



# RAILROAD COMMISSION OF TEXAS

## OFFICE OF GENERAL COUNSEL

November 13, 2009

OIL AND GAS DOCKET NO. 06-0262483

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THE COMPLAINT OF GRAWARD OPERATING, INC., REGARDING THE COMPLETE VACUUM AND RENTAL INC., JACKSON SWD NO. 1 WELL, DEBERRY (TRAVIS PEAK) FIELD, PANOLA COUNTY, TEXAS.

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### APPEARANCES:

#### For Complainant Graward Operating, Inc.

Matt Baab  
Keith Masters

#### For Respondent Complete Vacuum and Rental, Inc.

George Neale  
Rick Johnston  
Steve Kent

### PROPOSAL FOR DECISION

### PROCEDURAL HISTORY

<b>COMPLAINT FILED:</b>	May 29, 2009
<b>NOTICE OF HEARING:</b>	August 5, 2009
<b>HEARING DATES:</b>	September 2 & 9, 2009
<b>TRANSCRIPT RECEIVED:</b>	September 17, 2009
<b>RECORD CLOSED:</b>	October 9, 2009
<b>HEARD BY:</b>	Mark Helmueller - Hearings Examiner Donna Chandler - Technical Examiner
<b>PROPOSAL FOR DECISION ISSUED:</b>	November 13, 2009

### STATEMENT OF THE CASE

Graward Operating, Inc. ("Graward"), requests that Complete Vacuum and Rental Inc.'s ("Complete") Commercial Disposal Permit No. 12794 for its Jackson SWD No. 1 well be cancelled because disposal operations from December 2008 through January 2009 negatively impacted Graward's Jernigan-Evans No.1 well, a producing well completed in the Bethany (Travis Peak) Field. Graward claims that Complete's disposal operations led to a surface breakout at the Jernigan-Evans No. 1 well over a ¼ mile from the disposal well within 2 months after disposal commenced. Graward further argues that continued disposal in the Jackson SWD No. 1 well poses a future threat of fresh water pollution and a threat to production from active oil and gas wells. Complete opposes any cancellation or modification, arguing that any alleged problems are now resolved and there is no threat of pollution or waste of oil and gas resources.

In brief, the evidence indicates that Complete's commercial disposal operations will potentially affect producing oil and gas wells offsetting the Jackson SWD facility up to 2 miles from the disposal well at current volumes and pressures. The examiners therefore recommend that the permit be canceled because continued disposal operations threaten pollution of usable quality surface and ground water or production from any offsetting producing wells within 2 miles.

### APPLICABLE AUTHORITY

Statewide Rule 9(6)(A), provides in pertinent part:

A permit for saltwater or other oil and gas waste disposal may be modified, suspended, or terminated by the commission for just cause after notice and opportunity for hearing, if:

- (i) a material change of conditions occurs in the operation or completion of the disposal well, or there are material changes in the information originally furnished;
- (ii) fresh water is likely to be polluted as a result of continued operation of the well;
- (iii) there are substantial violations of the terms and provisions of the permit or of commission rules;
- (iv) the applicant has misrepresented any material facts during the permit issuance process;
- (v) injected fluids are escaping from the permitted disposal zone; or
- (vi) waste of oil, gas, or geothermal resources is occurring or is likely to occur as a result of the permitted operations.

### PERMIT RECORDS AND COMMISSION INSPECTIONS

On August 22, 2008, Complete applied for a commercial permit to dispose up to 25,000 barrels of salt water and frac flow back water per day into the Rodessa formation in Panola County in its Jackson SWD No. 1 well. The Rodessa is productive in Panola County, but not within a 2 mile radius of the Jackson SWD No. 1. The maximum permitted injection pressure is 2500 psig.

As required under Statewide Rule 9, notice of the application was provided to operators of wells within ½ mile of the proposed commercial disposal well, including Graward. Complete was required to evaluate all wells within ½ mile of the Jackson SWD No. 1 well to determine whether disposal operations posed any threat to ground water, surface water and existing production. The ½ mile review requirement exceeds the requirement in Statewide Rule 9 of a ¼ mile radius of review. The ½ mile review requirement is currently applied by the Oil & Gas Division, Technical Permitting Section, Underground Injection Control Group to disposal and injection applications into the Rodessa formation in Panola, Harrison and Shelby Counties.

