

**State of Colorado**  
**Oil and Gas Conservation Commission**



FOR OGCC USE ONLY  
**Received 12/29/2016**  
**Remediation #9951**

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OGCC Employee:

Spill       Complaint  
 Inspection       NOAV

Tracking No: **200440746**

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

**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 Operator Number: <u>10311</u> Name of Operator: <u>Synergy Resources Corporation</u> Address: <u>20203 Highway 60</u> City: <u>Platteville</u> State: <u>CO</u> Zip: <u>80651</u>	Contact Name and Telephone: <u>Jerry Brian</u> No: <u>970-518-2062</u> Fax: _____
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API Number: <u>05-123-15385</u> Facility Name: <u>Toedtli 1-10 Pit</u> Well Name: <u>Toedtli</u> Location: (QtrQtr, Sec, Twp, Rng, Meridian): <u>NESW, Sec. 10, T10N, R57W, 6th PM</u>	County: <u>Weld</u> Facility Number: <u>113418</u> Well Number: <u>1-10</u> Latitude: <u>40.851086</u> Longitude: <u>-103.739992</u>
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**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): <input checked="" type="checkbox"/> Soils <input type="checkbox"/> Vegetation <input type="checkbox"/> Groundwater <input type="checkbox"/> Surface Water	Extent of Impact: <u>Elevated pH, EC, and SAR</u>	How Determined: <u>Site investigation soil samples</u>
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**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. Impacted soils will be excavated.

**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.:**

Elevated levels of pH, EC, and SAR will be treated by excavating and hauling to the Synergy Toedtli 22-2 Pit to be used for backfill below 3 feet bgs. The area will then be backfilled with clean fill and covered with topsoil.



Tracking Number: Name of Operator: Synergy Resources Corporation OGCC Operator No: 10311 Received Date: 12/29/2016 Well Name & No: Toedtli 1-10 Facility Name & No: Toedtli 1-10 Pit 113418

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.

As discussed above, the impacted material will be hauled to the Synergy Toedtli 22-2 Pit facility to be used as fill material below 3 feet bgs. Prior to transporting impacted soils, Synergy will submit a written Waste Management Plan to the COGCC on a Sundry Notice, Form 4. Clean fill will be brought in, and 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 [x] N If yes, describe:

Once the former pit area is filled in, samples will be collected beneath the berm to assess for presence of any remaining impacts. If the area is determined to meet COGCC Table 910-1 standards, closure will be requested.

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

As noted above, prior to transporting the impacted material to the Synergy Toedtli 22-2 facility, Synergy will submit a written Waste Management Plan via a Sundry Notice Form 4 to the COGCC in accordance with COGCC Rule 907.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 10/28/2016 Date Site Investigation Completed: Date Remediation Plan Submitted: 12/7/2016 Remediation Start Date: N/A Anticipated Completion Date: N/A Actual Completion Date: N/A

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:

OGCC Approved: Title: Northeast EPS Date: 1/19/2017

Condition of Approval: Operator shall comply with the Waste Management Plan on approved Sundry Notice Document #401176256. Material with elevated pH, SAR, or EC should be buried under a minimum of three (3) feet of backfill cover and soil that satisfies either the Table 910-1 levels for pH, SAR, and EC or the background levels for such contaminants within three (3) feet of the ground surface at the site. In addition, the soil horizons must be replaced in their original relative position and the location must be reclaimed in accordance with 1000 Series Rules, including the establishment of vegetative cover on non-cropland and successful crop growth on cropland.



December 29, 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 (Remediation Project #9951)  
Site Investigation Supplemental Information  
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, and has been assigned Remediation Project #9951. 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, 6<sup>th</sup> 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. The soil analytical results are presented on Figure 2 and summarized in Table 1. The laboratory analytical report is included as Attachment 1.

### **Remedial Action Plan**

To remediate the inorganic impacts identified in the sidewall of the pit, LTE proposes that the pit sidewalls be excavated and hauled to the Toedtli 22-2 Pit (Facility Number 258442, Remediation Number 9950), placed at a depth greater than 3 feet bgs, and then be backfilled with clean soil as needed to match surface grade of the surrounding area. Prior to commencing excavation and transportation of impacted soil from the Toedtli 1-10 to the Toedtli 22-2, Synergy will submit a written waste management plan to the COGCC for approval on a Sundry Notice, Form 4 in accordance with COGCC Rule 907. After the impacted soil is removed from the Site, LTE will collect confirmation soil samples from beneath the previous sidewall locations for analysis of pH, EC, and SAR. If the laboratory analytical results indicate the samples meet COGCC Table 910-1 standards, closure will be requested.

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 blue ink that reads "Allison S. White". The signature is written in a cursive, flowing style.

Allison White, P.E.  
Project Engineer

A handwritten signature in black ink that reads "Steve Kahn". The signature is written in a cursive, flowing style.

