



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL & GAS DOCKET NO. 02-0297905, et al.

THE APPLICATIONS OF HILCORP ENERGY COMPANY PURSUANT TO 16 TEX. ADMIN. CODE §3.46 FOR PERMITS TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS, WEST RANCH -A- LEASE, WELL NUMBERS 1061, 1013, 1037, 1038, 1062, 1010, 1036, 1060, 1007, 1035 & 1004, WEST RANCH (41-A & 98-A CONS.) FIELD, JACKSON COUNTY, TEXAS

PROPOSAL FOR DECISION

HEARD BY: Peggy Laird, P.G. – Technical Examiner
Marshall F. Enquist – Administrative Law Judge

PREPARED BY: Brian Fancher, P.G. – Technical Examiner

APPEARANCES:

APPLICANT:

Bill Hayenga
Abel Salazar
Jay King
Jill Fisk

REPRESENTING:

Hilcorp Energy Company

PROTESTANTS:

Tony Williams

REPRESENTING:

Industrial Independent School District

PROCEDURAL HISTORY

Application Published:	May 13 or May 20, 2015
Application Filed:	August 25, 2015
Protest Received:	May 21, June 2 and July 14, 2015
Request for Hearing:	August 17, 2015

Notice of Hearing:	September 16, 2015
Hearing Held:	November 17 and November 20, 2015
Transcript Received:	December 01, 2015
Record Closed:	March 9, 2016
Proposal for Decision Issued:	April 25, 2016

STATEMENT OF THE CASE

The Technical Examiner and Administrative Law Judge's (collectively "Examiners") Proposal For Decision is made of the following oil and gas docket numbers: 02-0297905; 02-0297906; 02-0297907; 02-0297908; 02-0297909; 02-0297910; 02-0297911; 02-0297912; 02-0297913; 02-0297914; and 02-0297915. The Examiners granted the motion to consolidate the above-named dockets into Oil & Gas Docket No. 02-0297905, et al. due to the common facts and parties of the cases.

Hilcorp Energy Company ("Hilcorp" or "Applicant") seeks authority to inject produced water and carbon-dioxide ("CO₂") into its West Ranch -A- Lease (the "Subject Lease"), Well Nos. 1061, 1013, 1037, 1038, 1062, 1010, 1036, 1060, 1007, 1035 and 1004 ("Subject Wells"), respectively, pursuant to Statewide Rule 46 [16 Tex. Admin. Code §3.46]. The Subject Lease is composed of roughly 11,582-acres. Collectively, Hilcorp proposes to inject 220,000 barrels of produced water per day (20,000 barrels of water per day per well) and 275,000,000 cubic feet of CO₂ per day (25,000,000 cubic feet of CO₂ per day per well) into the Frio Formation from 5,750 to 6,300 feet (collectively, "Subject Application").

The Subject Application was originally protested by Phere Operating, Inc. ("Phere"), Texana Groundwater Conservation District ("Texana"), and Industrial Independent School District ("Industrial"). There were no other submissions expressing an interest in the Subject Application. On September 16, 2015, notice of the hearing was sent to all persons who expressed an interest, in writing, in the Subject Application; this included Hilcorp, Phere, Texana and Industrial ISD. The hearing was held on November 17 and November 20, 2015.

Texana, Industrial, and Phere submitted letters of protest in opposition of the Subject Application on May 21, June 2, and July 14, 2015, respectively. No persons on behalf of Texana and Phere participated in the hearing for the Subject Application. Mr. Tony Williams, Superintendent of Industrial, was the only person to appear at the hearing to protest the Subject Application. Therefore, Industrial is the only party of record to appear at the hearing against the Subject Application.

Industrial protests the Subject Application due to concerns related to public safety and protection of groundwater. Industrial ISD's concerns are as follows: (1) that there be sufficient due diligence regarding the roughly 700 existing wells in the Subject Field; (2) that sufficient groundwater monitoring of the area be performed by a third-party; and (3) that a mitigation plan be established by Hilcorp, should the existing groundwater be negatively impacted.¹

¹ Tr., Vol. I., Pgs. 24 - 28.

By letter dated November 17, 2015, State Representative Phil Stephenson submitted a list of requirements that Texana would like to see incorporated into any permits resulting from the Subject Application. The list includes the following that: (1) Hilcorp develop, maintain, and share inventories of oil wells and water wells located on the field as specified by Texana; (2) Hilcorp monitor and report all groundwater production on the well field; (3) Hilcorp provide access to a water well monitoring network acceptable to Texana (near the perimeter of the well field, completed down to the base of usable quality water); (4) Hilcorp utilize tracer chemicals in all injected fluids as specified by Texana; (5) Hilcorp reimburse Texana for the costs associated with monitoring and assessing the groundwater conditions of the Subject Field; and (6) Hilcorp provide copies of the records associated with (a) well integrity testing and monitoring, (b) formation pressure monitoring, and (c) plugged or abandoned well(s).

