BW - 37

SURFACE SUBSIDENCE MONITORING PLAN

Chavez, Carl J, EMNRD

From: danny@pwllc.net
Sent: Wednesday, January 9, 2019 11:02 AM
To: Chavez, Carl J, EMNRD; Griswold, Jim, EMNRD
Cc: Marvin Burrows
Subject: RE: [EXT] State 4 BSW #1 (BW-37) Subsidence Monitoring Plan Documentation
Attachments: Pettigrew Subsidence Monitoring Report 010919.pdf

Sorry, here is the attachment.

Danny J. Holcomb
Cell: 806-471-5628
Email: danny@pwllc.net

> -------- Original Message --------
> Subject: RE: [EXT] State 4 BSW #1 (BW-37) Subsidence Monitoring Plan Documentation
> From: <danny@pwllc.net>
> Date: Wed, January 09, 2019 12:00 pm
> To: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>, "Jim Griswold" <Jim.Griswold@state.nm.us>
> Cc: "Marvin Burrows" <burrowsmarvin@gmail.com>
>
> Carl/Jim,
> Attached is Llano's State 4 BSW #1 (BW-37) subsidence monitoring plan documentation from the installation/survey company. Thank you for extending the deadline for this documentation. If you have any questions concerning this information, please let me know.
> Thank you,
> Danny J. Holcomb
> Agent for Llano Disposal, LLC
> Cell: 806-471-5628
> Email: danny@pwllc.net
>
> > -------- Original Message --------
> > Subject: RE: [EXT] State 4 BSW #1 (BW-37) Solution Cavern Characterization Plan
> > From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>
> > Date: Wed, January 02, 2019 5:57 pm
> > To: "danny@pwllc.net" <danny@pwllc.net>
> > Cc: Marvin Burrows <burrowsmarvin@gmail.com>, "Griswold, Jim, EMNRD" <Jim.Griswold@state.nm.us>
> >
> > Danny:
> >
> > **Approved** for good cause.
> >
> > Thank you.
> >
> > Mr. Carl J. Chavez, CHMM (#13099)
> > New Mexico Oil Conservation Division
> > Energy Minerals and Natural Resources Department

1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us
"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD **and see "Publications")**

From: danny@pwllc.net <danny@pwllc.net>
Sent: Thursday, December 27, 2018 8:27 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Marvin Burrows <burrowsmarvin@gmail.com>
Subject: RE: [EXT] State 4 BSW #1 (BW-37) Solution Cavern Characterization Plan

Carl,
Hope your holidays were good.

Llano Disposal, LLC requests an additional 30 day extension on the completion of the subsidence monument installation and subsequent documentation for BW-37 (STate 4 BSW #1). The contractor drilled the holes for the monuments yesterday, however, the material for the monuments did not arrive until late yesterday afternoon. They plan to install the monuments today. With the holidays, I'm afraid the final report to you will not be available until January. Thus we request the additional 30 day extension.

Sorry for the delay.

Thank you,
Danny J. Holcomb
Cell: 806-471-5628
Email: danny@pwllc.net

-------- Original Message --------
Subject: RE: [EXT] State 4 BSW #1 (BW-37) Solution Cavern Characterization Plan
From: "Chavez, Carl J, EMNRD" <CarlJ.Chavez@state.nm.us>
Date: Wed, October 31, 2018 5:06 pm
To: "danny@pwllc.net" <danny@pwllc.net>
Cc: Marvin Burrows <burrowsmarvin@gmail.com>, "Griswold, Jim, EMNRD" <Jim.Griswold@state.nm.us>

Danny:

The New Mexico Oil Conservation Division (OCD) is in receipt of the **"60 days"** extension request to complete the monument construction for subsidence monitoring plan. Today Llano Disposal, LLC indicated that Pettigrew Surveying informed Llano that there is a scheduling delay due to their current work schedule and load.

OCD hereby approves the extension for good cause.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)

New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us
"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD and see "Publications")

From: danny@pwllc.net <danny@pwllc.net>
Sent: Wednesday, October 31, 2018 2:47 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Marvin Burrows <burrowsmarvin@gmail.com>
Subject: [EXT] State 4 BSW #1 (BW-37) Solution Cavern Characterization Plan

Carl,
Please see attached cover letter and Solution Cavern Characterization Plan attachment. As the cover letter states, Llano requests a 60 extension to complete the surface subsidence monument installation.

