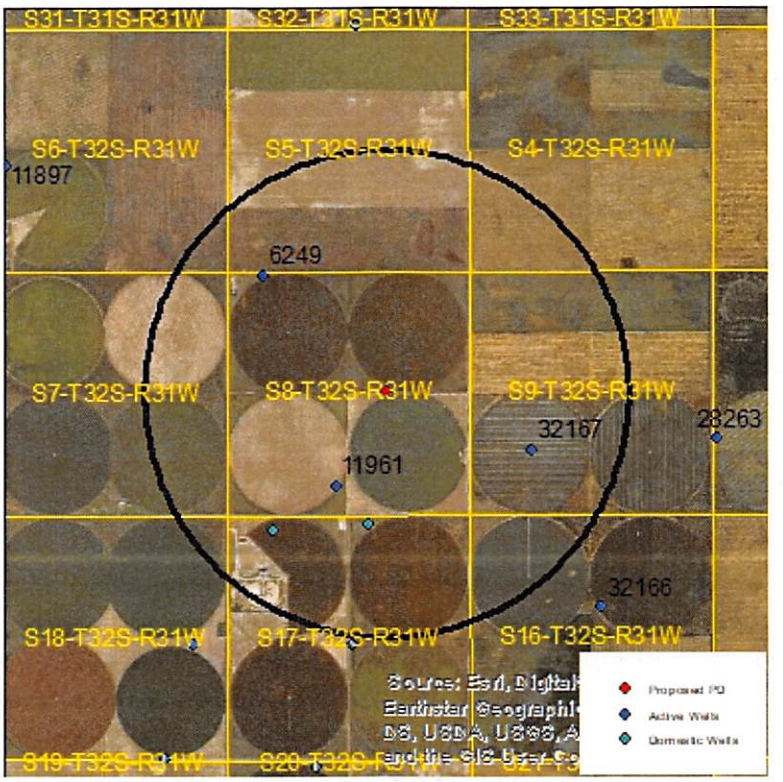
Evaluation of proposed move for Water Right No 11961

Proposed: Move water right no. 11961 a distance of 2282 ft to the northeast.



Wells within 1 mile: 6249, 32167, a domestic well in the northwest ¼ of section 17-32-31, and a domestic well in the northeast ¼ of section 17-32-31.

The saturated thickness at the proposed well location is estimated to be 219 ft, based upon the driller's log and an observation well located in section 8-32-31. For saturated thickness greater than 200 ft, the drawdown allowance is 4.0 ft.

50 year Theis Analysis: The following values were used to run the analysis:

S = 0.2231, T = 1517 ft^2/day, $tp_{current}$ = 125 days (based upon average use and observed rate), $Q_{current}$ = 383 gpm (based upon 2013 field inspection), $tp_{proposed}$ = 103 days, $Q_{proposed}$ = 1400 gpm

Theis drawdowns were calculated as follows:

6249:	Drawdown from current location = 3.37 ft
	Drawdown from proposed location = 12.25 ft
	Net drawdown = **8.9 ft**
32167:	Drawdown from current location = 3.65 ft
	Drawdown from proposed location = 12.96 ft
	Net drawdown = **9.3 ft**

Domestic NW 17-32-31: Drawdown from current location = 6.57 ft

Drawdown from proposed location = 11.85 ft

Net drawdown = **5.3 ft**

Domestic NE 17-32-31: Drawdown from current location = 8.57 ft

Drawdown from proposed location = 14.27 ft

Net drawdown = **5.7 ft**

Net drawdown exceeds the drawdown allowance of 4.0 ft for all wells within 1 mile of the proposed point of diversion, so critical well evaluation is necessary on those wells.

Critical Well Evaluation:

6249:

Water Column = 274 ft

DP = 7.2 ft

DE = 10.9 ft

DD = 204 ft (S = 0.2231, T = 1517 ft^2/day, Q = 1000 gpm, tp = 91 days, efficiency = 70%)

DT = 222.1 ft

Economic Drawdown Constraint (EDC) = 274 ft * 0.4 = 109.6 ft

Physical Drawdown Constraint (PDC) = 274 ft – 60 ft = 214 ft

The EDC is more conservative than the PDC, so the maximum allowable drawdown is 109.6 ft. Total drawdown of 222.1 ft is greater than the maximum allowable drawdown, so this well **is critical.**

32167:

Water Column = 156 ft

DP = 7.5 ft

DE = 10.9 ft

DD = 103 ft (S = 0.2231, T = 1517 ft^2/day, Q = 500 gpm, tp = 105 days, efficiency = 70%)

DT = 121.4 ft

Economic Drawdown Constraint (EDC) = 156 ft * 0.4 = 62.4 ft

Physical Drawdown Constraint (PDC) = 156 ft – 60 ft = 96 ft

The EDC is more conservative than the PDC, so the maximum allowable drawdown is 62.4 ft. Total drawdown of 121.4 ft is greater than the maximum allowable drawdown, so this well **is critical.**