DISCUSSION OF THE EVIDENCE

Statewide Rule 46 (“SWR 46”)

Generally, SWR 46 requires that a permit be approved prior to conducting fluid injection operations in a reservoir productive of oil, gas, or geothermal resources. An applicant is required to file its injection application with the Railroad Commission of Texas’ (“Commission”) Austin office, as well as supply a copy to affected persons who include: (1) the owner of record of the surface tract on which the well is located; (2) each commission-designated operator of any well located within one-half mile of the proposed injection well; (3) the county clerk of the county in which the well is located; and (4) the city clerk or other appropriate city official of any city where the well is located within the corporate city limits of the city.² In addition, notice of each injection application is required to be published once by the applicant in a newspaper of general circulation for the county where the injection well will be located.

Applicant’s Direct Evidence (Hilcorp)

Salazar’s Supporting Testimony

Mr. Abel Salazar, a Staff Reservoir Engineer at Hilcorp, testified as an expert reservoir engineer on behalf of Hilcorp.³

General Background

Hilcorp submitted a copy of an open-hole well log performed in the West Ranch -A-, Well No. 600 (“Type Log”).⁴ The purpose of that Type Log is to provide a general understanding as to the petropysical nature of the geologic formations that make-up the subject field. Mr. Salazar testified that the Greta, Glasscock, Ward, 41-A and 98-A Formations are the targets of Hilcorp’s overall CO2 project. However, the Subject Application aims only at the 41-A and 98-A Formations.⁵

² 16 Tex. Admin. Code §3.46(c) (“Notice and opportunity for hearing”).

³ Tr., Vol. I, Pgs. 32 – 81.

⁴ Hilcorp Exh. B and Exh. C.

⁵ Tr., Vol. I, Pg. 35.

Hilcorp submitted a copy of the existing field rules that govern the subject field.⁶ Those field rules provide as follows: (1) a designated correlative interval; (2) oil and gas well minimum spacing requirements; (3) oil and gas well minimum acreage requirements; and (4) a capacity allowable for all wells in the field. Noteworthy, the subject field is defined as the correlative interval from 5,708 feet to 6,265 feet, as shown on the log of the Hilcorp Energy Company, West Jackson Ranch -A- 600 Well (API No. 42-239-33580) (“WRA No. 600”) of the Ramon Musquiz Survey (A-19), Jackson County, Texas.

Hilcorp submitted a copy of Oil and Gas Final Order 02-0295336, et al. – Application of Hilcorp Energy Company for Authority Pursuant to Statewide Rule 46 for the West Ranch -A- Lease, Well Nos. 1129, 1144, 1133, 1139, 1089, 1136, 1131, 1104, 1149, 1126, 1115 and 1127 (“Initial Injection Wells”).⁷ That Final Order granted Hilcorp authority to inject produced water into the Initial Injection Wells in the injection interval between 5,050 to 6,339 feet below the Subject Lease.

Hilcorp submitted a copy of the November 2015 Oil and Gas Proration Schedules for the subject field.⁸ Those proration schedules indicate that Hilcorp is the only operator of record in the subject field.

Development Plan

Hilcorp submitted a graph entitled, “Production History; West Ranch Field Performance” to show the variations in oil, gas and water production rates from the subject field between 1957 and 2015.⁹ Mr. Salazar testified that oil production peaked at about 52,000 barrels per day (“bpd”) in 1970 and subsequently entered a natural decline.¹⁰ Since 1970, the field has undergone waterflood operations. Today, the subject field produces around 300 bpd of oil. He testified that although the field is more or less near the end of its economic life, there is plenty remaining oil to be recovered; and, the way to recover that remaining oil is through CO₂ injection.

Hilcorp intends to utilize CO₂ injection in the subject field for approximately 20 years. Hilcorp plans to successively incorporate a total of 114 CO₂ injection patterns, or injection wells, on the Subject Lease through the year 2020.¹¹ Mr. Salazar testified that Hilcorp plans to begin drilling roughly 48 wells per year through the year 2020. In other words, he testified that by the end of Hilcorp’s development plan for the Subject Lease, it will include 158 injection wells and 164 production wells. Each of those wells will be newly drilled.¹² He testified that Hilcorp plans to begin its planned CO₂ flood in the middle of the subject field because that’s where the highest oil in place resides. He stated that Hilcorp intends to raise the field’s reservoir pressure to 2,700 pounds per square inch (“psi”) in order to reach minimum miscibility to liberate the

⁶ Hilcorp Exh. D.

