RW-7 Pilot Polymer Flood

General information and comments as of 1-2-95

12-29-94:
20 lbs. of KCl was dissolved in 20 gal. of water. The KCl was allowed to dissolve overnight in the "horse tank".

12-30-94:
A 100 gal. batch of P-500 (125 ppm) was hydrated at 11:30 a.m. At 1:15 p.m. polymer injection began. The wellhead pressure was 280 psi. The approximate rate of injection is 80 bbl./day. The Texteen pump is set at 100% which calculates at 3.2 gal./hr. Before leaving, the injection rate was adjusted to 65.1 bbls/day.

Tank vis. = 13.0 cp.
Texteen pump effluent = 10.2 cp.

12-31-94:
A 100 gal. batch of P-500 (125ppm) was hydrated at 9:30 a.m. to the 40+ gal. still remaining in tank. NO KCl was used. The wellhead pressure is at 300 psi. The injection rate was determined to be 50.3 bbls/day.

Tank vis. = 17.5 cp.
Texteen pump effluent = 17.4 cp.

1-1-95:
A 90 gal. batch of P-500 was added to the 40+ gal. still remaining in tank. The same amount of dry polymer was weighed as if this had been a 100 gal. batch. Again, NO KCl was added. The wellhead pressure is at 350 psi. The injection rate was not determined.

Tank vis. = 20.5 cp.
Texteen pump effluent = 21.1 cp.

1-2-95:
A 50 gal. batch of P-500 (125ppm) was hydrated at 3:15 p.m. Also added was 5 lbs. of KCl (difficulty in dissolving KCl). The wellhead pressure is at 385 psi. The injection rate was determined to be 43.4 bbls./day.

Tank vis. = 17.6 cp.
Texteen pump effluent = 16.5 cp.

TORP

RW-7 Pilot Polymer Flood
General Information and Comments as of 1-14-95

1-8-95:
No testing or mixing (Sunday).

1-9-95:
About 18 gal. of polymer soln. remained in the tank since the last mixing on 1-7-95. At 11:00 a.m. a 127 gal. batch (this is all that tank could hold along with 18 gal. already present), was mixed. The same amount of dry polymer was used as if this had been a 150 gal. batch (3.75 lbs. or 125 ppm). 12½ lbs. of KCl was used. The wellhead pressure at 10:55 a.m. was 485 psi. The injection rate is 64.0 bbls/day.
Tank vis. = 9.0 cp.
Texsteam pump effluent = 8.5 cp.

1-10-95:
No testing or mixing.

1-11-95:
In less than 5 days, the "bug test" results were positive. This "bug" infestation necessitates draining tank completely and scouring with bleach. Therefore, 50 gal. of water only (no polymer) was added to tank to ensure enough volume of water to last untill tomorrow when cleaning will begin. The wellhead pressure was 520 psi. The 2-day injection rate average (1-10 & 1-11) is 51.5 bbls/day.
Tank vis. = 12.5 cp.
Texsteam pump effluent = 12.0 cp.

1-12-95:
At 11:00 a.m. the tank was dismantled by Jeff and taken outside building to begin scrubbing with 2 gal. of 10% bleach and a small amount of Joy detergent. At 12:00 p.m. the tank was reassembled. One gal. of 10% bleach and 20 gal. of water was added to tank. This 21 gal. soln. was allowed to circulate thru centrifugal pump. Also, the Texsteam pump was started thus allowing this bleach soln. to be injected downstream. At 1:00 p.m. a 145 gal. batch (all tank can hold), was mixed (3.75 lbs. dry polymer or 125ppm). At 2:00 p.m. it was noted that the "froth" on top of tank appeared thicker and greater in quantiy compared to previous batches. Upon Delmer's past experience and recommendation, about 5 gal. or most of this froth was removed. Historically, similar froths have difficulty in hydrating.

One quart of Formaldehyde (37% active) was added at the end (poured on top of froth). Due to non-freezing temperatures, NO KCl was added. The wellhead pressure at 2:00 p.m. was 520 psi. The injection rate is 46.9 bbl/day. No viscosity samples were obtained.

1-13-95:
No testing or mixing

1-14-95:
Three gal. of additional froth was skimmed off top of tank. This froth is from the batch mixed on 1-12-95. To hopefully avoid froth from forming on subsequent batches, the addition of dry polymer thru eductor (hootenanny) was slowed.