Completion records for the seven active wells within ½ mile of the Jackson SWD No. 1 were reviewed to determine whether there is adequate cement behind the production string across the proposed disposal interval. The determination of whether cement was present across the disposal interval was based on the reported top of cement in the completion and cementing records for the active wells. If the top of cement was not reported in Commission records, it was calculated from the diameter of the wellbore, diameter of the production string, reported number of cement sacks used, and the type of cement. Additionally, the records for one plugged well were reviewed to determine whether it was properly plugged. Based on calculations showing that adequate cement was present across the proposed disposal interval in all of the active wells within ½ mile, confirmation that the plugged well was plugged properly, and satisfaction of all other permitting requirements, Complete's application was administratively approved on September 23, 2008. Complete's permit allows disposal of up to 25,000 bpd with a maximum injection pressure of 2500 psig. The permitted disposal interval is between 5000 and 5400 feet.

The Jackson SWD No. 1 well was completed in the Rodessa formation on December 16, 2008. The perforated disposal interval is between 5214 and 5234 feet, a 20 feet thick section. Review of the well log indicates that there may be other zones suitable for disposal in the permitted interval. Disposal is through 4 ½ inch tubing with a packer set at 4950 feet. The Commission Form H-10 (Annual Disposal/Injection Well Monitoring Report) for the well reported disposal of 72,707 barrels in December 2008 and 199,810 barrels in January 2009. The reported average surface injection pressure was 1300 psig with a reported maximum surface injection pressure of 1500 psig. Between February 2009 and June 2009 the average surface injection pressure increased to 1750 psig and the maximum surface injection pressure increased to 2000 psig. Disposal volume increased to a high of 284,060 barrels in May 2009. In June 2009, Complete reported disposal of 195,810 barrels.

On February 3, 2009, Graward contacted the District Office to report water breaking through at the surface 30 to 40 feet from the Jernigan-Evans No. 1, located 1620 feet from the Jackson SWD No. 1 well. The Commission inspector who arrived at the Jernigan-Evans wellsite reported salt water bubbling out of the ground. Opening a valve on the surface casing for the well resulted in a flowing stream of salt water.

Back check inspections on February 4 and 5 indicated that water flow was increasing with water bubbling to the surface at more locations surrounding the Jernigan-Evans No. 1. Graward moved a rig on the well on the evening of February 5. An inspection report on February 7 noted that the well passed a casing integrity test. A cement bond log was run in the well which showed no cement across the Rodessa. Several attempts were made to perforate and squeeze cement behind pipe across the injection interval. The salt water flow was not stopped until four cement squeezes were performed across the Rodessa in the Jernigan-Evans No. 1.

Following the break out, the District Office initiated inspections of wells in the ½ mile radius surrounding the Jackson SWD No. 1 well to monitor Bradenhead pressures. Inspections on April 6, 2009 and August 6, 2009 noted Bradenhead pressures ranging from 20 psig to 220 psig on five of six active wells. The inspection reports indicated pressure was blown down quickly with no associated water flow on all wells.

#### **GRAWARD'S POSITION**

Graward contends that Complete's operations fractured the disposal interval in the Rodessa formation. Graward argues the high volume disposal operations in the Jackson SWD No. 1 well create a continuing threat to fresh water and oil and gas production in the area. Graward urges that the Jackson SWD No. 1 well should be shut-in until Complete can confirm that there will be no potential pollution of fresh water and no impact on any producing wells in the area.

Graward argues that the potential threat is confirmed by the breakout at the Jernigan-Evans No. 1 well. Graward also relies on pressure transient calculations using reported disposal volumes and reservoir characteristics to support this contention. Additionally, Graward points to the reported surface injection pressure for the Jackson SWD No. 1 well to support its position that the formation is fracturing at current pressure rates. Graward further believes that the calculated top of cement in the active wells surrounding the Jackson SWD No. 1 well in the permit review was erroneous. Graward opines that there is either missing or inadequate cement behind the production string across the disposal interval for several wells within ½ mile of the Jackson SWD No. 1. Finally, Graward argues that the observed bradenhead pressures in five of the active wells within the ½ mile radius is an indicator of the threat posed by continued disposal operations in the Jackson SWD No. 1 well.