Domestic NW 17-32-31:

Water Column = 216 ft

DP = 3.6 ft

DE = 35.4 ft

DT = 39.0 ft

Economic Drawdown Constraint (EDC) = 216 ft * 0.4 = 86.4 ft

Physical Drawdown Constraint (PDC) = 216 ft – 20 ft = 196 ft

The EDC is more conservative than the PDC, so the maximum allowable drawdown is 86.4 ft. Total drawdown of 39.0 ft is less than the maximum allowable drawdown, so the well is **not critical.**

Domestic NE 17-32-31:

Water Column = 216 ft

DP = 4.0 ft

DE = 35.4 ft

DT = 39.4 ft

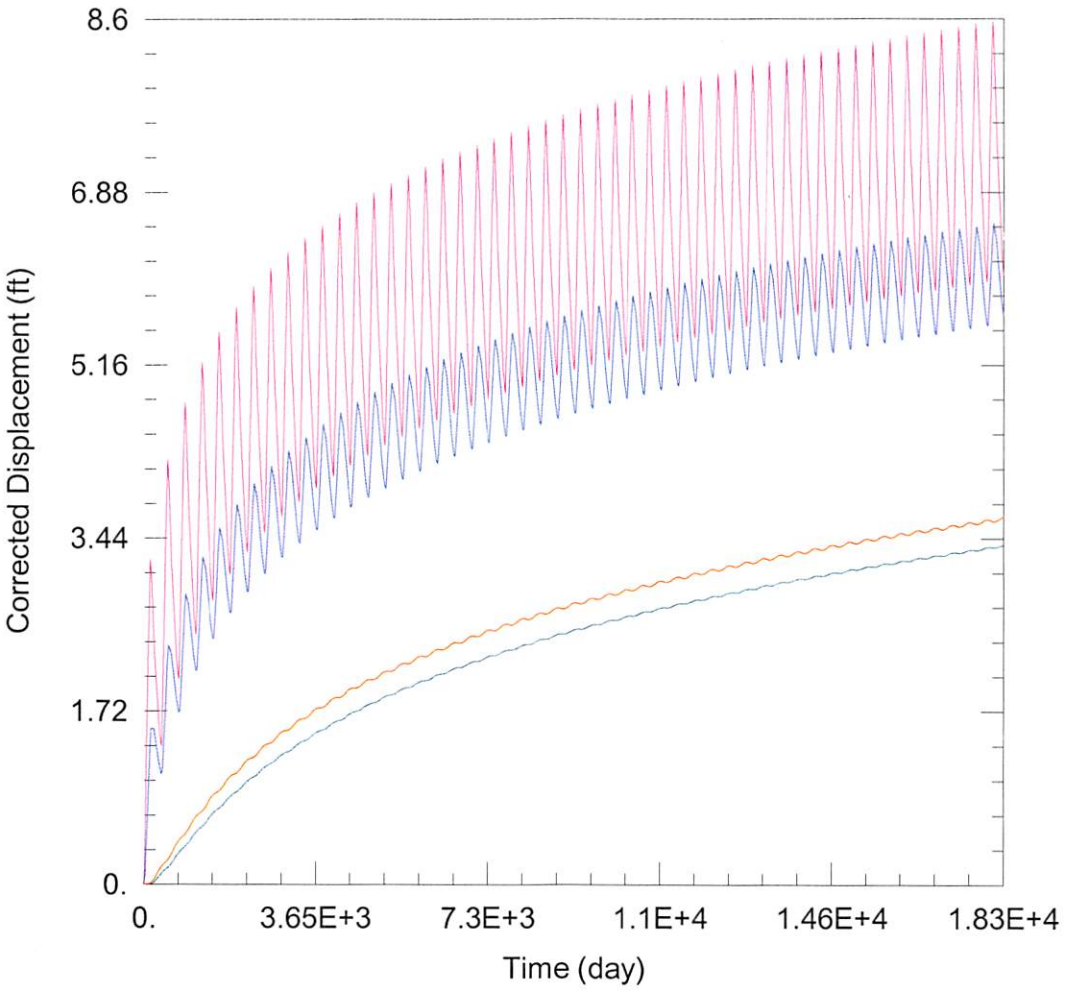
Economic Drawdown Constraint (EDC) = 216 ft * 0.4 = 86.4 ft

Physical Drawdown Constraint (PDC) = 216 ft – 20 ft = 196 ft

The EDC is more conservative than the PDC, so the maximum allowable drawdown is 86.4 ft. Total drawdown of 39.4 ft is less than the maximum allowable drawdown, so the well **is not critical.**

Conclusion:

The wells authorized under water right numbers 6249 and 32167 are critical wells. Well logs indicate that most of the aquifer near the proposed well location has a lower storage coefficient and transmissivity than most other areas of the Ogallala Aquifer, resulting in greater effects on neighboring wells than normal. These conditions also make it unlikely that the applicant would be able to pump the requested rate of 1400 gpm. The applicant has indicated that the well is likely to produce around 700 gpm. At 700 gpm and 122 days of operation, the well-to-well effect on water right number 32167 drops to 4.0 ft and the effect on water right number 6249 drops to 3.9 ft. That rate and quantity would minimize the interaction effect on critical wells, making a future impairment complaint less likely. Therefore, GMD3 staff recommends that the applicant be limited to an annual rate and quantity of 700 gpm and 377 AF.



