

**STATE OF NEW MEXICO
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONSERVATION DIVISION**

**APPLICATION OF SAN JUAN
RESOURCES, INC. FOR APPROVAL OF
THE REGINA RANCH (DEEP) UNIT,
SANDOVAL COUNTY, NEW MEXICO.**

CASE NO. 22508

**AFFIDAVIT OF RICHARD BOSHER, GEOLOGIST ADDITIONAL GEOLOGY
SUBMITTAL**

Richard Boshier, of lawful age and being first duly sworn, declares as follows:

1. My name is Richard Boshier and I am employed by San Juan Resources, Inc. (“SJR”) as a geologist. I am familiar with the application filed by SJR in this case and have conducted a geologic study of the proposed unit area.

2. I have previously provided my credentials to the Division and testified as an expert witness in petroleum geology, most recently in Division Case 22399 involving the Lindrith East (Deep) Unit.

3. The unitized interval for the proposed Regina Ranch (Deep) Unit is all formations below the Top of the Mancos Formation, which is defined as the stratigraphic equivalent of 5,400 feet MD in the Regina Ranch Federal 32-1 well located in the SW/4, Section 32, Township 23 North, Range 1 West, N.M.P.M., Sandoval County, New Mexico (API#30-043-20989).

4. The initial development objective is the Mancos Niobrara C interval of the Mancos Formation. Additional targets in the Mancos Formation include the Mancos Silt, the Mancos Niobrara A, the Mancos Niobrara B and the Sanostee/Juana Lopez intervals.

5. **SJR Exhibit B-4** is a geologic write up that I prepared for a generalized description of the Mancos Niobrara oil targets for the proposed unit area.

6. **SJR Exhibit B-5** is an isopach that I prepared for the Mancos Niobrara A, B and C intervals that demonstrate continuous high resistive fine-grained sands and siltstones encased in organically rich Mancos shale throughout the proposed unit area.

7. **SJR Exhibit B-6** is a well log of the Mobil Oil Schmitz 34-3 with an accompanying core report that demonstrates the nature of the Mancos Niobrara A interval being of fine-grained sands and siltstones interbedded with organically rich Mancos Shale.

8. **SJR Exhibit B-7** is a well log of the Mobil Oil Schmitz 34-3 with an accompanying core report that demonstrates the nature of the Mancos Niobrara B interval being of fine-grained sands and siltstones interbedded with organically rich Mancos Shale.

9. **SJR Exhibit B-8** is a well log of the Mobil Oil Schmitz 34-3 with an accompanying core report that demonstrates the nature of the Mancos Niobrara C interval being of fine-grained sands and siltstones interbedded with organically rich Mancos Shale.

10. In my opinion, the approval of this unit is in the best interests of conservation, the prevention of waste and the protection of correlative rights.

11. SJR Exhibits B-4 through B-8 were either prepared by me or compiled under my direction and supervision.

FURTHER AFFIANT SAYETH NOT

RICHARD BOSHER

STATE OF COLORADO)
)
COUNTY OF _____)

SUBSCRIBED and SWORN to before me this ____ day of _____ 2022 by
Richard Boshier.

NOTARY PUBLIC

My Commission Expires:

SJR Exhibit B-4 is a geologic write up that I prepared for a generalized description of the Mancos Niobrara oil targets for the proposed unit area.

