



**REPORT OF CLEAN-OUT ACTIVITIES  
INJECTION WELLS # 1-12 AND # 2-12**

**ENVIRONMENTAL GEO-TECHNOLOGIES, LLC**

**Romulus, Michigan**

**Subsurface Project No. 60D6896**

**FEBRUARY 2013**

**Prepared By:**

**SUBSURFACE CONSTRUCTION CORPORATION**

**54520 Northern Avenue, Unit A**

**South Bend, Indiana 46635**

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## EXECUTIVE SUMMARY

Environmental Geo-Technologies, Inc. (EGT) of Romulus, Michigan contracted with Subsurface Construction to correct an obstruction situation in the injection tubing of their Well #2-12 and the open hole portion of both wells #1-12 and #2-12. These wells are permitted by the United States Environmental Protection Agency (U.S. EPA) and known as MI-163-1W-C01, MI-168-1W-C011 the state of Michigan permit M-452 and M-453 respectively. Detailed procedures based on findings of a Mechanical Integrity Test (MIT) were developed and supplied to EGT for distribution to these agencies. A copy of these procedures is included in this report.

The clean-out occurred on January 14<sup>th</sup> and 15<sup>th</sup>, 2013, with the moving of Coil Tubing Technologies coil unit on Well #2-12. The wellhead, protective structure, and related surface equipment had been removed by EGT personnel prior to rig up. Coil was tripped and shallow obstruction (2300') was successfully removed. Coil continue down hole and tagged top of fill at 4185'; no further progress was achieved. The coil rig was moved and rigged up on well #1-12 on the morning of the 15<sup>th</sup>. The coil tagged up at 4247' and was jetted out to the original total depth (total depth) of 4650'.



## REGULATORY CORRESPONDENCE



**PROCEDURES FOR WORKOVER OF  
ENVIRONMENTAL GEO-TECHNOLOGIES, LLC  
WELL #2-12  
ROMULUS MICHIGAN**

**SUBSURFACE PROPOSAL NO.: 71Z5767**

1. Assure that all regulatory agencies have been informed of intentions.
2. Review procedures with client, plant personnel and subcontractors.
3. Conduct site safety meeting with all site personnel. Special attention should be brought to handling and collection of nitrogen, high pressures, hoses, and pinch points.
4. Remove a minimum of the East end of well house and roof. Rig will be backed up to the well from the East.
5. Rig up coil tubing unit, fluid and nitrogen pumper and frac tanks.
6. Rig up coil straightener on well by using crane.
7. Run 1-1/4" coil tubing down 4-1/2" fiberglass to resistance (approximately 2,316').
8. Address obstruction at 2,316' as needed and circulate out to frac tank. (Be aware that return fluid is potentially hazardous).
9. If the obstruction can be removed, continue down hole and jet out any material to original total depth of 4,550'.
10. Once all material is circulated out, open formations should be washed as thoroughly as possible with coil tubing.

**PROCEDURES FOR WORKOVER OF  
ENVIRONMENTAL GEO-TECHNOLOGIES, LLC  
WELL #2-12  
ROMULUS MICHIGAN  
(CONTINUED)**

**SUBSURFACE PROPOSAL NO.: 71Z5767**

11. Evaluate fluid returns in frac tank to establish potential hazardous nature and managed properly.
12. Rig down and move out coil unit and related equipment.
13. Secure well for continued testing related to mechanical integrity test.

