Pool - Eunice; Blinebry-Tubbs-Drinkard, North 22900
active oil well ⇒ inj well - Perfs 6470-6662 -
NE Drinkard Unit - Case 9231, R-8540 1987 - active WFX Dec 11-29-21

30-025-06579

C-108 APPLICATION FOR AUTHORIZATION TO INJECT
ADMINISTRATIVE COMPLETENESS FORM

Well Name: NE Drinkard Unit #614

Applicant: Apache Corporation 873

PO Number: WFX-1045

Admin. App. No: pKAM 2133-350-022

C-108 Item	Description of Required Content	Yes	No
I. PURPOSE	Selection of proper application type.	✓	
II. OPERATOR	Name; address; contact information.	✓	
III. WELL DATA	Well name and number; STR location; footage location within section.	✓	
	Each casing string to be used, including size, setting depth, sacks of cement, hole size, top of cement, and basis for determining top of cement.	✓	
	Description of tubing to be used including size, lining material, and setting depth.	✓	
	Name, model, and setting depth of packer to be used, or description of other seal system or assembly to be used.	✓	
	Well diagram: Existing (if applicable).	✓	
	Well diagram: Proposed (either Applicant's template or Division's Injection Well Data Sheet).	✓	
IV. EXISTING PROJECT	For an expansion of existing well, Division order number authorizing existing well (if applicable).	✓	
V. LEASE AND WELL MAP	AOR map identifying all wells and leases within 2 mile radius of proposed well, and depicting a 1/2 mile radius circle around any another projected injection well and a 1 mile radius circle around any other projected injection well in the Devonian formation.	✓	
VI. AOR WELLS	Tabulation of data for all wells of public record within AOR which penetrate the proposed injection zone, including well type, construction, date drilled, location, depth, and record of completion.	✓	
	Schematic of each plugged well within AOR showing all plugging detail.	✓	
VII. PROPOSED OPERATION ✓	Proposed average and maximum daily rate and volume of fluids to be injected.	✓	
	Statement that the system is open or closed.	✓	
	Proposed average and maximum injection pressure.	✓	
	Sources and analysis of injection fluid, and compatibility with receiving formation if injection fluid is not produced water.	✓	
	A chemical analysis of the disposal zone formation water if the injection is for disposal and oil or gas is not produced or cannot be produced from the formation within 1 mile of proposed well. Chemical analysis may be based on sample, existing literature, studies, or nearby well.	✓	
VIII. GEOLOGIC DATA	Proposed injection interval, including appropriate lithologic detail, geologic name, thickness, and depth.	✓	
	USDW of all aquifers overlying the proposed injection interval, including geologic name and depth to bottom.	✓	
	USDW of all aquifers underlying the proposed injection interval, including including the geologic name and depth to bottom.	✓	

C-108 (SWD) APPLICATION FOR AUTHORIZATION TO INJECT
ADMINISTRATIVE COMPLETENESS FORM

Well Name: _____

Applicant: _____

PO Number: _____

Admin. App. No: _____

C-108 Item	Description of Required Content	Yes	No
IX. PROPOSED STIMULATION	Description of stimulation process or statement that none will be conducted.	☑	☐
X. LOGS/WELL TESTS	Appropriate logging and test data on the proposed well or identification of well logs already filed with OCD.	☑	☐
XI. FRESH WATER	Chemical analysis of fresh water from two or more fresh water wells (if available and producing) within 1 mile of the proposed well, including location and sampling date(s).	☑	☐
XII. AFFIRMATION STATEMENT	Statement of qualified person endorsing the application, including name, title, and qualifications.	☑	☐
XIII. PROOF OF NOTICE	Identify of all "*affected persons*" identified on AOR map in Section V, including all affected persons within 1/2 mile radius circle around any another projected injection well and a 1 mile radius circle around any other projected injection well in the Devonian formation.	☑	☐
	Identification and notification of all surface owners.	☑	☐
	BLM and/or NMSLO notified per 19.15.2.7(A)(8)(d) NMAC.	☑	☐
	Notice of publication in local newspaper in county where proposed well is located with the following specific content:	☑	☐
	• Name, address, phone number, and contact party for Applicant;	☑	☐
	• Intended purpose of proposed injection wel, including exact location of a single well, or the section, township, and range location of multiple wells;	☑	☐
	• Formation name and depth, and expected maximum injection rates and pressures; and	☑	☐
	• Notation that interested parties shall file objections or requests for hearing with OCD no later than 15 days after the admin completeness determination.	☑	☐
XIV. CERTIFICATION	Signature by operator or designated agent, including date and contact information.	☑	☐