The Cretaceous Mancos interval, primarily marine shale with periods of sand and siltstone influx, is approximately 2,000' thick in the area of the proposed units Lindrith East (Deep) Unit and Regina Ranch (Deep) Unit ("Areas") in the Southeast San Juan Basin (Geology and Oil and Gas Assessment of the Mancos-Menefee Composite Total Petroleum System, J.L. Ridgley, S.M. Condon and J.R. Hatch, Chapter 4, Total Petroleum Systems and Geologic Assessment of Undiscovered Oil and Gas Resources in the San Juan Basin Province, Exclusive of Paleozoic Rocks, New Mexico and Colorado, Data Series 69-F-4, 2013, USGS). The Mancos shale was laid down as part of the Cretaceous Seaway that had influx of terrigenous sediments from highlands to the southwest. There existed a northwest to southeast shoreline that moved southwest to northeast with the rise and fall of sea-level through this time period. Within the Coniacian time interval in the southeastern portion of the basin and the Areas, there are several intervals of fine-grained sands and siltstones interbedded within the Mancos shale that form the primary targets of the Areas intended for exploration horizontal drilling. Authors in the past (A.R. Greer and R.K. Ellis, West Puerto Chiquito-U.S.A. San Juan Basin, New Mexico, AAPG Treatise Volume 5, 1991) have termed these primary targets as the Mancos Niobrara A, B and C. We follow that nomenclature as well. It is these targets that we are pursuing that are also the primary productive intervals for the large oil fields drilled to the north of the Area, East and West Puerto Chiquito Fields having produced 20 Mmbo from vertical wells and the Gavilan Field which has produced 8 Mmbo from vertical wells. To the west of the Area on the Jicarilla Reservation, 20 Mmbo have been produced from both the Mancos A, B, C and the Dakota sandstone interval. To the south of the Area at the Rio Puerco Field, 1.5 Mmbo have been produced from vertical wells. Other later authors have termed a portion of the Mancos Niobrara A, B and C, the El Vado sandstone interval (Geology and Oil and Gas Assessment of the Mancos-Menefee Composite Total Petroleum System, J.L. Ridgley, S.M. Condon and J.R. Hatch, Chapter 4, Total Petroleum Systems and Geologic Assessment of Undiscovered Oil and Gas Resources in the San Juan Basin Province, Exclusive of Paleozoic Rocks, New Mexico and Colorado, Data Series 69-F-4, 2013, USGS). These intervals are composed primarily of marine shales, fine grained sandstones and siltstones, having a lower interval transgressive sequence, rising sea level, and an upper regressive sequence, a receding sea level. During time of both transgression and regression, terrigenous sediments from the southwest have been deposited in these shallow marine environments. It is these clastic and interbedded shales that are our oil exploration targets.

Source Rock: The Upper Cretaceous Mancos interval is a rich source rock, having total organic content between 0.8% to 5.3%. Vitrinite reflectance of the Dakota interval, just below the Mancos Niobrara targets, are approximately 0.6 to 0.8 putting these targets within the oil window for hydrocarbon generation. The hydrogen index ranges between 86 to 620, expected types of hydrocarbons

