

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 12/12/2016
 Remediation #9951
 Document #200440746

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): closure of 1 of 2 pits

OGCC Employee:

☐ Spill ☐ Complaint
☐ Inspection ☐ NOAV

Tracking No:

OGCC Operator Number: 10311

Name of Operator: Synergy Resources Corporation

Address: 20203 Highway 60

City: Platteville State: CO Zip: 80651

Contact Name and Telephone:

Jerry Brian

No: 970-518-2062

Fax:

API Number: 05-123-15385

County: Weld

Facility Name: Toedtli 1-10 Pit

Facility Number: 113418

Well Name: Toedtli

Well Number: 1-10

Location: (QtrQtr, Sec, Twp, Rng, Meridian): NESW, Sec. 10, T10N, R57W, 6th PM Latitude: 40.851086 Longitude: -103.739992

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): Produced Water

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.): Rangeland

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Silty sand and angular gravel, siltstone, clay

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Intermittent tributary to Horsetail Creek located approximately 1,115 feet to the south.

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

Impacted Media (check):



Soils



Vegetation



Groundwater



Surface Water

Extent of Impact:

Elevated pH, EC, and SAR

How Determined:

Site investigation soil samples

REMEDIALTION WORKPLAN

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

On October 28, 2016, site investigation activities were conducted to assess the potential presence of petroleum hydrocarbon impact associated with one of the historical produced water overflow evaporation pits. Please refer to the LTE Site Investigation and Closure Request, dated December 7, 2016, for additional details.

Describe how source is to be removed:

No organic impacts were encountered during the site investigation. One soil sample collected from the east sidewall of the produced water overflow pit from 0 feet to 3 feet below ground surface (bgs) indicated elevated levels of pH, EC, and SAR. No additional removal activities are planned at this time.

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.:

The Toedtli 1-10 facility is active; therefore, and residual effects of elevated levels of pH, EC, and SAR will be addressed during closure and final reclamation.



Tracking Number:	
Name of Operator:	<u>Synergy Resources Corporation</u>
OGCC Operator No:	<u>10311</u>
Received Date:	<u>12/12/2016</u>
Well Name & No:	<u>Toedtli 1-10</u>
Facility Name & No:	<u>Toedtli 1-10 Pit 113418</u>

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 site investigation activities.

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.

Upon approval of the closure request, the perimeter berms of the produced water overflow pit will be pushed in to fill the pit and re-establish the pre-existing grade. Interim reclamation will be compliant with COGCC 1003 series rules. The skim pit located approximately 20 feet north of the produced water overflow pit will remain in place.

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:

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

Not applicable

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: <u>10/28/2016</u>	Date Site Investigation Completed: <u>10/28/2016</u>	Date Remediation Plan Submitted: <u>N/A</u>
Remediation Start Date: <u>N/A</u>	Anticipated Completion Date: <u>N/A</u>	Actual Completion Date: <u>N/A</u>

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

Print Name: Jerry Brian

Signed: [Signature]

Title: Manager of Environmental and Health

Date: 12/12/16

OGCC Approved: _____ Title: Northeast EPS Date: 12/15/2016

Condition of Approval: Additional investigation to determine the vertical and horizontal extent of impacts related to the inorganic parameters pH, EC and SAR is required prior to project closure.



December 7, 2016

Mr. Rick Allison, P.G.
Environmental Protection Specialist
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

**RE: Toedtli 1-10 Pit (Facility ID 113418)
Site Investigation and Closure Request
Synergy Resources Corporation
Weld County, Colorado**

Dear Mr. Allison:

LT Environmental, Inc. (LTE), has prepared this report on behalf of Synergy Resources Corporation (Synergy) to provide the Colorado Oil and Gas Conversation Commission (COGCC) with documentation of the site investigation activities conducted at the Toedtli 1-10 Produced Water Overflow Evaporation Pit (Site). The Site is identified in the Colorado Oil and Gas Information System by Facility Number 113418. The Site is located approximately 2.65 miles west of Colorado State Highway 71 and 0.70 miles south of County Road 120 in Weld County, Colorado. The legal Site description is the northeast quarter of the southwest quarter of Section 10, Township 10 North, Range 57 West, 6th Principal Meridian. The Site Location Map is provided as Figure 1.

