

FORM
2

Rev
10/24

State of Colorado

Energy & Carbon Management Commission

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



Document Number:

404023428

Date Received:

12/31/2024

APPLICATION FOR PERMIT TO

Drill Deepen Re-enter Recomplete and Operate Amend

TYPE OF WELL OIL GAS COALBE GEOTHERMAL OTHER: _____

Refile

ZONE TYPE SINGLE ZONE MULTIPLE ZONES COMMINGLE ZONES

Sidetrack

Well Name: GLADE Well Number: EAST

Name of Operator: OXY USA INC ECMC Operator Number: 66561

Address: PO BOX 173779

City: DENVER State: CO Zip: 80217-3779

Contact Name: Loryn Spady Phone: (720)9293504 Fax: ()

Email: Loryn_Spady@oxy.com

FINANCIAL ASSURANCE FOR PLUGGING, ABANDONMENT, AND RECLAMATION

ECMC Financial Assurance

The Operator has provided or will provide Financial Assurance to the ECMC for this Well.

Surety ID Number (if applicable): 20230087

Federal Financial Assurance

In checking this box, the Operator certifies that it has provided or will provide at least this amount of Financial Assurance to the federal government for this Well. (Per Rule702.a.)

Amount of Federal Financial Assurance \$ _____

WELL LOCATION INFORMATION

Surface Location

QtrQtr: NESE Sec: 2 Twp: 3N Rng: 66W Meridian: 6

Footage at Surface: 2134 Feet FSL 1146 Feet FEL

Latitude: 40.252551 Longitude: -104.738967

GPS Data: GPS Quality Value: 1.3 Type of GPS Quality Value: PDOP Date of Measurement: 12/03/2024

Ground Elevation: 4901

Field Name: _____ Field Number: _____

Well Plan: is Directional Horizontal (highly deviated) Vertical

If Well plan is Directional or Horizontal attach Deviated Drilling Plan and Directional Data.

Subsurface Locations

Top of Productive Zone (TPZ)

Sec: 2 Twp: 3N Rng: 66W Footage at TPZ: 2137 FSL 1188 FEL

Measured Depth of TPZ: 10558 True Vertical Depth of TPZ: 10556 FNL/FSL FEL/FWL

Base of Productive Zone (BPZ)

Sec: 2 Twp: 3N Rng: 66W Footage at BPZ: 2287 FSL 2376 FWL
Measured Depth of BPZ: 20162 True Vertical Depth of BPZ: 20000 FNL/FSL FEL/FWL

Bottom Hole Location (BHL)

Sec: 2 Twp: 3N Rng: 66W Footage at BHL: 2287 FSL 2376 FWL
FNL/FSL FEL/FWL

LOCAL GOVERNMENT PERMITTING INFORMATION

County: WELD Municipality: N/A

Is the Surface Location of this Well in an area designated as one of State interest and subject to the requirements of § 24-65.1-108 C.R.S.? Yes

Per §34-60-106(1)(f)(I)(A) C.R.S and §37-90.5-107(2)(b)(I) C.R.S, the following questions pertain to the Relevant Local Government approval of the siting of the proposed Oil and Gas or Deep Geothermal Locations.

The Energy and Carbon Management Act and the Geothermal Resources Act provide that when "applying for a permit to drill," operators must include proof that they sought a local government siting permit and the disposition of that permit application, or that the local government does not have siting regulations.

Does the Relevant Local Government regulate the siting of Oil and Gas and Deep Geothermal Locations, with respect to this Location? [X] Yes [] No

[X] If yes, in checking this box, I hereby certify that an application has been filed with the local government with jurisdiction to approve the siting of the proposed oil and gas location.

The disposition of the application filed with the Relevant Local Government is: Approved Date of Final Disposition: 12/11/2024

Comments: GLADE Pilot Project

GEOTHERMAL

Well Overview

The following questions determine informational requirements based on Well type:

Which type of Geothermal Well is this? Select one of the following: Science Well

Will this well be constructed using cementing methodologies other than those listed in Rule 408.f? No

If Yes, what method will be used:

Please describe the cementing method to be used in detail:

Surface: Casing will be cemented using a pump and plug method with a 13.5 ppg lead cement and a 14.8 ppg tail cement. A water-based spacer will be pumped ahead of lead cement. Lead/tail interface is planned for 1850 ft MD. Cement will be pumped with excess to ensure cement to surface.