BW sent ✓

Review Date*: 12-16-21 **Reviewer:** KMurphy

☑ **Administratively COMPLETE**

☐ **Administratively INCOMPLETE**

NOTES:

Not in seismic area ✓

* The Review Date is the date of administrative completeness determination that commences the 15 day protest period in 19.15.26.8 (C)(2) NMAC.

PERMITS WEST
PROVIDING PERMITS for LAND USERS
37 Verano Loop, Santa Fe, New Mexico 87508 505-466-8120

EXHIBIT J

NM Oil Conservation Division
1220 S. St. Francis Dr.
Santa Fe, NM 87505

Re: Geology Statement
Apache Corporation
Northeast Drinkard Unit #614
Section 14, T. 21S, R. 37E
Lea County, New Mexico

To whom it may concern:

Publicly available geologic and engineering data related to the proposed well have been thoroughly reviewed, and no evidence for open faults or any other hydrologic connection between the proposed Drinkard injection zone and any underground sources of drinking water has been found. Please see the attached seismic risk assessment for additional information.

Sincerely,

Cory Walk

Cory Walk
Geologist

EXHIBIT J

Seismic Risk Assessment

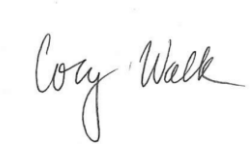
Apache Corporation

Northeast Drinkard Unit #614

Section 14, Township 21 South, Range 37 East

Lea County, New Mexico

Cory Walk, M.S.



Geologist

Permits West Inc.

November 22, 2021

GENERAL INFORMATION

Northeast Drinkard Unit #614 is located in the NW ¼, section 14, T21S, R37E, about 3 miles north of Eunice, NM in the Central Basin Platform of the greater Permian Basin. Apache Corporation proposes to convert this existing oil well to a water injection well. The proposed injection zone is within the Drinkard member of the Yeso Formation through a cased hole from 6,470'-6,662' below ground surface. The Drinkard is primarily a carbonate reservoir. This report assesses any potential concerns relating to induced seismicity along deep penetrating Precambrian faults or the connection between the injection zone and known underground potable water sources.

SEISMIC RISK ASSESSMENT

Historical Seismicity

Searching the USGS earthquake catalog resulted in no (0) earthquakes above a magnitude 2.5 within 6 miles (9.7 km) of the proposed injection site since 1970 (Fig 1). According to this dataset, the nearest historical earthquake occurred June 2, 2001 about 10.4 miles (~16.7 km) south and had a magnitude of 3.3.

Basement Faults and Subsurface Conditions

A structure contour map (Fig. 1) of the Precambrian basement shows the Northeast Drinkard Unit #614 is approximately 1.5 miles from the nearest basement-penetrating fault inferred by Ewing et al (1990) and about 63 miles from the nearest surface fault.

Snee and Zoback (2018) state, "In the western part of Eddy County, New Mexico, S_{Hmax} is ~north–south (consistent with the state of stress in the Rio Grande Rift; Zoback and Zoback, 1980) but rotates to ~east-northeast–west-southwest in southern Lea County, New Mexico, and the northernmost parts of Culberson and Reeves counties, Texas." Around the Northeast Drinkard Unit #614 site, Snee and Zoback indicate a **S_{Hmax} direction of N075°E and an A_{φ} of 0.81, indicating a normal/strike-slip faulting stress regime**.