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2019_moves\11961\11961 Current.aqt
Date: 10/24/19 Time: 09:11:19

PROJECT INFORMATION

Company: GMD 3
Project: 11961
Location: Seward County
Test Well: 11961

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
11961	23705	145031

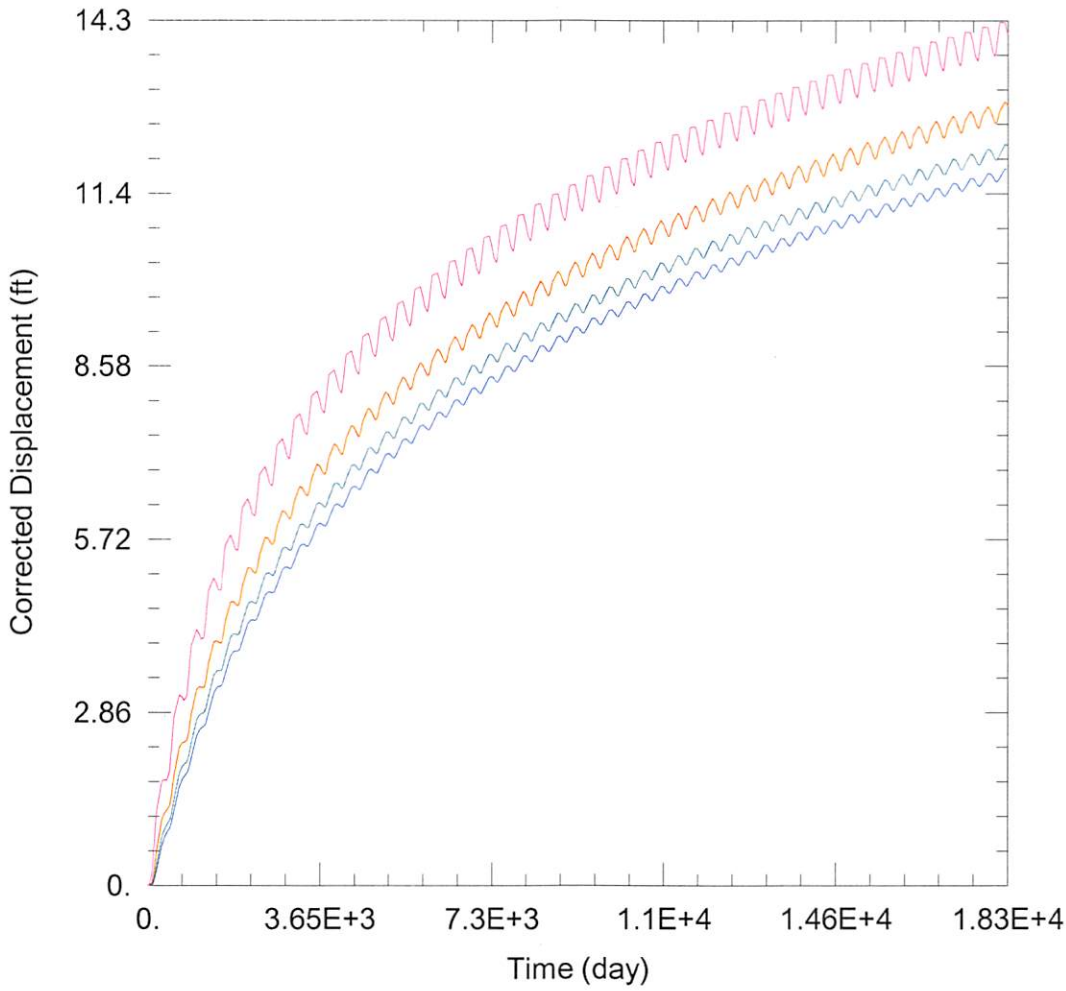
Observation Wells

Well Name	X (ft)	Y (ft)
▫	23705	145031
▫ 6249	22106	149564
▫ 32167	27960	145786
▫ Domestic NW 17-32-31	22329	144036
▫ Domestic NE 17-32-31	24415	144175

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1517. ft^2/day
S = 0.2231
Kz/Kr = 1.
b = 219. ft