If you have any questions, please let me know.
Thank you,
Danny J. Holcomb
Cell: 806-471-5628
Email: danny@pwllc.net

PETTIGREW
& ASSOCIATES PA

ENGINEERING | SURVEYING | TESTING
DEFINING QUALITY SINCE 1965

Marvin Burrows
Llano Disposal LLC
Lovington, New Mexico, 88260
806-471-5628

January 9, 2019

RE: Survey Report
Llano Disposal LLC'S State 4 BSW #1 (BW037) Project
2018.1328

SUBSIDENCE MONUMENT SURVEY

On December 27, 2018 a field survey was conducted to set and observe positions of three new subsidence monuments for the State 4 BSW #1 (BW-37) Llano Wellhead located at: N33°13'21.03893", W103°18'55.69480". The well location and associated subsidence monuments can be accessed from NM 206, just south of Tatum, NM in Lea County.

The Google Earth image and the sketch below illustrate locations of the monuments:

The discussion was to set at least three monuments at varying distances from the well head. The three monuments were set at differing distances in three separate directions.

This survey was conducted using Trimble R10 GNSS Receivers and a Trimble DiNi digital level. The GNSS Receivers were used to establish the locations of the monuments and the well head through Differential GNSS observations. In an effort to tie into an existing published control point, the National Geodetic Survey website was reference to find the nearest published benchmark. Vertical Control point DQ0312 is located approximately 23,322.68 feet or 4.42 miles northwest of the well site. Once the monument was recovered, a GNSS base was setup over the point and static data was observed for nearly two hours. The data was then submitted to an online positioning service to firmly establish the horizontal coordinates: Latitude: N33°17'11.66161", Longitude: W103°19'02.82827". The published elevation of 4025.20 feet was held.

While, the published/accepted elevation for the point was used. The Trimble DiNi was then used to accurately establish the elevation of the monuments and the wellhead in relation to the NGS control point featured above in the Google Maps screenshot. The DiNi reads a barcode off of a special rod in order to determine difference in elevation from a known control point. The accuracy of this level helps to eliminate human reading errors. The data is

stored onboard and may be transferred directly into the computer software at the office for analysis of results, ensuring greater accuracy.

SUBSIDENCE MONITORING PLAN

The NGS Control Point DQ0312, with an elevation of 4025.20 feet above mean sea level (MSL), will be used as the Reference Control Point for determining the elevations of the newly placed Subsidence Monuments. The elevations of these monuments will be observed semi-annually by a level loop run with the DiNi level to ensure accuracy and precision.

Future observations made on all available points and tabulated to compare the elevations to the base elevations were established on December 27, 2018. The results will be graphically represented by trend lines representing measurements made on each monument. The continual change will be monitored by P.A. and presented to you semi-annually.

MONUMENT DESCRIPTIONS

Each of the monuments set and observed are shown below with a description and images of the point.

X95 – DQ0312

NGS Control Point DQ0312 is a brass U.S. Coast & Geodetic Survey Benchmark set in concrete. It is stamped with an X and with the year it was set as shown below, followed by the NGS datasheet:

Llano Disposal LLC'S State 4 BSW #1 (BW037)

The existing wellhead was measured on the top screw of a brass clamp; leaving the wellhead on a horizontal plane.

Subsidence Monument 1

A Berntsen three quarter inch Aluminum Top Security Sleeve Monument was set. It consists of a rod driven till refusal into a pre drilled three-foot deep hole with a twelve inch diameter. The sleeved rod is encased in six-inch PVC filled with sand, then topped with a Datum Point and an Aluminum Floating Datum Cap. It is then capped with an Access Cover that must be removed with a flathead screw driver or similar tool. The Monument is pictured below:

Subsidence Monument 2

A Berntsen three quarter inch Aluminum Top Security Sleeve Monument was set. It consists of a rod driven till refusal into a pre drilled three-foot deep hole with a twelve inch diameter. The sleeved rod is encased in six-inch PVC filled with sand, then topped with a Datum Point and an Aluminum Floating Datum Cap. It is then capped with an Access Cover that must be removed with a flathead screw driver or similar tool. The Monument is pictured below:

Subsidence Monument 3

A Berntsen three quarter inch Aluminum Top Security Sleeve Monument was set. It consists of a rod driven till refusal into a pre drilled three-foot deep hole with a twelve inch diameter. The sleeved rod is encased in six-inch PVC filled with sand, then topped with a Datum Point and an Aluminum Floating Datum Cap. It is then capped with an Access Cover that must be removed with a flathead screw driver or similar tool. The Monument is pictured below