Graward believes the break out in February 2009 resulted from the disposal operations for the Jackson SWD No. 1 well. The short time between the commencement of disposal operations and the break out, the fact that the water flow was stopped when cement was squeezed across the Rodessa interval, and the confirmation by the cement bond log that the Jernigan-Evans No. 1 well did not have cement behind pipe across the disposal interval prior to the cement squeeze are all cited to support Graward's concern of future problems in other area wells. Additionally, Graward's pressure transient calculations confirm that disposal into the injection interval at an average volume of 6000 bpd was sufficient to raise a column of fluid to the surface in its Jernigan Evans No. 1 well within the short time frame after disposal operations began.

To support the position that Complete's disposal operations are fracturing the Rodessa, Graward points to the reported surface injection pressure for operation of the Jackson SWD No. 1 well. Graward opines that the reported pressures in the Jackson SWD No. 1 well are not influenced by the volume of fluid injected. Graward also asserts that there is no indication of a pressure build up over time, a fact confirmed when no increased pressure was reported from the Rodessa formation during the remedial operations on the Jernigan-Evans No. 1 well after the breakout. Graward believes this is most easily explained by formation breakdown at current injection pressures. Graward estimates that the fracture gradient for the Rodessa formation is between 0.6 and 0.7 psi. However, Graward acknowledges that the actual fracture gradient can not be determined without performing a step rate test.

Graward also believes that Complete overestimated the top of cement in all of the active wells within the ½ mile radius. Complete relied on calculations and information reported on the completion and cementing reports to conclude that there was cement across the Rodessa disposal interval in all of the active wells. Cement bond logs Graward ran on its three active wells, including the cement bond log run on the Jernigan-Evans No. 1 well, show lack of cement or inadequate cement across the disposal interval. In the Jernigan-Evans No. 1 well, the reported top of cement was more than 1000 feet above the actual top of cement observed in the cement bond log.

Graward opines that the overestimate resulted from the failure to account for cement lost to the deeper Travis Peak formation which is known to have a low fracture gradient. An American Association of Drilling Engineers ("AADE") article cited by Graward reported wells drilled in Panola County to the Cotton Valley formation between 2000 and 2001 by one of the major operators in the area lost circulation during cementing of the production string in 50% of its wells. Graward notes that no loss factor was used in the estimated top of cement reported in the completion and cementing reports. Additionally, no loss factor was used for the calculated top of cement estimated by Complete as part of its review of the wells within ½ mile of the Jackson SWD No. 1.

Graward identified 35 wells within 2 miles of the Jackson SWD No. 1 well. A well approximately  $\frac{3}{4}$  mile away has a cement bond log that shows the top of cement is below the top of the Rodessa formation. Additionally, for 5 wells within 1 mile of the Jackson SWD No. 1 well, the calculated top of cement is less than 400 above the top of the Rodessa formation. Finally, there are 7 wells within 2 miles of the Jackson SWD No. 1 which Graward believes are high risk for providing a conduit for the migration of fluids out of the Rodessa. These wells are either plugged wells where the only reported plug in the well at the base of the surface casing shoe, or producing wells with no cementing records, or producing wells where the calculated top of cement behind the production string is unreliable.

With respect to wells cemented through the Travis Peak in this area, Graward's calculations show even if one uses a standard washout factor of 20 percent to calculate the top of cement behind the production string, that the result is still unreliable when compared to the top of cement observed in the available cement bond logs. Graward cites the breakout well as the best example of the unreliability of calculations to determine the top of cement. Using the information from Commission records for cementing, Graward calculated the top of cement in the Jernigan-Evans No. 1 well at 4754 feet. However, the cement bond log run on the well conservatively estimates the actual top of cement at 5740 feet. Graward therefore opines that no washout factor can be used to accurately calculate the top of cement for wells cemented in the Travis Peak. Graward contends that Complete significantly overestimated of the top of cement behind the production string in the active wells within the  $\frac{1}{2}$  mile area of review.

