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RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 8A-0298875

THE APPLICATION OF OXY USA, INC. TO CONSIDER APPROVAL OF UNITIZATION AND SECONDARY RECOVERY AUTHORITY FOR THE PROPOSED WEST SUNDOWN UNIT, SLAUGHTER FIELD, HOCKLEY COUNTY, TEXAS

HEARD BY: Peggy Laird, P.G. - Technical Examiner
Laura Miles-Valdez - Hearings Examiner
Jennifer Cook - Administrative Law Judge

PREPARED BY: Peggy Laird, P.G. - Technical Examiner
Ryan M. Lammert - Administrative Law Judge

HEARING DATE: January 21, 2016

CONFERENCE DATE: March 29, 2016

APPEARANCES:	**REPRESENTING:**
John Soule	OXY USA, INC.
Vishal Gupta	
Aaron Edwards	
Felicitas Kaiser	
Dean Donckels	
Zachery West, Jr.	
Robbie Abraham	

EXAMINER'S REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

OXY USA, INC. ("OXY") requests Commission authority for the unitization of the proposed West Sundown Unit ("Unit") in the Slaughter Field ("Field"), Hockley County, Texas, and approval of enhanced recovery through continued waterflood operations (secondary recovery), and initiation of a CO_2 flood (tertiary recovery) on the Unit. The application is unprotested and the Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend approval of the authority for unitization and approval of enhanced recovery operations on the Unit.

Notice of the application was published in the *Levelland & Hockely County News-Press*, a newspaper of general circulation in Hockley County, on December 9, 16, 23, and 30, 2015. Notice of the application and notice of the hearing were served on the working interest owners, royalty interest owners, surface owner, offset operators, and overriding royalty interest owners. A unit agreement has been ratified by 100 percent of the working interest owners and is in the process of being ratified by royalty interest owners, currently with 95 percent approval. There are no state owned lands within the proposed Unit.

DISCUSSION OF EVIDENCE

OXY recently acquired the operation of wells in the Field from BEPCO, L.P. The former operator had implemented waterflooding by lease, and had elected not to unitize. After review of the underlying San Andres Formation, OXY concluded a CO_2 flood could reverse the decline in hydrocarbon production, resulting in significant additional reserves.

The proposed Unit is located in the Slaughter Field, Hockley County, Texas, and consists of 23 tracts containing approximately 4,000 total acres. (Reference is made to the attached Maps and Table.) There are currently 127 producing wells, 61 active injection wells, and 29 shut-in wells within the Unit boundaries. Many of the shut-in wells have injection permits, but are not active injection wells at this time. OXY understands existing injection permits need to be amended to include authority to inject CO_2.

The oil and gas produced from the Field contains H_2S, and current operations are in compliance with Statewide Rule 36. Initiation of the planned CO_2 flood will require revision and approval of applicable Forms H-9 and contingency plans to ensure continued compliance with SWR 36.

The proposed Unit is surrounded by existing units and one lease in the Field. The tracts in the Unit and the offset Mallet A Lease have all been approved for secondary recovery waterflood operations. The offset units have also been approved for unitization and secondary waterflood operations. Several of the offset units and other units in the Slaughter Field have been approved for CO_2 flood operations and have active CO_2 injection.

OXY owns and operates the offset 2,800-acre Mallet A Lease ("Mallet"), which is being waterflooded on a lease basis. As a result of the relatively poor porosity and permeability, the Mallet has experienced poor waterflood performance and OXY determined it is a poor candidate for a CO_2 flood. Because of Mallet's unsuitability for a CO_2 flood, OXY would not execute the Unit Agreement as 100% working interest owner of the lease. Therefore, the Mallet will not qualify for inclusion in the Unit under the Tract Qualification provisions of the Unit Agreement. OXY met with the lessor/royalty owners under the Mallet A Lease to advise them of the reasons for not including the Mallet in the Unit. OXY stated that the lessor/royalty owners understood and had no objection. They

were sent notice of hearing and none appeared at the hearing. OXY indicated that if a CO_2 flood becomes feasible on the Mallet in the future, the Mallet is large enough to support its own CO_2 flood and facilities.

