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RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

PROPOSAL FOR DECISION

OIL AND GAS DOCKET NO. 01-0288054

THE APPLICATION OF HIGH SIERRA WATER-EAGLEFORD, LLC PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A RESERVOIR NOT PRODUCTIVE OF OIL OR GAS KINGSLEY SWD LEASE, WELL NO. 1, EAGLEVILLE (EAGLE FORD-1) FIELD, DIMMIT COUNTY, TEXAS

OIL AND GAS DOCKET NO. 01-0288046

THE APPLICATION OF HIGH SIERRA WATER-EAGLEFORD, LLC PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A RESERVOIR NOT PRODUCTIVE OF OIL OR GAS KINGSLEY SWD LEASE, WELL NO. 2, EAGLEVILLE (EAGLE FORD-1) FIELD, DIMMIT COUNTY, TEXAS

OIL AND GAS DOCKET NO. 01-0288047

THE APPLICATION OF HIGH SIERRA WATER-EAGLEFORD, LLC PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A RESERVOIR NOT PRODUCTIVE OF OIL OR GAS KINGSLEY SWD LEASE, WELL NO. 3, EAGLEVILLE (EAGLE FORD-1) FIELD, DIMMIT COUNTY, TEXAS

HEARD BY:

Karl Caldwell - Technical Examiner
Michael Crnich - Legal Examiner

PROPOSAL FOR DECISION PREPARED BY:

Karl Caldwell - Technical Examiner
Terry Johnson - Legal Examiner

PROCEDURAL HISTORY

Application Filed:	December 27, 2013
Protest Received:	December 27, 2013
Request for Hearing:	March 17, 2014
Notice of Hearing:	April 7, 2014 and April 21, 2014
Hearing Held:	May 23, 2014
Transcript Received:	June 9, 2014
Proposal for Decision Issued:	July 31, 2015

APPEARANCES:	**REPRESENTING:**
APPLICANT:	High Sierra Water-Eagleford, LLC
Jay Stewart Wesley McGuffey Kelly Knight Daniel Arrant Brandon Otwell	
PROTESTANT:	Wintergarden Groundwater Conservation District
Peter Gregg Ed Walker Dr. Ronald Green F. Paul Bertetti	

CASE SUMMARY

High Sierra Water-Eagleford, LLC ("High Sierra") is applying for commercial disposal permits pursuant to 16 Tex. Admin. Code § 3.9 for the Kingsley SWD Lease, Well Nos. 1, 2 and 3, Eagleville (Eagle Ford-1) Field, Dimmit County, Texas. High Sierra is requesting to inject a maximum volume of 20,000 barrels per day (bpd), per well into the Edwards and Glen Rose Formations between 7,600 feet and 10,500 feet. The applications are protested by Wintergarden Groundwater Conservation District ("WGCD"). The protest by WGCD is based on three main concerns:

(1) the Glen Rose Formation at the location of the proposed disposal wells may contain water of a quality which may have some general use;

(2) two plugged oil wells located less than a mile away may be improperly cased, cemented, and plugged, and therefore may provide an avenue for injected fluids to escape the disposal zone and pollute useable-quality water; and

(3) there is not a need for additional disposal capacity in Dimmit County.

Based on the evidence, the Examiners conclude that the injection interval is below both the base of useable quality water and underground sources of drinking water. The Georgetown and Del Rio Formations located above the injection interval will prevent fluids from migrating from the injection interval to useable quality water. The only productive formation within two miles of the proposed disposal well locations is the Eagleford Formation, which is also isolated from the injection interval by the Georgetown and Del Rio Formations.

The Examiners conclude that additional disposal capacity in the area is in the public interest. However, based on the evidence, the Examiners do not recommend approval of all three commercial disposal permits authorizing a combined maximum injection volume of 60,000 bpd. The Examiners' recommend the Railroad Commission of Texas ("Commission") approve two of the three disposal wells, which will provide a combined maximum injection volume of 40,000 bpd, and deny the third disposal well application.

DISCUSSION OF THE EVIDENCE

High Sierra's Evidence

Notice of Application

On December 20, 2013, copies of the subject applications were mailed to the surface owner of the well site tract, to the only offset operator within a half-mile radius of any of the applications, to all adjacent surface owners of the drill site tract, and to the Dimmit County Clerk. The commercial disposal well applications were published in *The Carrizo Springs Javelin*, a newspaper of general circulation in Dimmit County, Texas, on February, 12, 2014. The applications are protested by WGCD, a groundwater conservation district with jurisdiction in Dimmit, LaSalle, and Zavala Counties.

Well Construction

The Commission's Groundwater Advisory Unit (GAU) identified the base of usable-quality groundwater (BUQW) at a depth of approximately 1,000 feet at the proposed disposal well

locations.[1] The subject wells have not yet been drilled, but the proposed well construction plan is identical for each application and meet the requirements of Statewide Rule 13.[2] Each wellbore will have 10 3/4-inch. 40.5 lb per foot surface casing set at a depth of 1,000 feet and cemented in-place with cement circulated to surface (Attachment A).

Each disposal well will have 7-inch, 24 lb per foot long string casing set at a depth of 10,500 feet. The long string casing will be cemented with cement circulated to surface. A packer will be set at a depth of 7,500 feet with 4.5 inch-tubing run inside the long string casing.

Surface Injection Pressure and Injection Volume

The maximum requested surface injection pressure for each of the subject wells is 3,800 psi.[3] The maximum daily injection volume requested is 20,000 barrels per day (bpd), per well, of salt water and RCRA-exempt waste.[4]

Injection Interval and Confining Intervals

The proposed disposal interval in the Kingsley SWD Nos. 1, 2 and 3 is from 7,600 feet to 10,500 feet in the Edwards and Glen Rose Formations, which is below the base of the underground source of drinking water (USDW). The GAU identifies the USDW at a depth of approximately 1,800 feet. The Applicant submitted a letter from the GAU stating that the use of such formations will not endanger the freshwater strata in that area and that the formations to be used for disposal are not freshwater-bearing.[5]

Carter Davis, the Applicant's engineering witness, estimated the salinity of the water in the Glen Rose Formation at the proposed disposal well locations using a nearby well log. The Briscoe

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[1] 16 Tex. Admin. Code § 3.30(e)(7)(B)(i) defines base of useable-quality water, in general, to be less than 3,000 ppm total dissolved solids (TDS), but may include higher levels of TDS if identified as currently being used or identified by the Texas Water Development Board as a source of water for desalination. There is nothing in the record to indicate either of these scenarios apply in the present case.

[2] 16 Tex. Admin. Code § 3.13 (b)(1)(B)(I) (Casing, Cementing, Drilling, Well Control, and Completion Requirements) requires an operator to set and cement sufficient surface casing to protect all useable-quality water strata, as defined by the Groundwater Advisory Unit of the Oil and Gas Division.

[3] The permitted pressure will not exceed 0.5 psi per foot of depth to the top of the injection/disposal interval, unless the results of a fracture pressure step-rate test support a higher pressure. (http://www.rrc.state.tx.us/oil-gas/publications-and-notices/manuals/injectiondisposal-well-manual/summary-of-standards-and-procedures/technical-review/)

[4] Resource Conservation and Recovery Act: Examples of RCRA exempt oil and gas waste includes produced water, drilling fluids, hydraulic fracturing flow back fluids, rig wash and workover wastes.

[5] 16 Tex. Admin. Code §3.9 (2)

Catarina Ranch Lease, Well No. 1, API No. 42-127-33398, ("Briscoe Catarina No. 1"), is located approximately 6 miles south-southeast of the proposed disposal well locations. Based on the deep resistivity readings at depths ranging from 10,140 feet and 10,232 feet within the Glen Rose Formation, the salinity of the formation water was estimated to be between 78,000 ppm to 98,000 ppm (Applicant's Exhibit No. 10).