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



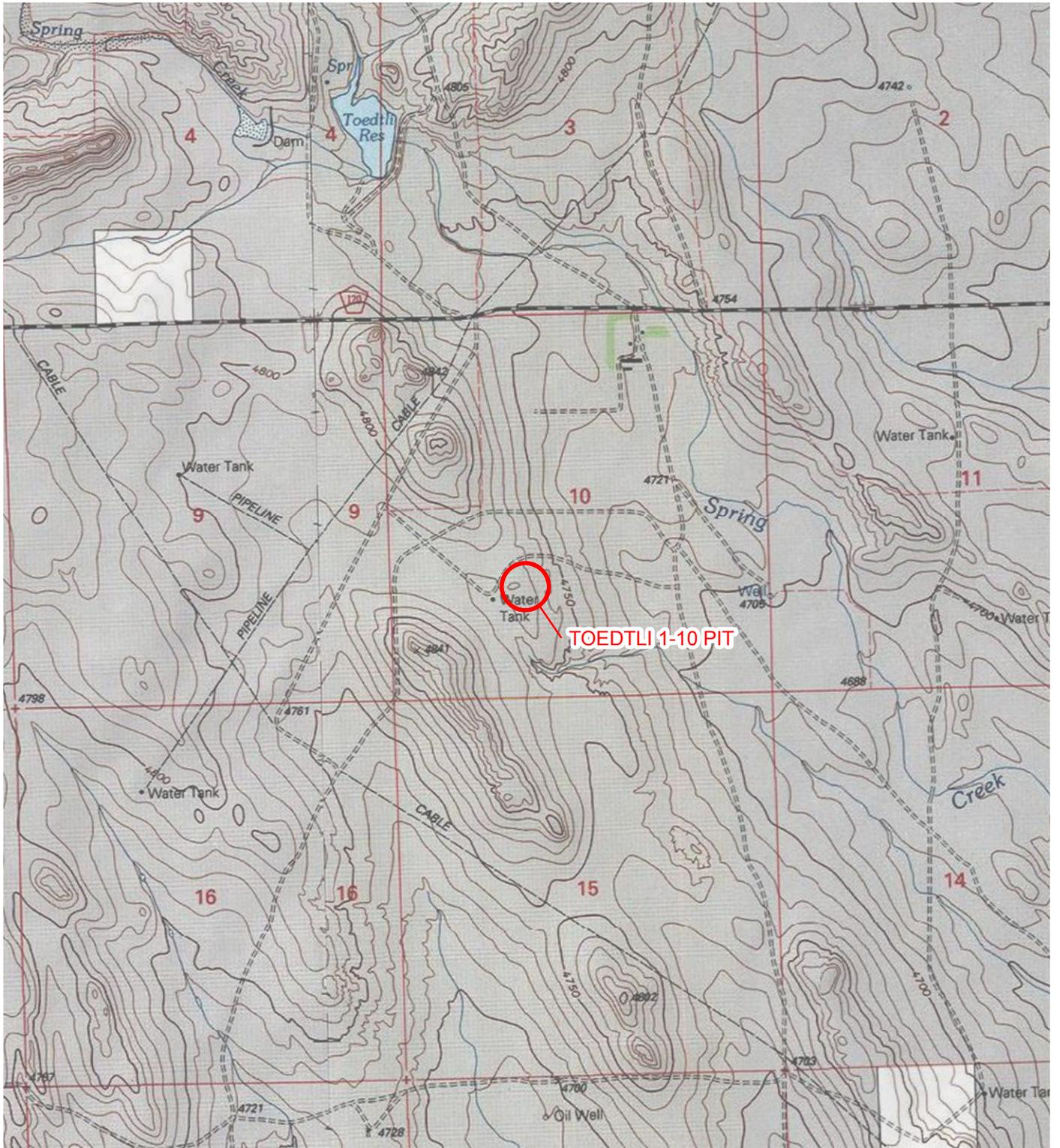
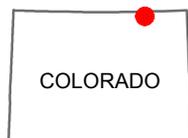
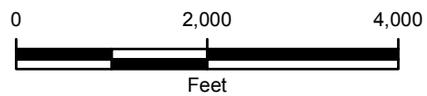