A bleach odor was still noticeable in tank. It should be noted that the total of 8 gal. of froth that was skimmed could conceivably contain much of the polymer.

One quart of formaldehyde was added at the beginning before the new batch was mixed. No KCl was used. A 110 gal. batch was mixed at 10:30 a.m. with the 35 gal. left over from last batch. The same amount of polymer was used as if this had been a 100 gal. batch. The wellhead pressure at 10:45 a.m. was 520 psi. The injection rate was 48.0 bbls/day.
Tank vis. = 1.8 cp.
Texsteam pump effluent = 2.0 cp.

Torp

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RW-7 Pilot Polymer Flood
General Information and Comments as of 1-21-95

1-15-95:
No testing or mixing (Sunday).

1-16-95:
No significant amount of froth was found on top of tank. Slowing the addition of dry polymer thru eductor seems to have eliminated froth. A 125 gal. batch was mixed (3.125 lbs. or 125 ppm) and added to the 20 gal. remaining from previous batch. No KCl was used. One quart of formaldehyde was added after the batch was mixed. The water appears to be the best quality to date (clear to light gray in color). The pH of top of tank after mixing was 8.0. The wellhead pressure at 11:45 a.m. was 530 psi. The injection rate is 45.7 bbls/day.

Tank vis. = 9.1 cp.
Texsteam pump effluent = 8.7 cp.

1-17-95:
No testing or mixing.

1-18-95:
The bottom of tank has a "layer" (¼ in.) of polymer solution that appears hydrated but yet concentrated and more viscous. The tank was stirred vigorously for 5 minutes to blend the ¼ in. "layer" with the 20 gal. remaining in tank and the viscosity checked (39.5 cp!).

A 125 gal. batch was mixed (3.125 lbs. or 125 ppm). Because the eductor is apparently plugged, only 2 lbs. of dry polymer was hydrated. The eductor was dismantled and taken to lab for cleaning. The hose to eductor was plugged with polymer. Only the hose was cleaned with alcohol. The eductor appears clean and in good shape. One quart of formaldehyde was poured on top of new batch. No KCl was used. The pH of tank before mixing new batch was 8.1. The wellhead pressure at 10:30 a.m. was 540 psi. The injection rate was 96 bbls/day.

At 1:50 p.m. the header was turned off to reroute water so that water and polymer soln. are combined before passing thru in-line mixer. Also, a cannister filter was installed downstream after the polymer soln. and water have mixed. The upstream and downstream pressures will be monitored as fluids enter and exit cannister. The header was turned on at 4:05 p.m. The injection rate was adjusted to 61.7 bbls/day. The wellhead pressure is now 420 psi.

Tank vis. = 17.0 cp.
Texsteam pump effluent = 17.0 cp.

1-19-95:
No testing or mixing.

1-20-95:

A 125 gal. batch was mixed (3.125 lbs. or 125 ppm.) Only 110 gal. of water was used because tank contained 30 gal. from previous batch. No KCl was used. One quart of formaldehyde was added to top of tank. There was another layer of viscous polymer soln. on bottom of tank but not nearly as much as what was observed on 1-18-95. This layer plus 30 gal. remaining was vigorously stirred and the viscosity found to be 13.9 cp. The ph was 7.9 (befor mixing).

The water is gray. As concluded by Wendell this is most likely caused by the water supply well running longer. The water supply well is apparently running longer to compensate for increased injection due to recent filter changes. A check valve was installed immediately downstream of Texsteam pump. The wellhead pressure at 11:30 a.m. was 495 psi. The injection rate is 61.5 bbls/day. An additional viscosity sample will now be obtained at the wellhead.

Tank vis. = 11.3 cp.
Texsteam pump effluent = 10.9 cp.
Wellhead vis. = 1.5 cp.

1-21-95:
A 50 gal. batch was mixed at 10:00 a.m. (125 ppm.) No KCl was used. One pint of formaldehyde was added. The pH before mixing was 8.2. The injection rate is 43.4 bbls/day (adjusted to 55.2 bbls/day). The wellhead pressure before adjusting was 430 psi. (after = 450). Water is still gray.

Tank vis. = 21.1 cp.
Texsteam pump effluent = 19.4 cp.
Wellhead vis. = 1.5 cp.