STATE PLANE POINT REPORT FROM TRIMBLE BUSINESS CENTER

Project file data		Coordinate System	
Name:	Z:\2018.1328\Field Data \State4BSW1_SubsidenceMonuments.vce	Name:	United States/State Plane 1983
Size:	54 KB	Datum:	NAD 1983 (Conus)
Modified:	12/27/2018 6:22:14 PM (UTC-7)	Zone:	New Mexico East 3001
Time zone:	Mountain Standard Time	Geoid:	GEOID12B (Conus)
Reference number:		Vertical datum:	
Description:		Calibrated site:	Default
Comment 1:			
Comment 2:			
Comment 3:			

Additional Coordinate System Details

Local Site Settings			
Project latitude:	N33°13'21.24663"	Ground scale factor:	1.00016788873455
Project longitude:	W103°18'55.06593"	False northing offset:	0.000
Project height:	3928.198	False easting offset:	0.000

Point List

ID	Northing (US survey foot)	Easting (US survey foot)	Elevation (US survey foot)	Feature Code
104	633315.893	851778.444	4025.200	X95 DO0312
500	809623.387	853084.695	3996.984	SUBSIDENCE MONUMENT 1
501	810029.598	852664.466	4000.084	SUBSIDENCE MONUMENT 2
503	809946.803	852217.376	3999.785	SUBSIDENCE MONUMENT 3
505	809869.722	852375.815	4000.454	BM CHISELED X IN SW CORNER OF CONCRETE
506	810008.082	852611.238	4000.690	STATE 4 BSW 1 WELL HEAD

LAT/LONG POINT REPORT FROM TRIMBLE BUSINESS CENTER

Project file data		Coordinate System	
Name:	Z:\2018.1328\Field Data \State4BSW1_SubsidenceMonuments.vce	Name:	United States/State Plane 1983
Size:	54 KB	Datum:	NAD 1983 (Conus)
Modified:	12/27/2018 6:22:14 PM (UTC:-7)	Zone:	New Mexico East 3001
Time zone:	Mountain Standard Time	Geoid:	GEOID12B (Conus)
Reference number:		Vertical datum:	
Description:		Calibrated site:	Default
Comment 1:			
Comment 2:			
Comment 3:			

Additional Coordinate System Details

Local Site Settings			
Project latitude:	N33°13'21.24663"	Ground scale factor:	1.00016788873455
Project longitude:	W103°18'55.06593"	False northing offset:	0.000
Project height:	3928.198	False easting offset:	0.000

Point List

ID	Latitude (Local)	Longitude (Local)	Height (Local) (US survey foot)	Feature Code
104	N33°17'11.66161"	W103°19'02.82827"	3953.457	X95 DQ0312
500	N33°13'17.18819"	W103°18'50.16711"	3925.146	SUBSIDENCE MONUMENT 1
501	N33°13'21.24663"	W103°18'55.06593"	3928.207	SUBSIDENCE MONUMENT 2
503	N33°13'20.47071"	W103°19'00.33693"	3927.945	SUBSIDENCE MONUMENT 3
505	N33°13'19.69304"	W103°18'58.48118"	3928.567	BM CHISELED X IN SW CORNER OF CONCRETE
506	N33°13'21.03893"	W103°18'55.69480"	3919.036	STATE 4 BSW 1 WELL HEAD

NATIONAL GEODETIC SURVEY DATA SHEET:

Disclaimer: The National Oceanic and Atmospheric Administration (NOAA) website, operated by the U.S. Department of Commerce, was unavailable due to a lapse in appropriation. The information used in this report was obtained using the benchmark search engine http://benchmarks.scaredycatfilms.com/index.php## to locate the benchmark and the https://www.geocaching.com/play website to generate a pdf copy of the original datasheet shown below.

```
DQ0312
**********************************************************************
DQ0312  DESIGNATION -  X 95 RESET
DQ0312  PID         -  DQ0312
DQ0312  STATE/COUNTY-  NM/LEA
DQ0312  USGS QUAD   -  'TATUM NORTH (1972)
DQ0312
DQ0312                          *CURRENT SURVEY CONTROL
DQ0312  ______________________________________________________________________
DQ0312* NAD 83(1986)-  33 17 12.      (N)     103 19 01.      (W)      SCALED
DQ0312* NAVD 88     -       1226.88   (meters)     4025.2     (feet)   RESET
DQ0312  ______________________________________________________________________
DQ0312  GEOID HEIGHT-          -21.91  (meters)                          GEOID99
DQ0312
DQ0312  VERT ORDER  -  THIRD
DQ0312
DQ0312.The horizontal coordinates were scaled from a topographic map and have
DQ0312.an estimated accuracy of +/- 6 seconds.
DQ0312
DQ0312.The orthometric height was computed from unverified reset data.
DQ0312
DQ0312.The geoid height was determined by GEOID99.
DQ0312
DQ0312;                      North          East     Units  Estimated Accuracy
DQ0312;SPC NM E     -    254,010.       259,670.       MT  (+/- 180 meters
Scaled)
DQ0312
DQ0312                           SUPERSEDED SURVEY CONTROL
DQ0312
DQ0312.No superseded survey control is available for this station.
DQ0312
DQ0312_MARKER: DB = BENCH MARK DISK
DQ0312_SETTING: 66 = SET IN ROCK OUTCROP
DQ0312_STAMPING: X 95 RESET 1972
DQ0312_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
DQ0312+STABILITY: POSITION/ELEVATION WELL
DQ0312
DQ0312  HISTORY     - Date      Condition         Recov. By
DQ0312  HISTORY     - 1972      MONUMENTED        NGS
DQ0312
DQ0312                           STATION DESCRIPTION
DQ0312
DQ0312''DESCRIBED BY NATIONAL GEODETIC SURVEY 1972
DQ0312''2 MI N FROM TATUM.
DQ0312''FROM THE INTERSECTION OF U.S. HIGHWAY 380 AND STATE HIGHWAY 18 IN
DQ0312''TATUM, GO NORTH ON STATE HIGHWAY 18 FOR 2.0 MILES TO MARK ON THE
DQ0312''RIGHT.  A STANDARD BENCH MARK DISK, SET IN A DRILL HOLE IN BEDROCK,
DQ0312''THAT IS FLUSH WITH THE GROUND AND IS STAMPED X 95 RESET 1972.  IT IS
DQ0312''101 PACES NORTH OF WHERE A PIPE-LINE CROSSES UNDER THE HIGHWAY, 64
DQ0312''PACES NORTH OF A FENCE-CORNER, 55 FEET EAST OF THE CENTER OF HIGHWAY
DQ0312''AND 10 FEET WEST OF FENCE-LINE.
```

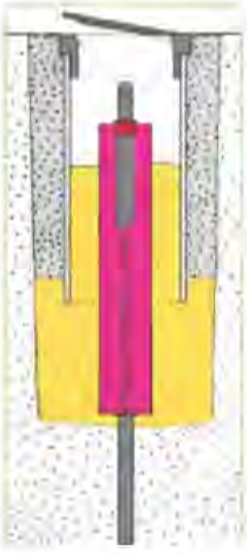
Top Security Sleeve Rod Monuments

9/16" Stainless Steel Top Security Sleeve Monument	3/4" Aluminum Top Security Sleeve Monument
	
More Info	More Info

Berntsen Sectional Rod Monument with Floating Sleeve

Berntsen's exclusive Top Security™ Sleeve 3-Dimensional Rod Monument System is specifically designed for high-precision geodetic and GPS surveys. Its patented design helps protect against excessive movements in the control monument. The Berntsen extendible rods, when driven to refusal, provide excellent vertical stability. The unique Y-shaped design of the Top Security Sleeve adds the second and third dimension to provide the most stable 3-D survey monument available.

Eliminate most common and unexpected shifts in stability by eliminating most of the direct transfer of shifts in movement from ground level or surface movement. Here's how: Rod markers (driven to refusal) have good vertical stability but can be disturbed by the natural phenomenon known as frost heave. Rod markers, installed with a greased-filled PVC pipe surrounding the upper three or four feet (900 or 1200 mm) (or more) of rod, are known to be effective in combating movement caused by frost heave but offer little protection against possible horizontal movement of surrounding earth (another major cause of differences in readings on rod markers). For the first time, Berntsen's Top Security Sleeve™ with the horizontal stability of the original Berntsen Top Security™ finned rod marker system, this is now available in a commercially available survey monument.



It's even extendible! 3' (914mm) lengths of Top Security Sleeves can also be connected together by Berntsen's exclusive End Cap Alignment Bushings and a little PVC Cement. When used in combination(s), nearly any even-foot length over six feet long (1.83m) of support for the rod marker is possible. That's innovative and flexible design at work for you.

More good news! The Top Security Sleeves' greatest advantage at installation time is speed. Simply drive standard Berntsen round rods to refusal, slip on the grease-filled finned Top Security Sleeve (recommended sleeve length greater than maximum recorded local frost depth), back-fill around the fins with sand, tamp firmly. The color coded End Cap Alignment Bushings follow Berntsen's long established universal color codes for rod marker systems and tell other surveyor's at a glance what size rod is installed - 9/16" (14 mm) Yellow; 3/4" (19 mm) Blue. We recommend NO-TOX lubricating grease to fill the Top Security Sleeve. It is specially formulated to be non-toxic and environmentally safe. It is available in an easy to use cartridge that fits a standard "grease gun". One cartridge should be used for each 36" (915mm) long Top Security Sleeve.