⁷ Hilcorp Exh. E.

⁸ Hilcorp Exh. F.

⁹ Hilcorp Exh. No. 4.

¹⁰ Tr., Vol. I., Pg. 43, L. 14.

¹¹ Hilcorp Exh. No. 5.

¹² Tr., Vol. I., Pg. 49.

remaining oil in place. Thereafter, Hilcorp plans to maintain that reservoir pressure to maximize recovery from the field.

Hilcorp presented a “pressure profile” of the Subject Field based on downhole pressure measurements taken from a single well, the WRA No. 600.¹³ That profile eclipses 30 zones that span from roughly 3,050 to 6,400 feet in that well. Mr. Salazar testified that he used a methodology called repeat formation tester (“RFT”) to construct the profile. Based on that exhibit, the reservoir pressures alternate from low pressures to higher pressures between those 30 zones. Therefore, those 30 zones are not in pressure communication.¹⁴ He testified that pressure profile is representative of the field beneath the Subject Lease. He also testified that the lack of equalization across the entire profile indicates that geologic confinement is present between those intervals.¹⁵ Thus, the Subject Application’s proposed injection interval contains adequate confinement.¹⁶

Fisk’s Supporting Testimony

Ms. Jill Fisk, the Asset Team Leader for Hilcorp’s Central Texas Assets, testified on behalf of Hilcorp.¹⁷

For each of the Subject Wells, Ms. Fisk provided the following:

- Proposed completion data and schematic for the Subject Well;
- The injection permit application for the Subject Well (Forms H-1 and H-1A);
- Maps showing the quarter-mile radius for the Subject Well showing all wells in that area;
- A summary list of the wells within a quarter-mile radius for each Subject Well;
- Commission records concerning the plugging status of each plugged well within the quarter-mile radius of the Subject Well that penetrates the proposed injection interval;
- A letter from the Commission Groundwater Advisory Unit designating the base of usable-quality of water at the proposed location for the Subject Well;
- A half-mile radius plat showing there are no other offset operators within a half-mile of the Subject well;
- A Certificate of Notice that the application for the Subject Well was provided to the County Clerk of Jackson County, Texas;
- A Certificate of Notice that the application for the Subject Well was provided to the surface owner (Hilcorp);
- A Publisher’s Affidavit from the newspaper that published notice of permit application and a copy of the newspaper publication;
- A United States Geological Survey earthquake survey of the area showing no earthquake activity;
- The Commission permit to drill the Subject Well;

¹³ Hilcorp Exh. No. 8.

¹⁴ Tr., Vol. I., Pg. 69, L. 19.

¹⁵ Tr., Vol. I., Pg. 72.

¹⁶ *Id.*

¹⁷ Tr., Vol. I., Pgs. 82 - 181.

Proposal for Decision

- The letter from the Commission Oil and Gas Division with a determination that the application for the Subject Well is administratively complete but it cannot be approved due to protests received; and
- The Notice of Hearing and Service List for the hearing in this case.¹⁸

Notice of Application

Hilcorp is the surface owner of the Subject Lease. Hilcorp provided a copy of the Subject Application to the Jackson County Clerk on June 24, 2015, or July 6, 2015. A copy of the Subject Application was published in *The Jackson County Herald-Tribune*, a newspaper of general circulation in Jackson County, on Wednesday, May 13, 2015, or Wednesday, May 20, 2015.¹⁹

Usable Quality Water

Ms. Fisk testified that the current base of usable quality water (“BUQW”) occurs at 1,450 feet below the surface location of the Subject Wells, and that the BUQW was determined by the Commission’s Underground Water Advisory Unit.

The Wells (Casing, Cementing and Completion)

The Subject Wells are planned to be drilled in the near future. Ms. Fisk testified that each well’s design includes 10 ¾” surface casing set at a depth of 2,600 feet and cemented to surface with ~1,400 sacks of cement. Each well will have 7” production casing set at 6,500 feet and cemented to surface with ~1,600 sacks of cement. The proposed injection will be at a maximum injection pressure of 2,875 psig through 3 ½” specialized tubing set at about 5,700 feet. She testified that the purpose of the Subject Wells is for non-commercial use to inject CO₂ and produced water into the proposed injection interval.²⁰

Area of Review for Historical Earthquakes

Hilcorp performed the requisite review of USGS records for historical earthquakes around each of the Subject Wells. That area composes nine kilometers around each Subject Well. Ms. Fisk testified that no recorded earthquake activity was identified within nine kilometers around each of the Subject Wells.²¹

Areas of Review (AORs)

Hilcorp performed a review of each Commission-regulated well (*e.g.* production wells) located within the ¼-mile and ½-mile radii of each Subject Well’s proposed location. Hilcorp is the only operator of wells inside ½-mile of the Subject Wells’ proposed locations.