Intermediate: Casing will be cemented using a pump and plug method with a 12.5 ppg lead cement and a 13.2 ppg tail cement. A water-based spacer will be pumped ahead of lead cement. Lead/tail interface is planned for 7100 ft MD. Cement will be pumped with excess to ensure cement to surface. Additives will be used in the slurries to mitigate bradenhead pressure risks.

Science Well Information

Please describe the timing, duration, and types of tests that may be run in the wellbore for scientific purposes:

The first well is currently planned for spud in early April 2025. All phases of drilling are expected to take 60 days per well, for a total planned duration of 120 days on the pad. This duration also includes the time required to perform an intercept between the two wellbores at their toes.

Upon completion of drilling and wellbore interception, testing may be conducted to evaluate the thermal potential and heat extraction capabilities. These tests could include running thermal logs to measure in-situ temperatures or setting up surface equipment to circulate fluid through the wellbores. Data collected during these tests, such as flow rates, temperatures, and heat extraction metrics, will be analyzed at the surface to assess the system's performance.

Please describe the reason for the scientific well and its potential future use:

Oxy aims to surpass the limits of current geothermal drilling technology by safely drilling two adjacent high-temperature geothermal wells (i.e., twin wells) at the GLADE location. These wells are part of a project funded under a Funding Opportunity Announcement (FOA) issued by the Department of Energy (DOE). The primary objective is to demonstrate the capability to penetrate deep into granitic basement rock at drilling rates and cycle times that could support economic viability for future geothermal projects.

Located in the Denver-Julesburg Basin, the wells are planned to be drilled to a target true vertical depth (TVD) of 20,000 feet, with downhole temperatures potentially approaching 572 °F. By integrating existing and novel drilling technologies, we aim to achieve a significant increase in daily drilling rates, surpassing 25%, well over well.

To achieve these objectives, we will deploy cutting-edge high-temperature downhole tools, implement advanced cloud-based real-time drilling optimization, and leverage technologies to reduce non-productive time, all while prioritizing operational safety. The twin-well design enables a robust comparative analysis of drilling performance both within and between wells, providing reliable insights into geothermal drilling equipment and best practices.

The future use of these wells remains uncertain. If the wells are successfully intercepted to create a closed-loop system, flow testing may be conducted using a small surface test facility. The twin-well design also provides flexibility for future applications, potentially supporting either enhanced geothermal systems (EGS) or advanced geothermal systems (AGS). However, any future use will depend on the results obtained during drilling and the availability of funding to support subsequent phases.

SURFACE AND MINERAL OWNERSHIP AT WELL'S OIL & GAS OR DEEP GEOTHERMAL LOCATION

Surface Owner of the land at this Well's Oil and Gas Or Deep Geothermal Location: Fee State Federal Indian

Mineral Owner beneath this Well's Oil and Gas Or Deep Geothermal Location: Fee State Federal Indian

Surface Owner Protection Bond (if applicable): _____

Surety ID Number (if applicable): _____

MINERALS DEVELOPED BY WELL

The ownership of all the minerals that will be developed by this Well is (check all that apply):

- Fee
- State
- Federal
- Indian
- N/A

LEASE INFORMATION

Using standard QtrQtr, Section, Township, Range format describe one entire mineral lease as follows:

* If this Well is within a unit, describe a lease that will be developed by the Well.

* If this Well is not subject to a unit, describe the lease that will be produced by the Well.

(Attach a Lease Map or Lease Description or Lease if necessary.)

Total Acres in Described Lease: _____ Described Mineral Lease is: Fee State Federal Indian

Federal or State Lease # _____

SAFETY SETBACK INFORMATION

Distance from Well to nearest:

Building: 1109 Feet
Building Unit: 1834 Feet
Public Road: 1142 Feet
Above Ground Utility: 1730 Feet
Railroad: 5280 Feet
Property Line: 527 Feet

INSTRUCTIONS:

- Specify all distances per Rule 308.b.(1).
- Enter 5280 for distance greater than 1 mile.
- Building - nearest building of any type. If nearest Building is a Building Unit, enter same distance for both.
- Building Unit – as defined in 100 Series Rules.

OBJECTIVE FORMATIONS

Objective Formation(s) **Formation Code** **Spacing Order Number(s)** **Unit Acreage Assigned to Well** **Unit Configuration (N/2, SE/4, etc.)**

Objective Formation(s)	Formation Code	Spacing Order Number(s)	Unit Acreage Assigned to Well	Unit Configuration (N/2, SE/4, etc.)
PRECAMBRIAN	PCMB			

Federal or State Unit Name (if appl): _____ Unit Number: _____

SUBSURFACE MINERAL SETBACKS

Enter 5280 for distance greater than 1 mile.