Graward also urges that the disposal operations will cause the waste of oil and gas reserves from existing producing wells. Graward again cites the AAED article concerning drilling operations in Panola County. The article reports a significantly higher incidence of casing leaks reported in producing wells. The leaks are found to occur in the zones used for salt water disposal, specifically including the Rodessa formation. This has led operators drilling new wells in Panola County to circulate cement to the surface on the production string to protect the wells. Graward contends the additional costs to workover wells to squeeze cement across disposal intervals, repair casing leaks when they occur, and other protective anti-corrosion measures may impact the economic viability of a well. This can lead to premature abandonment and the corresponding loss of oil and gas resources which would otherwise be recovered by the well.

Finally, Graward points to Bradenhead pressures in five active wells as an indicator of continued influence of Complete's disposal into the Rodessa on producing wells in the area. While admitting that Bradenhead pressures are not direct evidence that disposal operations are impacting producing wells, Graward urges that this evidence, in conjunction with the break out, shows the need to shut in the Jackson SWD No. 1 well until Complete provides evidence demonstrating that the well poses no future threat.

### COMPLETE'S POSITION

Complete argues that Graward failed to provide evidence to support cancellation, modification or suspension of the permit for the Jackson SWD No. 1 well under Statewide Rule 9(6)(A). Complete contends: 1) the permit review was appropriate; 2) there is no evidence of any potential threat after the break out occurred; 3) the Rodessa formation is a widely used and suitable zone for disposal operations in the area; and, 4) that its operations are not fracturing the formation.

Complete asserts that a proper review of its application was performed by the Commission, with notice provided to all affected parties, including Graward as an operator of producing wells within ½ mile of the Jackson SWD No. 1. Complete specifically points to the increased area of review it was required to perform by Commission staff as evidence of the thoroughness of the Commission's technical review of its application. While Statewide Rule 9 specifies that an applicant review all wells within a ¼ mile area for disposal applications, in Panola County review of all wells within a ½ mile of the proposed well is required. Complete evaluated seven active wells and one plugged well using accepted standards and Commission records to show that its proposed disposal operations would not pose a threat of pollution or waste of oil and gas resources in the ½ mile area of review. The permit was administratively approved after Complete answered all inquiries from Commission staff and no protest was received from any affected party. Complete claims it then spent \$2.7 million to drill, complete, and build the Jackson SWD No. 1 well and facilities in reliance on the valid permit it received from the Commission.

Complete claims the Jernigan-Evans No. 1 well now has cement across Rodessa formation. Complete further contends that there is no threat of pollution of freshwater because all wells within ½ mile of the Jackson SWD No. 1 have cement circulated to the surface behind the surface casing, and the District Office is actively monitoring surface conditions and Bradenhead pressures in the area. Complete notes that through the date of the hearing in this matter, over 1.7 million barrels were injected in the Jackson SWD No. 1 with no reported problems in any nearby wells.

Complete points to historical injection into the Rodessa formation in Panola County regarding the suitability of the formation for high volume commercial disposal operations. An audit of Commission records shows 16 wells are authorized for commercial disposal into the Rodessa. An estimated 67.9 million barrels of water have been injected since 1997 with 46.7 million barrels injected since 2005. Complete argues that the break out incident at the Jernigan-Evans No. 1 well is the only instance of a problem related to commercial disposal in the Rodessa in Panola County.

Complete also identifies three commercial disposal wells, the Allen No. 1D, Panola Salty SWD No. 1 and Davis No. 1 well which are permitted within 4 miles of the Jackson SWD No. 1 well. Together these wells have cumulatively injected 21 million barrels of water into the Rodessa. Complete contends that the history of injection into the Rodessa formation in Panola County and particularly in the area of the Jackson SWD No. 1 well supports its position that continued disposal operations do not pose a threat to freshwater or oil and gas resources in the area.