Site Investigation Activities

On October 28, 2016, under the direction of Synergy, LTE personnel conducted a site investigation to assess potential petroleum hydrocarbon impacts associated with one of the historical produced water overflow evaporation pits. Five soil borings (SB01 through SB05) were advanced using a hand auger and soil samples were collected and field screened for volatile organic compounds using a photo-ionization detector (PID). Five soil samples were advanced until refusal was encountered at depths ranging from 1 foot below ground surface (bgs) to 4 feet bgs to assess the potential presence of petroleum hydrocarbon impact. Five soil samples (SB01@4', SB02@1.5', SB03@0.75', SB04@0.75', and SB05@1.5') were collected and submitted for laboratory analysis based on the interval that exhibited visible soil staining and/or where the most elevated PID reading was observed. One soil sample (SB01@0'-3') was collected and submitted for laboratory analysis to assess the potential presence of inorganic impact near the surface within the typical vegetative root zone. Groundwater was not encountered during the site investigation activities.

Soil Sampling

Five soil samples (SB01@4', SB02@1.5', SB03@0.75', SB04@0.75', SB05@1.5') were collected, placed on ice, then submitted with a completed chain of custody form to eAnalytics



Laboratory (eAnalytics) of Loveland, Colorado, for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) by United States Environmental Protection Agency (EPA) Method 8260 and TPH as diesel range organics (DRO) by EPA Method 8015. One soil sample (SB01@0'-3') was submitted for laboratory analysis of pH by EPA method 9045D, electrical conductivity (EC) by modified United States Department of Agriculture (USDA) Method 60(3), and sodium adsorption ratio (SAR) by modified USDA Method 60(20B).

Soil Analytical Results

The COGCC Table 910-1 standards for BTEX, TPH, pH, EC, and SAR in soil are 0.17 milligrams per kilogram (mg/kg), 85 mg/kg, 100 mg/kg, 175 mg/kg, 500 mg/kg, 6 to 9 standard units, 4 millimhos per centimeter (mmhos/cm), and 12 (ratio), respectively. Laboratory soil analytical results indicated that all soil samples were in compliance with the COGCC Table 910-1 standards for BTEX and TPH. Soil sample SB01@0'-3' exceeded the COGCC Table 910-1 standards for pH, EC, and SAR at values of 10.1 standard units, 10.42 mmhos/cm, and 65.7, respectively. Any residual effects of the inorganic impacts will be addressed during closure and final reclamation activities. The soil analytical results are presented on Figure 2 and summarized in Table 1. The laboratory analytical report is included as Attachment 1.

Summary and Conclusions

On October 28, 2016, LTE conducted a site investigation to assess the potential presence of petroleum hydrocarbon impacts at the Site associated with the historical produced water overflow evaporation pit. Five soil samples (SB01@4', SB02@1.5', SB03@0.75', SB04@0.75', and SB05@1.5') were collected within the limits of the pit and submitted for laboratory analysis of BTEX and TPH to assess the potential presence of organic impacts at the Site. One soil sample (SB01@0'-3') was collected from the pit sidewall and submitted for laboratory analysis of pH, EC, and SAR to assess the potential presence of inorganic impacts in the typical vegetative root zone. Laboratory analytical results indicated all soil samples were in compliance with the COGCC Table 910-1 standards for BTEX and TPH. Soil sample SB01@0'-3' exceeded the COGCC Table 910-1 standards for pH, EC, and SAR at values of 10.1 standard units, 10.42 mmhos/cm, and 65.7, respectively. The pit is located on an active oil and gas production facility; therefore, any residual effects of elevated pH, EC, and SAR levels will be mitigated upon closure and final site reclamation.



