

Goetze, Phillip, EMNRD

From: Tyler Woodruff <twoodruff@alamoresources.com>
Sent: Tuesday, July 22, 2014 8:40 AM
To: Goetze, Phillip, EMNRD
Cc: Tom Feketa; 'Pat Seale'
Subject: RE: Case No. 15116 - High Lonesome Queen Unit Waterflood; Request for Clarification
Attachments: High Lonesome Queen Unit Requested injection Depth for NMOCD.docx

Mr. Goetze,

As per your request, Alamo has reviewed our geological & engineering data that was submitted in the C-108 and through our testimony regarding the High Lonesome Queen Unit Waterflood and we have identified a "working" description for the Penrose interval that quantifies the maximum/minimum depths to be included in the order. Attached is a write-up identifying the interval as well as an explanation supporting our recommendation. Please let me know if there is any additional data you would like or if you would like to discuss the matter over the phone with Alamo.

Sincerely,

Tyler Woodruff

From: Goetze, Phillip, EMNRD [<mailto:Phillip.Goetze@state.nm.us>]
Sent: Thursday, July 17, 2014 4:18 PM
To: Tyler Woodruff; Patrick Seale
Cc: Ezeanyim, Richard, EMNRD
Subject: Case No. 15116 - High Lonesome Queen Unit Waterflood; Request for Clarification

Tyler and Patrick:

Per our conversation, I am forwarding this request for additional information to clarify the definition of the injection interval for the Penrose. Upon review of testimony and exhibits, OCD has encountered a dilemma in providing a "working" description for the Penrose interval that quantifies the maximum/minimum depths to be included in the order to reduce the approval process. The information provided in sections and logs is sufficient to characterize the definition of the injection interval (the type log for the Penrose). However, OCD wishes to construct the order to allow Permian the ability to select perforation and obtain approval at the District level. This would require specifying the limits of uppermost perf depth and lowermost perf depth. The C-108 application shows all injection wells to be constructed with total depths no greater than 2,000 feet. This would be the deepest depth for description of the interval.

The uppermost perf depth is a little more complicated. Based on the testimony from the hearing, a depth of 1880 feet was used to determine the injection pressure using the standard 0.2 psi/ft during the discussion of the requested 1100 psi surface injection pressure. With this depth given in testimony, a depth of 1880 feet was recommended as the top of the injection interval (i.e. the order would have 1880 feet to 2000 feet as the interval where perms would be permitted). However, on reviewing the cross section B to B', the depths for the top of Penrose is ~1830 feet and ~1861 feet for the two wells in proximity for the proposed Well No. 1 (Unit letter D). A proposed minimum depth of 1880 feet would cause the District to consider any shallower perforation depths as out of compliance.

The request to your group: with your subsurface information of the unit, what is the minimum depth for perforation that would address the perforation interval for new wells and potentially cover future injectors? For example, 1820 feet? Please call with any questions. Thank you. PRG

Phillip R. Goetze, P.G.

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High Lonesome Queen Unit

T-16-S, R-29-E, Sections 15 & 16

Eddy County, New Mexico

Requested Approved Interval For Penrose Completions: 1700' to 2000'

Please refer to the "West-East Structural Cross-Section B-B'", prepared in support of Alamo Permian Resources, LLC's application to the NMOCD for waterflood approval of the High Lonesome Queen Unit.

The combined Penrose structure and line of cross-section map appended to Cross-Section B-B' indicates that there is about 140 feet of structural drop from the northwest corner to the southeast corner of the unit. The structural contours indicate that the structurally lowest Penrose well drilled to-date is located 1980' FSL & 660' FWL of Section 15. This well is the Alamo Permian Resources, LLC Skelly-State #10, and is the easternmost well documented on Cross-Section B-B'. The base of the Penrose interval in the Skelly-State #10 is at a drill depth of 1944 feet. A potential Penrose drill location exists in the SE/4 SE/4 of Section 16. The structure map suggests that this would be the absolute lowest well in the unit and would expect to find the top and base of the Penrose Sandstone interval as much as 35 feet deeper than in the Skelly-State #10. Thus, the base of the Penrose interval in this structurally lowest new drill well could be at a drill depth of about 1979 feet. Therefore, a base depth of 2000 feet for the approved interval for water injection or oil production is requested.

The structurally highest Penrose well drilled to-date is the westernmost well on Cross-Section B-B'. This is the Alamo Permian Resources, LLC State #1, located 1980' FNL & 660' FWL of Section 16. This well produces from an openhole interval extending downward from a drill depth of 1750 feet. The structure map shows that a potential drill location exists in the SW/4 NW/4 of Section 16, and that the Penrose top and bottom depths at this location could be as much as 25 feet higher (and shallower) than the State #1. Thus, an upper depth of 1700 feet is requested for the approved interval for water injection or oil production in the High Lonesome Queen Unit.