Induced seismicity is a growing concern of deep injection wells. Snee and Zoback (2018) show that due to its orientation, the nearest Precambrian fault has a low probability of slipping (Fig. 2). Also, the proposed injection zone is much shallower in the Drinkard member of the Yeso Formation and therefore would not affect the deep Precambrian faults. In addition to the existing fault orientation, the vertical (approx. 1550') and horizontal (1.5 miles) separation between the proposed SWD injection zone and any deep Precambrian faults is large enough to infer that there is no immediate concern or potential of induced seismicity as a result from this injection well.

GROUNDWATER SOURCES

Three principal aquifers are used for potable groundwater in southern Lea County; these geologic units include the Triassic Santa Rosa formation, Tertiary Ogallala formation, and Quaternary alluvium. Nicholson and Clebsch (1961) state, "Potable ground water is not available below the Permian and Triassic unconformity but, because this boundary is not easily defined, the top of the Rustler anhydrite formation is regarded as the effective lower limit of 'potable' ground water." Around the Northeast

Drinkard Unit #614 well, the top of a thick anhydrite unit interpreted to represent the Rustler Formation lies at a depth of ~1285 feet bgs.

STRATIGRAPHY

A thick permeability barrier (Rustler Anhydrite and Salado Fm; 1500+ ft thick) exists above the targeted Drinkard injection zone. Well data indicates ~5,185 ft of rock separating the top of the injection zone from the previously stated lower limit of potable water at the top of the Rustler anhydrite formation.

CONCLUDING STATEMENT

All available geologic and engineering data evaluated around the Northeast Drinkard Unit #614 well show no potential structural or stratigraphic connection between the Drinkard injection zone and any subsurface potable water sources. The shallow injection zone, spatial location and orientation of nearby faults also removes any major concern of inducing seismic activity.