¹⁸ Hilcorp Exh. Nos. 9 – 19.

¹⁹ *Id.*

²⁰ Tr., Vol. I., Pg. 89, L. 21.

²¹ Tr., Vol. I., Pg. 113, L. 5 – 12.

Ms. Fisk provided well tabulations and containing data for each of the Subject Wells and for each Commission-regulated well located within a ¼-mile radius of the Subject Wells. Compiling the well tabulations provided show the following:

	<u>Existing Wells²²</u>	<u>P&A Wells²³</u>	<u>Penetrates Inj. Int.</u>
Well No. 1004 ²⁴	32	2	27
Well No. 1007 ²⁵	32	0	22
Well No. 1010 ²⁶	28	0	15
Well No. 1035 ²⁷	33	2	26
Well No. 1036 ²⁸	26	1	19
Well No. 1037 ²⁹	23	1	15
Well No. 1038 ³⁰	28	0	16
Well No. 1060 ³¹	21	3	18
Well No. 1061 ³²	19	3	16
Well No. 1062 ³³	22	3	16
Well No. 1013 ³⁴	30	1	16

For example, Well No. 1002 is surrounded by 24 existing wellbores and 3 plugged and abandoned wellbores (“P&A Wells” or “P&A’d Wells”). 21 of those 27 wellbores located within ¼-mile of Well No. 1002 were drilled deep enough to penetrate the Subject Application’s proposed injection interval (*i.e.*, 5,750 to 6,300 feet). Noteworthy, several Existing Wells and P&A’d Wells that make-up that table are included in more than one ¼-mile AOR for the Subject Wells because those ¼-mile AORs overlap in some instances.³⁵

²² “Existing Wells” refers to wellbores that have not been plugged and abandoned.

²³ “P&A Wells” refers to plugged and abandoned wellbores.

²⁴ Hilcorp Exh. No. 9.

²⁵ Hilcorp Exh. No. 10.

²⁶ Hilcorp Exh. No. 11.

²⁷ Hilcorp Exh. No. 12.

²⁸ Hilcorp Exh. No. 13.

²⁹ Hilcorp Exh. No. 14.

³⁰ Hilcorp Exh. No. 15.

³¹ Hilcorp Exh. No. 16.

³² Hilcorp Exh. No. 17.

³³ Hilcorp Exh. No. 18.

³⁴ Hilcorp Exh. No. 19.

³⁵ Tr., Vol. 1., Pg. 111, L. 5.

In addition, Ms. Fisk provided a spreadsheet that summarizes several aspects of the P&A'd Wells located inside the Subject Wells' ¼-mile AOR that penetrate the proposed injection interval.³⁶ The spreadsheet includes well identification data, spud date, total depth, casing depths, date the well was plugged, total number of plugs in the well, depth of the deepest plug, and general comments related those P&A wells. The spreadsheet identifies five P&A'd Wells (Well Nos. 313, 331, 338, 352, and 497), and shows that P&A Well Nos. 149, 199, 236, 313, and 348 all have surface casing set above the current BUQW, which is at 1,450 feet. It also identifies that those five P&A'd Wells' deepest plug is set anywhere between 2,160 to 5,550 feet. Ms. Fisk testified, however, that she reviewed each of those P&A'd Wells and they were plugged in a manner to isolate fresh groundwater from injection fluids through escape of the Subject Application's injection interval.³⁷ Ms. Fisk testified that a similar list of P&A'd wells was submitted in the first hearing related to this project (*i.e.* O&G Docket No. 02-0295336, et al.), and that the P&A'd wells at issue in that docket were not required to be reentered and replugged.³⁸

According to Ms. Fisk, no wells located within ¼-mile of the Subject Wells will be a conduit for the migration of injected fluids, and that approval of Hilcorp's consolidated application is necessary to recover hydrocarbons in the Subject Field that would otherwise go unrecovered.³⁹

Re-Entry of Existing P&A'd Wells

Ms. Fisk testified regarding an exhibit consisting of a three point summarization entitled, "Risks with Re-entering P&A'd Wells."⁴⁰ The three main points of that exhibit include – (1) Re-entering P&A'd Wells could damage the surface casing that is protecting usable quality groundwater; (2) If the operator was unable to set deeper plugs during the original P&A operation, then it is very unlikely that subsequent operations would be successful; and, (3) In many of the P&A'd wells at West Ranch (*i.e.*, Subject Lease), the production casing has been cut and salvaged near the bottom of the surface casing, which makes it very difficult to re-enter a well.