Mr. Davis, describes the disposal formations as carbonates, which contain intervals of porous, permeable intervals as well as very tight impermeable intervals which will prevent the injected fluids from migrating out of the disposal zone. Based on Mr. Davis' analysis of well logs in the area there are intervals with sufficient porosity and permeability within the Edwards and Glen Rose Formations to accept the injection of oil and gas waste and "there are some other injection wells that have been successful in the Edwards and the Glen Rose in the area." [6]

Impermeable intervals overlay the disposal formations, namely the Georgetown Formation, which contains impermeable intervals, and the Del Rio Formation, a shale, estimated to be approximately 210 feet thick in this area. The Del Rio Formation is continuous throughout this area, and will prevent any fluids injected below this formation from migrating up to productive intervals, or the BUQW.

Productive Formations Within a Two-Mile Radius

A review of Commission records shows no current or past production from the Edwards or Glen Rose Formations within a two-mile radius of the proposed disposal wells. The only productive formation within two miles of the proposed disposal wells is the Eagleford Formation, estimated at a depth of 6,286 feet at the proposed disposal well locations.

Nearby Wellbores

There are no wellbores within a one-quarter mile radius of any of the three proposed disposal well locations. There is one well, the Silva Unit Dim, Well No 1H, API No. 42-127-34844 ("Silva 1H), located within a half-mile radius. The Silva 1H is a horizontal well, completed in the Eagleford Formation and does not penetrate the proposed disposal interval. The deepest point along the horizontal drainhole in the Silva 1H is 1,011 feet above the top of the proposed disposal interval. The 1,011 feet of separation between the producing well and the proposed disposal interval includes the Del Rio Formation. The Del Rio Formation is an impermeable confining layer which will prevent any fluids below the Del Rio Formation from migrating up to the productive Eagleford Formation. The Georgetown Formation directly above the proposed disposal interval is a carbonate, composed of tight impermeable zones that will confine fluids to the disposal interval.

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[6] Tr. pg. 43, ln 12-14.

The Protestant is concerned that two plugged oil wells, the Winn Lease, Well No. 1, API No. 127-33254, ("Winn No. 1"), and the Winn Lease, Well No. 2, API No. 127-33417, ("Winn No. 2"), located between a half-mile and one mile from the proposed disposal wells may act as conduits for injected fluids to pollute useable-quality water. In Mr. Davis' opinion, the Winn No. 1 and Winn No. 2 will not act as conduits for fluids injected in the Edwards and Glen Rose Formations.

Winn No.1

There is 566 feet of strata between the top of the injection zone and the total depth to which the Winn No. 1 was drilled. Although the Winn No. 1 was drilled through the Del Rio Formation and penetrated the top of the Georetown Formation, the well was plugged back to a depth of 6,804 feet, which is above the top of the Georgetown Formation and estimated to be 92 feet above the base of the Del Rio Formation (Applicant's Exhibit No. 11). The base of the Winn No. 1wellbore is cemented, and there is cement behind the longstring casing to approximately 5,326 feet. The upper perforations in the Winn No. 1 wellbore are at a depth of 6,616 feet, which is above the Del Rio Formation. If fluids were to somehow enter the wellbore through the perforations, there is a cast iron bridge plug (CIBP) with 20 feet of cement on top of the plug located at a depth of 6,525 feet, and there are multiple cement plugs set in the wellbore between the CIBP and the surface. In addition, the surface casing was set to a depth of 1,053 feet, 53 deeper than the BUQW at this location, and the surface casing was cemented with cement circulated to surface to protect the BUQW.

Winn No. 2

There is 950 feet of vertical separation between the top of the injection interval in the proposed disposal wells and the TD of the Winn No. 2. The Winn No. 2 does not penetrate the Del Rio Formation, estimated to be approximately 210 feet in thickness at this location. The Del Rio Formation will provide an impermeable shale boundary preventing fluids below the Del Rio Formation from migrating upward.

The Need For Additional Disposal Capacity in this Area

Kelly Knight, Vice President of Business Development with High Sierra stated that wells completed in the Eagleford Formation produce large volumes of water and some days there may be huge spikes in water, which is directly related to the flowback of wells. "If you have several operators in the area that have five-well pads flowing back at the same time, there might be eight or ten flowbacks going on. If it's huge amounts of water, the trucks running around trying to find a place to dispose of the water." [7] High Sierra and Ms. Knight have noticed wells being drilled in Dimmit County, but not necessarily coming on-line. "We think there is going to be a backlog.

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[7] Tr. pg. 82, ln 7-11.

Through our analysis as a company, we feel very strongly that the water growth demand is going to continue, and we're staying full now. Our disposals are full". [8]

In Ms. Knight's opinion, projection of future disposal capacity need can not be based solely on drilling permit activity, or rig count. Drilling rigs have become more efficient, as data shows an increase in the total number of wells being drilled with fewer rigs, or more wells drilled per rig. Spud activity, along with producing wells coming on-line must also be considered. In discussions with operators in the area, some operators have indicated that they are drilling three, four, and five well pads. The operator has the ability to drill a well "scoot over, drill the next well. So they're picking up the pace at which they can drill the wells... we just know there are wells that have been drilled but haven't been frac'd, but they will be".[9]

NGL Energy Partners, the owner of High Sierra, has conducted an internal market analysis of active rigs, new wells drilled, as well as commercial disposal wells in Dimmit, Frio, La Salle, and Zavala Counties. High Sierra estimates that actual water production in Dimmit County exceeds actual water injection in Dimmit County, and forecasts this trend to continue in the future. The Protestant questioned Ms. Knight on how she arrived at the forecast that water production will exceed water injection in Dimmit County. Ms. Knight stated that the actual injection volume is the volume of water that was reported to the Commission for active disposal wells in Dimmit County on Forms P-18 and H-10. The water production data is an estimate of how much water is produced from a well at the time the well is tested and reported on well completion forms filed with the Commission. From that information, water production numbers are extrapolated since operators are not required to report water production.

The Protestant questioned Ms. Knight's statement that these wells will satisfy industry need. Ms. Knight responded that these wells will satisfy industry need by placing disposal wells close to the source of production, thereby reducing truck time and lowering the cost to the operator. "Our facilities that we currently have are operating at capacity. We have contracts; we have agreements with oil companies. More verbal agreements...to provide a certain capacity. Our truck, our driveways are full. Trucks are stacked out on the streets, and we get phone calls...we're full. We can only pump it; we can only unload trucks as fast as we can pump it down the hole. The only way we can create more - the only way I can turn trucks around faster... accommodate what they need is to drill more wells". [10]

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[8] Tr. pg. 82, ln 14-19.

[9] Testimony of Ms. Knight, Tr. pg. 97, ln 23 - pg. 98, ln 8.

[10] Tr. pg. 141, ln 9-20.

Selection of Disposal Well Location and Disposal Formations

High Sierra is an experienced disposal well operator, with twelve disposal facilities and a total of seventeen disposal wells in the Eagle Ford trend area. Ms. Knight has permitted over 25 disposal well locations in South Texas and has been involved in numerous commercial disposal wells across the Eagle Ford trend area. She has experience in the construction, drilling, completion, and operation of disposal wells. Ms. Knight's primary responsibility with High Sierra is to find locations for new disposal wells. The Kingsley SWD Nos. 1, 2, and 3 locations were chosen due to the close proximity to oil and gas production, the disposal capacity of the Edwards and Glen Rose Formations, and accessibility.