The Unit Agreement has been executed or ratified by 100% of the working interest ownership and 95% of the royalty interest ownership. OXY anticipates 100% or near 100% royalty-interest sign-up before unit operations begin. There are no State lands within the Unit boundaries.

The Unit participation formula has two phases. Phase I is based 100% on waterflood reserves estimated for the time period from 2015 to 2019. The Phase I formula will be in effect until 1.75 million barrels of oil (BO) have been produced after initiation of Unit operations, and 10 billion cubic feet of CO_2 have been injected. Phase II accounts for both the expected waterflood reserves and the expected recovery from CO_2 injection, which is directly proportional to the initial Hydrocarbon Pore Volume (HCPV). The Phase II formula is weighted 50% on waterflood reserves estimated from the year 2020 onward, and 50% on HCPV. OXY contracted with the Ryder Scott Company, L.P. who performed an independent analysis that confirmed the accuracy of the waterflood reserves and the HCPV calculations. The participation formula was also confirmed by Ryder Scott as a fair and reasonable basis for allocating Unit production among the various tracts in the Unit.

The proposed Unitized Formation is that subsurface portion of the unit area commonly known as the San Andres Formation. It is defined in the Unit Agreement as the "continuous stratigraphic interval occurring between the top of the San Andres Formation and the top of the Glorieta Formation, and which is the same formation, the top of which was penetrated at 4,088 feet measured depth in Amoco Production Company's M.R. Barry No. 10, located 1,339 feet from the North and 440 feet from the West lines, Labor 46, League 39, Maverick CSL Survey, Hockley County, Texas, as shown on the Schlumberger Compensated Neutron Log of said well dated January 8, 1983. The base of the above described San Andres Formation is the top of the Glorieta Formation as correlated from OCCIDENTAL PERMIAN LTD.'s Slaughter Consolidated No. 111 located 440 feet from the North and 515 feet from the West lines of Labor 2, League 40, Maverick CSL Survey, Hockley County, Texas, as shown on the Schlumberger Three Detector Lithodensity/Compensated Neutron/Special Gamma Ray log of said well dated July 22, 2004, at a depth of 5,557 feet measured depth."

During primary production, about 10-12% of the original oil in place (OOIP) is produced. Waterflood operations typically result in the recovery of an additional 30% of the OOIP. OXY reported that cumulative production from wells on the Unit is about 95 million BO as a result of primary and secondary operations. Current production is approximately 1,100 barrels of oil per day (BOPD). OXY estimates the remaining recovery as a result of waterflood operations would be about 8.3 million barrels of oil equivalent, including oil, gas, and natural gas liquids.

OXY plans to initiate tertiary recovery by means of a CO_2 flood on the Unit to produce additional reserves and extend the life of the Field. The technology has been proven in surrounding units and OXY reported that a CO_2 flood in the Field typically results in the recovery of an additional 15% of the OOIP. The initial CO_2 used will be purchased sweet CO_2 and excess sour CO_2 that is produced from other mature CO_2 floods in the Slaughter Field. OXY stated in the subject hearing that anthropogenic CO_2 will not be used for the CO_2 floods.

As explained by OXY, a CO_2 flood is a multi-step process whereby CO_2 is injected and then followed by water-alternating-gas injection (WAG). The injected CO_2 mixes with the oil, and creates a miscible zone which decreases the viscosity of the oil and allows it to flow more easily to producing wells. The injection of CO_2 improves sweep efficiency by contacting more hydrocarbon-filled pore space within the reservoir. Continued water injection helps sweep the oil to producing wells. Employing the WAG method results in the retrieval of additional hydrocarbons not recoverable by waterflooding alone. Based on its experience in the Field with CO_2 floods, OXY estimates 32 million barrels of oil equivalent may be recovered.