Finally, Complete contends that its operations are not fracturing the injection interval. Complete presented calculations based on cementing its Jackson SWD No. 1 well to show that the fracture gradient for the Rodessa is at least 0.7668 psi. These calculations are based on the known slurry weight used during cementing operations and the hydrostatic head of a column of cement. If one accepts the fracture gradient exceeds 0.7668 psi based on these calculations, Complete argues that disposal at current pressures would not have fractured the injection interval.

### EXAMINERS' OPINION

Under Statewide Rule 9(6)(A), a permit can be canceled if the evidence shows material changes in the information furnished with the permit application. Graward established that there are material changes from the information furnished by Complete to support the original permit application for the Jackson SWD No. 1 well. These material changes show that the reported and calculated top of cement in wells within ½ mile of the Jackson SWD No. 1 well do not accurately estimate the actual top of cement. The evidence also established that disposal at permitted volumes in the Jackson SWD No. 1 well will affect wells beyond the ½ mile area used when the permit application was administratively approved. Together the unreliable calculations and larger area of influence due to the thin section of the injection interval in the Jackson SWD No. 1 well require cancellation of the permit because disposal operations pose a threat of pollution or waste in a 2 mile area.<sup>1</sup>

While the parties had different interpretations of the location of the top of cement as shown by the cement bond logs Graward ran on the three Jerningan-Evans wells within ½ mile of the Jackson SWD No. 1, there was no dispute that the logs demonstrated a cement bond behind pipe significantly below the reported or calculated top of cement as analyzed by Complete in its permit application. The top of cement reported in completion or cementing records or otherwise calculated for wells within the ½ mile area of review were up to 20% higher than the top of cement observed in a cement bond log. A fourth cement bond log further supports this position. Depending on the amount of cement used in a particular well, an overestimation in the calculated top of cement could lead to an inaccurate conclusion that cement is present behind the production string across the disposal interval.

The inaccurate reports and unreliable calculations of the top of cement behind the production string appear in wells which are cemented through the deeper Travis Peak formation as producers in the Cotton Valley and Travis Peak formations. It is uncontested that the Travis Peak in Panola County has a low fracture gradient, therefore the weight of the cement used when completing the well causes the formation to breakdown. This can lead to lost circulation during the displacement of the production string cement. This conclusion is confirmed by the AADE article related to wells

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<sup>1</sup>The examiners note that Graward contended that Complete's disposal operations were fracturing the Rodessa formation. The examiners do not believe there is conclusive evidence in this docket to support this argument, particularly in light of the fracture gradient calculations submitted by Complete based on its cementing operations for the Jackson SWD No. 1.

drilled in Panola County to the Cotton Valley formation and the reports of lost circulation during displacement of the production string in 50% of one operator's wells over a two year period.

When Complete evaluated the wells within ½ mile of the Jackson SWD No. 1, it relied on calculations and reports which did not take into account the loss of cement for wells completed in the Cotton Valley and Travis Peak formations in Panola County. This is a material change from the information relied upon when the permit for the Jackson SWD No. 1 well was approved by the Commission. It is necessary to cancel the permit authorizing disposal operations as this material change illustrates a threat to freshwater and oil and gas resources in the area.

Additionally, the completion and disposal interval in the Jackson SWD No. 1 well is relevant to the analysis of the impact of disposal into the Rodessa formation in this area. The perforated disposal interval in the Rodessa formation for the Jackson SWD No. 1 is a very thin section, reported as 20 feet thick in the completion report for the well. Because of the reservoir characteristics of the Rodessa formation and the thin disposal interval being used in the Jackson SWD No. 1 well, the potential area affected by the permitted disposal operations is much greater than other nearby disposal wells in the area. Pressure transient calculations based on the reservoir characteristics and data show that disposal volumes of less than 10,000 bpd will increase pressure in the disposal interval enough to raise a column of fluid to the surface in wells within 2 miles of the Jackson SWD No. 1 within 2 years.

Numerous plugged wells within 2 miles of the Jackson SWD No. 1 well were identified by Graward as "high risk" wells. The Commission records for the plugged wells do not adequately document the original cementing of the surface casing and production casing. Plugging records also do not document the presence of plugs in the well other than at the base of the surface casing shoe. Additionally, several active wells are at risk because the determination of whether cement is present behind the production string is based on cementing and completion reports or calculations which do not account for the cement loss in the Travis Peak formation. For at least six of these wells, the calculated or reported top of cement is within 400 feet of the top of the Rodessa formation. If the calculations are not reliable, one cannot conclude that cement is behind the production string across the injection interval.