In Ms. Knight's opinion, the Edwards and Glen Rose Formations will provide High Sierra the best opportunity to find a zone with sufficient thickness, permeability, and porosity to support a commercial disposal well facility. Most of the disposal wells in Dimmit County inject in the Olmos Formation, a formation with a small disposal capacity that becomes pressurized over time. Ms. Knight has personally operated disposal wells injecting into the Olmos Formation. According to Ms. Knight, the majority of the Olmos Formation injection wells can only accept between 3,000 and 4,000 bpd, which is not sufficient for the disposal demand in western Dimmit County. In Ms. Knight's experience, some wells injecting into the Olmos Formation reach their maximum permitted injection pressure quickly during the injection of fluids, and the shut-in pressure of wells tends to stay high, which in Ms. Knight's opinion, is an indication "that formation's full".[11]

Based on Ms. Knight's experience and research, the actual injection capability, or the maximum functional disposal capacity, as compared to the maximum permitted capacity of Olmos Formation injection wells in Dimmit County, "is probably a fourth. In other words, if their wells are permitted for 15,000 bpd, these wells are probably doing four, maybe 4,000 bpd. The Olmos wells just don't take water, and a lot of them are already out of service. We study it; we look at it every day. We track who's in business, who's out of business, who's got issues. It's just part of what we do. On the deeper wells, my experience is that we're seeing - we're - you can safely and easily inject into the deeper formations 10 to 12,000 bpd per well and you're seeing injection pressures that are 1,800 to 2,000 pounds (psi), which at that depth is less than half of the frac gradient. So the permitted capacity is a number that doesn't really mean anything to the producer. What really matters is how much water can they put in the ground".[12]

Ms. Knight also testified that the Edwards and Glen Rose Formations are more suitable disposal formations as compared to the Olmos Formation, because they are geologically deeper than the productive formations in the area. In Ms. Knight's opinion, when operators try to drill through

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[11] Tr. pg. 80, ln 21.

[12] Direct testimony of Ms. Knight, Tr. pg. 102, ln 9-25.

an over-pressured shallow zone it causes problems. Since the Edwards and Glen Rose Formations are below the Eagleford Formation, injection into deeper formations will not impact operators.

On cross-examination, the Protestant questioned Ms. Knight if the existence of two permit applications for disposal wells between a mile to a mile and a half northwest of the proposed Kingsley SWD wells were a consideration. Ms. Knight stated that those applications were actually permit amendments as the wells are currently permitted to inject in the Olmos Formation, but the wells were never drilled.

The Case For Permitting Multiple Disposal Wells

Ms. Knight stated that having multiple wells provides redundancy and reliability in case a pump fails or there is an issue with one of the wells. Ms. Knight stated "by having two wells, we don't have to pump real hard on those wells. It lets us slow our rate down. We can use a lower rate, lower pressure and still achieve the goal of that facility".[13] In Ms. Knight's opinion, it is not a good practice to operate injection wells at, or near the maximum permitted injection pressure as it is hard on the pumps as well as the disposal formation. Ms. Knight stated "our facilities are designed for 22 to 24,000 barrels a day. The wells typically-I've been involved in enough of them, these wells are going to take 10 to 12,000 barrels a day, even though the permitted limit is higher, we ask for... the moon and the stars. But typically, the real injection capacity of these wells is going to be 10 to 12,000 a day. So between the two wells, you get to the 22 , 24 (thousand barrels per day)".[14]

Ms. Knight's recommendation was to try to permit three wells with the plan of developing two. "Our plan is to drill two wells, build a facility, and that's it. That's our plan".[15] A third well could be put online, which would be largely dependant on the permeability and porosity of the disposal interval determined after drilling the first two wells. "The third permit is just a back-up in case there were a casing collapse, a failure, some sort of...issue which rarely happens...but I've learned to plan...if we're going to make an $8 million dollar investment we need to have enough wellbore there to support it. That's typically what the Kingsley facility would be, an $8 million investment". [16]

The Kingsley SWD Nos. 1 and 2 are the first two wells to be drilled. The proposed well locations are separated by almost a quarter of a mile. High Sierra tried to get the wellbores as far away from each other to minimize the potential impact on each other. Ms. Knight stated that she is

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[13] Tr. pg. 84, ln 7-10.

[14] Tr. pg. 86, ln 13-21.

[15] Tr. pg. 144, ln 9-10.

[16] Tr. pg. 86, ln 22 - pg. 87, ln 4.

not aware of any current disposal facility with three disposal wells injecting into the same interval. [17]

Potential for Piping Water to the Proposed Disposal Facility

Kingsley Constructors ("Kingsley") is a general contractor providing construction services to the oil and gas industry. These services include comprehensive water management, encompassing the construction, planning and implementation of water solutions. Daniel Arrant, Vice President of Kingsley, stated that the company provides services in the Eagle Ford Shale area to numerous operators, including Anadarko, SM Energy, Rosetta, Newfield, Chesapeake, and Murphy. [18]

Kingsley and High Sierra have explored the possibility of constructing gathering systems to transport water via pipelines to the proposed Kingsley SWD disposal well locations. Mr. Arrant has noticed a shift by oil and gas operators to find efficiencies that will facilitate production at costs that are sustainable now and in the future. In discussions with operators regarding the possibility of constructing gathering systems to these operators, the response is "one, is that disposal is needed, and two, is that the gathering lines could be a huge win for them in ways to increase their efficiency". [19]

In Mr. Arrant's opinion, gathering systems via pipeline is "pennies on the dollar compared to trucking". [20] Mr. Arrant has discussed the idea with this particular site with several operators in the area, and while the discussions have been preliminary in nature since there's no permitted well at this time, there is a very high interest. [21] On cross-examination, Mr. Arrant stated that Kingsley does not have an agreement at this time to construct the gathering lines and that discussions are at their initial stages. At this point in time, the only agreement reached between Kingsley and High Sierra is the sale of land to High Sierra where the proposed Kingsley SWD Well Nos 1, 2 and 3 would be drilled.

The Protestant questioned whether there was anything unique about the location of the Kingsley SWD Lease. Mr. Arrant considers the proposed location of these disposal wells to be fairly unique as it is located on a major pipeline right-of-way that bridges the east and west side of Highway 83. Conceptually, constructing water gathering lines from the proposed Kingsley disposal wells "just a couple miles to the east could collect water from multiple wells from two different

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[17] Tr. pg. 143, ln 14.

[18] Tr. pg. 63, ln 13-15.

[19] Tr. pg. 69, ln 24 - pg. 70, ln 1.

[20] Tr. pg. 66, ln 16-17.

[21] Tr. pg. 66, ln 18-22.

operators, and just probably three or four miles west, would not only gather significant wells from two different operators on the west side, but could also tie into a gathering system of produced water that's already in place". [22]

Financial Assurance

At the time of the hearing, High Sierra Water-Eagle Ford, LLC had an active P-5 (Operator Number 385649) and a $50,000 bond on file with the Commission for financial assurance. Commission records show High Sierra Water-Eagle Ford, LLC changed the company name to NGL Watersolutions Eagleford, LLC (Operator Number 609267) on August 6, 2014. NGL Watersolutions Eagleford, LLC has a $50,000 bond on file with the Commission for financial assurance. NGL Watersolutions Eagleford, LLC is an operator in good standing with no current Commission enforcement actions against the company.

Protestants' Evidence (Wintergarden Groundwater Conservation District)

The Kingsley SWD Nos. 1, 2, and 3 applications are protested by WGCD. WGCD is a groundwater conservation district with jurisdiction in Dimmit, LaSalle, and Zavala Counties. The Protestants are concerned that a potential conduit from the zone of injection up to the usable quality water may exist via improperly plugged and abandoned oil wells. Secondly, the Protestants are concerned that potentially usable water at depth in the Glen Rose could be contaminated by injection. Finally, the WGCD questions the need for more disposal capacity.