RW-7 Pilot Polymer Flood
General Information and Comments as of 1-14-95

1-8-95:
No testing or mixing (Sunday).

1-9-95:
About 18 gal. of polymer soln. remained in the tank since the last mixing on 1-7-95. At 11:00 a.m. a 127 gal. batch (this is all that tank could hold along with 18 gal. already present), was mixed. The same amount of dry polymer was used as if this had been a 150 gal. batch (3.75 lbs. or 125 ppm). 12½ lbs. of KCl was used. The wellhead pressure at 10:55 a.m. was 485 psi. The injection rate is 64.0 bbls/day.
Tank vis. = 9.0 cp.
Texsteam pump effluent = 8.5 cp.

1-10-95:
No testing or mixing.

1-11-95:
In less than 5 days, the "bug test" results were positive. This "bug" infestation necessitates draining tank completely and scouring with bleach. Therefore, 50 gal. of water only (no polymer) was added to tank to ensure enough volume of water to last untill tomorrow when cleaning will begin. The wellhead pressure was 520 psi. The 2-day injection rate average (1-10 & 1-11) is 51.5 bbls/day.
Tank vis. = 12.5 cp.
Texsteam pump effluent = 12.0 cp.

1-12-95:
At 11:00 a.m. the tank was dismantled by Jeff and taken outside building to begin scrubbing with 2 gal. of 10% bleach and a small amount of Joy detergent. At 12:00 p.m. the tank was reassembled. One gal. of 10% bleach and 20 gal. of water was added to tank. This 21 gal. soln. was allowed to circulate thru centrifugal pump. Also, the Texsteam pump was started thus allowing this bleach soln. to be injected downstream. At 1:00 p.m. a 145 gal. batch (all tank can hold), was mixed (3.75 lbs. dry polymer or 125ppm). At 2:00 p.m. it was noted that the "froth" on top of tank appeared thicker and greater in quantiy compared to previous batches. Upon Delmer's past experience and recommendation, about 5 gal. or most of this froth was removed. Historically, similar froths have difficulty in hydrating.

One quart of Formaldehyde (37% active) was added at the end (poured on top of froth). Due to non-freezing temperatures, NO KCl was added. The wellhead pressure at 2:00 p.m. was 520 psi. The injection rate is 46.9 bbl/day. No viscosity samples were obtained.

1-13-95:
No testing or mixing

1-14-95:
Three gal. of additional froth was skimmed off top of tank. This froth is from the batch mixed on 1-12-95. To hopefully avoid froth from forming on subsequent batches, the addition of dry polymer thru eductor (hootenanny) was slowed.

A bleach odor was still noticeable in tank. It should be noted that the total of 8 gal. of froth that was skimmed could conceivably contain much of the polymer.

One quart of formaldehyde was added at the beginning before the new batch was mixed. No KCl was used. A 110 gal. batch was mixed at 10:30 a.m. with the 35 gal. left over from last batch. The same amount of polymer was used as if this had been a 100 gal. batch. The wellhead pressure at 10:45 a.m. was 520 psi. The injection rate was 48.0 bbls/day.
Tank vis. = 1.8 cp.
Texsteam pump effluent = 2.0 cp.

RW-7 Pilot Polymer Flood

General Information and Comments as of 1-7-95

1-3-95:
A 50 gal. batch of P-500 (1¼ lbs. or 125 ppm) was hydrated at 3:00 p.m. 5 lbs. of KCl was also added. The meter stopped sometime between 1:00 p.m. and 3:00 p.m. due possibly to solids lodging in meter. The valve was opened to flush. Jeff adjusted the injection rate to 60.6 bbls/day. The wellhead pressure is at 435 psi.

Tank vis. = 11.9 cp.
Texsteam pump effluent = 9.0 cp.

1-4-95:
A 100 gal. batch of P-500 (2½ lbs. or 125 ppm) was hydrated at 3:15 p.m. 10 lbs of KCl was also added. The wellhead presure at 3:00 p.m. was 470 psi. The injection rate is 57.1 bbls./day.

Tank vis. = 9.7 cp.
Texsteam pump effluent = 9.7 cp.

1-5-95:
A 50 gal. batch (1¼ lbs. or 125 ppm) was hydrated at 3:25 p.m. 10 lbs. of KCl was used. This is the first batch since batch #1 that the target amount of KCl was added. The plant was down approximately 2 hrs. due to bitter cold.