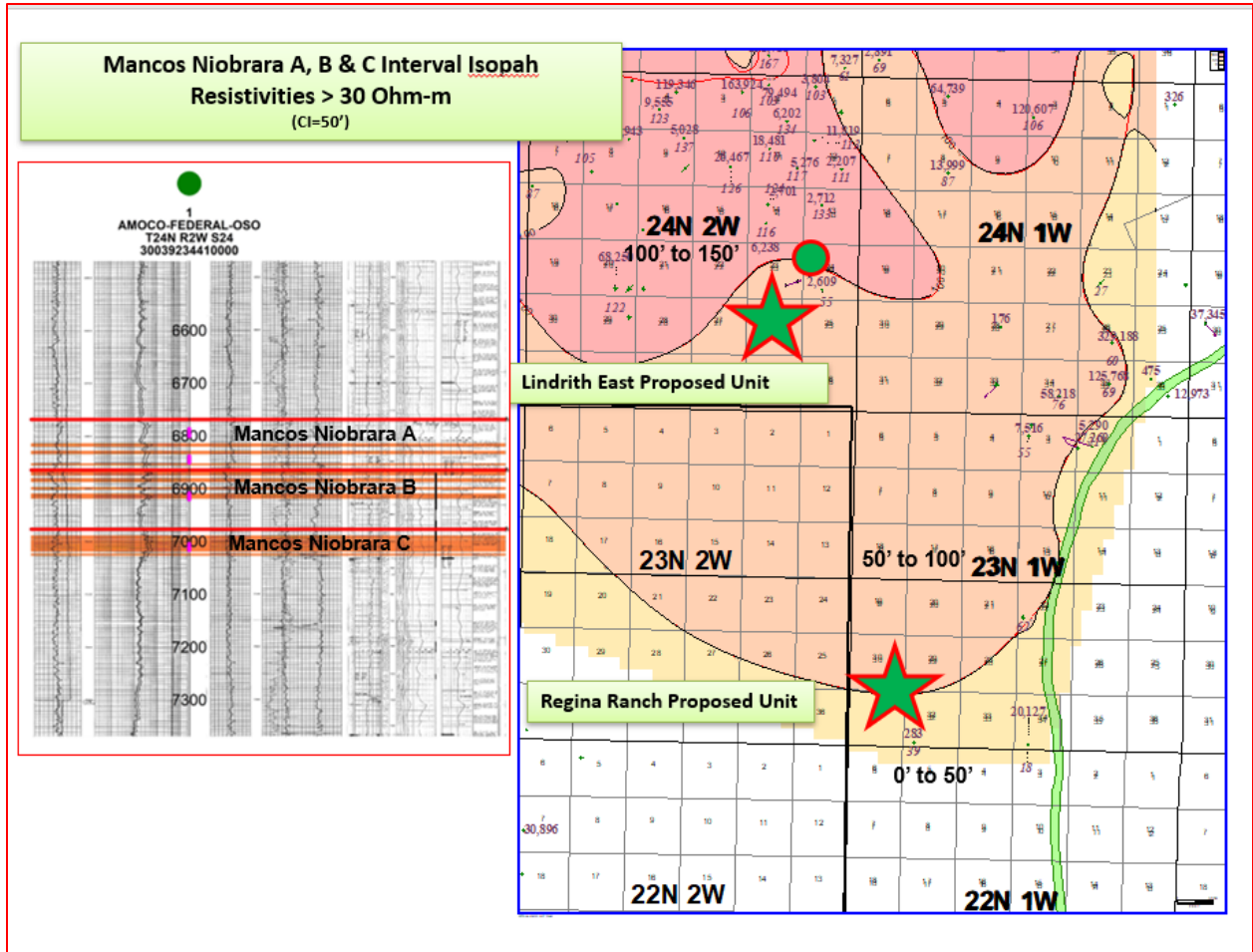
wet and / or dry gas, oil (Geology and Oil and Gas Assessment of the Mancos-Menefee Composite Total Petroleum System, J.L. Ridgley, S.M. Condon and J.R. Hatch, Chapter 4, Total Petroleum Systems and Geologic Assessment of Undiscovered Oil and Gas Resources in the San Juan Basin Province, Exclusive of Paleozoic Rocks, New Mexico and Colorado, Data Series 69-F-4, 2013, USGS).

Structure: The Mancos Niobrara intervals in the Area are relatively quiet and have very subtle dip down to the north. The area is bounded to the east by Nacimiento Uplift, where the basin rises quickly to the east and approximately 3 to 4 miles to the east of the Area the Mancos begins to outcrop. Through numerous studies, our own 2D seismic evaluation and the more modest accumulation of oil from prior vertical wells in the Area as compared to the large volumes of oil found in the highly fractured West and East Puerto Chiquito Fields to the north indicate that the Area is relatively structurally quiet. The large fractures of the fields to the north have not migrated to the south in our area and we do not expect any significant drainage of the Area from fractures to the north. It is expected that exposing the Mancos Niobrara interval in our Area (excellent vertical “oil show” wells with significant oil accumulations) to significantly more well bore with horizontal wells and modern day hydraulic fractures that we have the potential to have 500,000 bo plus estimated ultimate recovery wells similar to volumes operators to the west are finding.