IMAGE COURTESY OF ESRI/USGS

**LEGEND**

 SITE LOCATION



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



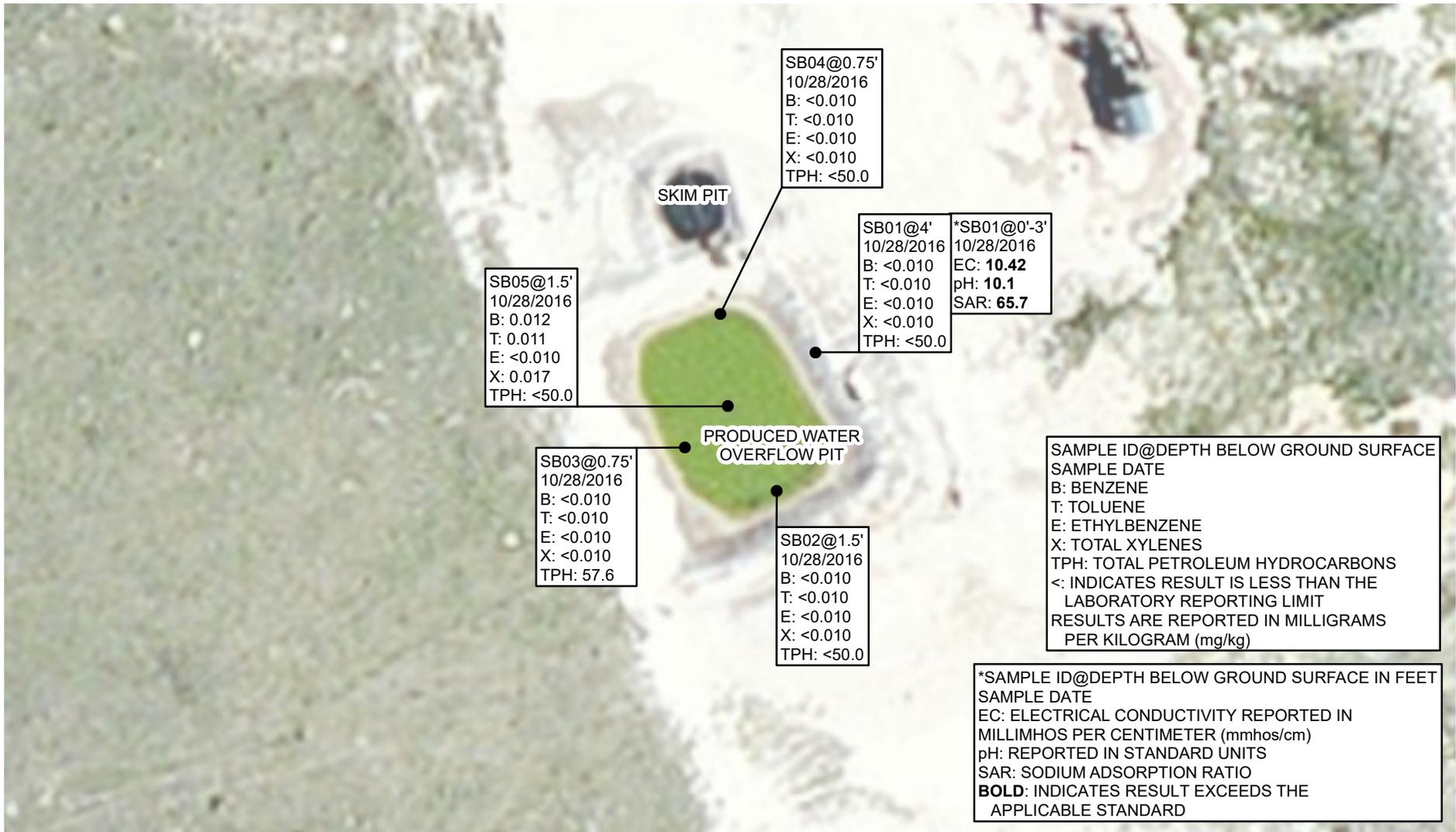


IMAGE COURTESY OF ESRI

**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	--	--	--	--	--	--	--	<b>10.1</b>	<b>10.42</b>	<b>65.7</b>
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	--	--	--
<b>COGCC Table 910-1 Standards</b>		<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	--	--	<b>500</b>	<b>6 - 9</b>	<b>4</b>	<b>12</b>

**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

## eANALYTICS LABORATORY

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

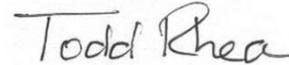
Sample Temperature: Samples arrived within the acceptable temperature range as specified in the test method

Comments:

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



Christopher Dieken  
Quality Assurance Manager



Todd Rhea  
Laboratory Manager

**eAnalytics Laboratory**

4130 Clydesdale Parkway Loveland CO 80538





Client: LT Environmental Lab ID: 6041  
 Project: Toedtli 1-10  
 Analysis: Volatile Organics Method: EPA8260  
 TPH-GRO/DRO EPA8260/8015

Sample Name	Benzene mg/kg	Toluene mg/kg	Ethyl- benzene mg/kg	Total Xylenes mg/kg	TPH- GRO mg/kg	TPH- DRO mg/kg	Date Sampled	Date Analyzed	Lab ID
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



Client:	LT Environmental	Lab ID:	6041
Project:	Toedtli 1-10		
Analysis:	pH-Soil Electrical Conductivity-Soil SAR	Method:	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



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



Client: LT Environmental Lab ID: 6041  
 Project: Toedtli 1-10  
 Analysis: Volatile Organics Method: EPA8260  
 TPH-GRO/DRO EPA8260/8015

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