The oxygen was tested before a new batch was hydrated and determined to be 4.5 ppm. The soluable iron was 4 ppm and the total iron was "off scale". These tests were performed on location using CHEMetrics test kits. Total iron was tested at the lab using the Hach Colorimeter and found to be 21.3 ppm. An additional tank sample was obtained for the purpose of beginning a "bug test".

It should be noted that while the plant was down the Texsteam pump was still injecting at 3.2 gal./hr. This had very little effect, if any, as no increase in pressure was noted.

The wellhead pressure at 12:40 p.m. was 425 psi. The injection rate is 66.3 bbls/day.

Tank vis. = 12.4 cp.
Texsteam pump effluent = 11.5 cp.

1-6-95:
A 100 gal. batch was hydrated at 2:00 p.m. 10 lbs. of KCl was used. The Texsteam pump was reset to 90% which calculates to 2.92 gal./hr. This should allow for a batch to be mixed every other day, instead of every day. The wellhead pressure at 2:25 p.m. was 475 psi. The injection rate is at 61.7 bbl./day.

Tank vis. = 9.8 cp.
Texsteam pump effluent = 9.9 cp.

1-7-95:
A 50 gal. batch (125 ppm) was hydrated at 10:30 a.m. 5 lbs. of KCl was used. The wellhead pressure at 10:40 a.m. was 485 psi. The injection rate is at 54.9 bbls./day.

Tank vis. = 10.8 cp.
Texsteam pump effluent = 10.2 cp.

RW-7 Pilot Polymer Flood

General information and comments as of 1-2-95

12-29-94:
20 lbs. of KCl was dissolved in 20 gal. of water. The KCl was allowed to dissolve overnight in the "horse tank".

12-30-94:
A 100 gal. batch of P-500 (125 ppm) was hydrated at 11:30 a.m. At 1:15 p.m. polymer injection began. The wellhead pressure was 280 psi. The approximate rate of injection is 80 bbl./day. The Texteen pump is set at 100% which calculates at 3.2 gal./hr. Before leaving, the injection rate was adjusted to 65.1 bbls/day.

Tank vis. = 13.0 cp.
Texteen pump effluent = 10.2 cp.

12-31-94:
A 100 gal. batch of P-500 (125ppm) was hydrated at 9:30 a.m. to the 40+ gal. still remaining in tank. NO KCl was used. The wellhead pressure is at 300 psi. The injection rate was determined to be 50.3 bbls/day.

Tank vis. = 17.5 cp.
Texteen pump effluent = 17.4 cp.

1-1-95:
A 90 gal. batch of P-500 was added to the 40+ gal. still remaining in tank. The same amount of dry polymer was weighed as if this had been a 100 gal. batch. Again, NO KCl was added. The wellhead pressure is at 350 psi. The injection rate was not determined.

Tank vis. = 20.5 cp.
Texteen pump effluent = 21.1 cp.

1-2-95:
A 50 gal. batch of P-500 (125ppm) was hydrated at 3:15 p.m. Also added was 5 lbs. of KCl (difficulty in dissolving KCl). The wellhead pressure is at 385 psi. The injection rate was determined to be 43.4 bbls./day.

Tank vis. = 17.6 cp.
Texteen pump effluent = 16.5 cp.

RW-7 Pilot Polymer Flood
Information and Comments as of 1-28-95

1-22-95:
No testing or mixing (Sunday).

1-23-95:
A 125 gal. batch was mixed (4.7 lbs. or 188 ppm). This is the first batch in which the amount of dry polymer was increased beyond 125 ppm. No KCl was used. One quart of formaldehyde was poured on top of tank. The water is still gray. The pH of tank before mixing was 8.2. Trouble was again encountered when the eductor partially plugged. The hose was plugged, and also the eductor had a build-up of polymer. The hose and eductor were dismantled to be cleaned at lab. An additional tank sample was obtained to begin a 2nd "bug test".

The wellhead pressure at 1:00 p.m. was 475 psi. The injection rate is at 57.1 bbls/day.

Tank vis. = 19.2 cp.
Texsteam pump effluent = 18.5 cp.
Wellhead vis. = 1.5 cp.

1-24-95:
No testing or mixing.