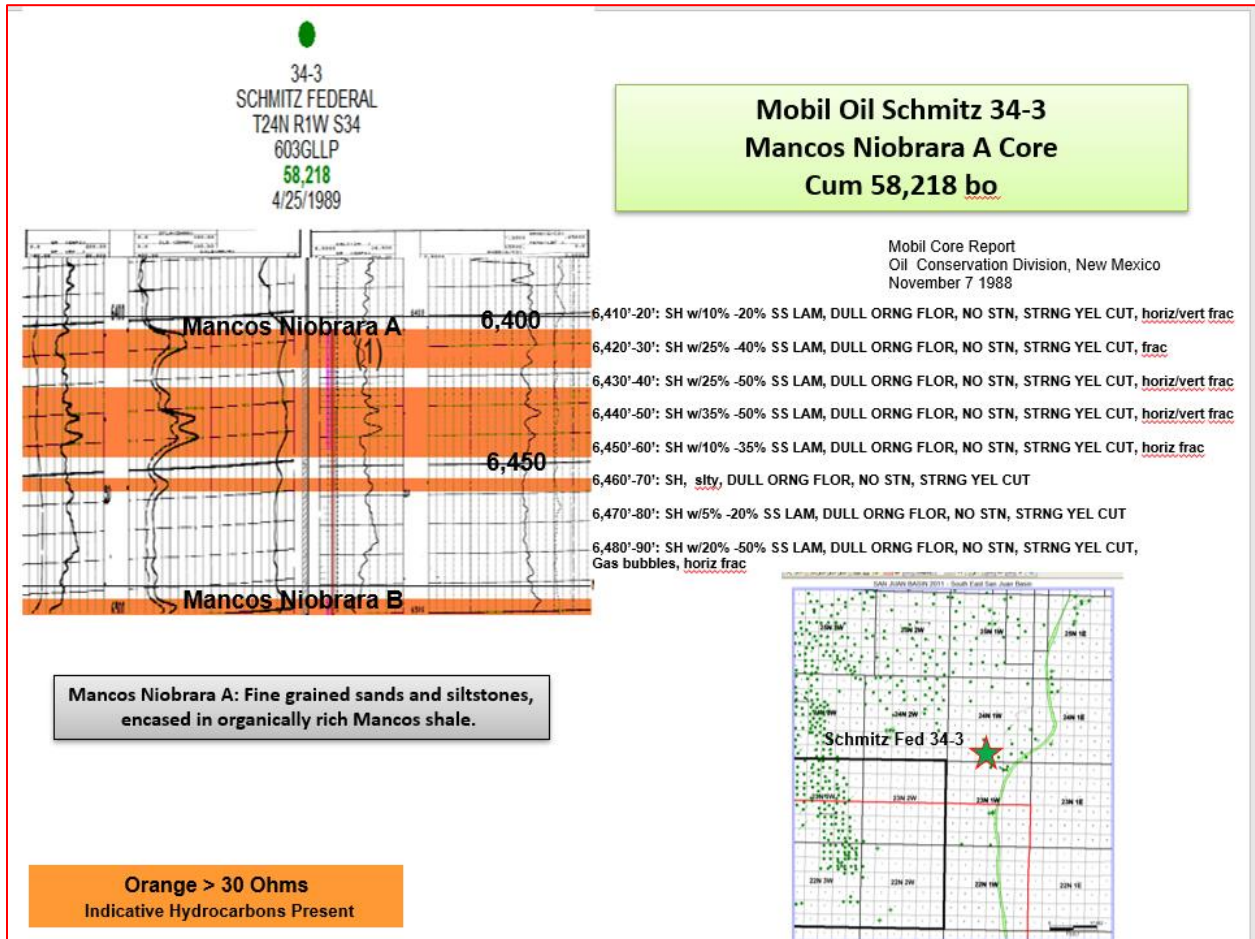
Reservoir: The fine-grained sands and silts in our area are relatively tight rocks, have low permeability and low porosities. Thickness of the Mancos Niobrara A, B and C intervals ranges between 200’ to 300’ thick in the Area. Both carbonaceous and calcareous material is found within the Mancos Niobrara sand and siltstone intervals. It is expected the calcareous material will aid in hydraulic fracturing and be conducive to higher oil productivity from the horizontal wells.

Seal: the seal for this reservoir will be the surrounding and interbedded Mancos shale. Oil had been generated and captured within these tight reservoirs and the impermeable nature of the Mancos shale provides significant vertical and lateral seals.