Based on these findings, LTE and Synergy respectfully request that the COGCC grant a closure status for the Site. The nearby skim pit located approximately 20 feet north of the produced water overflow evaporation pit will remain in place. Should you have any questions or comments, please feel free to contact the undersigned at 303-433-9788 or Mr. Jerry Brian of Synergy at 970-518-2062.

Sincerely,

LT Environmental, Inc.

A handwritten signature in black ink, appearing to read 'Chris Roy', is positioned above the name and title of the signatory.

Chris Roy
Project Environmental Scientist

A handwritten signature in black ink, appearing to read 'Steve Kahn', is positioned above the name and title of the signatory.

Steve Kahn, P.E.
Vice President

cc: Mr. Jerry Brian, Manager of Environment and Health, Synergy Resources Corporation

Attachments

Figure 1	Site Location Map
Figure 2	Site Investigation Soil Analytical Results
Table 1	Site Investigation Soil Analytical Results
Attachment 1	Laboratory Analytical Report

FIGURES

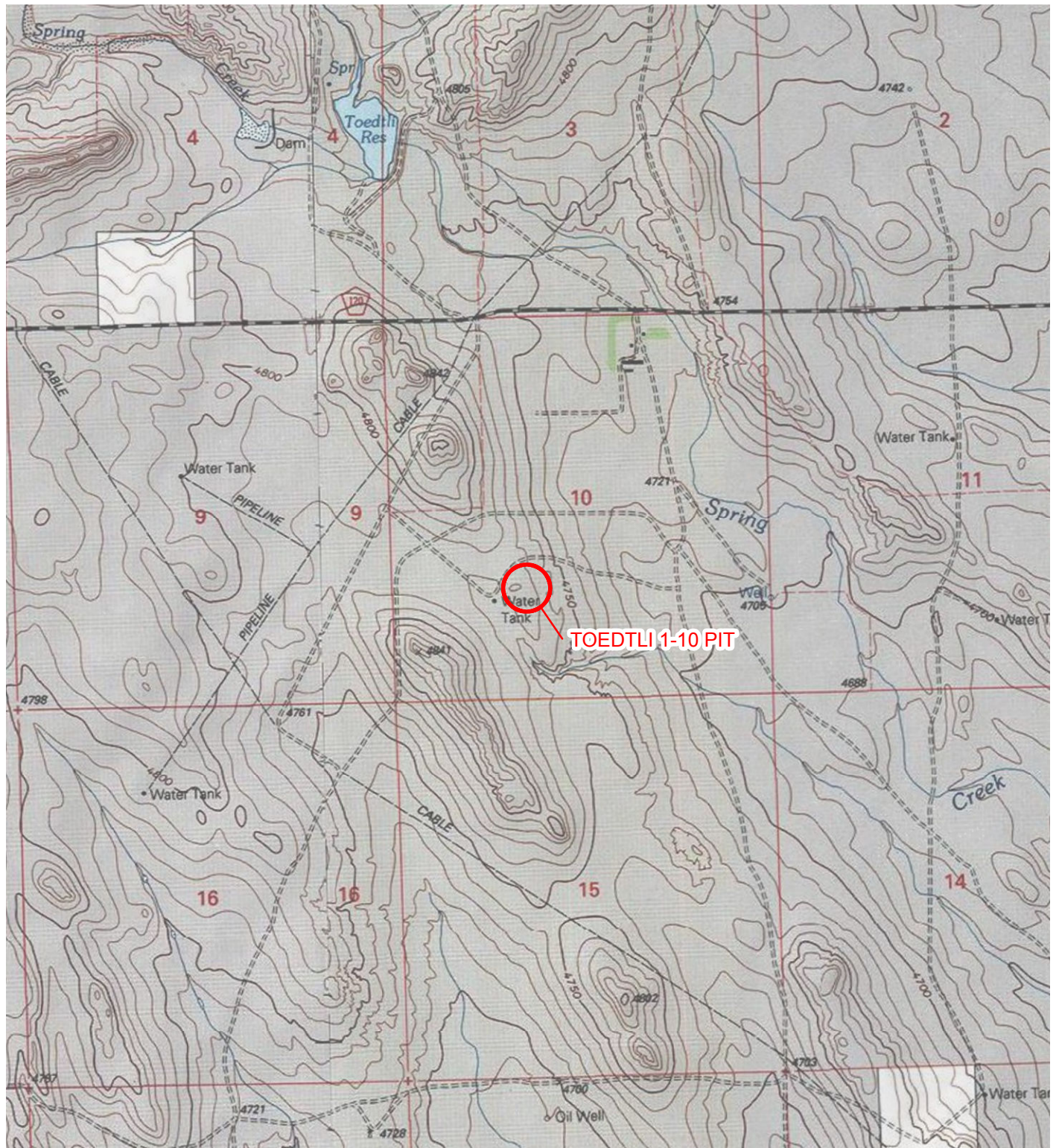
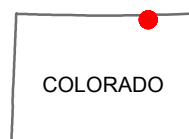
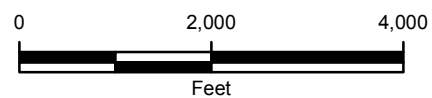