Is this Well within a unit? _____

If YES:

Enter the minimum distance from the Completed Zone of this Well to the Unit Boundary: _____ Feet

Enter the minimum distance from the Completed Zone of this Well to the Completed Zone of an offset Well within the same unit permitted or completed in the same formation: _____ Feet

If NO:

Enter the minimum distance from the Completed Zone of this Well to the Lease Line of the described lease: _____ Feet

Enter the minimum distance from the Completed Zone of this Well to the Completed Zone of an offset Well producing from the same lease and permitted or completed in the same formation: _____ Feet

Exception Location

If this Well requires the approval of a Rule 401.c Exception Location, enter the Rule or spacing order number and attach the Exception Location Request and Waivers. _____

SPACING & FORMATIONS COMMENTS

DRILLING PROGRAM

Proposed Total Measured Depth: 20162 Feet

TVD at Proposed Total Measured Depth 20000 Feet

Distance from the proposed wellbore to nearest existing or proposed wellbore belonging to another operator, including plugged wells:

Enter distance if less than or equal to 1,500 feet: 156 Feet No well belonging to another operator within 1,500 feet

Will a closed-loop drilling system be used? Yes

Is H₂S gas reasonably expected to be encountered during drilling operations at concentrations greater than or equal to 100 ppm? No If yes, attach an H₂S Drilling Plan unless a plan was already submitted with the Form 2A per Rule 304.c.(10).

Will there be hydraulic fracture treatment at a depth less than 2,000 feet in this well? No

Will salt sections be encountered during drilling? No

Will salt based (>15,000 ppm Cl) drilling fluids be used? Yes

Will oil based drilling fluids be used? Yes

BOP Equipment Type: Annular Preventor Double Ram Rotating Head None

Beneficial reuse or land application plan submitted? No

Reuse Facility ID: _____ or Document Number: _____

CASING PROGRAM

<u>Casing Type</u>	<u>Size of Hole</u>	<u>Size of Casing</u>	<u>Grade</u>	<u>Wt/Ft</u>	<u>Csg/Liner Top</u>	<u>Setting Depth</u>	<u>Sacks Cmt</u>	<u>Cmt Btm</u>	<u>Cmt Top</u>
CONDUCTOR	26	20	A53B	79	0	80	60	80	0
SURF	17+1/2	13+3/8	L80	54.5	0	2350	770	2350	0
1ST	12+1/4	9+5/8	P110IC	47	0	10608	1700	10608	0
OPEN HOLE	8+1/2				10608	20162			

Conductor Casing is NOT planned

POTENTIAL FLOW AND CONFINING FORMATIONS

<u>Zone Type</u>	<u>Formation /Hazard</u>	<u>Top M.D.</u>	<u>Top T.V.D.</u>	<u>Bottom M.D.</u>	<u>Bottom T.V.D.</u>	<u>TDS (mg/L)</u>	<u>Data Source</u>	<u>Comment</u>
Groundwater	Fox Hills and Shallower	17	17	472	472	501-1000	USGS	Depth from DWR
Confining Layer	Pierre Shale	473	473	671	671			
Groundwater	Upper Pierre Aquifer	672	672	1577	1577	501-1000	Electric Log Calculation	Controlled by samples
Confining Layer	Pierre Shale	1578	1578	4309	4309			
Hydrocarbon	Sussex	4310	4310	4609	4609			Productive
Confining Layer	Pierre Shale	4610	4610	7112	7112			
Hydrocarbon	Niobrara	7113	7113	7355	7355			
Hydrocarbon	Codell	7356	7356	7371	7371			
Confining Layer	Carlile	7372	7372	7409	7409			
Hydrocarbon	Greenhorn	7410	7410	7596	7596			
Confining Layer	Graneros Shale	7597	7597	7857	7857			
Hydrocarbon	Dakota	7858	7858	8034	8034			
Confining Layer	Morrison	8035	8035	8298	8298			
Groundwater	Entrada	8299	8299	8423	8423	>10000	USGS	
Confining Layer	Lykins	8424	8424	8958	8958			
Confining Layer	Blaine	8959	8959	9004	9004			Anhydrite
Groundwater	Lyons	9005	9005	9196	9196	>10000	USGS	
Groundwater	Lower Satanka	9197	9197	9362	9362	>10000	USGS	
Groundwater	Wolfcamp	9363	9363	9974	9974	>10000	USGS	
Groundwater	Fountain	9975	9975	10557	10555	>10000	USGS	
Geothermal	Precambrian Basement	10558	10556	20162	20000			Igneous/Metamorphic; *base MD/TVD is BHL per ECMC

OPERATOR COMMENTS AND SUBMITTAL

Comments

Based on the information provided herein, this Application for Permit-to-Drill complies with ECMC Rules, applicable orders, and SB 19-181 and is hereby approved.