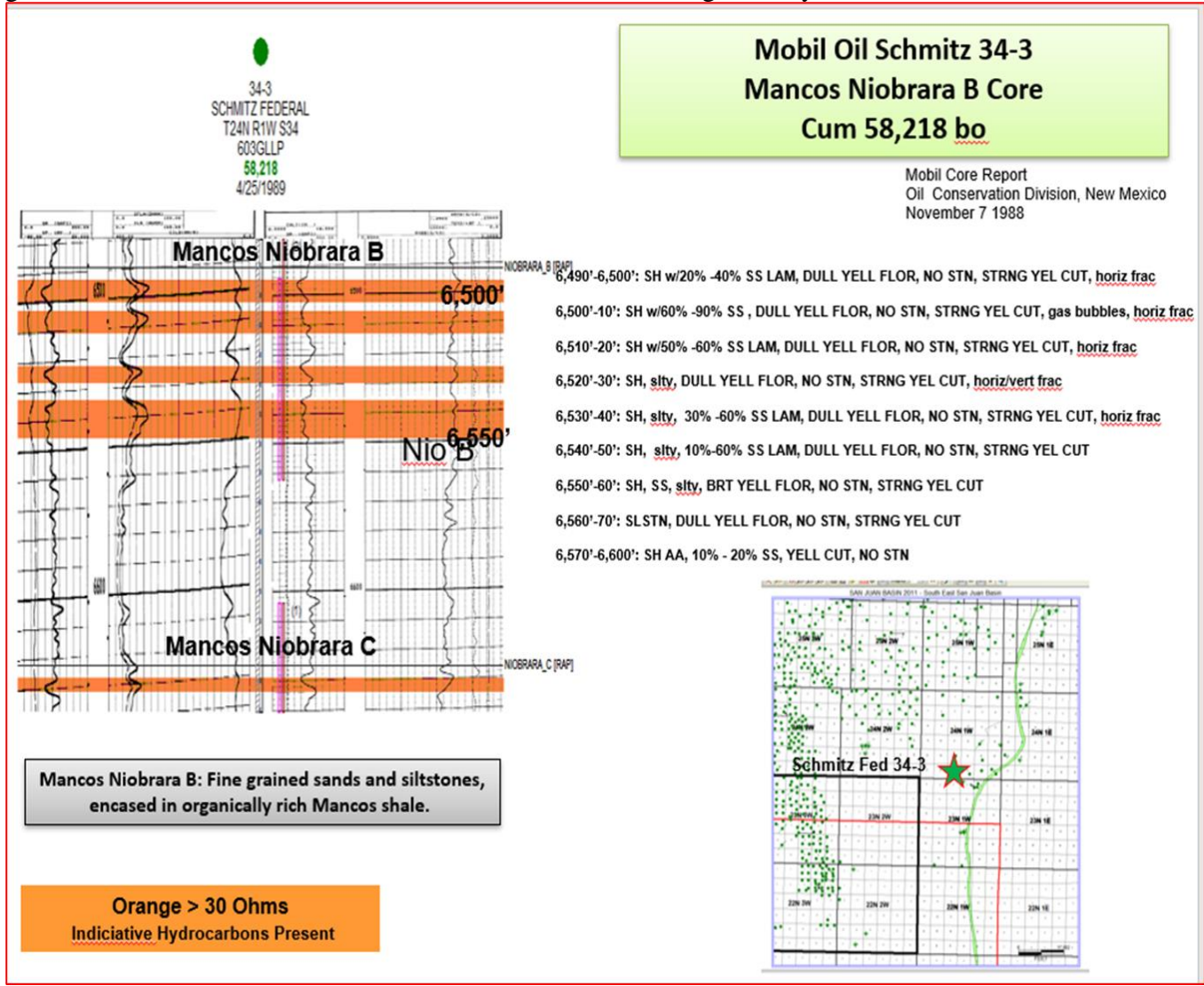
SJR Exhibit B-5 is an isopach that I prepared for the Mancos Niobrara A, B and C intervals that demonstrate continuous high resistive fine-grained sands and siltstones encased in organically rich Mancos shale throughout the proposed unit area.



SJR Exhibit B-6 is a well log of the Mobil Oil Schmitz 34-3 with an accompanying core report that demonstrates the nature of the Mancos Niobrara A interval being of fine-grained sands and siltstones interbedded with organically rich Mancos Shale.



SJR Exhibit B-7 is a well log of the Mobil Oil Schmitz 34-3 with an accompanying core report that demonstrates the nature of the Mancos Niobrara B interval being of fine-grained sands and siltstones interbedded with organically rich Mancos Shale.



SJR Exhibit B-8 is a well log of the Mobil Oil Schmitz 34-3 with an accompanying core report that demonstrates the nature of the Mancos Niobrara C interval being of fine-grained sands and siltstones interbedded with organically rich Mancos Shale.