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2019_moves\11961\11961 Proposed.aqt
Date: 10/24/19 Time: 09:09:38

Authorized 1400gpm

PROJECT INFORMATION

Company: GMD 3
Project: 11961
Location: Seward County
Test Well: 11961

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
11961	24803	147032

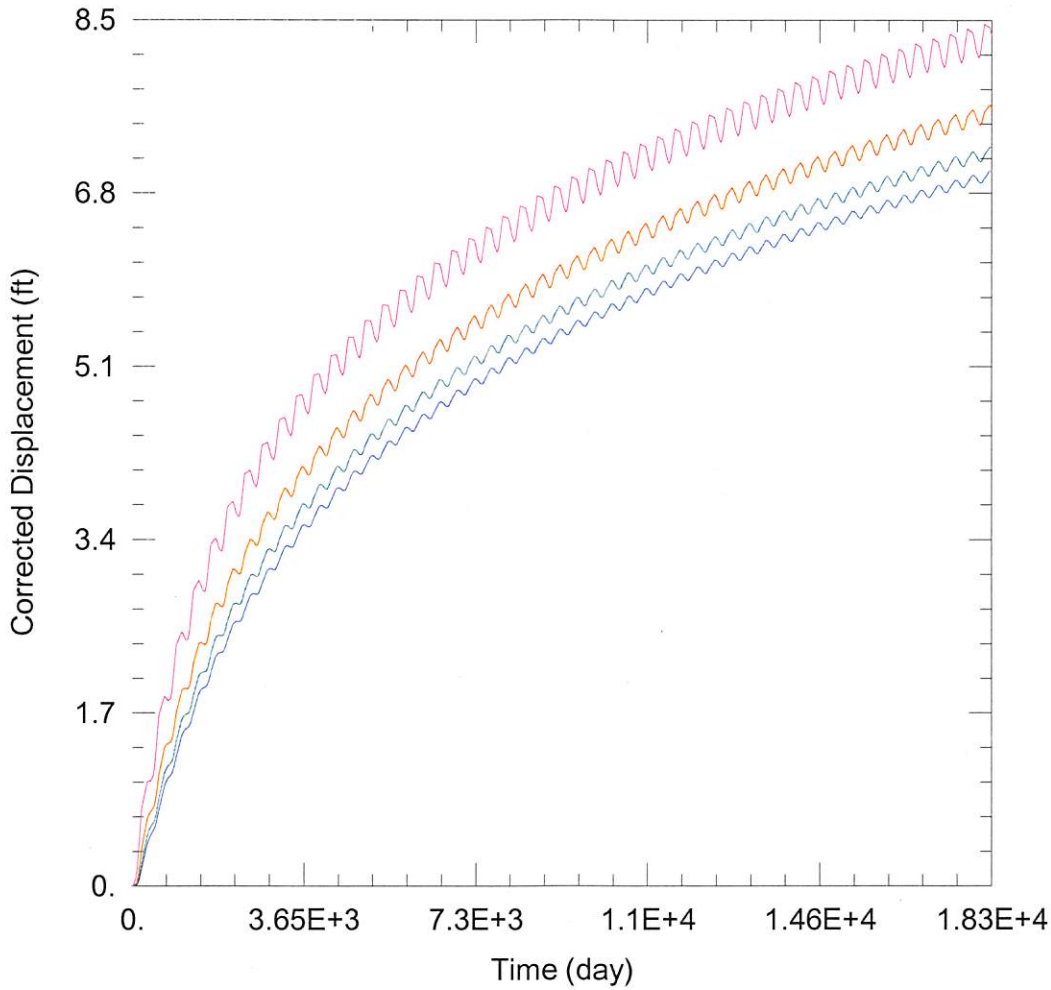
Observation Wells

Well Name	X (ft)	Y (ft)
▫	24803	147032
▫ 6249	22106	149564
▫ 32167	27960	145786
▫ Domestic NW 17-32-31	22329	144036
▫ Domestic NE 17-32-31	24415	144175

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1517. ft^2/day
S = 0.2231
Kz/Kr = 1.
b = 219. ft



WELL TEST ANALYSIS

Data Set: C:\Users\trevora\Documents\2019_moves\11961\11961 Proposed.aqt
Date: 10/24/19 Time: 09:13:19

700 gpm @ 377 AF

PROJECT INFORMATION

Company: GMD 3
Project: 11961
Location: Seward County
Test Well: 11961

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
11961	24803	147032

Observation Wells

Well Name	X (ft)	Y (ft)
▫	24803	147032
▫ 6249	22106	149564
▫ 32167	27960	145786
▫ Domestic NW 17-32-31	22329	144036
▫ Domestic NE 17-32-31	24415	144175

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1517. ft^2/day
S = 0.2231
Kz/Kr = 1.
b = 219. ft