## WORK LOG OF DAILY ACTIVITIES



<b>Monday, January 14, 2013</b>		
<b>Start Time</b>	<b>Depths</b>	<b>Description</b>
		<b>Well No. 2-12</b>
0.9:00	Surface	<b>Arrive on Location. Spot and Rig Up Equipment. Line Out Suction Hoses, Pump Line &amp; Flow Back Line. Weld 2" CT Connector to end of CT. Rig Up 1.5" MT x 1" MT crossover, 1-11/16" Knuckle Joint and 1-11/16" Wash Nozzle. Rig Up with no BOP's. Rig Up Flow Back Line to Frac Tank.</b>
12:25	Surface	<b>Load CT with Fresh Water.</b> 12:45 – 17.5 bbl in. Break Circulation to Frac Tank.
12:45	Surface to 4,025	<b>TIH with 1-11/16" Knuckle Jointed Wash Nozzle. Pump Fresh Water. Wash Thru Plugs/Bridges.</b> Pump 0.5bpm @ 500 psi and TIH 13:14 & 2,317 ft – Tag Plug. Pick Up 5 ft. Increase Pump Rate to 1.5 bpm FW @ 1,600 psi. TIH & wash thru. 13:42 & 4,025 ft – Tag Plug. Pick Up 5 ft. Increase Pump Rate to 2 bpm FW @ 2,500 psi. Unable to pass thru
13:50	4,025 to 3,900 to 4,028	<b>Try to work Thru Plug Tagged at 4,025 ft</b> 13:51 – Lost Fluid Returns and Little Wash Off. TOH slowly and monitor returns. 13:56 & 3,900 ft – Still no fluid returns. TIH. Pumping 2 bpm @ 2,700 psi. 112 bbl pumped. 14:00 & 3,993 ft – Still no returns. Increase pump rate to 2.5 bpm @ 3,600 psi. 14:03 & 4,026 ft – Tag Up. Try to Wash Thru Plug. 14:05 & 4,026 ft – Pick Up 10 ft and TIH. No progress made – plug still at 4,026 ft. Regain Circulation. 14:07 – Good Fluid returns to Frac Tank. 14:10 & 4,027 ft – 5klbs slack off weight. Pick up and set lightly with 1k lbs slack off weight. 14:25 & 4,028 ft – Think that Nozzle could be setting on ledge in Open Hole Wall. Pick Up 10 ft, shut down pump and TIH with Knuckle Joint relaxed. Still tag up. Start Pumping 2.5 bpm with 5k lbs Slack Off Weight on Nozzle to try and kick off ledge. Shut down Pump and Repeat process once more. 14:35 & 4,028 ft – no progress, decide to TOH.
14:35	4,028 to Surface	<b>TOH.</b> Shut Down Pump and TOH.
15:20	Surface	<b>Lay Down Knuckle Joint and Wash Nozzle. Rig Up 1-11/16" Mud Motor and 2.2" Bit.</b>
15:40	Surface to 4,202	<b>TIH with 1-11/16" Mud Motor and 2.2" Bit.</b> No pumping during TIH. 16:45 & 3,900 ft – Start pumping 1 bpm FW @ 1,300 psi. 17:06 & 4,171 ft – Tag Up. Pick up 5 ft and Wash/Drill Thru. 17:08 & 4,177 ft – Tag Up. Pick up 5 ft and Wash/Drill Thru. 17:14 & 4,202 ft – Tag Up. Unable to Wash thru.
17:15	4,202 to 4,235 to 4,202	<b>Drill Fill with 1-11/16" Mud Motor and 2.2" Bit.</b> Reduce FW to 0.1 bpm and Start Nitrogen at 500 scf/min. 15,00 psi CTP. 17:30 & 4,208 ft – Drilling Fill Slow. Stop pumping Nitrogen and Increase FW rate to 1 bpm. 18:03 – Nitrogen returns to surface. Drilling slowly with 3-4k lbs Slack Off Weight. 18:19 & 4,221 ft – Slow drilling of fill. Pick up 5 ft and TIH. Able to Slack Off 15k lbs with no stall. Slow Drill. 18:32 – Still slow drilling with 15k lbs Slack Off Weight. Increase to 1.7 bpm @ 2,500 psi. 19:00 & 4,235 ft – Slow Progress with 15k lbs Slack Off Weight. Pick up to Wipe section of fill Drilled – get stuck in the hole. Work CT up and down and work CT out of Restriction. 19:25 & 4,202 ft – Free from being stuck.
19:25	4,202 to 4,000 to 4,097	<b>Jet Open Hole with Nitrogen.</b> Stop Pumping Fresh Water – 355 bbl total pumped. Start pumping Nitrogen at 600 scf/min. TOH to 4,000 ft. 19:50 & 4,000 ft – wait for well to start unloading from Nitrogen being pumped. 20:00 & 4,000 ft – Well unloading strong. TIH at 15 fpm to Jet Open Hole with Nitrogen. 20:12 & 4,097 ft – tag up and unable to pass after several attempts.
20:20	4,097 to Surface	<b>TOH.</b> Shut Down Nitrogen and TOH. 63,000 scf of Total Nitrogen Pumped. 20:20 – Approximately 250 bbl unloaded from well.
21:45	Surface	<b>Shut in Well and Secure Equipment. Leave Location.</b>
<b>Tuesday, January 15, 2013</b>		
<b>Start Time</b>	<b>Depths</b>	<b>Description</b>
7:30	Surface	<b>Rig Down from 2-12. Move Equipment and Rig Up on 1-12.</b> Rig Up 1.5" MT x 1" MT crossover, 1-11/16" Knuckle Joint and 1-11/16" Wash Nozzle. Rig Up with no BOP's. Rig Up Flow Back Line to Frac Tank.
11:30	Surface to 4,650	<b>TIH with 1-11/16" Mud Motor and 2.2" Diamond Bit. Clean Open Hole to TD.</b> 12:30 & 2,330 ft – Start Pumping FW to Load CT. 13:03 – Coil Volume Pumped and well Circulating back to Frac Tank. Continue Pumping 0.5 bpm @ 500 psi. 13:40 & 4,246 ft – Tag Up and Stall Motor. Pick up 5 ft. Increase to 1bpm @ 1,300 psi. TIH and work on obstruction. Thru obstruction at 4,251 ft. 13:45 & 4,266 ft – Tag Up and stall motor. Pick up 5 ft. TIH and work thru 5 ft obstruction. 13:53 & 4,277 ft – Tag Up and stall motor. Pick up 5 ft. TIH and work on obstruction. Taking weight with no motor work – pick up 10 ft, 29k lbs pick up weight and 21k lbs TIH weight. 13:56 & 4,280 ft – Thru 3rd obstruction. TIH 10 ft/min. 14:43 & 4,650 ft – Tag TD. Pick up 10 ft and TIH to confirm TD.
14:45	4,650 to 4,645	<b>Pick Up 5 ft. Start Pumping Nitrogen. Wait for good Returns to Frac Tank.</b> 14:47 & 4,645 ft – Shut down Fluid Pumper. Start Nitrogen at 500scf/min. Wait for well to start unloading
15:15	4,645 to 4,000 to 4,645 to 4,000	<b>Jet Open Hole with Nitrogen and Unload Fluid from Well</b> 15:15 – Good returns to Surface. TOH slow to Jet Open Hole with Nitrogen. 15:35 & 4,000ft – Stop CT and TIH to Jet Open Hole again. 15:43 – 500 psi Wellhead Pressure. Shut Down Nitrogen Pump. Continue to Jet with Nitrogen dissipating from CT 15:55 & 4,650 ft – Tag TD. TOH for one last Jet pass of Open Hole.
16:15	4,000 to Surface	<b>TOH.</b> Approximately 250bbl Fluid Unloaded during Nitrogen Jetting.
17:30	Surface	<b>Rig Down Equipment and Leave Location</b>



