**Site Operations Log : Citizen Green #1 Well**

This document includes compiled operations notes from the drilling of WESTCARB’s Citizen Green #1 well during December of 2011. Notes come from John Henry Beyer, Elizabeth Burton, Jonathan Ajo-Franklin, and the Sandia operations crew.

*Dec. 1st, 2011*

Paul Graham Drilling crane and personnel arrived at site. A safety review was conducted. Drilling fluid (mud) was delivered. Wooden mats for the substructure were positioned at wellhead and the lower section of the substructure was placed on the mats. The drilling fluid pits were set and solids control equipment was placed on top of the tanks. The remainder of the substructure, the rig floor, draw works, and other equipment were set. The derrick was positioned for lifting. Pumps, electrical, and parts were hooked up during the remainder of the work day. Housing for site supervisor, mud engineer, and coring personnel were delivered and set up.

Notes/Observations

* High winds caused difficult work conditions, and additional time was needed to perform operations safely
* The derrick was not placed atop the substructure due to high winds. It is hoped that winds will subside in the morning and the derrick can be safely set in place.

*Dec. 2nd, 2011*

The derrick was set in place and rig up operations continued. The crane completed its tasks and departed the site. The derrick was raised and scoped out. Lights in the derrick and around the rig were connected. Additional drilling fluid (mud) products were delivered. Rig monitor equipment and satellite phone were installed. A work building was delivered. Fluid was placed in the rig tanks and circulating equipment was function tested. Well control equipment was set in place and pressure tested. A 7-7/8″ drill bit was picked up and lowered into the well as joints of heavy weight drill pipe were picked up.

Notes / Observations

* California Division of Oil, Gas and Geothermal Resources was notified of intention to test well control equipment and begin drilling

*Dec. 3rd, 2011*

A 7-7/8” drill bit was lowered into the well to the top of cement at 429 ft measured depth (MD) depth. Cement was drilled to 505 ft MD. With the bit inside the 8-5/8” casing, lost circulation material was added to the drilling fluid. The remaining cement inside the casing was drilled. Cement and formation was drilled to 597 ft MD. The drilling assembly was pulled out of the well. A 7-7/8” PDC bit and directional drilling assembly was picked up and lowered into the well. The bit was oriented and new hole was drilled to 950 ft MD. Pipe became stuck on a connection and was worked free. Drilling fluid was circulated as fluid density and viscosity were increased. Drilled from 950 to 1,010 ft MD.

*Dec. 4th, 2011*

Drilled from 1,010 to 1,231 ft measured depth (MD). Started wiper trip, and pipe stuck (up and down). Worked pipe free and circulated drilling fluid, raising fluid density to 10.2 pounds per gallon (ppg). Pulled bit out to casing shoe to wipe hole. Lowered bit to 1,231 ft MD and resumed directional drilling. Drilled directionally from 1,231 to 1,988 ft MD. Made wiper trip every 2 to 4 hours.

*Notes/Observations*

* Directional drilling is on or very near planned course
* Hole stability problems seemed to have been cured with 10.2 ppg fluid density, and wiper trips will be less frequent if hole stability continues

*Dec. 5th, 2011*

Drilled directionally from 1,988 to 2,968 ft measured depth. Maintained fluid density to 10.2 pounds per gallon. Made wiper trip every 4 to 6 hours.

Notes/Observations

* Directional drilling is on or very near planned course
* Hole continues to be stable

*Dec. 6th, 2011*

Drilled directionally from 2,968 ft measured depth (MD)/2,743 ft true vertical depth (TVD) to 3,670 ft MD/3,345 ft TVD. Maintained fluid density at 10.2 pounds per gallon. Made wiper trip every 4 to 6 hours. Made wiper trip to casing shoe after drilling to 3,343 ft MD/3,066 ft TVD. No hole problems encountered.

*Notes/Observations*

* Directional drilling is on or very near planned course
* Hole continues to be stable

*Dec. 7th, 2011*

Drilled directionally from 3,670 ft measured depth (MD)/3,345 ft true vertical depth (TVD) to 4,189 ft MD/3,788 ft TVD. Circulated hole clean. Pulled directional drilling assembly out of the well, laying down same. Changed mud pump liners from 6" to 5". Changed pipe rams in well control equipment and pressure tested same. Picked up National Oilwell Varco (NOV) coring equipment including bit and core barrel. Maintained fluid density at 10.2 pounds per gallon. Made wiper trip after 9 hours of drilling.