OXY estimates the value of the recovered hydrocarbons obtained from the CO_2 flood is $1,221 million. The incremental capital and operating costs of the CO_2 flood will be approximately $742 million, resulting in incremental revenue of $479 million.

FINDINGS OF FACT

1. Notice of hearing was sent to all working interest owners, royalty interest owners and other mineral interest owners within the Unit and all operators in tracts offsetting the Unit at least ten days prior to the hearing. There are no offset unleased mineral interests.

2. Notice of the application was published in the *Levelland & Hockely County News-Press*, a newspaper of general circulation in Hockley County, for four consecutive weeks (December 9, 2015, December 16, 2015, December 23, 2015, and December 30, 2015.

3. The proposed Unit consists of 23 tracts which contain approximately 4,000 acres.

4. OXY and participating working interest owners operate all wells within the Unit boundaries.

5. The Unit Agreement has been executed or ratified by 100% of the working interest ownership and 95% of the royalty interest ownership.

6. The Slaughter Field produces from the San Andres Formation.

7. The proposed Unitized Formation is that subsurface portion of the unit area commonly known as the San Andres Formation, and is the correlative interval occurring between the top of the San Andres Formation at 4,088 feet in the Amoco Production Company, M.R. Barry No.10 (API# 42-219-33677) Labor 46, League 39, Maverick CSL Survey, Hockley County, Texas, and the top of the Glorieta Formation at 5,557 feet in the Occidental Permian LTD, Slaughter Consolidated No.111 (API# 42-219-36738), Labor 2, League 40, Maverick CSL Survey, Hockley County Texas.

8. Tertiary recovery by water-alternating-gas (CO_2) injection is a multi-step process that will produce substantial additional volumes of oil that are not recoverable solely through secondary recovery waterflood methods.

   a. Injected CO_2 will mix with oil, creating a miscible zone and decreasing the viscosity of the oil allowing it to flow more easily to producing wells.

   b. The injection of CO_2 will improve sweep efficiency.

   c. Continued water injection helps sweep the oil to producing wells.

9. The cumulative recovery from wells within the proposed unit is about 95 million BO. OXY estimates the remaining recovery as a result of waterflood operations would be about 8.3 million barrels of oil equivalent, including oil, gas, and natural gas liquids. Based on its experience in the Field with CO_2 floods, OXY estimates 32 million barrels of oil equivalent will be recovered.

10. The expected incremental revenue from the CO_2 flood is $479 million. The estimated revenue of the recovered hydrocarbons obtained from the CO_2 flood is $1,221 million. Incremental capital and operating costs of the CO_2 flood will be approximately $742 million.

11. The participation formula includes two phases.

    a. The Phase I formula is based 100% on waterflood reserves for the years 2015 to 2019.

    b. The Phase I formula will be in effect until 1.75 million BO have been recovered and 10 billion cubic feet of CO_2 have been injected.

    c. The Phase II formula is based 50% on waterflood reserves from the year 2020 onward and 50% hydrocarbon pore volume.

12. The enhanced recovery project will not be successful unless the proposed area is unitized.

13. The Unit Agreement or ratifications of the Unit Agreement were voluntarily executed by all parties affixing their signatures thereto and no person has been compelled or required to enter into the agreement. The Unit Agreement binds only those persons who have executed it, their heirs, successors, assigns and legal representatives. The rights of all owners of interests in the field will be protected under the operation of the Unit, regardless of whether an owner signed the Unit Agreement.

14. All owners of interests in the oil and gas under each tract of land within the Unit have been given an opportunity to enter into the Unit on the same yardstick basis.

15. The Unit area has been reasonably defined by development. The entire Unit area is productive in the Slaughter Field.

16. The Mallet A Lease is the only tract offsetting the proposed Unit that was not made an offer to participate and is not already included in a unit in the Slaughter Field.

    a. An offer was not made to the lessor/royalty interest owners of the Mallet A Lease because OXY determined the tract is not suitable for a flood at this time, and the tract would not qualify for inclusion in the Unit.

    b. Mallet A Lease lessors/royalty owners have no objection to exclusion of the Mallet A Lease from the Unit.