In summary, based on that exhibit, Ms. Fisk testified that "to reenter a well that Hilcorp and the Railroad Commission feels is already properly P&A'd, then it's not worth taking these risks. You're going to possibly create a problem where there is no problem right now and put the groundwater at risk, where it wasn't previously at risk."⁴¹

Wellbore Evaluation & Monitoring Program ("WEMP")

Ms. Fisk testified regarding an exhibit that summarizes the implementation and development of Hilcorp's WEMP at the Subject Lease.⁴² With regard to the wellbore evaluation

³⁶ Hilcorp Exh. No. 21.

³⁷ Tr., Vol. I., Pgs. 118 – 128.

³⁸ Tr., Vol. I., Pg. 128, L. 11 – Pg. 129, L.3.

³⁹ Tr., Vol. I., Pg. 114, L. 24 - 115, L. 2.

⁴⁰ Hilcorp Exh. No. 21.

⁴¹ Tr., Vol. I., Pg. 135.

⁴² Hilcorp Exh. No. 22.

efforts, Hilcorp will review the mechanical integrity of all, roughly 700, existing wells on the Subject Lease and rate them through a priority system created by Hilcorp. After review, those wellbores will either be used as part of the CO₂ flood as production wells, used as a monitoring well, or P&A'd.

With regard to the monitoring program, Hilcorp will install tubing and casing pressure gauges on roughly 400 wells that will be connected to a Supervisory Control and Data Acquisition ("SCADA") system. That SCADA system will provide "real-time" monitoring of those wells and be equipped with alarms set to notify Hilcorp if any significant changes occur.

Groundwater Monitoring Plan ("GMP")

Ms. Fisk testified regarding an exhibit entitled, "Groundwater Monitoring Plan," as well as an aerial map that indicates the locations of groundwater monitoring wells.⁴³ Those groundwater monitoring wells are completed in either the Chicot or Evangeline Aquifers.⁴⁴ She stated that the purpose of the GMP is to monitor and document the condition of the groundwater supplies on the and near the Subject Lease prior to and during both CO₂ and water injection.⁴⁵ The GMP includes monthly baseline sampling for one year, beginning October 2015, prior to CO₂ injection. Subsequently, Hilcorp will sample during the first three years of CO₂ injection and intermittently as needed thereafter. She testified that groundwater sampling will be performed by a third-party environmental consulting company. Those samples will be analyzed by an environmental laboratory accredited by Texas, and they will be analyzed for dissolved gasses (CO₂, ethane, and methane), dissolved metals (Arsenic, Barium Cadmium, Chromium, Lead, Mercury, Selenium, and Silver), and additional water quality parameters (*e.g.*, iron, manganese, pH, etc.). The groundwater analytical results will be provided to landowners upon request.

King's Supporting Testimony

Mr. Jay King, a Senior Geologist employed at Hilcorp, testified as an expert geologic witness on behalf of Hilcorp.⁴⁶

The Subject Field was formed on January 27, 2015, through a consolidation of the West Ranch (41-A) and West Ranch (98-A) Fields ("41-A Field and 98-A Field").⁴⁷ Historically, the 41-A and 98-A Fields were two of six major reservoirs that comprised the West Ranch Field, which was discovered in 1938.⁴⁸

Hilcorp is in the process of unitizing portions of the Frio Formation (*i.e.*, part of the Subject Field) for enhanced recovery purposes. Hilcorp's proposed unit includes roughly 4,700-acres. The purpose of Hilcorp's proposed unit is to employ enhanced recovery operations in the Frio Formation to rescue residual hydrocarbons which were not recovered by previous operators in the Subject Field.

⁴³ Hilcorp Exh. Nos. 25 and 26.

⁴⁴ Tr., Vol. I., Pg. 165.

⁴⁵ Tr., Vol. I., Pg. 156, L. 13.

⁴⁶ Tr., Vol. II, Pgs. 10 – 45.

⁴⁷ Hilcorp Exh. D.

⁴⁸ Hilcorp Exh. No. 27.

Mr. King testified that approval of the Subject Application is integral for Hilcorp to successfully exercise its proposed enhanced recovery operations on the Subject Lease. The Subject Lease will be connected by pipeline to the W.A. Parish Power Plant located in Fort Bend County. That power plant will supply Hilcorp with anthropogenic CO₂ for injection into the Subject Wells.