IMAGE COURTESY OF ESRI/USGS

LEGEND

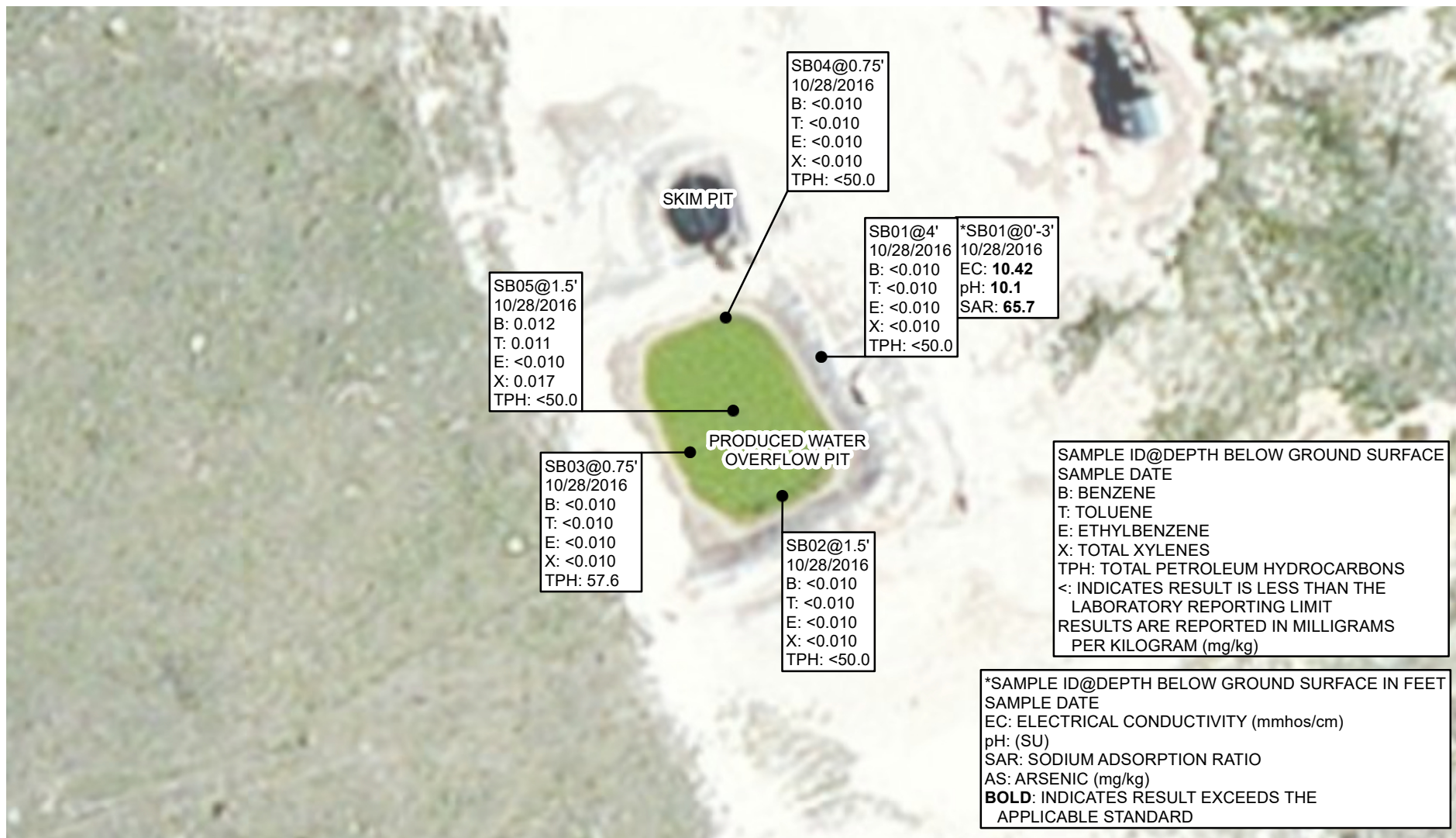
○ SITE LOCATION



COLORADO

FIGURE 1
SITE LOCATION MAP
TOEDTLI 1-10 PIT
NESW SEC 10-T10N-R57W
WELD COUNTY, COLORADO
SYNERGY RESOURCES CORPORATION





LEGEND

- SOIL BORING

IMAGE COURTESY OF ESRI

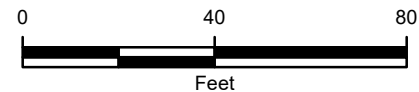


FIGURE 2
SITE INVESTIGATION SOIL ANALYTICAL RESULTS
TOEDTLI 1-10 PIT
NESW SEC 10-T10N-R57W
WELD COUNTY, COLORADO
SYNERGY RESOURCES CORPORATION



TABLES

TABLE 1
SITE INVESTIGATION SOIL ANALYTICAL RESULTS
TOEDTLI 1-10 PIT
WELD COUNTY, COLORADO
SYNERGY RESOURCES CORPORATION

Soil Sample ID	Date Collected	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	TPH (mg/kg)	pH (s.u.)	EC (mmhos/cm)	SAR (unitless)
SB01@4'	10/28/2016	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	<50.0	--	--	--
SB01@0'-3'	10/28/2016	--	--	--	--	--	--	--	10.1	10.42	65.7
SS02@1.5'	10/28/2016	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	<50.0	--	--	--
SS03@0.75'	10/28/2016	<0.010	<0.010	<0.010	<0.010	<50.0	57.6	57.6	--	--	--
SS04@0.75'	10/28/2016	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	<50.0	--	--	--
SS05@1.5'	10/28/2016	0.012	0.011	<0.010	0.017	<50.0	<50.0	<50.0	--	--	--
COGCC Table 910-1 Standards		0.17	85	100	175	--	--	500	6 - 9	4	12

NOTES:

COGCC - Colorado Oil and Gas Conservation Commission

DRO - diesel range organics analyzed by EPA Method 8015

EC - electrical conductivity analyzed by modified USDA Method 60 (3)

GRO - gasoline range organics analyzed by EPA Method 8260

mg/kg - milligrams per kilogram

mmhos/cm - millimhos per centimeter

s.u. - standard units

SAR - sodium adsorption ratio analyzed by modified USDA Method 60 (20B)

TPH - total petroleum hydrocarbons is the sum of GRO and DRO

-- - indicates there is no standard or the sample was not analyzed for the parameter

< - indicates result is less than the stated laboratory reporting limit

Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8260

pH analyzed by EPA Method 9045D

BOLD indicates result exceeds the applicable standard



ATTACHMENT 1
LABORATORY ANALYTICAL REPORT



Test Report



November 7, 2016

Client: LT Environmental

Project: Toedtli 1-10

Lab ID: 6041

Date Samples Received: 10/31/2016

Number of Samples: 6

Sample Condition: Samples arrived intact and in appropriate sample containers

Sample Temperature: Samples arrived within the acceptable temperature range as specified in the test method

Comments:

Thank you for allowing eAnalytics Laboratory to provide laboratory services for you.