## FIGURES

Kelly Bushing 639' ASL  
Ground Level 626' ASL

1000'

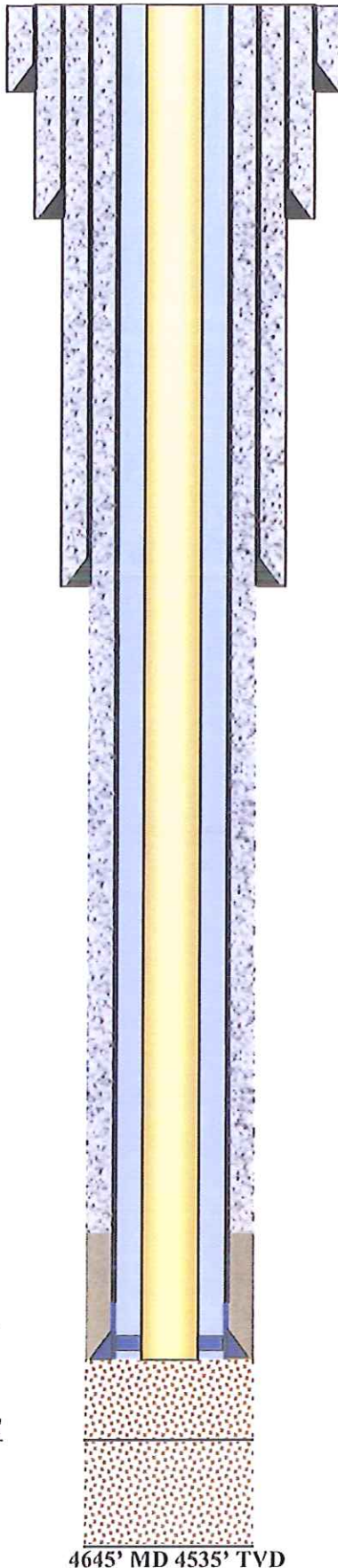
2000'