Notes/Observations

* Directional drilling is on or very near planned course
* Hole continues to be stable
* Top of Nortonville Shale picked at 4,090 ft MD/3,704 ft TVD

*Dec. 8th, 2011*

Finished pulling and laying down directional drilling assembly. Rigged up hydraulic tongs for making up drilling assembly. Picked NOV core barrels. Picked up and spaced out inner core barrel. Picked up and spaced out drill insert in core bit. Finished picking up bottom hole assembly (BHA). Circulated through BHA. Picked up 5" drill pipe. Stopped to circulate drilling fluid through coring assembly twice. Hole began taking drilling fluid. Circulate drilling fluid. Finished picking up drill pipe. With core bit at 4,121 ft  measured depth (MD), circulated drilling fluid and rigged down B&L lay-down/pick-up equipment. Rigged up Tiger wireline equipment. Washed and reamed bit down to 4,189 ft MD/3,788 ft true vertical depth (TVD). Pulled drill insert with wireline. Picked up inner core barrels and pumped down coring assembly, into core barrel. Cored from 4,189 to 4,201 ft MD.

*Notes/Observations*

* Maintained fluid density at 10.2 pounds per gallon. Some drilling assembly sticking problems observed when pipe is not moved and circulation of drilling fluid stops

*Dec. 9th, 2011*

Cored from 4,210 ft measured depth (MD)/3,806 ft true vertical depth (TVD) to 4,249 ft MD/3,840 ft TVD. Total of 60 ft MD cored. Retrieved and laid down core barrel. 19 ft of core recovered. Lowered drill rod into drill string but could not seat drill rod in core bit. Pulled drill rod out of drill string. Pulled drill string out of the well. Checked coring bit and drill rod and seated drill rod. Lowered drill sting into well, circulating periodically. Circulated and washed bit down last 100 ft. Drilled from 4,249 to 4,252 ft MD.

Notes/Observations

* Second core planned for Nortonville/ Domengine was eliminated based on sufficient recovery of first core
* Will drill to approximately 4,490 ft MD and check direction (inclination & azimuth) of wellbore
* Maintained fluid density at 10.2 pounds per gallon

*Dec. 10th, 2011*

Drilled from 4,252 ft measured depth (MD)/3,842 ft true vertical depth (TVD) to 4,441 ft MD/4,004 ft TVD. Circulated drilling fluid to clean hole. Rigged up to run directional survey and pipe became stuck. Rigged down equipment. Circulated drilling fluid while raising and lowering drill string. To free stuck drill rod, introduced LVT oil in pipe annulus and allowed to soak. Pipe remained stuck. Attempted to retrieve NOV drill rod, but rope socket on wireline broke. Rigged up wireline and free point locating equipment. Wireline indicated pipe stuck near 3,100 ft MD. Pumped LVT oil into drill string annulus to cover 3,000 to 4,000 ft MD. Allow oil to soak. At approximately 7:45, after the oil had been in place approximately 4 hours, the drill string pulled free.

*Notes/Observations*

* Lowered fluid density at 10.0 pounds per gallon

*Dec. 11th, 2011*

Pulled 80,000 # over drill string weight and drill string pulled free. Moved pipe and circulated drilling fluid to condition and ensure uniform properties in system. Attempted to pull drill rod and wireline rope socket sheared. Pulled drill string out of the well. Replaced damaged components of coring tools. Lowered drilling/coring assembly into the well in stages, with drill rod in place. Circulated at numerous depths to ensure hole stability. Washed to 4,370 ft measured depth (MD). Rigged up wireline survey equipment and surveyed for inclination and azimuth. Drilled from 4,441 to 4,535 ft MD/4,006 to 4,087 ft true vertical depth. Circulated and started wiper trip.

Notes/Observations

* NOV core bit in good condition
* Drilling fluid density maintained at 10.0 pounds per gallon

*Dec. 12th, 2011*

Completed wiper trip. Drilled from 4,535 to 4,659 ft measured depth (MD)/4,092 to 4,205 ft true vertical depth (TVD). Pulled bit up to 4,121 ft MD to wipe hole. Drilled from 4,659 to 4,733 ft MD/~4,205 to ~4,272 ft TVD. Ran gyro survey for inclination and azimuth information. Pulled drill/coring assembly out of well. Picked up directional drilling assembly and lowered same into well.

*Notes/Observations*

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density maintained at 10.0 pounds per gallon

*Dec. 13th, 2011*

Finished lowering directional drilling assembly into the well. Circulated and washed final 60 ft to bottom. Drilled directionally to direct wellbore path back to planned course from 4,733 to 4,860 ft measured depth (MD)/4,310 to ~4,343 ft true vertical depth (TVD). Drilling motor failed. Pulled drilling assembly out of the well. Picked up replacement drilling motor and lowered directional drilling assembly into the well. Circulated and washed to bottom. Drilled directionally to direct wellbore path back to planned course from 4,860 to 4,993 ft MD/~4,343 to ~4,510 ft TVD.