Geology

Hilcorp's proposed injection interval is from 5,750 to 6,300 feet. The Subject Application is aimed at injecting into the 41-A Sand and 98-A Sand members of the Frio Formation. Mr. King testified that those sand members are continuous throughout the Subject Lease and stratigraphically occur in the form of a four-way, closed anticline.⁴⁹ Mr. King testified that the Subject Field is not exposed to any subsurface faulting.⁵⁰ Based on a type log taken from the Subject Field, he testified that the top of the 41-A Sand occurs at 5,710 feet, and the 98-A Sand occurs at 6,130 feet.⁵¹ He indicated that a roughly 20' thick consistent shale break occurs immediately above the top of the proposed injection interval (*i.e.*, the 41-A Sand), which will confine injected fluids to that interval.⁵²

Protestant's Evidence (Industrial)

Industrial did not present or offer a direct case in this proceeding. Instead, Mr. Williams provided commentary in response to Hilcorp's direct case. Mr. Williams stated, "and I would like to say that from everything I have seen, I do believe Hilcorp is probably going above – above the laws as far as doing more than they have to do to be safe with the groundwater in mind and with our community in mind. And I – I'm very happy to see that."⁵³

Subsequent to the hearing, Industrial submitted its late-filed Exhibit No. 1 as directed by the Examiners. On February 2, 2016, the ALJ admitted that exhibit into the record for this case. That exhibit consists of over 135 pages and centers on a water quality analysis of groundwater taken from wells located on the Subject Lease. That study was performed by Daniel B. Stephens & Associates, Inc. ("DBA"), at Texana's request.

The DBA groundwater analysis described the following: (1) the reported water quality of the samples compared to "ambient" or normal water quality observed in groundwater in Jackson County; (2) any concerns or issues presented by analysis reports, and (3) recommended action, if any, to be taken by Texana.

That report's cover letter consists of about 2 ½ pages of the more salient facts and opinions of DBA. Overall, DBA opined that the results, as shown in its Figures, 1, 2, 3, 5, and 6, indicate that fluoride, chloride, bromide, total dissolved solids and pH appear to be elevated in the Hilcorp area wells in comparison to the ambient water quality observed in Jackson County.⁵⁴

⁴⁹ Tr., Vol. II., Pg. 18.

⁵⁰ Tr., Vol. II., Pg. 14, L. 19.

⁵¹ Tr., Vol. II., Pg. 25; *see also* Hilcorp Exh. No. 31.

⁵² Tr., Vol. II., Pgs. 33 - 42; *see also* Hilcorp Exh. Nos. 34 – 37.

⁵³ Tr., Vol. II., Pg. 50.

⁵⁴ Industrial Exh. No. 1, Pg. 2, ¶ 2.

At the same time, however, DBA clarified that it made multiple assumptions when matching sample IDs with well locations because documentation regarding the sampling event was minimal.⁵⁵

Official Notice

After the hearing, Hilcorp requested that official notice be taken of official Commission records. Specifically, Hilcorp requested that official notice be taken for 12 injection well permits that Hilcorp has been issued administratively through the Commission's Oil and Gas Division. These twelve permitted wells are in this same field and as part of the same project for which the Subject Application was submitted. After notice provided to all parties, and there being no response, official notice is hereby taken of the following permits:

The identification numbers for the permits are:

1. O&G Docket No: 02-0298351 Well No. 1014;
2. O&G Docket No: 02-0298352 Well No. 1015;
3. O&G Docket No: 02-0298353 Well No. 1017;
4. O&G Docket No: 02-0298354 Well No. 1018;
5. O&G Docket No: 02-0298415 Well No. 1011;
6. O&G Docket No: 02-0298416 Well No. 1012;
7. O&G Docket No: 02-0298837 Well No. 1019;
8. O&G Docket No: 02-0298838 Well No. 1020;
9. O&G Docket No: 02-0298839 Well No. 1040;
10. O&G Docket No: 02-0298840 Well No. 1016;
11. O&G Docket No: 02-0298841 Well No. 1039; and
12. O&G Docket No: 02-0298842 Well No. 1063.

Six of the permits were issued in December 2015 and six of the permits were issued in February 2016. All of them are injection well permits in the Subject Lease. The permitted fluids are salt water and CO₂. The injection interval for these twelve permits are approximately the same as proposed in the Subject Application. The top intervals of these twelve wells range between 5,750 (True Vertical Depth) – 5,848 feet (Measured Depth) while the bottom intervals range between 6,300 (TVD) – 6,398 feet (MD). The twelve permits do not contain the conditions requested by the Protestants in this case.