The evidence clearly indicates that the top of cement calculations are not reliable in this area of Panola County for wells cemented through the Travis Peak. Additionally, the thin interval currently used by the Jackson SWD No. 1 well for the reported disposal volumes results in a far wider area of influence from disposal operations than was evaluated when the permit for the Jackson SWD No. 1 well was approved. The permit should be canceled because disposal in the Rodessa formation in the Jackson SWD No. 1 well poses a threat of pollution to freshwater and a threat to existing producing wells within 2 miles.

Complete urges that the history of Rodessa injection in Panola County as a whole and specifically within 4 miles of the Jackson SWD No. 1 well shows that the Rodessa is a safe zone for high volume commercial salt water disposal operations. Complete points to the lack of incidents after the break out and the disposal of 1.7 million barrels into the Jackson SWD No. 1 to further support this argument.

Complete's claim that salt water disposal in the Rodessa does not threaten pollution of fresh water or the production of oil and gas in the area is not accurate. The AAED article concerning drilling operations in Panola County reports a significantly higher incidence of casing leaks reported in producing wells. The leaks are found to occur in the zones used for salt water disposal, specifically including the Rodessa formation. This has led operators drilling new wells in Panola County to circulate cement to the surface on the production string to protect the wells. The additional costs to repair casing leaks, apply anti-corrosion treatment, or application of other protective measures may impact the economic viability of a well, leading to premature abandonment and the corresponding loss of oil and gas resources which would otherwise be recovered by the well.

With regard to comparison to existing commercial disposal operations near the Jackson SWD No. 1 well, it should also be noted that the three commercial wells within 3.8 miles disposing in the Rodessa interval are all perforated in thicker sections. The Allen No. 1D and Panola Salty SWD No. 1 well are reportedly perforated and disposing into approximately 100 feet thick section of the Rodessa. The Davis No. 1 well is reportedly perforated and disposing into a 200 feet thick section of the Rodessa. Because these wells are completed for disposal into thicker sections, they do not have the same areal affect for similar disposal volumes as the Jackson SWD No. 1 well.

Finally, Complete suggests because there have been no other problems in the area of the Jackson SWD No. 1, that its disposal operations should continue unless another breakout occurs. While the examiners do not believe that the Bradenhead pressures alone are a basis for cancelling the permit, there is no question that Complete's disposal operations led to the breakout. Additionally, while the District Office and offset operators are monitoring the area wells, the pressure transient calculations show at least a 2 mile area of influence from the disposal into the Rodessa. Finally, records and calculations on the top of cement in the area wells are likely not reliable. Under such circumstances a further analysis is required before disposal operations can proceed in any fashion.

Accordingly, it is recommended that Complete's permit for the Jackson SWD No. 1 well be canceled as the authorized disposal operations pose a threat of pollution to freshwater and a threat to existing producing wells within 2 miles. It is further recommended that prior to approval of any future application for commercial disposal authority for the Jackson SWD No. 1 well, that upon completion of the administrative review, the application be referred to the Office of General Counsel to issue notice of hearing to all affected persons and operators and to conduct any required proceedings. The examiners will then prepare a proposal for decision and recommendation with respect to the application for consideration by the Commissioners.

Based on the record in this Docket, the examiners recommend adoption of the following Findings of Fact and Conclusions of Law.

