Oil Well Remediation in Clay and Wayne Counties, IL

Technical Progress Report

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ABSTRACT

This is the first technical progress report of the remediation of two wells and a water injection well in Clay County, Illinois.

The location is identified as the Routt lease and the wells will be identified as the Routt #3 and Routt #4 respectively throughout this report.

The Clay County portion of this project has met all legal, financial, and environmental requirements to drill and /or pump oil at this lease.

We have also obtained all available information about this site and have taken the necessary steps to improve access roads, dig the necessary pits and build the necessary firewalls. Both wells have been drilled to the Salem formation. Gas gun technology was used to stimulate the reservoir of the Routt #3. This report will address the technical aspects of the remediation.

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INTRODUCTION

Dakfam, Inc. is attempting to use new technology in an effort to increase the domestic oil supply and decrease our dependence on foreign oil. If Dakfam is able to initiate a profitable venture, Dakfam will improve the economic outlook in southern Illinois and will help the state meet its goal to clean up and preserve the environment. Dakfam will hire locally and secure supplies and services through local contractors thus stimulating the local economy in Clay and Wayne Counties.

If the gas gun technology proves successful, Dakfam will disseminate information about the technology that is suited to small company remediation in oil-rich formations where natural fractures exist. Dakfam will provide a model by which small companies operating in similar locations can emulate.

If successful, the technology will be easy to replicate and be cost effective which will help D.O.E. reach its stated objective to "increase oil production in the U.S. by finding solutions to problems that inhibit production."

Executive Summary

This summary will be limited to the remediation of the Routt Lease, specifically the Routt #3, Routt #4 and the Routt saltwater disposal well site.

All legal requirements were met, however it should be noted a twenty-year error in the legal description was found. That error has been corrected.

All lease roads were immediately improved by adding gravel and rock, which was leveled and graded. Necessary firewalls and pits were also dug. Electrical work was repaired and completed. Illinois State Regulations require all saltwater disposal wells meet certain requirements. Examination of the Routt well found it inoperative and unable to meet the Mechanical Integrity Test, which determines if there is a leak in the well casing. All tubing was pulled, examined, and tested. All damaged tubing was removed and tested prior to being replaced. The well was then tested by checking the pressure of the annular space between the tubing and the casing. The space is pressurized to 1936-sq. cm (300 p.s.i.) and held for a minimum of thirty (30) minutes.

The Routt disposal well passed its Mechanical Integrity Test and will not require another test for five (5) years. The repair of this disposal well will eliminate the need to truck water from any wells on this site. It can also be used to dispose of water from adjoining leases or take trucked water from leases in the area.

Work immediately began on the Routt #4. The decision was made to pull and repair tubing and place the well on pump without the benefit or use of gas gun stimulation at this time. After testing all tubing and replacing more than 20 sections of tubing, the well was placed on pump and is currently pumping 1.6 barrels per day.

Attention was turned to the Routt #3, which proved to be much more problematic. Examination of the Routt #3 revealed the rods to be parted and there was severe damage to the tubing. Tubing was found to be stuck downhole and all removal efforts proved unsuccessful. Several fishing tools were made, rented and utilized to remove the tubing. This effort was also met with great resistance. One hundred thirty meters (390') of washover pipe with a mill end was fished and the tubing was finally removed. Utilizing a 10.55 cm. (3 7/8") tri-coned drill bit, the hole was washed and swabbed. Over 200 meters (600') of iron sulfate and gyp was removed from hole. Touchdown was achieved at 1,116.33 meters (3349') in the Salem pay.

The well was perforated between 1,106-1,107meters (3319' and 3321') and shot using a .6096 meter (2') gas gun. Rod and tubing were replaced and the well was immediately put back on pump. The well was pumped for approximately three (3) weeks and we were unable to pump down the fluid. Due to the amount of water pumped, it was determined that we had a hole in the casing. The well was again taken off pump. The rods and tubing were pulled. A 10.55 cm (4 ½") set down packer was set at 860 meters (2580') to seal a hole in the casing. After seating the well, it was placed back on pump. The well made 1 barrel of oil per day and 40 barrels of water. After pumping successfully for approximate 60 days, a tubing leak developed below the packer. The well was again shut down and the rod and tubing pulled. Two leaks were located at this time. All tubing was tested to 38,712-sq. cm (6000 p.s.i.).

A determination was made to explore another zone. In an effort to do so, a cast iron bridge plug was placed at 1,084 meters (3252'). This will effectively plug the Salem zone and ensure all leaks are plugged to allow exploration of another area. After careful examination of the gamma ray log (radioactivity log) it has been determined to explore to the middle McClosky pay zone 1,005.33-1,006.33 meters (3016' to 3019').

The well was perforated at the above listed zone with five (5) shots per .3048cm (1 foot) for 1 meter (3'). A 10.55 cm (4 ½") Baker AD-l packer was placed at 763.66 meters (2291') with one joint of tubing with a seating nipple below the packer. The tubing was replaced and the well was placed on pump. The well is not giving up much fluid at this time and will be acidized as soon as practical. The small amount of fluid given up does indicate oil in this zone.

We have currently experienced a number of weather related delays and it is unknown when we will be able to acidize and produce this zone. If we are unable to complete this project by the due date of this technical report, it will be reported in our next scheduled report.

Experimental

The gas gun stimulation has been used twice on the Routt #3. The first usage occurred between 1,106.33-1,107 meters (3319'-3321') in the Salem pay. We were able to achieve approximately 1 BB of oil per day with 40 BB of water. Due to the large amount of water we did not acidize this zone for fear of producing additional barrels of water. Prior to the gas gun stimulation the zone was perforated using a steel carrier gun. We have experimented with other types and have come to learn that this particular gun will keep the concussion in the barrel reducing the risk of damaging the casing when shot. We utilized the normal gas gun procedure using a standard copper tube which houses the explosive charge which is used to fracture the limestone on the first stimulation.

The second time we used the gas gun we experimented by using a plastic tubing in an effort to reduce the amount of debris downhole. The gas gun was shot at 1,005.33-1,006.33 meters (3016' to 3019'). The tubing was replaced open-ended and the hole circulated to recover any debris in the zone. Recovery efforts proved promising as the plastic tubing was disintegrated and reduced to gravel like parts. The well was put on pump but has given up little fluid. The well will be acidized when weather permits.

Additional experimental procedures were used to remove the stuck and damaged tubing from the well site. We built a center spear consisting of 2.54-cm (1") rod onto which we welded several steel barbs at various upward angles. This proved very successful in pulling sucker rods from the casing.

Results and Discussion

The reclamation of the Routt #3 has proved to be difficult, however, initial results are showing some promise. The cleanup, road repairs, and the repair of the saltwater injection well have made the leasehold functional. A complete electrical overhaul has made both wells operational.

The decision to repair and place the Routt #4 on pump will help offset some of the costly repairs incurred on the Routt #3. The Routt #4 has been pumping 1.6 barrels per day since the start of this project and continues to do so. It has required only a minimal amount of maintenance.

The Routt #3 has experienced several weather delays, operational problems, and tubing leaks; however, we were able to produce 1 barrel of oil per day but pumped 40 barrels of water too. Due to the amount of water, the zone was not acidized and we were unable to increase the production. Examination of the gamma ray log has resulted in exploring the middle McClosky pay at 1,005.33-1,006.33meters (3016'-3019'). The well was perforated but weather delays have prevented us from acidizing this zone. The small amount of fluid given up is oil and we feel we will be able to produce this zone upon acidization.

It should be noted that the use of the gas gun in a limestone formation will ease the acidization process as it will require less pressure and acid to complete the formation. It is difficult to estimate how much production this zone will give up but due to our reporting schedule, the results may have to be reported in our next technical report.

If weather permits and we are able to acidize the zone prior to our required reporting date, we will include this information with this report

In summation, it appears we are nearing our objective of making these abandoned sites environmentally safe, improving access, reaching our desired formations, and using the gas gun to enhance our oil recovery. We have yet to use the gas gun on or acidize the Routt #4 well. It is currently giving up 1.6 BB of oil a day, but we feel gas gun stimulation and acidization will increase the amount of oil the well is producing.

Conclusion

It is much too early to declare the first phase of this project a success, but early indicators are showing we are able to extract oil from abandoned well sites.

We have been able to partially achieve some of our objectives. We were able to clean up and made this site environmentally safe. We have improved road access and made both well sites functional. The water injection well is operational and is able to take water from our wells plus other sites where they do not have the benefit of a water injection system. The benefit of this injection well will help to keep the water tables free of contamination and allow safe disposal.

We were able to place both wells on pump and extract oil. The Routt #4 has been pumping 1.6 BB per day since the project began. We have yet to utilize the gas gun to stimulate the zone and it has not been acidized. We feel somewhat confident that when we do stimulate the zone and acidize it, we will be able to increase out daily production. How much is anyone's guess, but if just 3 or 4 barrels are achieved, the Routt #4 would be considered a success.

The Routt #3 has received the gas gun stimulation, but it has not been acidized. Weather related delays have plagued the project but we anticipate acidizing the Routt #3 in the next 30 days, weather permitting.

It should also be noted that review of the available logs for both wells show other promising uphole zones, which have not yet been explored.

In conclusion, we are cautiously optimistic about our approach and initial findings. Several questions remain to be answered, however, reclamation of oil wells appear to be helping us reach our goals, completing our task and the D.O.E. objectives to "increase oil production in the U.S. by finding solutions to problems that inhibit production."