17. The proposed CO_2 flood will move hydrocarbons across lease lines, and unitization is necessary in order to protect the correlative rights of the various interest owners.

18. The Unitization Agreement is necessary to accomplish establishing a unit to effect enhanced recovery operations for continued waterflood operations and for CO_2 flood operations to be initiated and to operate cooperative facilities necessary thereto. Other available or existing methods or facilities for enhanced recovery operations are inadequate for the purpose of the planned operations.

19. The Unit Agreement does not provide, either directly or indirectly, for the cooperative refining or marketing of crude petroleum, distillate, condensate, or gas, or any by-product thereof.

20. The Unit Agreement is subject to all valid orders, rules and regulations of the Railroad Commission.

21. The Unit Agreement contains no provision regarding the field rules, nor does it limit the amount of production of oil and gas from the unitized area. The Unit Agreement does not release the operator from its obligation to reasonably develop lands or leases as a whole.

22. The Unit Agreement is a voluntary agreement entered into for the purpose of conducting enhanced recovery operations, specifically continued waterflood operations and a CO_2 flood.

23. The Unit Agreement does not provide for the location of wells.

24. There are no state-owned lands in the proposed Unit.

25. The Unit Agreement is in the interest of public welfare as being reasonably necessary to prevent waste and to promote conservation.

26. The reservoir described in the Unit Agreement is identified as a single reservoir for Commission purposes and is a suitable reservoir for a enhanced recovery operations, including continued water injection and planned future CO_2 injection.

27. The Unit Agreement contains only the acreage reasonably necessary to accomplish the proposed enhanced recovery project.

28. Tanks on the tract will be gauged to allocate production to wells on tracts for which 100% sign-up was not achieved.

CONCLUSIONS OF LAW

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. Tex. Nat. Res. Code § 81.051

2. All notice requirements have been satisfied. 16 Tex. Admin. Code § 1.45

3. Applicant's proposed enhanced recovery project satisfies all of the requirements set out in Tex. Nat. Res. Code Ann. §§101.001-052.

4. Approval of the proposed unit agreement and enhanced recovery operations is in the public interest and is necessary to prevent waste and to promote the conservation of oil or gas or both.