A handwritten signature in black ink, appearing to read "Chris Dieken".

Christopher Dieken
Quality Assurance Manager

A handwritten signature in black ink, appearing to read "Todd Rhea".

Todd Rhea
Laboratory Manager

eAnalytics Laboratory

4130 Clydesdale Parkway Loveland CO 80538

Chain of Custody

eANALYTICS
LABORATORY

Chain of Custody Form

[illegible]

WO# 6041

eANALYTICS: Environmental testing made Easy

Page 1 of 1

eAnalytics Laboratory

4130 Clydesdale Parkway Loveland CO 80538

The results contained within this report relate only to the items analyzed

eANALYTICS
LABORATORY

Client: LT Environmental

Lab ID: 6041

Project: Toedtli 1-10

Analysis: Volatile Organics
TPH-GRO/DROMethod: EPA8260
EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPH- GRO	TPH- DRO	Date Sampled	Date Analyzed	Lab ID	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
SB01 @ 4'	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	10/28/16	11/01/16	6041	2
SB02 @ 1.5'	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	10/28/16	11/01/16	6041	3
SB03 @ 0.75'	<0.010	<0.010	<0.010	<0.010	<50.0	57.6	10/28/16	11/01/16	6041	4
SB04 @ 0.75'	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	10/28/16	11/01/16	6041	5
SB05 @ 1.5'	0.012	0.011	<0.010	0.017	<50.0	<50.0	10/28/16	11/01/16	6041	6

eAnalytics Laboratory

4130 Clydesdale Parkway Loveland CO 80538

eANALYTICS
L A B O R A T O R Y

Client: LT Environmental

Lab ID: 6041

Project: Toedtli 1-10

Analysis: pH-Soil
Electrical Conductivity-Soil
SARMethod: EPA9045D
USDA 60 (3)m
USDA 60 (20B)m

Sample Name	pH	EC	SAR	Date	Date	Lab ID
	su	mmhos/cm	ratio	Sampled	Analyzed	
SB01 @ 0'-3'	10.1	10.42	65.7	10/28/16	11/01/16	6041 1

eAnalytics Laboratory

4130 Clydesdale Parkway Loveland CO 80538

eANALYTICS
LABORATORY

Client: LT Environmental

Lab ID: 6041

Project: Toedtli 1-10

Method: EPA8260

Sample Name	Dibromo- fluoromethane % Recovery	1,2 Dichloro- ethane-D4 % Recovery	Toluene-D8 % Recovery	Bromo- fluorobenzene % Recovery	Date Sampled	Date Analyzed	Lab ID
SB01 @ 4'	92	97	101	90	10/28/16	11/01/16	6041 2
SB02 @ 1.5'	92	97	100	92	10/28/16	11/01/16	6041 3
SB03 @ 0.75'	93	93	102	89	10/28/16	11/01/16	6041 4
SB04 @ 0.75'	93	95	103	83	10/28/16	11/01/16	6041 5
SB05 @ 1.5'	90	98	99	88	10/28/16	11/01/16	6041 6

eAnalytics Laboratory

4130 Clydesdale Parkway Loveland CO 80538

eANALYTICS
LABORATORY

Client: LT Environmental

Lab ID: 6041

Project: Toedtli 1-10

Analysis: Volatile Organics
TPH-GRO/DROMethod: EPA8260
EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPH- GRO	TPH- DRO	Date Analyzed	Lab ID
	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec		
Laboratory Control Sample	101	92	90	90	86	100	11/01/16	LCS 6041 1
(70-130%)								
Method Blank	<0.010	<0.010	<0.010	<0.010	<50.0	<50.0	11/01/16	MB 6041 1
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		

eAnalytics Laboratory

4130 Clydesdale Parkway Loveland CO 80538