.

Diam. (from _____ to _____, _____ in.

(from _____ to _____, _____ in.

Town or Subdivision _____

Street Address or Lot & Block _____

Ground elevation _____ (if known)

How Drilled: Rotary

REMARKS

Cementing, Packing, Type of Shut-off, Depth to Shut-off, etc.
 PUT LOG OF WELL ON REVERSE SIDE

TO BE MADE OUT IN QUADRUPPLICATE: Original Blue and Duplicate Green to State Engineer's Office, White copy to Owner, and Yellow copy to Driller

LOG OF WELL
(ADD SPACES AS NEEDED)

From <u>0</u> ft. to <u>8</u> ft.	Top soil (Adobe)
<u>8</u> ft. to <u>11</u> ft.	sand
<u>11</u> ft. to <u>13</u> ft.	clay
<u>13</u> ft. to <u>19</u> ft.	sand
<u>19</u> ft. to <u>19 1/2</u> ft.	limestone clay
<u>19 1/2</u> - <u>25 1/2</u>	water gravel
<u>25 1/2</u> - <u>26</u>	Shale

Form G (Rev.)
7-58/5M

STATE OF COLORADO
APPLICATION FOR USE OF GROUND WATER
(Use Indelible Pencil or Typewriter)

RECEIVED
MAY 16 1962
GROUND WATER SECT.
COLORADO
STATE ENGINEER

Applicant Getman Bros

P.O. Address Kit Carson Colo

Quantity applied for 10 gpm or
AF Storage

Used for Stock Purposes

on/at _____
(legal description of land site)

Total acreage irrigated and other rts.

ESTIMATED DATA OF WELL

Hole size: 6 in. to 30 ft.
in. to _____ ft.

Casing Plain 6 in. from 0 to 27 ft.
in. from _____ to _____ ft.

Perf. 6 in. from 27 to 30 ft.
in. from _____ to _____ ft.

PUMP DATA: Type Windmill HP _____ Size _____
Outlet

Use initiation date May 20 19 62
(Use Supplemental pages for additional data)

THIS APPLICATION APPROVED

NO. 11576

DATE MAY 16 1962 19 _____

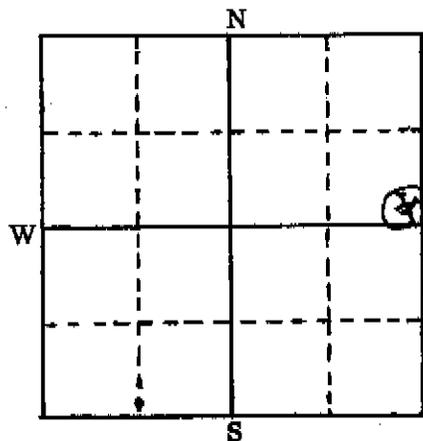
LOCATION OF WELL
County Cheyenne

SE, $\frac{1}{4}$ NE, $\frac{1}{4}$ Sect. 25 Twp. 135

Rge. 48W, 6th P.M. OR

Street Address or Lot & Block No.

Town or Subdivision



Locate well in 40 acre (small) square as near as possible.

\$25.00 fee required for Industrial, Commercial or Irrigation uses.

Applicant Getman Bros

Agent or Driller Getman Bros No. 106

Address Kit Carson Colo

NOTE — SATISFACTORY COMPLETION REQUIRED FOR APPROVAL OF APPLICATION