1-25-95:
A 125 gal. batch was mixed (6.25 lbs. or 250 ppm). This is the first 250 ppm batch mixed. No KCl was used. One quart of formaldehyde was poured on top of tank. The water is not as gray. The pH of tank before mixing was 8.1. The pH of the injection water to tank was 7.1. The cannister filter that serves tank was changed from 10 to 2 microns. The wellhead pressure at 11:10 a.m. was 470 psi. The injection rate is at 56.0 bbls/day.

Tank vis. = 30.6 cp.
Texsteam pump effluent = 29.0 cp.
Wellhead vis. = 1.4 cp.

1-26-95:
No testing or mixing.

1-27-95:
The water is back to a rusty color. A 125 gal batch was mixed (6.25 lbs. or 250 ppm. No KCl was used. One quart of formaldehyde was poured on top of tank. The pH of tank before mixing was 8.2. The pH of the injection water to tank was 7.3. The cannister filter that is located downstream of the combined polymer solution and injection water was changed. The wellhead pressure at 12:35 p.m. was 485 psi. The injection rate is at 48.0 bbls/day. Because the filter was changed, the injection rate had to be readjusted due to turning off RW-7. The new injection rate is now 51.4 bbls/day and the wellhead pressure 460 psi.

Tank vis. = 61.6 cp.
Texsteam pump effluent = 58.2 cp.
Wellhead vis. = 1.4 cp.

1-28-95:
A 50 gal. batch was mixed (2½ lbs. or 250 ppm). No KCl was used. One pint of formaldehyde was poured on top of tank. The pH of tank before mixing was 8.2. The pH of the injection water to tank was 7.4. The wellhead pressure at 11:45 a.m. was 480 psi. The injection rate is at 46.9 bbls/day.

Tank vis. = 121 cp.
Texsteam pump vis. = 119.4 cp.
Wellhead vis. = 1.7 cp.

RW-7 Pilot Polymer Flood
General Information and Comments as of 1-21-95

1-15-95:
No testing or mixing (Sunday).

1-16-95:
No significant amount of froth was found on top of tank. Slowing the addition of dry polymer thru eductor seems to have eliminated froth. A 125 gal. batch was mixed (3.125 lbs. or 125 ppm) and added to the 20 gal. remaining from previous batch. No KCl was used. One quart of formaldehyde was added after the batch was mixed. The water appears to be the best quality to date (clear to light gray in color). The pH of top of tank after mixing was 8.0. The wellhead pressure at 11:45 a.m. was 530 psi. The injection rate is 45.7 bbls/day.

Tank vis. = 9.1 cp.
Texsteam pump effluent = 8.7 cp.

1-17-95:
No testing or mixing.

1-18-95:
The bottom of tank has a "layer" (¼ in.) of polymer solution that appears hydrated but yet concentrated and more viscous. The tank was stirred vigorously for 5 minutes to blend the ¼ in. "layer" with the 20 gal. remaining in tank and the viscosity checked (39.5 cp!).

A 125 gal. batch was mixed (3.125 lbs. or 125 ppm). Because the eductor is apparently plugged, only 2 lbs. of dry polymer was hydrated. The eductor was dismantled and taken to lab for cleaning. The hose to eductor was plugged with polymer. Only the hose was cleaned with alcohol. The eductor appears clean and in good shape. One quart of formaldehyde was poured on top of new batch. No KCl was used. The pH of tank before mixing new batch was 8.1. The wellhead pressure at 10:30 a.m. was 540 psi. The injection rate was 96 bbls/day.

At 1:50 p.m. the header was turned off to reroute water so that water and polymer soln. are combined before passing thru in-line mixer. Also, a cannister filter was installed downstream after the polymer soln. and water have mixed. The upstream and downstream pressures will be monitored as fluids enter and exit cannister. The header was turned on at 4:05 p.m. The injection rate was adjusted to 61.7 bbls/day. The wellhead pressure is now 420 psi.

Tank vis. = 17.0 cp.
Texsteam pump effluent = 17.0 cp.

1-19-95:
No testing or mixing.

1-20-95:

A 125 gal. batch was mixed (3.125 lbs. or 125 ppm.) Only 110 gal. of water was used because tank contained 30 gal. from previous batch. No KCl was used. One quart of formaldehyde was added to top of tank. There was another layer of viscous polymer soln. on bottom of tank but not nearly as much as what was observed on 1-18-95. This layer plus 30 gal. remaining was vigorously stirred and the viscosity found to be 13.9 cp. The ph was 7.9 (befor mixing).