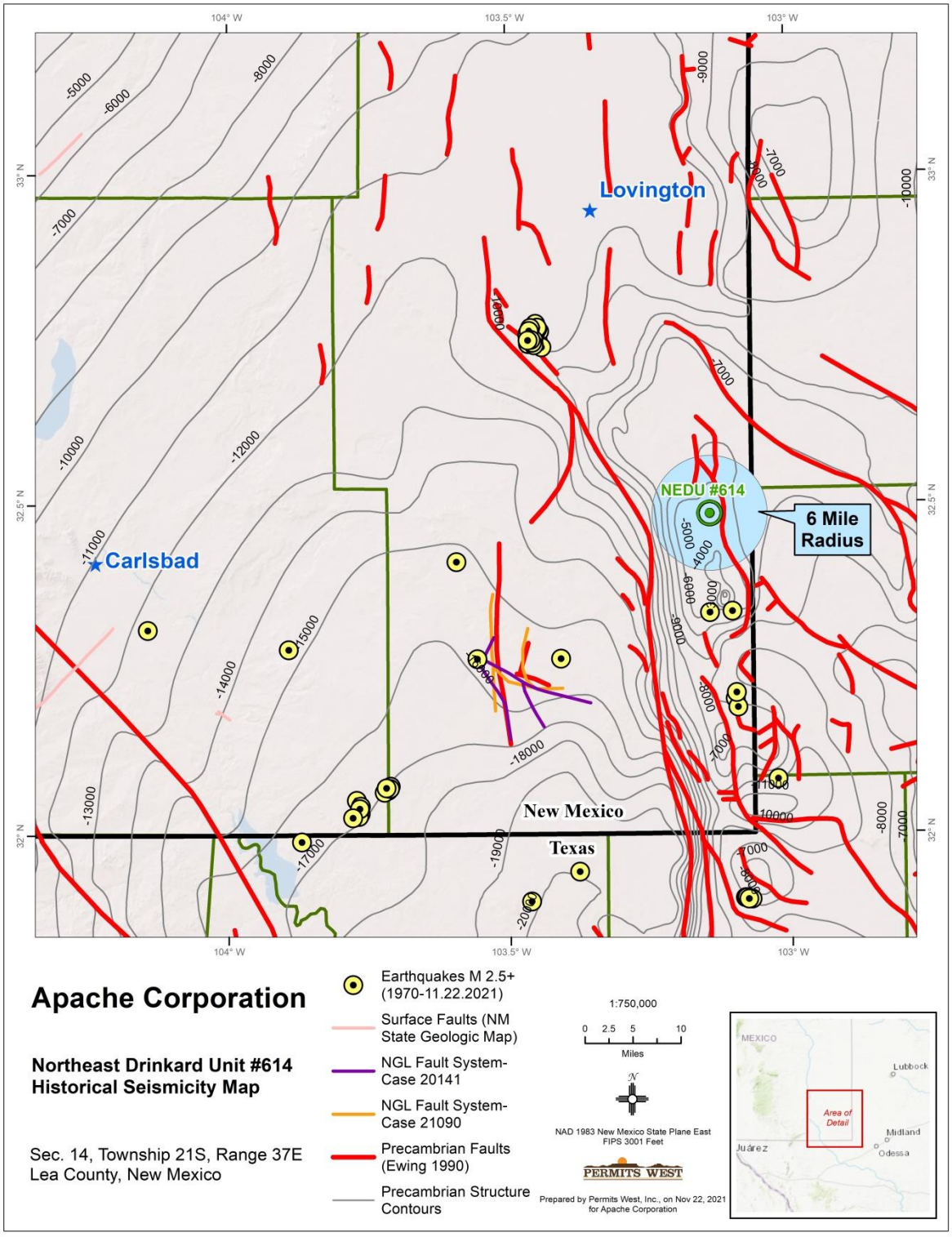


Figure 1. Structural contour map of the Precambrian basement in feet below sea level. Red lines represent the locations of Precambrian basement-penetrating faults (Ewing et al., 1990). The Northeast Drinkard Unit #614 well lies ~1.5 miles west of the closest deeply penetrating fault, ~63 miles from the nearest surface fault and ~10.4 miles from the closest historic earthquake.