EXAMINERS' RECOMMENDATION

Apart from the twelve injection wells that were officially noticed, as previously mentioned., the Subject Application parallels twelve previous Hilcorp cases for injection on the Subject Lease that were approved by the Commission on August 25, 2015 (Oil & Gas Final Order 02-0295336, et. al.), and six additional Hilcorp cases for injection on the Subject Lease that were approved by the Commission on March 29, 2016 (Oil & Gas Final Order 02-0297674, et al.) (collectively "Permitted Wells"). Based on the record evidence, Hilcorp has met its

⁵⁵ *Id.*, Pg. 1, ¶2.

burden of proof for approval of the Subject Application. Accordingly, the Examiners recommend that it be granted.

Proposed Completion of the Subject Wells

Hilcorp established that each of the Subject Wells will be completed in manner as follows: (1) 10 ¾" surface casing set at a depth of 2,600 feet and cemented to surface with ~1,400 sacks of cement; and (2) 7" production casing set at 6,500 feet and cemented to surface with ~1,600 sacks of cement. The proposed injection will be at a maximum injection pressure of 2,875 psig. Hilcorp evidenced that its proposed completion program will meet the minimum casing and cement requirements of Statewide Rule 46(f).

Confinement to the Injection Interval

The Subject Application consists of a smaller injection interval inside a larger injection interval that was granted for injection of produced water on the Subject Lease (*i.e.*, O&G Final Order 02-0295336, et al.). Compared to that previous case, the chief difference in the Subject Application is that it includes CO₂ as a type of injection fluid. At the same time, the twelve injection wells that were officially noticed in this case, as well as the six injection wells authorized by Commission Oil and Gas Final Order 02-0297674, et al., are all authorized for injection of produced water and CO₂ into the same injection interval of issue in the immediate case.

Nonetheless, Hilcorp evidenced that produced water and CO₂ will not escape the Subject Application's proposed injection interval due to the roughly 20' thick shale interval identified by Mr. King immediately above the top of the injection interval. Furthermore, Mr. King evidenced that faulting does not occur beneath the Subject Lease.

Texana did not appear at the hearing in opposition of the Subject Application. Phere did not appear at the hearing in opposition of the Subject Application. Industrial was the only protesting party that appeared at the hearing against the Subject Application. Industrial did not present a direct case to counter Hilcorp's evidence. Instead, Industrial submitted a late-filed exhibit (*i.e.*, the DBA water quality analysis) that questioned the groundwater quality beneath the Subject Lease against "normal" water quality observed in groundwater in Jackson County. In other words, Industrial only submitted a report performed by a third-party consulting firm as to the groundwater quality beneath the Subject Lease. Industrial did not refute that the Subject Wells will not meet the requirements of Statewide Rule 46.

Discussion of Protection of Water

The current BUQW occurs at 1,450 feet below the surface locations of the Subject Wells. Hilcorp's proposed injection interval is from 5,750 to 6,300 feet in the Subject Wells. Again, that injection interval is a portion of a larger injection interval authorized for use through existing permitted injection wells on the Subject Lease. Immediately above the Subject Application's injection interval lies a roughly 20' thick shale interval that is continuous across the Subject Lease, and will prevent the upward migration of disposal fluids from escaping the proposed

injection interval. Additionally, the Subject Wells will be completed in a manner that meets the requirements Statewide Rule 46(f). Thus, the Subject Application will protect fresh water from harm.

Discussion of Protection of Oil and Gas

Because the injected material will be confined to the injection interval, oil and gas production will also be protected. Moreover, Hilcorp is the only operator in the AOR. The Subject Lease is a proposed unit, and the purpose of that unit is to employ enhanced recovery operations in the Frio Formation to rescue residual hydrocarbons which were not recovered by previous operators in the Subject Field. Not only will the Subject Application protect oil and gas, it will prevent waste by recovering hydrocarbons which have thus far been unable to be recovered.

For those reasons, in reviewing the record in this case, and remaining consistent with the Commissions' decision made in the Prior Applications, the Examiners recommend that the Subject Application and that the Commission adopt the following Findings of Fact and Conclusions of Law.