Notes/Observations

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density at 10.1 pounds per gallon

*Dec. 14th, 2011*

Drilled directionally to direct wellbore path back to planned course from 4,993 to 5,248 ft measured depth (MD)/4,505 to ~4,724 ft true vertical depth (TVD). Circulated drilling fluid. Pulled directional drilling tools out of well. Stood directional drilling bottom hole assembly in derrick. Picked up coring assembly. Spaced out core inner barrel assembly. Inserted drill rod. Lowered coring assembly into well. Circulated drilling fluid. Lowered wireline into drill string and retrieve drill rod from coring assembly.

*Notes/Observations*

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density at 10.1 pounds per gallon

*Dec. 15th, 2011*

Retrieved drill rod from coring assembly. Made up inner core barrels, placed in drilling assembly, and pumped down into place. Cored from 5,246 to 5,306 ft measured depth (MD)/4,722 to 4,774 ft true vertical depth (TVD). Retrieved and laid down 57.5 ft of recovered core. Inserted drill rod and wiped hole up to 5,000 ft. Drilled from 5,306 to 5,533 ft MD/4,774 to ~4,974 ft TVD. Wiped hole up to 5,000 ft. Surveyed for inclination and azimuth. Drilled from 5,533 to 5,702 ft MD/~4,774 to ~5,123 ft TVD.

Notes/Observations

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density at 10.1 pounds per gallon

*Dec. 16th, 2011*

Drilled from 5,702 to 6,062 ft measured depth (MD)/5,126 to ~5,460 ft true vertical depth (TVD). Surveyed at 5,935 ft MD and wiped hole. Drilled from 6,062 to 6,313 ft MD/~5,460 to ~5,693 ft TVD.

Notes/Observations

* ~TVD depths are based on projected inclination and azimuth
* Some drag observed on wiper trip; plan to wipe hole back to previous core point at next wiper trip point
* Drilling fluid density at 10.1 pounds per gallon

*Dec 17th, 2011*

Drilled from 6,313 to 6,561 ft measured depth (MD)/5,693 to ~5,929 ft true vertical depth (TVD). Surveyed at 6,430 ft MD and wiped hole up to 4,619 ft. Observed 30,000# to 40,000# over pull. Lowered pipe to 5,306 ft. Drill string stuck and no circulation. Raised and lowered string to free pipe and establish circulation. Reamed up and down through tight hole from 5,100 to 5,300 ft. Lowered drill sting back into well and drilled from 6,561 to 6,679 ft MD. Rotary chain broke. Repaired rotary chain.

Notes/Observations

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density at 10.1 pounds per gallon

*Dec 18th, 2011*

Drilled from 6,679 to 6,973 ft measured depth (MD)/~6,048 to ~6,331 ft true vertical depth (TVD). Penetration rate slowed to less than 10 ft/hour. Circulated drilling fluid to clean hole. Pulled drilling assembly/coring out of the well. Laid down NOV coring assembly and drill collars. Rigged down wireline equipment. Laid down directional drilling assembly. Made up new bit on heavy weight drill pipe (HWDP) in derrick and lowered same into well. Picked up additional HWDP.

*Notes/Observations*

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density at 10.2 pounds per gallon
* Generator for solids control equipment and mud logging trailer failed at midnight; no updated mud log
* Cores will be shipped to Core Labs today
* Extremely foggy conditions this morning

*Dec 19th, 2011*

Picked up additional heavy weight drill pipe. Laid down excess drill pipe from derrick. Lowered drilling assembly into well. Washed 60 to 6,973 ft measured depth (MD). Drilled new hole from 6,973 to 7,335 ft MD/~6,331 to 6,888 ft true vertical depth (TVD). Circulated drilling fluid to clean hole. Made 10 stand wiper trip after drilling 8 hours. Drilled from 7,335 to 7,570 ft MD/6,920 ft TVD. Circulated hole clean. Started 10 stand wiper trip.

Notes/Observations

* ~TVD depths are based on projected inclination and azimuth
* Drilling fluid density at 10.2 pounds per gallon
* Schlumberger logging truck scheduled to arrive at noon today

*Dec. 20th, 2011*

Completed 10 stand wiper trip. Circulated drilling fluid to clean hole. Pulled drilling string out of the well. Rigged up Schlumberger open hole wireline logging equipment. Schlumberger calibrated Platform Express tool string and lowered same into the well. Logged open hole from 7,562 ft to 516 ft MD (wireline measurements). Laid down Platform Express tools and picked up CMR-HNGS tool string and calibrated same. Lowered wireline tools into the well and logged up from 7,562 ft MD.

*Notes/Observations*

* Drilling fluid density at 10.2 pounds per gallon

*Dec. 21st, 2011*

Completed open hole wireline logging with CMR-HNGS tool string (run #2) from 7,562 to 3,600 ft (wireline measurements). Laid down wireline equipment from rig floor and derrick. Lowered drilling string into the well to condition hole and drilling fluid. Circulated drilling fluid. Pulled drilling string out of the well. Rigged up Schlumberger open hole wireline logging tools to collect fluid samples from formation (MDT Tool). Lowered MDT tool into well to 520 ft. MDT setting down, and could not be worked deeper. Pulled MDT out and laid down Schlumberger tools from rig floor and derrick. Lowered drill string, with drill bit into wellbore.

Notes/Observations

* Drilling fluid density at 10.2 pounds per gallon
* 4-1/2" casing delivered to well site

*Dec. 22nd, 2011*

Lowered drill string, with drill bit into wellbore to 600 ft. Encountered obstruction at +/-560 ft. Worked through obstruction until not observed. Pulled drill string out of the well. Lowered MDT tool into well to 630 ft. Pulled MDT tools out of well. Lowered drill string with bit into the well to condition hole and drilling fluid. Circulated drilling fluid. Pulled drilling string out of the well. Rigged up Schlumberger open hole wireline logging equipment. Lowered logging string into the well to 7,562 ft. Logged up from 7,562 to 6,600 ft with MSIP/ECS.

*Notes/Observations*

* Drilling fluid density at 10.2 pounds per gallon
* MSIP (Modular Sonic Imaging Platform) = FMI + Sonic
* Logging tool pulled tight (tool dragging in hole) from 7,562 to 7,460 ft. No other tool drag observed through report time

*Dec. 23rd, 2011*

Completed logging run with MSIP/ECS up to 3,600 ft. Pulled logging tools out of the well and rigged down Schlumberger tools from floor and derrick. Lowered drill string with bit into the well, to total depth, to condition hole and drilling fluid. Circulated drilling fluid. Pulled drilling string out of the well. Rigged up Schlumberger open hole wireline sidewall coring equipment. Lowered sidewall coring tool into the well to 7,450 ft. Logged up with gamma ray log for depth correlation.

Notes/Observations

* 10 cores drilled
* Drilling fluid density at 10.2 pounds per gallon

*Dec. 24th, 2011*

Completed gamma ray log for depth correlation with MSCT. Drilled 50 cores at various depths. Pulled MSCT out of well and unloaded cores from MSCT. 43 cores recovered. Laid down bottom hole assembly. Ran drill pipe, open ended, into the well to 6,015 ft measured depth (MD). Set balanced cement plug in open hole from 6,015 to ~5,700 ft MD. Pulled drill pipe to 5,385 ft MD and circulated to clear pipe of cement. Pulled drill pipe out of the well.

*Notes/Observations*

* Drilling fluid density at 10.2 pounds per gallon

*Dec. 25th, 2011*

Completed pulling drill pipe out of the well. Attached bit to drill pipe and lowered bit into well with drill pipe. Circulated and washed from 5,465 to 5,525 ft measured depth. Circulated to clean hole and condition drilling fluid for running casing. Pulled drill pipe out of the well and laid down. Rigged up casing running equipment. Picked up and made up float shoe, first joint of casing, float collar, and additional joints of casing. Placed 30 centralizers on first joints of casing. Continued picking up and making up joints of casing.

Notes/Observations

* Drilling fluid density at 10.2 pounds per gallon

*Dec. 26th, 2011*

Completed picking up and making up joints of casing. Circulated drilling fluid and rigged up cementing equipment. Mixed and pumped cement as per plan. Rigged down cementing equipment. Set casing slips in wellhead. Nippled down well control equipment and nippled up wellhead. Cleaned Paul Graham surface mud tanks. Released Paul Graham Rig #6 to rig down and move.

*Dec. 27th, 2011*

Rigged down Paul Graham Rig #6 and rental equipment. Returned two loads of drill pipe to NOV (additional trucks not available until Thursday). Released all rental equipment.

*Dec. 28th, 2011*

Rigged down Paul Graham Rig #6, loaded equipment, and hauled all loads off location.