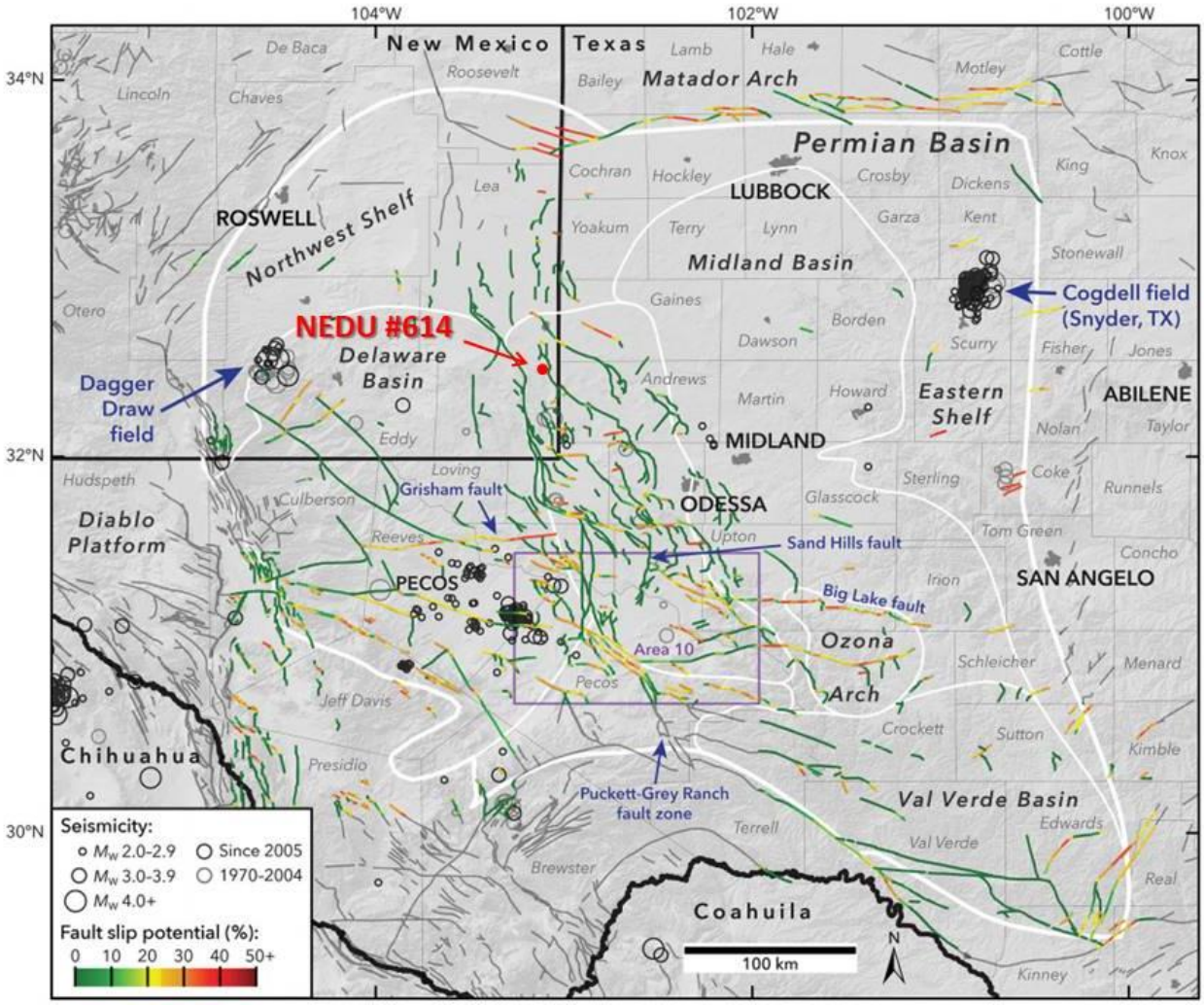


Figure 2. Modified from Snee and Zoback (2018). The nearest deep Precambrian fault lies ~1.5 miles east of the proposed SWD well and has a low probability (0%) of slip. Also, the proposed injection zone is much shallower in the Drinkard and therefore removes any major concern of inducing seismicity on any known fault.

References Cited

Ewing, T. E., 1990, The tectonic map of Texas: Austin, Bureau of Economic Geology, The University of Texas at Austin.

Geologic Map of New Mexico, New Mexico Bureau of Geology and Mineral Resources, 2003, Scale 1:500,000.

Nicholson, A., Jr., and Clebsch, A., Jr., 1961, Geology and ground-water conditions in southern Lea County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Ground-Water Report 6, 123 pp., 2 plates.

Snee, J.-E.L., Zoback, M.D., 2018, State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity: Leading Edge, v. 37, p. 127–134.

Pkam2133350022

FORM C-108 Technical Review Summary [Prepared by reviewer and included with application; V17]

DATE RECORD: First Rec: 11-29-2021 Admin Complete: _____ or Suspended: _____ Add. Request/Reply: _____

ORDER TYPE: WFX Number: 1045 Order Date: _____ Legacy Permits/Orders: R-8540

Well No. 614 Well Name(s): NEDU #614

API: 30-0 25-06579 Spud Date: 1950 New or (Old) (EPA): ____ (UIC Class II Primacy 03/07/1982)

Footages 660 FNL 660 FWL Lot ' or Unit D Sec 14 Tsp 21S Rge 37E County Lea

Latitude: 32.48429 Longitude 103.14019 Pool: Eunice-Bln-Tu-Dr-N Pool No.: 22900

Operator: apache OGRID: 873 Contact: _____ Email:

COMPLIANCE RULE 5.9: Total Wells: 2978 Inactive: 3 Fincl Assur: ✓ Compl. Order? ☐ IS 5.9 OK? ☑ Date: 2-22-2022

WELL FILE REVIEWED ☐ Current Status: active oil

WELL DIAGRAMS: NEW: Proposed ○ or RE-ENTER: Before Conv. ◉ After Conv. ○ Logs in Imaging: _____