RECOMMENDATION

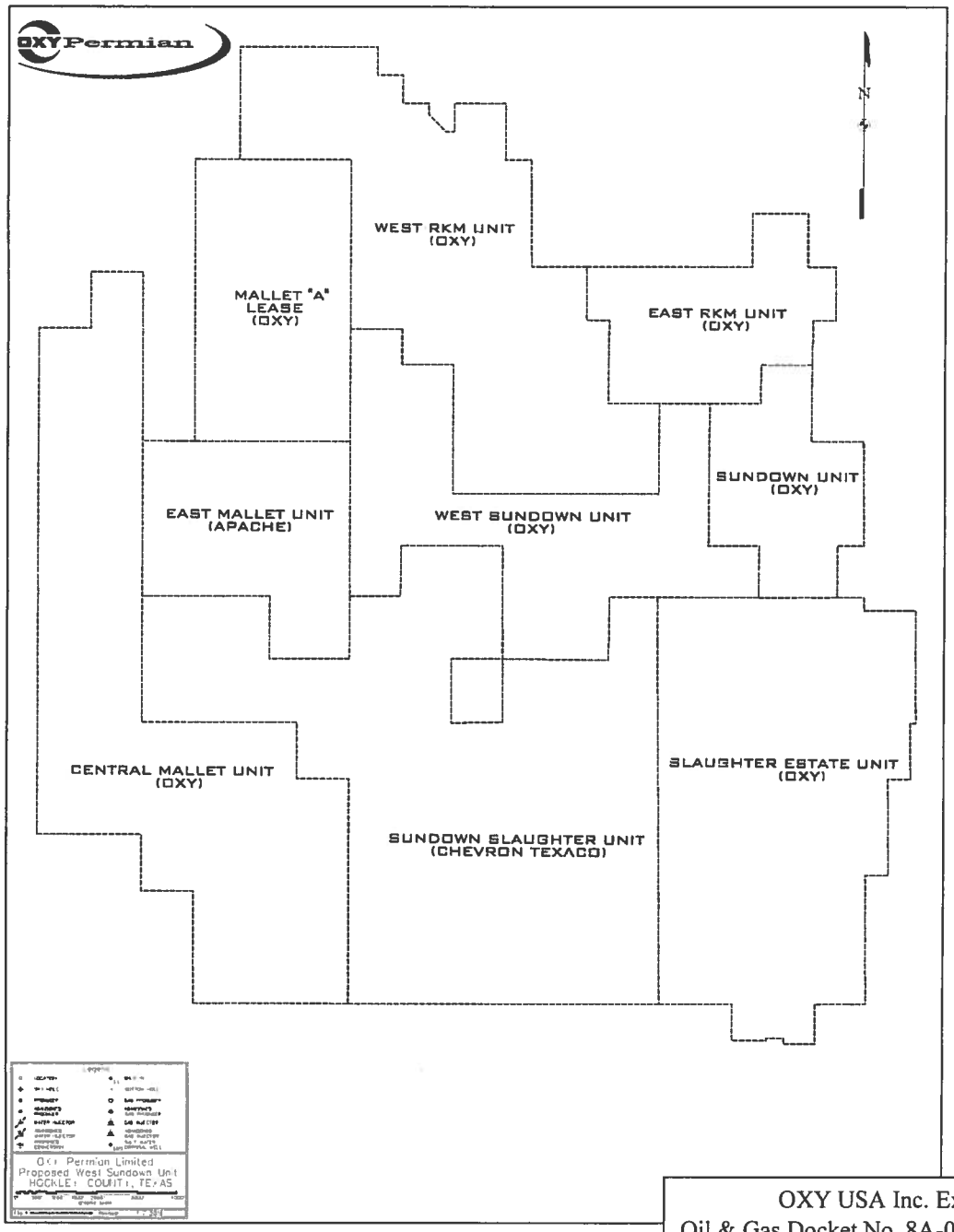
Based on the above findings of fact and conclusions of law, the Examiners recommend approval of the proposed West Sundown Unit and enhanced recovery operations.

Respectfully submitted,

Peggy Laird
Technical Examiner

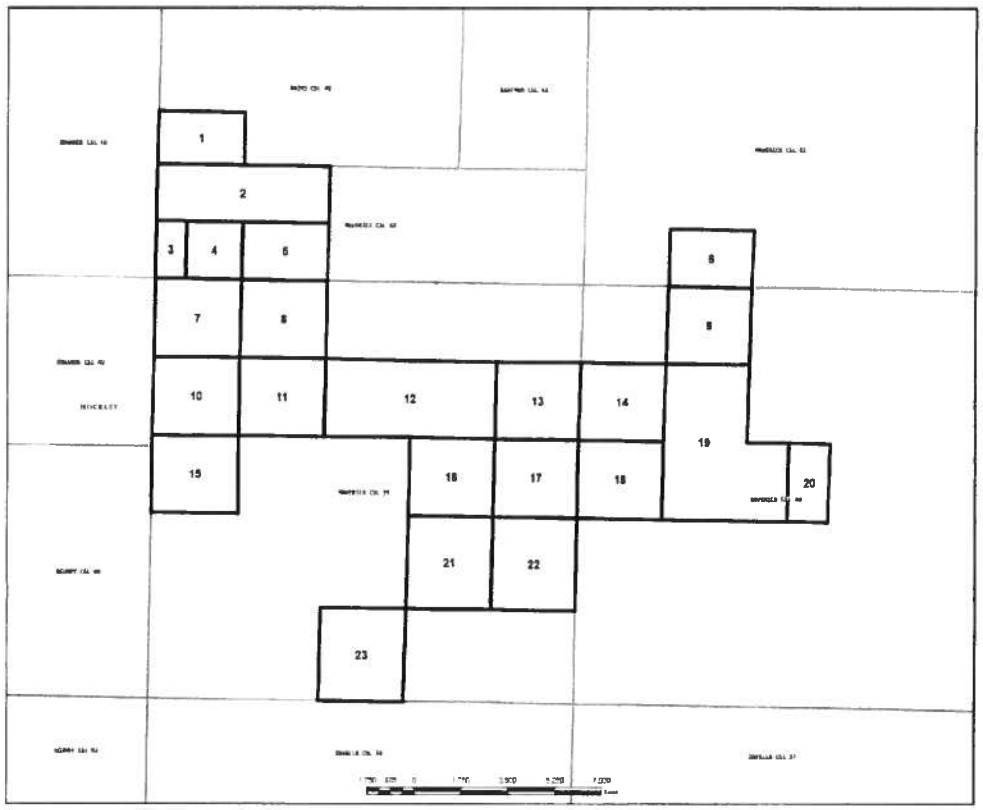
Ryan M. Lammert
Administrative Law Judge