WGCD's Characterization of the Glen Rose Formation

Ed Walker, General Manager of WGCD, considers the useable groundwater in the area to be within the Carrizo and Wilcox Formations, and possibly the Glen Rose Formation. On cross-examination, Mr. Walker stated that the Texas Water Development Board identifies aquifers in the district and that WGCD has "no ability to designate an aquifer".[23] In Mr Walker's opinion, the Glen Rose Formation is a groundwater reservoir and aquifer in the district that should be protected and the Glen Rose Formation is useable in some parts of the district. Mr. Walker stated that the WGCD has not considered proposing rule-making at either the Texas Water Development Board or the Texas Commission on Environmental Quality (TCEQ) regarding designating any reservoirs in the WGCD's jurisdiction as an underground source of drinking water (USDW). [24]

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[22] Testimony of Mr. Arrant, Tr. pg. 74, ln 3-9.

[23] Testimony of Mr. Walker, Tr. pg. 166, ln 3-9; The Carrizo and the Wilcox have been identified as aquifers by the Water Development Board in the area.

[24] Tr. pg. 168, ln 18-21.

On cross-examination, Mr. Walker stated that the WGCD permits water extraction wells, but has not permitted any water extraction wells in the Glen Rose Formation within five miles of the proposed Kingsley SWD Well Nos. 1, 2, and 3 locations. On re-direct, Mr. Walker stated WGCD has jurisdiction, and protection of all formations in their district. The Glen Rose Formation is not designated as a groundwater reservoir or aquifer to be protected, but in Mr. Walker's opinion, it should be. [25] Glen Rose Formation water to the west in Maverick County and near the Maverick County-Dimmit County line is being used for stock water. The quality of water in the Glen Rose Formation degrades to the east.

Water Quality of the Glen Rose Formation

Paul Bertelli, WGCD's consulting scientist, believes there is uncertainty in the water quality of the Glen Rose Formation at the proposed disposal well locations. In Mr. Bertelli's opinion, there is a possibility that the water could be classified as an underground source of drinking water. The Commission has issued discharge permits for wells in Maverick County and western Dimmit County that produce from the Glen Rose Formation. The discharge permits authorize the discharge of produced water to the surface and to the waters of the State of Texas. The operator is required to submit water quality reports to the Commission upon initial application for a discharge permit, and to collect and analyze produced water on a monthly basis. The operator is required to report the results to the Commission on a quarterly basis after a permit has been issued. Mr. Bertelli estimates the average TDS of the Glen Rose Formation water to be "less 2,000 ppm with fairly low chlorides" and the water "is certainly usable for livestock, agriculture and wildlife" based on the water quality reports submitted with the discharge permits. [26] Mr. Bertelli reviewed the chlorides data from late-2008 through the middle of 2013 and found that the chloride levels in the water, as reported on the discharge permits, was fairly consistent, less than 2,000 ppm TDS. [27]

Mr. Bertelli estimates that the producing horizontal wells completed in the Glen Rose Formation in Maverick and western Dimmit Counties that produce "good water" are completed in the top 700 feet true vertical depth (TVD) of the formation, based on the completion report information. [28] Based on his analysis, Mr. Bertelli concluded that the Glen Rose Formation is continuous and dips downward to the east between the producing wells in Maverick and Western Dimmit County and four wells that penetrate the Glen Rose Formation in the vicinity of the proposed High Sierra disposal wells. Mr. Bertelli stated that the distance between the wells producing from the Glen Rose Formation in Maverick and western Dimmit County is approximately fifteen miles,

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[25] Tr. pg. 173, ln 16-17.

[26] Tr. pg. 234, ln 20 - pg. 235, ln 11.

[27] Tr. pg. 245, ln 21-24.

[28] Tr. pg. 242, ln 11.

and the water quality over this distance is fairly consistent. As a result, Mr. Bertelli concluded that it is possible that the water quality in the Glen Rose Formation at the proposed disposal well locations in Dimmit County twenty miles east of the wells in western Dimmit County is of similar quality.

Mr. Bertelli disagrees with the Applicant's estimate of the salinity concentration of the Glen Rose Formation water based on the Briscoe Catarina No.1 log. Mr. Bertelli believes the good quality water within the Glen Rose Formation occurs in the upper part of the Glen Rose Formation. The wells in Maverick County with discharge permits were completed in the upper 600 feet to 700 feet of the formation, whereas the Applicant's calculation of the salinity of the Glen Rose Formation water is based on a resistivity reading at a depth deeper than the upper 600 to 700 feet of the Glen Rose Formation. Mr. Bertelli estimated a salinity value between 4,000 ppm and 5,000 ppm at a depth of 9,712 feet based on the Briscoe Catarina No.1 well log. In Mr. Bertelli's opinion, this "is consistent with some degradation of water quality but also consistent with good water quality in the upper few hundred feet of the Glen Rose" Formation in Maverick County.[29] Based on Mr. Bertelli's research, the quality of the water in the upper zone of the Glen Rose Formation at the proposed disposal well locations should be usable source of drinking water.

On cross-examination, Mr. Bertelli stated that the in calculating the dip of the Glen Rose Formation between the producing wells in Maverick County and the proposed disposal well locations, variations in surface elevations were not taken into account, and the depths represented are the depths below surface to the formation tops. Mr. Bertelli stated that WGCD does not oppose injection into the Edwards Formation since the Edwards is not a producing aquifer in Dimmit County. However, the Edwards is a producing aquifer in most of central Texas, and distance does make a difference. The wells producing from the Glen Rose Formation with discharge permits are located in Maverick County, with one well located in western Dimmit County. None of the wells with discharge permits are located within ten miles of the proposed disposal well locations.

Mr. Bertelli did not investigate whether there are any water wells in the Glen Rose Formation in Maverick County. There do not appear to be any water wells in the Glen Rose Formation in Dimmit County. Mr. Bertelli is not aware of whether the Glen Rose Formation has been designated as a usable-quality aquifer in Maverick County or Dimmit County. Mr. Bertelli does not have any water samples that have been tested within 10 miles of the proposed disposal wells. The only data that Mr. Bertelli has is the discharge reports and data, and the associated discharge application information.

In Mr. Bertelli's opinion, the GAU has not throughly considered the possibility of a deeper source of freshwater at the locations of the proposed disposal wells. Mr. Bertelli's opinion is based on the continuity of the upper Glen Rose Formation between the wells completed in Maverick and western-Dimmit Counties, and the proposed disposal well locations. "There's sufficient continuity

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[29] Tr. pg. 248, ln 17-20.

to suggest that it's not unreasonable to expect water quality in the order of 5,000 ppm TDS". [30] Mr. Bertelli stated that the continuity study he performed is formation continuity, and not a reservoir or aquifer-type analysis of continuity between Maverick County and the proposed disposal well locations.

Nearby Plugged and Abandoned Wellbores as Potential Conduits

WGCD is concerned that the Winn Nos. 1 and 2, located less than one mile from the proposed injection wells, may be improperly plugged and abandoned. The completion report shows that the Winn No. 1 was plugged back to 6804 ft, which is 16 feet above where WGCD has estimated the base of the Del Rio Formation to be located in this area. Dr. Ronald Green, WGCD's witness, stated that if the depth of the Del Rio Formation estimate was exactly correct, there would be some assurance that the bottom of the Winn No. 1 is sealed off from fluids migrating in from below. However, there is some uncertainty in picking where the base of the Del Rio formation is located. In Dr. Green's opinion, "if we used a different offset log we might get a different depth". [31] WGCD is also concerned that a calculation was used to estimate the top of cement behind the long strong casing in the Winn No. 1 instead of measuring the top of cement, and that no allowance for washout was used in the calculation.