3000'

Injection Interval 3919' TVD

4000'  
Top of fill before jetting 4246'

Depth after jetting 4650'



4645' MD 4535' TVD

24" hole drilled 121'. 3 jts. (136.87 feet) of 20-inch, H-40, conductor casing was set at 119 feet with a stab-in float shoe. Cemented through drill pipe with 200 sacks of Class "A" cement containing 3% CaCl<sub>2</sub> with 75% returns. Top 50 feet of annulus cemented with grout string with 50 sacks of Class "A"

17-1/2" hole drilled to 405". Ran 9 jts. (398.34 feet) of 13-3/8", H-40, new surface casing set at 396' with an insert float at 393'. Cemented with 75 sacks of Lite cement with 3% CaCl<sub>2</sub> followed by 150 sacks of Class "A" with 3% CaCl<sub>2</sub>. The top of the annulus was grouted from the surface with 175 sacks of Class "A" cement with 3% CaCl<sub>2</sub>.

12-1/4" hole drilled to 825'. 19 jts. (826.53') of 9-5/8", 36 #/ft casing set at 824' with insert float at 790'. Annulus cemented with 150 sacks of Lite with 3% CaCl<sub>2</sub> and 200 sacks of Class "A" with 3% CaCl<sub>2</sub>. Approximately 10 barrels of cement circulated.

8-3/4" hole drilled vertically to 1494' then directionally drilled to measured depth of 4645' (true vertical depth of 4535'). The hole was filled with frac sand to 4067' Long-string casing was run as follows: (1) Halliburton 7" float shoe at 4080' MD, (2) Halliburton 7" float collar, (3) 5 jts. (98.37') of 7", 0.250" wall thickness Hastelloy C-276, STL with the top 10' Teflon coated for galvanic corrosion inhibition, (4) 7 jts. (316.40') of 7", 26 #/ft, K-55, LT&C,, (5) Halliburton 7" stage collar at 3664' MD, and (6) 81 jts. (3665') of 7", 26 #/ft, K-55, LT&C. First stage: 420 gal. mud flush, 500 gal. methanol, 1500 gal. gelled diesel at 11 ppg, 686 gallons of Halliburton EPSEAL at 12.5 ppg, followed by 1500 gallons of gelled diesel fuel at 12.6 ppg and 121.5 barrels of drilling fluid. Second stage: 500 sacks of 50/50 Standard Pozmix with 2% gel, 0.4% HALAD 344, and 3% Salt and 450 sacks of Standard Class "A" containing 3% HALAD 322, 0.4% HALAD 344, 8.2% Microbond, and 2.14% salt. Displaced with 140 barrels of water with full returns.

Injection Tubing: 135 joints of 4-1/2", Red Box 2000, TFP with 4 pup joints (10', 8', 6', and 2'). Latched and landed with 12,000 lbs tension.

Injection Packer: Groundwater Protection Systems set at 4066'

Open hole completion in Eau Claire and Mt. Simon formations from 4080' to 4645' MD (3970' to 4535' TVD)

The bottom-hole location is 211 feet south and 754 feet west of the surface location.



HOUSTON, TX.  
SOUTH BEND, IN.  
BATON ROUGE, LA.

FIGURE 1  
ENVIRONMENTAL GEO-TECHNOLOGIES  
ROMULUS, MICHIGAN

WELL NO. 1-12

DATE: 1/23/13	CHECKED BY: <i>ZWS</i>	JOB NO: 60D6896
DRAWN BY: CRB	APPROVED BY: <i>ZWS</i>	DWG. NO:

Kelly Bushing 639' ASL  
Ground Level 626' ASL

1000'

2000'