Planned Rehab Work to Well: convert oil to injector Oil-Dr-Abo

Well Construction Details	Sizes (in) Borehole / Pipe	Setting Depths (ft)	Stage Tool	Cement Sx or Cf	Cement Top and Determination Method
Planned ☐ or Existing ☐ Surface	17.5 → 13.3	170		150	CTS
Planned ☐ or Existing ☐ Interm/Prod	12.2 → 8.6	1350		800	Temp Surv
Planned ☐ or Existing ☐ Interm/Prod					
Planned ☐ or Existing ☐ Prod/Liner	7.8 → 5.5	7610		TOPC = 3153	Temp Survey
Planned ☐ or Existing ☐ Liner					
Planned ☐ or Existing ☐ OH / PERF	6470	6662	Inj Length		

Injection Lithostratigraphic Units:	Depths (ft)	Injection or Confining Units	Tops
Adjacent Unit: Litho ☐ Struc ☐ Por. ☐			
Confining Unit: Litho ☐ Struc ☐ Por ☐			
Proposed Inj Interval TOP:	see inj order for geology		
Proposed Inj Interval BOTTOM:			
Confining Unit: Litho ☐ Struc ☐ Por. ☐			
Adjacent Unit: Litho ☐ Struc ☐ Por. ☐			

Completion/Operation Details:

Drilled TD 7610 PBTD 6900

NEW TD _____ NEW PBTD _____

NEW Open Hole ○ NEW Perfs ◉

Tubing Size 2 7/8 in. Inter Coated? ✓

Proposed Packer Depth 6420 ft

Min. Packer Depth 6370 (100-ft limit)

Proposed Max. Surface Press. 1000 psi avg

Admin. Inj. Press. 1294 ✓ (0.2 psi per ft)

AOR: Hydrologic and Geologic Information

POTASH: R-111-P ☐ NA Noticed? ☐ BLM Sec Ord ☐ WIPP ☐ Noticed? ☐ Salt/Salado T: ____ B: ____ NW: Cliff House fm ____

USDW: Aquifer(s) _____ Max Depth _____ HYDRO AFFIRM STATEMENT By Qualified Person ☐

NMOSE Basin: _____ CAPITAN REEF: thru ☐ adj ☐ NA ☐ No. GW Wells in 1-Mile Radius? _____ FW Analysis? _____

Disposal Fluid: Formation Source(s) Blb, Tubb, Drk Analysis? ✓ On Lease (Ex) ✓ Operator Only ○ Commercial ◉

Disposal Interval: Inject Rate (Avg/Max BWPD): 2000 Protectable Waters? ____ Source: _____ System: Closed ☐ or Open ☐

HC Potential: Producing Interval? yes Formerly Producing? yes Method: Logs ☑ DST ☐ P&A ☐ Other _____ 2-Mi Radius Pool Map ☐

AOR Wells: 1/2-M ✓ or ONE-M ____ RADIUS MAP/WELL LIST: Total Penetrating Wells: 38 [AOR Hor: ___ AOR SWDs: ___]

Penetrating Wells: No. Active Wells 36 No. Corrective? ____ on which well(s)? ~~2~~ 2 o/g, 7 inj Diagrams? ✓

Penetrating Wells: No. P&A Wells 0 No. Corrective? ____ on which well(s)? no P+A Diagrams? ____

Induced-Seismicity Risk Assess: analysis submitted ☐ historical/catalog review ☐ fault-slip model ☐ probability _____

NOTICE: 1/2-M ☐ or ONE-M ☐ : Newspaper Date 11-22-22 Mineral Owner* ✓ Surface Owner ✓ N. Date 11-2-22

RULE 26.7(A): Identified Tracts? ☐ Affected Persons*: _____ N. Date _____

* new definition as of 12/28/2018 [any the mineral estate of United States or state of New Mexico; SWD operators within the notice radius]

Order Conditions: Issues: _____

Additional COAs: _____