WGCD's concern with the Winn No. 2 is that a large volume of cement was reported on the completion report to circulate cement to the surface behind the longstring casing. Dr. Green calculated the amount of cement pumped to be 95% excess. In Dr. Green's opinion, this indicates that a serious washout was encountered. The Winn No. 2 does not penetrate the Del Rio Formation, and therefore, the washout did not occur in the Del Rio Formation.

Dr. Green considers the annulus[32] of the Winn No. 1 to be improperly cemented and is concerned that fluids could migrate up the annulus in the Winn No. 1. From there, fluids could migrate over to the Winn No. 2 in which the well was not plugged directly above the perforated interval. In Dr. Green's opinion, "you can potentially migrate up the long string to the elevation of the usable quality water which is about 1,000 feet, 1,050 feet to the base of the surface casing. At that point, the only thing that's stopping these fluids from entering the freshwater is the cement surrounding the long string casing". [33]

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[30] Tr. pg. 259, ln 10-12.

[31] Tr. pg. 189, ln 4-5.

[32] The annulus (annular space) is the space surrounding the casing in the wellbore.

[33] Tr. pg. 186, ln 3-6.

Dr. Green calculated a cumulative differential pressure of 50.99 psi at the location of the Winn No. 1 based on the distances from each of the three proposed disposal wells, in addition to two applied-for disposal well permits in the area. In total, if all five disposal well permits were granted and all wells were injecting at their maximum permitted volumes, cumulative injection rates would be 110,000 bpd. In Dr. Green's opinion, there is sufficient differential pressure based on the assumptions in the calculation to indicate that there would be a pressure build-up that would be measurable at the Winn No. 1 from injection at these five proposed disposal well locations.

On cross-examination, Dr. Green stated that one assumption in the calculation is all three of the proposed disposal wells injecting at their maximum permitted volume, 60,000 bpd, and the two other pending applications in the area injecting at the maximum requested injection volume of 25,000 bpd per well, for a total injection volume of 110,000 bpd. Dr. Green acknowledged that at the present time, none of these proposed disposal wells have been drilled. Dr. Green also stated that the calculated 51 psi of differential pressure based on the assumptions used, is a radial pressure calculation and not a direct pressure at the base of the Winn No.1, and 51 psi would raise a column of water a little more than 100 feet.

Existing Disposal Capacity in the Area

In Dr. Green's opinion, there is not a need for an additional 60,000 bpd of disposal capacity in this area. There are 51 approved SWD permits within a 20-mile radius of the proposed Kingsley SWD wells. In addition, there are nine pending applications for a total disposal capacity of 250,000 bpd, which includes High Sierra's request for three permits totaling 60,000 bpd in the current applications.

On cross-examination, Dr. Green agreed that permitted disposal capacity does not always match the actual disposal capacity. WGCD's disposal well numbers include non-commercial wells, and Protestant's Exhibit No. 8 repeats Permit Nos. 13325 and 18055 in calculating the number of approved salt water disposal wells, in addition to disposal capacity. WGCD did not conduct any studies on the number of disposal wells needed, or the amount of disposal capacity considered to be sufficient for Dimmit County. WGCD did not have any information on truck wait time at disposal facilities or distances to disposal facilities in Dimmit County in relation to actual production activities.

Applicant's Rebuttal Evidence

Available Disposal Capacity in Dimmit County

Ms. Knight determined that there are twenty-three active permits in Dimmit County, based on H-10 information from the Commission's website and her personal knowledge. The Protestant's existing disposal permit information listing approximately fifty items included some duplicates,

eighteen wells that have not yet been drilled, and five wells that are inactive as a result of being shut-in, or have a mechanical issue.

Based on the H-10 data on the Commission website, the average volume injected per day amongst the 23 active disposal wells is approximately 57,000 bpd. On a per-well basis, "the average injection per active well, a little under 2,500 bpd, so there really is not as much capacity as the permits would indicate. You really have to drill down, and that data's not readily available to the Commission. I look at this every day, I drive it, I know who our competitors are...the total water being disposed of in Dimmit County right now is really only on the order of 57,000 barrels a day". [34]

On cross-examination, Ms. Knight stated that the additional disposal capacity needed in Dimmit County is 60,000 bpd to 85,000 bpd. Ms. Knight can not project what capacity may be coming on-line with the eighteen permits that have been approved but no well has been drilled. Ms. Knight is unable to predict what other people are going to do. Additional capacity cannot instantly be increased as the demand increases, as it takes time to go through the permitting process for a disposal well, to drill the well, and to construct the facility.

Water Quality of the Glen Rose Formation

The Applicant's engineering witness disagrees with the salinity calculation of the Glen Rose Formation water performed by WGCD's witness. In. Mr. Davis' opinion, WGCD's witness picked a very thin stringer[35], and it is unlikely the logging tool is actually able to correctly read the deep resistivity in that thin of a stringer. [36] The log is showing that the thinner the stringer, the higher the resistivity, so to conclude that the thin stringers have the freshest water is an incorrect conclusion. The log response in the thin stringers is not capable of accurately measuring the deeper resistivity. The log shows that there are porous, permeable intervals deeper in the Glen Rose Formation and as these intervals increase in thickness, the resistivity decreases. Mr. Davis did not select an interval higher in the Glen Rose Formation to calculate the salinity of the formation water due to crossover of the neutron-density porosity curves shown on the Briscoe Catarina No 1. log, which indicates there may be some gas. The gas saturation would increase the resistivity reading, "so your calculation would give you an overly freshwater, apparent water". [37]

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[34] Tr. pg. 266, ln 9-14.

[35] A stringer is a thin, discontinuous rock layer.

[36] Tr. pg. 272, ln 18-21.

[37] Testimony of Mr. Davis, Tr. pg. 273, ln 20-21.

Winn Nos. 1 and 2 Wellbores

The reported top of cement (TOC) in the Winn No.1 is 5,326 feet, which is 1,700 feet above the TD of the well. In order to have a good seal to prevent fluids from migrating through the Del Rio Formation, the well would need to be cemented from TD to above the Del Rio Formation. Mr. Davis stated that you would only need approximately 354 feet of cement to accomplish this, while four times the amount of cement required to pump cement behind the longstring casing from TD to above the Del Rio Formation was reported. In Mr. Davis' opinion, in order for the Winn No. 1 to act as a conduit for fluids to escape the disposal interval "any injected fluid would have to break through-somehow get through all that cement, and I think that is very unlikely". [38]

WGCD's theory is that injected fluid will escape the disposal interval through the Del Rio Formation at the Winn No.1 location, and the fluids would then migrate from the Winn No.1 location and enter the Winn No.2 wellbore through the perforations. "Then the fluid could go up the wellbore; pressurize the wellbore enough to, at some point in time, break through the casing, break through the steel casing and the cement". [39] Applicant's Exhibit No. 12 shows the longstring casing in the Winn No. 2 was cemented to the surface. In Mr. Carter's opinion, the Winn Nos. 1 and 2 have multiple safeguards to protect against pollution of useable-quality water.

EXAMINERS' OPINION

Pursuant to Texas Water Code § 27.051(b), the Commission has authority to permit disposal and injection wells if it finds:

(1) that the use or installation of the injection well is in the public interest;

(2) that the use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;

(3) that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and

(4) that the applicant has made a satisfactory showing of financial responsibility if required by Section 27.073.

In the Examiners' opinion, the Applicant has adequately demonstrated that disposal into the Edwards and Glen Rose Formations meets these four requirements. However, the Examiners' do not recommend approval of three injection wells permits for a total combined injection volume of

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[38] Tr. pg. 277, ln 14-16.

[39] Tr. pg. 277, ln 19-22.

60,000 bpd. As set out below, the Examiners' recommend approval of two disposal well permits, for a maximum volume of 20,000 bpd per well, for a total permitted capacity of 40,000 bpd.

Public Interest

Pursuant to Texas Water Code § 27.051(d), in determining whether the proposed application demonstrates a public interest, several factors may be considered, which include: whether there is a practical, economic, and feasible alternative to an injection well reasonably available; compliance history; as well as other considerations raised by the Commission in consideration of the application.[40] In the Examiners' opinion, the Applicant showed that additional disposal capacity is needed in this area and provided sufficient evidence to support a need for more than one disposal well. However, in the Examiners' opinion, the Applicant failed to show a need for three disposal wells permitted for a combined maximum volume of 60,000 bpd. In the Examiners' opinion, the Applicant showed a need for a total of two disposal wells, each permitted for 20,000 bpd, for a total combined maximum injection volume of 40,000 bpd. The Examiners' recommend the Commission approve the applications for The Kingsley SWD Nos. 1 and 2, which the Applicant intends to drill and operate if the applications are approved. The Examiners' recommend denying the application for the Kingsley SWD No. 3.

Ms. Knight, High Sierra's Vice President of Business Development stated that her recommendation was to try to permit three wells with the plan of developing two, the Kingsley SWD Nos. 1 and 2. She was not aware of any disposal facilities with three disposal wells injecting into the same interval. Ms. Knight stated that High Sierra's facilities are designed for 22,000 bpd to 24,000 bpd and estimated the proposed disposal wells will be able to dispose of 10,000 bpd to 12,000 bpd. Recommending approval of more than one disposal well permit will provide the Applicant with the requested redundancy and reliability. Approval of two disposal well permits will also affording the Applicant the opportunity to achieve the goal of the proposed disposal facility to dispose of 22,000 to 24,000 bpd, the facility's design capacity, while allowing the Applicant to inject fluid at a lower pressure and rate. In the Examiners' opinion, the Applicant failed to show a need for a third disposal well beyond a provisional condition while the Kingsley Nos. 1 and 2 are drilled and completed to ensure two wells can be completed on the Kingsley SWD Lease.

The proposed disposal wells will provide additional disposal capacity in the Dimmit County area. Wells in the area surrounding the Kinsley SWD Lease are completed in the Eagleford Formation and produce large volumes of water. Multiple horizontal wells are drilled on the same pad which has led to increased efficiency. There has been a reduction in the number of rigs required to drill wells, and the number of days required to drill the wells. Multiple wells drilled on the same pad also lends to scheduling well completions to be done in batches which results in the initial flowback of multiple wells within days of each other. Currently, the majority of disposal wells in

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[40] The "public interest" finding required by Texas Water Code 27.051(b) is limited to matters related to oil and gas production, and does not include issues such as traffic safety and road conditions.

Dimmit County inject in the Olmos Formation. The Applicant's witness has personal experience operating disposal wells injecting into the Olmos Formation and the majority of the Olmos Formation injection wells can only accept between 3,000 and 4,000 bpd. The proposed disposal wells will inject into the Edwards and Glen Rose Formations, which are expected to accept 10,000 to 12,000 bpd, per well. The proposed disposal wells will provide additional disposal capacity which will satisfy industry need by placing disposal wells close to the source of production, thereby reducing truck time and lowering disposal costs to the operator.

In the Examiners' opinion, the Protestant's evidence that additional disposal capacity was not needed was not persuasive. The Protestant's evidence was based on the current number of permits and pending applications, which included non-commercial permits, and duplicated at least one permit in calculating the current permitted capacity in Dimmit County. The Protestant did not conduct any studies to estimate the total number of disposal wells needed, or what amount of disposal capacity is sufficient for Dimmit County. The Applicant did not have any information on truck wait time at disposal facilities or distances to disposal in Dimmit County related to actual production activities.

Endangerment or Injury to Any Oil, Gas, or Other Mineral Formation

In the Examiners' opinion, the use or installation of the injection wells will not endanger or injure any oil, gas, or other mineral formation. The Applicant is requesting to inject fluids into an interval from 7,600 feet to 10,500 feet in the Edwards and Glen Rose Formations. There is no current or past production from the Edwards or Glen Rose Formations within a two mile radius of the proposed Kinsley SWD Nos,1, 2, and 3. Each disposal well have 7-inch, 24 lb-per-foot longstring casing set to a depth of 10,500 feet. The longstring casing will be cemented in place with cement circulated to surface.

The Georgetown and Del Rio Formations overlay the disposal formations. The Georgetown Formation contains impermeable intervals to prevent fluids injected below the Georgetown Formation from migrating above the formation. The Del Rio Formation is a shale interval, approximately 210 feet thick at the proposed disposal well locations. The Del Rio Formation is continuous throughout the area and will prevent any fluids injected below this formation from migrating upward. The only productive formation within two miles of the proposed disposal wells is the Eagleford Formation, located above the disposal formations and upper confining formations. There are no existing wellbores that penetrate the disposal formations within a half-mile of the proposed disposal wells that could act as potential conduits for fluids to migrate from the disposal interval to productive intervals.

Ground and Surface Fresh Water Adequately Protected From Pollution

Casing Requirements

In the Examiners' opinion, the proposed disposal wells will adequately protect ground and surface fresh water. Statewide Rule 9(A)(8) (16 Tex. Admin. Code §3.9) requires disposal wells to be cased and the casing cemented in compliance with Statewide Rule 13 (16 Tex. Admin. Code §3.13), in such a manner that the injected fluids will not endanger freshwater resources, or oil, gas, or geothermal resources. Statewide Rule 13(a)(4)(C) requires casing to be cemented across and above all formations permitted for injection under Statewide Rule 9, and Statewide Rule 13(b)(1)(B) requires surface casing to be set and cemented to protect all useable-quality water strata, as defined by the GAU.[41]

The GAU identifies the useable-quality water to occur from the land surface to a depth of 1,000 feet at the location of the proposed disposal wells. The proposed well construction of the disposal wells will set 10 3/4-inch, 40.5 lb-per-foot surface casing at a depth of 1,000 feet. The surface casing will be cemented, with cement circulated to surface which will protect the useable-quality water. Each disposal well will have 7-inch, 24 lb-per-foot longstring casing set at a depth of 10,500 feet, which will be cemented, with cement circulated to surface to ensure casing is cemented across and above all formations permitted for injection.

Injection Interval

In the Examiners' opinion the requested injection interval in these applications meets the requirements of Statewide Rule 9 and Chapter 27 of the Texas Water Code. The GAU indicated that injecting oil and gas waste into strata in the depth interval from 7,600 feet to 10,500 feet at the proposed disposal well locations will not endanger the freshwater strata in the area. The GAU estimated the base of USDW to be at approximately 1,800 feet. Therefore, injection into an interval from 7,600 feet to 10,500 is below the base of USDW as identified by the GAU.

Protestant's claim that water in Glen Rose Formation at each of the proposed disposal well locations may be suitable for general use. The Protestant's claim is based on surface discharge permits that have been granted to an operator producing wells from the Glen Rose Formation in Maverick and western Dimmit County. The Protestant failed to provide any evidence to show that the fluid contained in the Glen Rose Formation at the proposed disposal well locations is hydrologically connected to the wells producing from the Glen Rose Formation in Maverick County and western Dimmit County. In addition, the Glen Rose Formation in Dimmit County has not been designated as a groundwater reservoir to be protected. As further evidence, there are no water wells

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[41] 16 Tex. Admin. Code § 3.13(a)(C) defines the protection depth as the depth to which usable-quality water must be protected, as determined by the GAU, which may include zones that contain brackish or saltwater if such zones are correlative and/or hydrologically connected to zones that contain usable-quality water.

extracting water from the Glen Rose Formation within five miles of the location of the proposed disposal wells. Therefore, the Examiners conclude that the evidence shows that injection into the Edwards and Glen Rose Formations will be below the base of usable-quality water and underground sources of drinking water.

In the Examiners' opinion, the log interpretation of the salinity of the Glen Rose Formation fluid in the Briscoe Catarina No.1 log by both the Applicant's witness and the Protestant's witness was not persuasive. Each party rebutted the analysis by the other party. The Protestant rebutted the Applicant's determination based on calculating the salinity of the Glen Rose Formation fluid deeper than the upper 700 feet of the Glen Rose formation. The Applicant rebutted the Protestant's analysis by pointing out that the interval selected by the Protestant is too thin to yield an accurate deep resistivity measurement, which is used to estimate the fluid salinity. The thickness of the interval at 9,712 feet is less than 10 feet thick, while the length of the resistivity tool used was 33.33 feet in length. [42]

Geological Requirements

Statewide Rule 9(2) requires the Applicant to show that the formations are separated from freshwater formations by impervious beds which will give adequate protection to such freshwater formations prior to approval of formations for disposal use. In the Examiners' opinion, the Applicant has made a satisfactory showing of this requirement. The Georgetown and Del Rio Formations overlay the disposal formations. The Georgetown Formation directly above the proposed disposal interval is a carbonate, composed of tight impermeable zones that will confine fluids to the disposal interval. Directly above the Georgetown Formation is the Del Rio Formation, which is approximately 210 feet of shale at the proposed disposal well locations. The Georgetown and Del Rio Formations will prevent any injected fluids from migrating up to productive intervals or to useable-quality water.

Area of Review

No wells penetrate the proposed disposal zone with a one-quarter or one-half mile radius of the proposed locations of the disposal wells. The Protestant is concerned that two plugged oil wells (Winn Nos. 1 and 2), located within a one-mile radius of the location of the proposed disposal wells may provide a conduit for fluid movement from the disposal zone into freshwater strata. In the Examiners' opinion, the well construction and plugging of the Winn Nos. 1 and 2 adequately protect ground and surface fresh water from pollution.

The completion report for the Winn No. 1 did not list a depth to the Del Rio Formation, but did list a depth of 6,534 feet to the top of the Buda Formation. The Protestant estimated the top of the Del Rio Formation to be at a depth of 6,650 feet, or 320 feet above the setting depth the

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[42] HRID-SP tool, Applicant's Exhibit No. 9

longstring casing. The Applicant estimated the top of the Del Rio Formation to be at a depth of 6,686 feet, or 284 feet above the setting depth of the longstring casing. The only known depth at the Winn No.1 location is the top of the Buda Formation which was reported on the completion report at a depth of 6,534 feet, or 436 feet above the setting depth of the longstring casing. Geologically, the Buda Formation is located above the Del Rio Formation, and therefore, if the casing were cemented to the top of the Buda Formation it would ensure cement was pumped across the entire Del Rio Formation. In order to cement the annulus of the longstring casing to the top of the Buda Formation in the Winn No.1, approximately 120 cubic feet of cement would be required to be pumped, which assumes a washout factor of 20%.[43] The completion report for the Winn No.1 listed 375 cubic feet (350 sacks) of cement pumped, which is greater than the amount of cement required to cement the longstring casing to the top of the Buda Formation using the Commission staff guideline for calculating the TOC for inland wells.

The Protestant was concerned that the Winn No.2 reported that 95% excess cement was pumped to circulate cement behind the longstring casing to surface, whereas no washout factor was used to calculate the TOC behind the longstring casing in the Winn No.1. However, since 375 cubic feet of cement was pumped, more than 300% excess cement was pumped to ensure cement behind the longstring casing to the top of the Buda Formation. In the Examiners' opinion, the completion report for the Winn No. 1 shows that a sufficient volume of cement was pumped to provide zonal isolation from the setting depth of the longstring casing to the top of the Buda Formation. Therefore, the Examiners conclude that there is sufficient evidence to show that the Winn No.1 is cemented across the Del Rio Formation and this wellbore will not act as a conduit for fluids to migrate through the upper confining formation.

Financial Assurance

The Examiners conclude that the Applicant has made a satisfactory showing of financial responsibility as required by Section 27.073 of the Texas Water Code. At the time of the hearing, High Sierra Water-Eagle Ford, LLC had an active P-5 (Operator Number 385649) and a $50,000 bond on file with the Commission for financial assurance. Commission records show High Sierra Water-Eagle Ford, LLC changed the company name to NGL Watersolutions Eagleford, LLC (Operator Number 609267) on August 6, 2014. NGL Watersolutions Eagleford, LLC has a $50,000 bond on file with the Commission for financial assurance. NGL Watersolutions Eagleford, LLC is an operator in good standing with no current Commission enforcement actions against the company.

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[43] A factor of 20% for inland wells is used by Commission staff in verifying cement top calculations. http://www.rrc.state.tx.us/oil-gas/publications-and-notices/manuals/injectiondisposal-well-manual/summary-of-standards-and-procedures/technical-review/

FINDINGS OF FACT

1. High Sierra Water-Eagle Ford, LLC is seeking permits authorizing commercial disposal operations pursuant to Statewide Rule 9for the Kingsley SWD Lease, Well Nos. 1, 2 and 3, Eagleville (Eagle Ford-1) Field, Dimmit County, Texas. 16 Tex. Admin. Code § 3.9.

2. Notice of the Kingsley SWD Lease, Well Nos. 1, 2, and 3 commercial disposal well applications were published in the in *The Carrizo Springs Javelin*, a newspaper of general circulation in Dimmit County, Texas, on February, 12, 2014.

3. At least 10 days' notice of the hearing was provided to the surface owner of the Kingsley SWD Lease, to the Dimmit County Clerk, to all adjacent surface owners of Kingsley SWD Lease, and to the only offset operator within one-half mile from the proposed location of the Kingsley SWD Lease, Well Nos. 1, 2, or 3.

4. The Kingsley SWD Lease, Well Nos. 1, 2, and 3 commercial disposal well applications are protested by Wintergarden Groundwater Conservation District.

5. The use or installation of three injection wells permitted for a maximum cumulative volume of 60,000 bpd is not in the public interest.

    a. The maximum daily injection rate, as limited by the maximum surface pressure and the properties of the disposal interval, is estimated to be 10,000 bpd to 12,000 bpd, per well;

    b. The proposed facility is designed to accommodate 22,000 bpd to 24,000 bpd;

    c. The Applicant plans to drill two wells, the Kingsley SWD Nos. 1 and 2.

    d. The Applicant applied for a permit for the Kingsley SWD No. 3 as a back-up permit in case a problem was encountered in drilling and completing the Kingsley SWD Nos. 1 or 2.

6. The permitting of two injection wells for a maximum cumulative volume of 40,000 bpd is in the public interest.

    a. Permitting a cumulative volume of 40,000 bpd will provide additional disposal capacity in the Dimmit County area;

b. Permitting a cumulative disposal capacity of 40,000 bpd on the Kingsley SWD Lease will satisfy industry need by placing disposal wells close to the source of production, reducing truck time and lowering disposal costs to operators;

c. Horizontal well completions in the Eagleford Formation produce large volumes of water on initial flowback;

d. Wells have been drilled but not completed in the area;

e. Development of the Eagleford Formation requires water disposal; and

f. The majority of disposal wells currently in operation in Dimmit County only inject into the Olmos Formation.

7. The use or installation of the disposal well will not endanger or injure oil, gas, or other mineral formations.

a. Injected fluids will be confined to the Edwards and Glen Rose Formations between 7,600 feet to 10,500 feet;

b. The only productive formation within two miles is the Eagleford Formation, which is located above the disposal interval;

c. The Georgetown Formation located directly above the disposal interval is a carbonate consisting of impermeable intervals, and the Del Rio Formation located directly above the Georetown Formation is 210 feet of shale which will act as impervious barriers between the disposal interval and the productive Eagleford Formation to protect productive formations; and

d. There are no wellbores that penetrate the disposal interval within a one-quarter or one-half mile radius of the locations of the proposed disposal wells.

8. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution.

a. The useable-quality water is from the land surface to a depth of 1,000 feet. The wells will be cased and cemented to isolate the base of useable-quality water from the injection interval:

i. Each wellbore will have 10 3/4-inch. 40.5 lb per foot surface casing set at a depth of 1,000 feet and cemented in-place with cement circulated to surface;

ii. Each disposal well will have 7-inch, 24 lb per foot longstring casing set at a depth of 10,500 feet. The long string casing will be cemented with cement circulated to surface; and

iii. Tubing will be run inside the long string casing and a packer will be set at a depth of 7,500 feet.

b. The Georgetown Formation located directly above the disposal interval is a carbonate consisting of impermeable intervals, and the Del Rio Formation located directly above the Georetown Formation is 210 feet of shale which will act as impervious barriers between the disposal interval and the fresh water formations;

c. Injected fluids will be confined to the Edwards and Glen Rose Formations with a permitted interval from 7,600 feet to 10,500 feet.

d. There are no wellbores within a one-quarter mile or one-half mile radius of the proposed disposal well locations that penetrate the proposed disposal interval.

e. The Winn Lease, Well Nos. 1 and 2 are located within a one-mile radius of the proposed disposal wells:

i. The Winn Lease Well Nos. 1 and 2 were cased and cemented in a manner that protects the BUQW; and

ii. The Winn Lease Well Nos. 1 and 2 were cemented and plugged in a manner that ensures the wells will not act as conduits for fluids injected into the Edwards and Glen Rose Formations at the proposed locations of the proposed disposal wells to escape the permitted intervals.

f. The maximum surface injection pressure for each well will be 3,800 psi; and

g. The maximum daily injection volume for the Kingsley SWD Nos. 1 and 2, will be 20,000 bpd, per well.

9. The Applicant has made a satisfactory showing of financial responsibility.

CONCLUSIONS OF LAW

1. All notice requirements have been satisfied. 16 TEX. ADMIN. CODE § 3.9.

2. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. TEX. NAT. RES. CODE § 81.051.

3. The proposed fluid disposal operations will not cause the pollution of freshwater strata and will not endanger oil, gas or geothermal resources. 16 TEX. ADMIN. CODE § 3.9.

4. The installation and use of the proposed commercial disposal wells permitted for a combined maximum injection volume of 40,000 bpd is in the public interest. Texas Water Code § 27.051(b)(1).

5. High Sierra Water-Eagleford, LLC has met its burden of proof and its application satisfies the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 9.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend the following:

(1) approve the applications of High Sierra Water-Eagleford, LLC for commercial disposal authority pursuant to Statewide Rule 9 for the for the Kingsley SWD Lease, Well Nos. 1 and 2 for a maximum injection volume of 20,000 bpd per well as set out in the attached Final Orders for Oil and Gas Docket Nos. 01-0288054 and 01-0288046; and

(2) deny the application of High Sierra Water-Eagleford, LLC for commercial disposal authority pursuant to Statewide Rule 9 for the Kingsley SWD Lease, Well No. 3, as set out in the attached Final Order for Oil and Gas Docket No. 01-0288047.

Respectfully submitted,

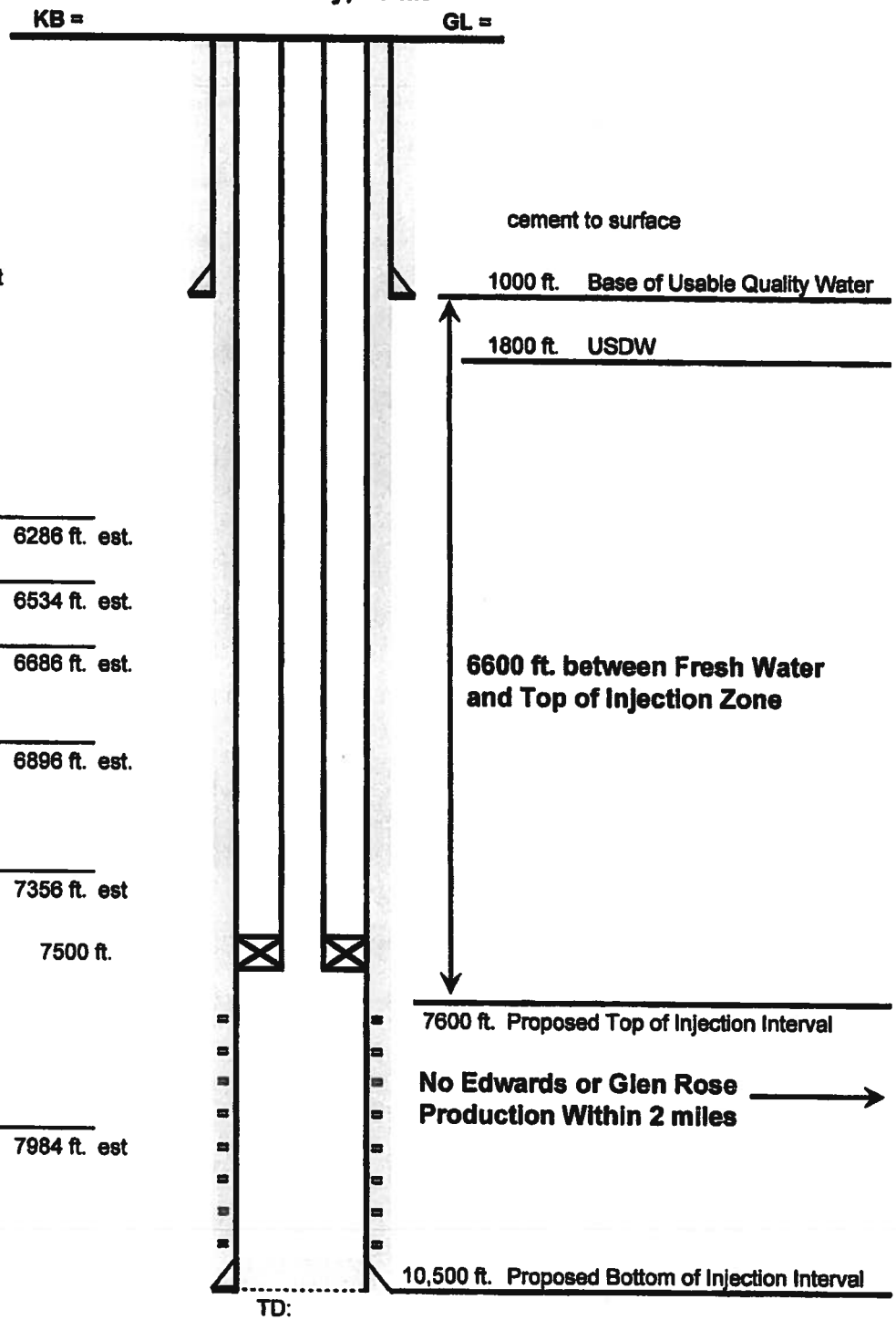
Karl Caldwell
Technical Examiner

Terry Johnson
Legal Examiner

Attachment A

Kingsley SWD 1, 2 and 3: Proposed
High Sierra Water-Eagle Ford, LLC

W-14 **Eagleville (Eagleford-1)**
Dimmit County, Texas



Platt, Sparks Associates Consulting Petroleum Engineers, Inc.
Texas Registered Engineering Firm F-1493

Exhibit No.:	4
Operator:	High Sierra Water-Eagle Ford, LLC
Docket No.:	01-0288054, 01-0288047 AND 01-0288046
Date:	May 23, 2014