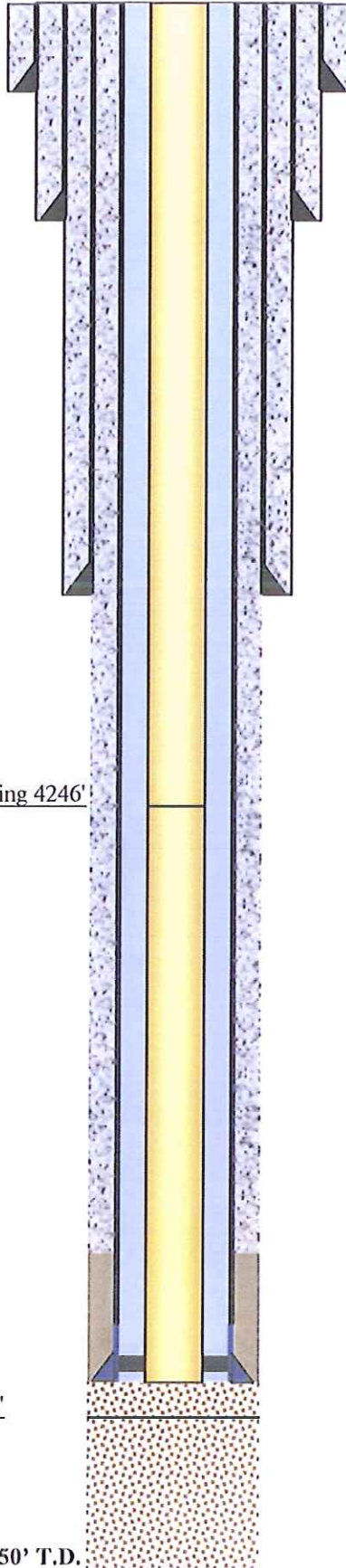
Top of obstruction before jetting 4246'  
(Removed after jetting)

3000'

Injection Interval Top 3919'

4000'  
Top of fill before jetting 4025'  
(No change after jetting)

4550' T.D.



20" hole to 178' with 16" 60 #/ft casing set at 169' Annulus cemented to surface with 300 sacks Class "A" with 3% CaCl<sub>2</sub> Recovered 11 bbls of cement returns.

14-3/4" hole drilled to 642'. Opened to 17-1/2" below the 16" casing to 602'. 13-3/8 inch, 48 lb/ft, H-40, ST&C casing was run and set with a stab-in float shoe at 598 feet RKB . The annulus was cemented with 350 sacks of 65/35 Pozalin with 3% CaCl<sub>2</sub> followed by 200 sacks of Class "A" cement containing 3% CaCl<sub>2</sub>. An additional 50 sacks of Class "A" Cement containing 3% CaCl<sub>2</sub> was pumped down the annulus between the 13-3/8" and 16" casing to fill to surface.

12-1/4" hole drilled to 1450'. 33 joints (1448") of 9-5/8", 36 #/ft, casing was set at 1444"with an insert float set at 1404'. Cemented with 725 sacks of Class "A" cement containing 3% CaCl<sub>2</sub>. Cement circulated to surface with 33 barrels recovered.

**Annulus filled with corrosion inhibited brine water**

8-3/4" hole drilled to 4550' T.D., logged and filled with sand to 3960' Long-string casing as follows: (1) Halliburton 7" float shoe at 3983', (2) Halliburton 7" float collar, (3) 5 jts. (97.39') of 7", 0.250" wall. Hastelloy C-276, STL casing with the top 10' Teflon coated for galvanic corrosion inhibition, (4) 7 jts. (315.43') of 7", 26 #/ft, K-55, (5) Halliburton 7" stage collar at 3565', and (6) 78 jts. (3563') of 7", 26 #/ft, K-55, new casing. 1<sup>st</sup> Stage: 500 gal. Mud flush, 500 gal. methanol, 1500 gal. gelled diesel fuel at 11 ppg, 686 gal. Halliburton EPSEAL at 12.5 lb/gal, displaced 1500 gal. gelled diesel fuel at 12.6 lb/gal and 116 barrels of drilling fluid. 2<sup>nd</sup> Stage: 310 sx of 50/50 Poz, 340 sx 50/50 Poz with microbond and 450 sx standard cement with microbond. 45 bbls circulated

Injection Tubing: 132 joints 4-1/2", TFP Red Box 2000, fiberglass reinforced plastic with 3 pup joints (10', 8', and 4'). Landed with 14,000 lbs tension.

Injection Packer: Groundwater Protection Systems set at 3965' Open hole completion in Eau Claire and Mt. Simon formations from 3983' to 4550'



HOUSTON, TX.  
SOUTH BEND, IN.  
BATON ROUGE, LA.

FIGURE 2  
ENVIRONMENTAL GEO-TECHNOLOGIES  
ROMULUS, MICHIGAN

WELL NO. 2-12

DATE: 2/6/13	CHECKED BY: [Signature]	JOB NO: 60D6896
DRAWN BY: CRB	APPROVED BY: [Signature]	DWG. NO: