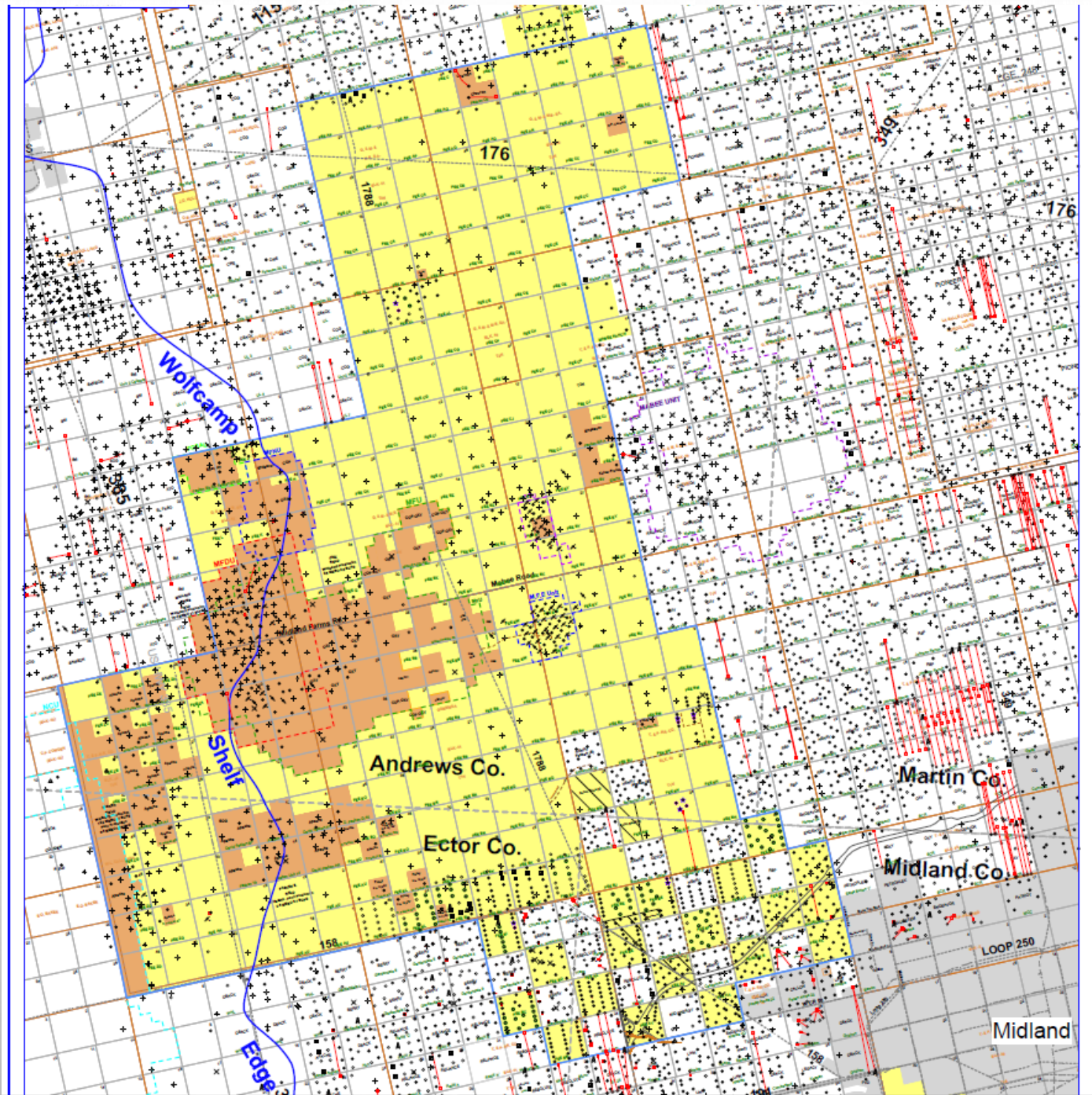




**ELIMINATING FRESH WATER  
USAGE IN OILFIELD  
OPERATIONS**



- Fasken Oil and Ranch, Ltd. operates oil and gas production on the 165,000 acre “C” Ranch located in Andrews, Ector and Midland Counties.
- We operate just over 450 Wolfberry producing wells drilled during the past 4-1/2 years.
- Approximately 57,600 bbls of water is required to drill and frac each well.



- There is very little fresh water located on the “C” Ranch and the decision was made over a year ago to do our very best to preserve this fresh water for future ranch operations.
- We first tried to work with new technology and remove sulfate from water that was produced from the brackish Santa Rosa aquifer located 900’ – 1500’ below ground level. Initial attempts were unsuccessful. We have frac’d several wells using 50% fresh water and 50% Santa Rosa water in an effort to dilute the sulfate concentration of the water that would be pumped into the producing wells.
- Some of the producing zones produce water that contains strontium which when combined with the sulfate contained in the Santa Rosa water can form strontium sulfate and can permanently plug up the producing zones frac’d with this water.

- Beginning in March, 2013 we began removing sulfate from Santa Rosa water produced from four Santa Rosa wells and frac'd 2-4 wells per month utilizing this water. Nano filtration technology is being utilized in this process.
- We are currently using this processed Santa Rosa water in approximately 50% of the wells that we frac today. We have drilled or recompleted eight Santa Rosa wells.
- Two months ago we placed into operation a membrane unit that removes both the sulfate and chloride in the Santa Rosa water to a level that will enable this water to be used for both drilling and cementing wells.
- We are currently processing 6000 bpd of Santa Rosa water for fresh water use and next month will have another 6000 bpd of capacity allowing us to discontinue the use of Ogallala fresh water for drilling operations.

## Santa Rosa Sulfate Removal Unit



## PRODUCED WATER RECYCLING

- Began produced water recycling program in July, 2013. Currently recycling approximately 6,000-8,000 bbls per day.
- We have recycled just over 1,500,000 bbls of water for fracturing operations to date.
- This accounts for nearly 50% of our frac water needs.







# PRODUCED WATER RECYCLING

- Produced water is gathered at a SWD facility.



- The water is then piped into an electrocoagulation (EC) unit where DC electric current is applied which causes the suspended solids in the water to coalesce.





- Then the water is pumped into a open top steel tank that contains baffles that accelerate the settling of solids to the bottom of the tank.
- From there the water flows into two horizontal 500 bbl settling tanks





- The water is then pumped into a 125,000 bbl capacity doubled lined storage pit.





And finally the water is pulled out of the storage pit and pumped to the well site to be used in the fracturing process.



## SUMMARY

- BY THE END OF JUNE, 2014 WE HOPE TO COMPLETELY DISCONTINUE THE USE OF FRESH WATER FOR DRILLING AND FRACTURING OPERATIONS
- THIS WILL RESULT IN A TOTAL OF APPROXIMATELY 2.3 MILLION GALLONS OF FRESH WATER LEFT IN THE GROUND THAT OTHERWISE WOULD HAVE BEEN USED IN DRILLING AND COMPLETION OPERATIONS FOR EVERY WELL TO BE DRILLED. WE ESTIMATE ANOTHER 2000 WOLFBERRY WELLS LEFT TO BE DRILLED ON THE C RANCH REQUIRING AN ESTIMATED 4.6 BILLION GALLONS OF WATER.