#### FINDINGS OF FACT

1. Notice of Hearing was provided to the parties through their attorneys of record who attended the proceedings and presented evidence.
2. On August 22, 2008, Complete Vacuum and Rental Inc. ("Complete") applied for a commercial permit to dispose up to 25,000 barrels of salt water and frac flow back water per day into the Rodessa formation in Panola County in its Jackson SWD No. 1 well. No protests were received from any affected operators or other parties.
3. Completion records for the seven active wells within ½ mile of the Jackson SWD No. 1 were reviewed to determine whether there is adequate cement behind the production string across the proposed disposal interval.
  - a. The determination of whether cement was present across the disposal interval was based on the reported top of cement in the completion and cementing records for the active wells.
  - b. If the top of cement was not reported in Commission records, it was calculated from the information on the diameter of the wellbore, diameter of the production string, reported number of cement sacks used, and the type of cement.
  - c. Records for one plugged well were reviewed to determine whether it was properly plugged.
4. On September 23, 2008, the Commission administratively approved Commercial Disposal Permit No. 12794 for disposal of oil and gas wastes in its Jackson SWD No. 1 subject to conditions including:
  - a. The maximum permitted injection pressure is 2500 psig.
  - b. The maximum permitted volumes is 25,000 bpd.
  - c. The permitted disposal interval is between 5000 and 5400 feet.
5. The Jackson SWD No. 1 well was completed in the Rodessa formation on December 16, 2008. The perforated disposal interval is between 5214 and 5234 feet, a 20 feet thick section.

6. The Commission Form H-10 (Annual Disposal/Injection Well Monitoring Report) for the Jackson SWD No. 1 well reported disposal of 72,707 barrels in December 2008 and 199,810 barrels in January 2009. The reported average surface injection pressure was 1300 psig with a reported maximum surface injection pressure of 1500 psig.
7. On February 3, 2009, Graward Operating, Inc. ("Graward") contacted the District Office to report water breaking through at the surface 30 to 40 feet from the Jernigan-Evans No. 1, an active well located 1620 feet from the Jackson SWD No. 1.
8. A Commission District Office inspector investigating the breakout at the Jernigan-Evans No. 1 wellsite reported salt water bubbling out of the ground. Opening a valve on the surface casing for the well resulted in a flowing stream of salt water.
9. The break out at the Jernigan-Evans No. 1 well resulted from Complete's disposal of fluids into the Rodessa formation in its Jackson SWD No. 1 well.
  - a. The break out occurred less than 2 months after Complete commenced disposal into the Rodessa formation.
  - b. Back check inspections on February 4 and 5 indicated that water flow was increasing with water bubbling to the surface at more locations surrounding the Jernigan-Evans No. 1.
  - c. A cement bond log run in the Jernigan-Evans No. 1 well after the breakout observed the top of cement at 5740 feet, over 1000 feet below the calculations in Complete's application for commercial disposal authority which estimated the top of cement at 4754 feet.
  - d. The Jernigan-Evans No. 1 well passed a casing integrity test on February 7, 2009.
  - e. The salt water flow was not stopped until four cement squeezes were performed across the Rodessa in the Jernigan-Evans No. 1.
  - f. Pressure transient calculations confirm that disposal into the Jackson SWD No. 1 well in the injection interval at an average volume of 6000 bpd was sufficient to raise a column of fluid to the surface in the Jernigan-Evans No. 1 well.
10. Following the break out, the District Office initiated inspections of wells in the ½ mile radius surrounding the Jackson SWD No. 1 well to monitor Bradenhead pressures.
  - a. Inspections on April 6, 2009 and August 6, 2009 noted Bradenhead pressures ranging from 20 psig to 220 psig on 5 of the 6 active wells.