ECMC Approved: _____



Director of ECMC

Date: 2/10/2025

Expiration Date: 02/09/2028

API NUMBER

05 123 52916 00

CONDITIONS OF APPROVAL, IF ANY LIST

All representations, stipulations and conditions of approval stated in the Form 2A for this location shall constitute representations, stipulations and conditions of approval for this Form 2 Permit-to-Drill and are enforceable to the same extent as all other representations, stipulations and conditions of approval stated in this Permit-to-Drill.

COA Type

Description

Drilling/Completion Operations	Bradenhead tests shall be performed according to the following schedule and Form 17 submitted within 10 days of each test: 1) Within 60 days of rig release. 2) Annually as required by Rule 419.c.
Drilling/Completion Operations	1) Submit Form 42 electronically to ECMC 2 business days prior to MIRU (spud notice) for the first well activity with a rig on the pad and provide 2 business day spud notice via Form 42 for all subsequent wells drilled on the pad. 2) Comply with Rule 408.j. and provide cement coverage from TD to a minimum of 500' above Sussex. Verify coverage with a cement bond log. 3) Oil based drilling fluid can only be used after all groundwater has been isolated.
Drilling/Completion Operations	In accordance with Rule 1314.b.(1), Operator will run a pipe analysis log or caliper log in conjunction with any other logging requirements of Rule 408.r.
Drilling/Completion Operations	Operator will Submit a Form 4-Notice of Intent requesting approval of any circulation of fluid in the production hole section for testing reasons prior to such operations.
Drilling/Completion Operations	Significant lost circulation encountered during drilling will be reported as soon as practicable to the ECMC. Such notice will be provided on a Form 42, Field Operations Notice – Notice of Significant Lost Circulation. For instances of lost circulation encountered during drilling, four sheets or drilling operations logs covering the time interval(s) where lost circulation was encountered will be attached to the Form 5 – Drilling Completion Report.

5 COAs

Operator Best Management Practices

No	BMP/COA Type	Description
1	Drilling/Completion Operations	Anti-Collision: Kerr-McGee will perform an anti-collision evaluation of all active (producing, shut in, or temporarily abandoned) offset wellbores that have the potential of being within one hundred fifty (150) feet of a proposed well prior to drilling operations for the proposed well. Notice shall be given to all offset operators within one hundred fifty (150) feet prior to drilling.
2	Drilling/Completion Operations	In one of the two GLADE wells, Oxy plans to run CBL, Gamma Ray, Resistivity, Density, Neutron, and Sonic logs through the entire intermediate hole section, and an Image Log across the deepest 3000' of the intermediate hole section. Additionally, Oxy plans to run Gamma Ray, Resistivity, Density, Neutron, Dipole Sonic, Image Log, and Spectroscopy logs through the entire production hole section. In the other GLADE well, Oxy plans to run CBL, Gamma Ray, Resistivity, Density, and Neutron logs in the intermediate section and Gamma Ray, Resistivity, Density, and Neutron logs in the production hole section. This logging program is subject to changes based on vendor and tool availability and hole conditions that may exceed logging tool limitations.

Total: 2 comment(s)

ATTACHMENT LIST

Att Doc Num	Name
2168656	WELLBORE DIAGRAM
2168658	WELL LOCATION PLAT
404023428	FORM 2 SUBMITTED
404032061	OTHER
404033078	DEVIATED DRILLING PLAN
404033082	DIRECTIONAL DATA
404087438	OFFSET WELL EVALUATION

Total Attach: 7 Files

General Comments

User Group	Comment	Comment Date
Permit	Final Review Complete.	02/07/2025
Permit	-Uploaded updated well location plat from the operator -Passed Permit Review	01/22/2025
Permit	-Removed field name since it's not needed since permit is for a geothermal well -Selected the minerals owner beneath this location to fee as per ECMC GIS maps -Deleted surface lease information in the lease information text box since that information is on the 2A -Added logging BMP from the operator -Updated casing grade as per operator -Uploaded wellbore diagram from the operator -Requesting corrected well location plats from the operator	01/16/2025
OGLA	The Location associated with this Form 2 was conditionally approved administratively pursuant to Order 1-326 on September 12, 2024. OGLA task passed.	01/08/2025
OGLA	Added Location ID #487829.	01/03/2025

Total: 5 comment(s)