Exhibit 1 – Map of West Sundown Unit



OXY USA Inc. Ex. No. 1
Oil & Gas Docket No. 8A-0298875
January 21, 2016

Exhibit 1 – Map of West Sundown Unit with Tracts



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West Sundown Unit Tract Reconciliation

Unit Tract No.	Tract Name	Operator	RRC Lease Name	RRC Lease ID#
1	Slaughter Unit #2 Tract 1	OXY USA Inc.	Slaughter Unit "2"	60048
2	Slaughter Unit #2 Tract 2	OXY USA Inc.	Slaughter Unit "2"	60048
3	Slaughter Unit #2 Tract 3	OXY USA Inc.	Slaughter Unit "2"	60048
4	Slaughter Unit #2 Tract 4	OXY USA Inc.	Slaughter Unit "2"	60048
5	Slaughter Unit #2 Tract 5	OXY USA Inc.	Slaughter Unit "2"	60048
6	Slaughter 20	OXY USA Inc.	Slaughter (San Andres) Tr. 20	60283
7	RL Slaughter C	OXY USA Inc.	Slaughter, R.L. Jr. "C"	06012
8	CNB (Morning Star)	Cross Timbers Energy, LLC	Citizens National Bank	06138
9	Slaughter 33	OXY USA Inc.	Slaughter, R.L. Jr. Tr. 33	16501
10	MR Barry	Occidental Permian Ltd.	Barry, M.R.	06027
11	Barry Unit	OXY USA Inc.	Barry Unit	19519
12	Slaughter B Tr 43 & 44	OXY USA Inc.	Slaughter, S.A. "B"	06014
13	Slaughter B Tr 42	OXY USA Inc.	Slaughter, S.A. "B"	06014
14	Sun Denton	OXY USA Inc.	Sun-Denton	06015
15	RL Slaughter 47	OXY USA Inc.	Slaughter, R.L. Jr. Tr. 47	06005
16	RA Hefner	OXY USA Inc.	Hefner, R.A.	05909
17	MH Davis	Occidental Permian Ltd.	Davis, M.H.	06034
18	Slaughter B Tr 52	OXY USA Inc.	Slaughter, S.A. "B"	06014
19	Coe	OXY USA Inc.	Coe, A.E.	06008
20	Pirkle	OXY USA Inc.	Pirkle Unit	19748
21	Slaughter Unit #1	OXY USA Inc.	Slaughter Unit "1"	19882
22	Town Lot Unit	OXY USA Inc.	Town Lot Unit	19883
23	LL Lauhoff	OXY USA Inc.	Lauhoff, L.L.	19699