- b. The inspection reports indicated pressure was blown down quickly with no associated water flow on all wells.
11. Complete's application for disposal authority did not accurately estimate the top of cement for the active wells drilled to the deeper Travis Peak and Cotton Valley formations within ½ mile of the Jackson SWD No. 1 well.
  - a. Cement bond logs on three of the active wells within ½ mile of the Jackson SWD No. 1 well, including the cement bond log run on the Jernigan-Evans No. 1 well, show lack of cement or inadequate cement across the disposal interval
  - b. The inaccurate estimate resulted from the failure to account for cement lost to the Travis Peak formation which is known to have a low fracture gradient.
  - c. An article published by the American Association of Drilling Engineers ("AADE") for wells drilled in Panola County to the Cotton Valley formation between 2000 and 2001 reported that lost circulation occurred during cementing of the production string in 50% of one operator's wells.
  - d. No loss factor was used in the estimated top of cement reported in the completion and cementing reports.
  - e. No loss factor was used for the calculated top of cement performed by Complete as part of its review of the wells within ½ mile of the Jackson SWD No. 1.
12. The calculations used to estimate the top of cement for wells completed in the deeper Cotton Valley and Travis Peak formations in Panola County are not reliable.
13. Disposal operations in the Jackson SWD No. 1 well over a two year period at volumes of 10,000 bwpd will affect wells within 2 miles and threatens to pollute fresh water and the production of oil or gas.
  - a. The perforated disposal interval in the Rodessa formation for the Jackson SWD No. 1 is a very thin section, reported as 20 feet thick in the completion report for the well.
  - b. Pressure transient calculations based on the reservoir characteristics and data show that disposal volumes of less than 10,000 bpd will increase pressure in the disposal interval enough to raise a column of fluid to the surface in wells within 2 miles of the Jackson SWD No. 1 within 2 years.
  - c. 35 wells are located within 2 miles of the Jackson SWD No. 1 well.

- d. A cement bond log shows that the top of cement is below the top of the Rodessa formation in a well approximately  $\frac{3}{4}$  mile away from the Jackson SWD No. 1 well.
- e. For five wells within 1 mile of the Jackson SWD No. 1 well, the calculated top of cement is less than 400 above the top of the Rodessa formation.
- f. Seven wells more than 1 mile from the Jackson SWD but within 2 miles of the Jackson SWD No. 1 are either plugged wells where the only reported plug in the well is located at the base of the surface casing shoe, producing wells with no cementing records, or producing wells where the calculated top of cement behind the production string is unreliable.
- g. The AAED article concerning drilling operations in Panola County reports a significantly higher incidence of casing leaks reported in producing wells across the shallow zones used for disposal operations, including the Rodessa formation.
- h. The additional costs to repair casing leaks, apply anti-corrosion treatment, or application of other protective measures may impact the economic viability of a well, leading to premature abandonment and the corresponding loss of oil and gas resources which would otherwise be recovered by the well.

#### CONCLUSIONS OF LAW

1. Proper notice of hearing was timely given to all persons legally entitled to notice.
2. All things have occurred to give the Commission jurisdiction to decide this matter.
3. Statewide Rule 9 provides for cancellation of a disposal permit where there are material changes from the information furnished by Complete to support the original permit application.
4. Statewide Rule 9 provides for cancellation of a disposal permit where waste of oil, gas, or geothermal resources is occurring or is likely to occur as a result of the permitted operations.
5. Statewide Rule 9 provides for cancellation of a disposal permit where fresh water is likely to be polluted as a result of continued operation of the well.
6. The inaccurate estimates of the top of cement in producing wells for the active wells drilled to the deeper Travis Peak and Cotton Valley formations within  $\frac{1}{2}$  mile of the Jackson SWD No. 1 well in Complete's permit application is a material change in the information relied upon when the permit for the Jackson SWD No. 1 well was administratively approved by the Commission.

7. Cancellation of Complete's commercial disposal permit No. 12794 is necessary because disposal operations pose a threat of pollution to freshwater in the area.
8. Cancellation of Complete's commercial disposal permit No. 12794 is necessary because disposal operations pose a threat of waste of oil and gas resources in the area.

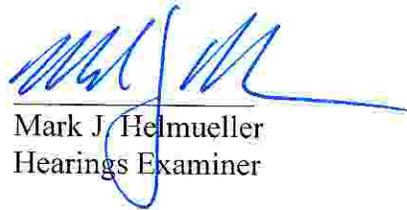
#### RECOMMENDATION

The examiners recommend Complete's permit be canceled as any disposal operations pose a threat of pollution to freshwater and a threat to existing producing wells within 2 miles. It is further recommended that prior to approval of an application for a disposal permit for the Jackson SWD No. 1 well, that upon completion of the administrative review, the application for reinstatement should be referred to the Office of General Counsel to issue notice of hearing to all affected persons and operators and to conduct any required proceedings.

Respectfully submitted,



Donna K. Chandler  
Technical Examiner



Mark J. Helmueller  
Hearings Examiner