FINDINGS OF FACT

1. Hilcorp Energy Company ("Hilcorp" or "Applicant") submitted an application to the Commission seeking authority to inject produced water and carbon-dioxide ("CO₂") into its West Ranch -A- Lease (the "Subject Lease"), Well Nos. 1004, 1007, 1010, 1013, 1035, 1036, 1037, 1038, 1060, 1061 and 1062 ("Subject Wells"), West Ranch (41-A & 98-A Cons.) Field ("Subject Field"), pursuant to Statewide Rule 46 [16 Tex. Admin. Code §3.46] (collectively "Subject Application").
2. Notices of the Subject Application were published Wednesday, May 13, 2015, or Wednesday, May 20, 2015, in the *Jackson County Herald Tribune*, a newspaper of general circulation in Jackson County, Texas.
3. Hilcorp provided a copy of the Subject Application to the Jackson County Clerk on June 24, 2015, or July 6, 2015.
4. Hilcorp is the only active operator in the Subject Field and the owner of the surface tract where the Subject Wells are located.
5. Texana Groundwater Conservation District ("Texana"), Industrial Independent School District ("Independent ISD") and Phere Operating, Inc. ("Phere") submitted protests of the Subject Application. There were no other submissions expressing an interest in the Subject Application.
6. On September 16, 2015, notice of the hearing in this matter was sent to all persons who expressed an interest, in writing, in the Subject Application; this included Hilcorp, Phere, Texana and Industrial ISD. The hearing was held on November 17 and November 20, 2015.

7. Notices of Hilcorp's Subject Application and hearing were issued to all persons entitled to notice. Phere and Texana did not appear at the hearing held for the Subject Application. Industrial ISD was the only party to appear at the hearing for the Subject Application as a protestant.
8. The Subject Wells will be used to inject produced water and CO₂ for the purposes of a waterflood and a miscible displacement injection project.
9. The proposed Subject Wells will inject a maximum volume of 20,000 barrels of produced water per day ("bpd") and 25,000,000 cubic feet of CO₂ per day, per well, at a maximum surface injection pressure of 2,875 pounds per square inch gauge ("psig") per well.
10. The Subject Wells will be cased and cemented to confine the injected fluid to the proposed injection zone. Each of the Subject Wells will be completed as follows:
 - a. 10 ¾" surface casing set at a depth of 2,600 feet and cemented to surface with ~1,400 sacks of cement; and
 - b. 7" production casing set at 6,500 feet and cemented to surface with ~1,600 sacks of cement.
11. The use or installation of the Subject Wells in the applied-for permit will not cause the pollution of ground and surface fresh water as indicated by the following:
 - a. The requested injection interval is between 5,750 feet and 6,300 feet.
 - b. Stratigraphically above the top of the proposed injection interval is a geologic shale break that is roughly 20 feet thick and is an impermeable layer that seals the injection interval to prevent migration of injected fluids outside the injection interval.
 - c. The Base of Usable Quality Water ("BUQW") occurs below the surface location of the Subject Wells from the ground surface to a depth of 1,450 feet. The Goliad Aquifer contains superior-quality water and occurs beneath the Subject Wells from 900 feet to 1,450 feet at that location.
 - d. The Subject Wells will be cased and cemented to confine the injected fluid to the proposed injection interval.
12. The use or installation of the Subject Wells will not endanger or injure oil, gas, or other mineral formations as indicated by the following:
 - a. The purpose of the Subject Application is to implement waterflood and miscible displacement operations through the injection of produced water and CO₂ into the injection interval beneath the Subject Lease.
 - b. Because the injection is part of a larger enhanced recovery project, the result of the injection into the Subject Wells will increase the ultimate recovery from the

Subject Field by recovering hydrocarbons that have thus far not been able to be recovered.

- c. Injection through the Subject Wells will remain confined to the Subject Application's injection interval and protect other mineral resources outside the injection interval.

CONCLUSIONS OF LAW

1. Proper notice was issued in accordance with all applicable statutes and regulatory codes. *See* Tex. Water Code § 27.034; 16 Tex. Admin. Code § 3.46(c).
2. All things have occurred and been accomplished to give the Commission jurisdiction in this matter pursuant to Tex. Nat. Res. Code ch. 81 and Tex. Water Code ch. 27. *See, e.g.*, Tex. Nat. Res. Code § 81.051; Tex. Water Code §§ 27.031 and 27.034.
3. Hilcorp's Subject Application pursuant to Statewide Rule 46 ("SWR 46") for permits to inject produced water and CO₂ into the proposed injection interval complies with the applicable provisions of SWR 46.
4. Approval of Hilcorp's Subject Application will not endanger or injure oil, gas, or other mineral formations.
5. Hilcorp's Subject Application will adequately protect ground and surface fresh water from pollution or harm.
6. Hilcorp has met its burden of proof and satisfied the requirements of Statewide Rule 46. 16 Tex. Admin. Code § 3.46.

EXAMINERS' RECOMMENDATION

Based on the record evidence, the Examiners recommend that the Commission approve Hilcorp's Subject Application.

Respectfully,



Brian Fancher, P.G.
Technical Examiner



Marshall F. Enquist
Administrative Law Judge