The water is gray. As concluded by Wendell this is most likely caused by the water supply well running longer. The water supply well is apparently running longer to compensate for increased injection due to recent filter changes. A check valve was installed immediately downstream of Texsteam pump. The wellhead pressure at 11:30 a.m. was 495 psi. The injection rate is 61.5 bbls/day. An additional viscosity sample will now be obtained at the wellhead.

Tank vis. = 11.3 cp.
Texsteam pump effluent = 10.9 cp.
Wellhead vis. = 1.5 cp.

1-21-95:
A 50 gal. batch was mixed at 10:00 a.m. (125 ppm.) No KCl was used. One pint of formaldehyde was added. The pH before mixing was 8.2. The injection rate is 43.4 bbls/day (adjusted to 55.2 bbls/day). The wellhead pressure before adjusting was 430 psi. (after = 450). Water is still gray.

Tank vis. = 21.1 cp.
Texsteam pump effluent = 19.4 cp.
Wellhead vis. = 1.5 cp.

RW-7 Pilot Polymer Flood
General Information and Comments as of 1-14-95

1-8-95:
No testing or mixing (Sunday).

1-9-95:
About 18 gal. of polymer soln. remained in the tank since the last mixing on 1-7-95. At 11:00 a.m. a 127 gal. batch (this is all that tank could hold along with 18 gal. already present), was mixed. The same amount of dry polymer was used as if this had been a 150 gal. batch (3.75 lbs. or 125 ppm). 12½ lbs. of KCl was used. The wellhead pressure at 10:55 a.m. was 485 psi. The injection rate is 64.0 bbls/day.
Tank vis. = 9.0 cp.
Texsteam pump effluent = 8.5 cp.

1-10-95:
No testing or mixing.

1-11-95:
In less than 5 days, the "bug test" results were positive. This "bug" infestation necessitates draining tank completely and scouring with bleach. Therefore, 50 gal. of water only (no polymer) was added to tank to ensure enough volume of water to last untill tomorrow when cleaning will begin. The wellhead pressure was 520 psi. The 2-day injection rate average (1-10 & 1-11) is 51.5 bbls/day.
Tank vis. = 12.5 cp.
Texsteam pump effluent = 12.0 cp.

1-12-95:
At 11:00 a.m. the tank was dismantled by Jeff and taken outside building to begin scrubbing with 2 gal. of 10% bleach and a small amount of Joy detergent. At 12:00 p.m. the tank was reassembled. One gal. of 10% bleach and 20 gal. of water was added to tank. This 21 gal. soln. was allowed to circulate thru centrifugal pump. Also, the Texsteam pump was started thus allowing this bleach soln. to be injected downstream. At 1:00 p.m. a 145 gal. batch (all tank can hold), was mixed (3.75 lbs. dry polymer or 125ppm). At 2:00 p.m. it was noted that the "froth" on top of tank appeared thicker and greater in quantiy compared to previous batches. Upon Delmer's past experience and recommendation, about 5 gal. or most of this froth was removed. Historically, similar froths have difficulty in hydrating.

One quart of Formaldehyde (37% active) was added at the end (poured on top of froth). Due to non-freezing temperatures, NO KCl was added. The wellhead pressure at 2:00 p.m. was 520 psi. The injection rate is 46.9 bbl/day. No viscosity samples were obtained.

1-13-95:
No testing or mixing

1-14-95:
Three gal. of additional froth was skimmed off top of tank. This froth is from the batch mixed on 1-12-95. To hopefully avoid froth from forming on subsequent batches, the addition of dry polymer thru eductor (hootenanny) was slowed.

A bleach odor was still noticeable in tank. It should be noted that the total of 8 gal. of froth that was skimmed could conceivably contain much of the polymer.

One quart of formaldehyde was added at the beginning before the new batch was mixed. No KCl was used. A 110 gal. batch was mixed at 10:30 a.m. with the 35 gal. left over from last batch. The same amount of polymer was used as if this had been a 100 gal. batch. The wellhead pressure at 10:45 a.m. was 520 psi. The injection rate was 48.0 bbls/day.
Tank vis. = 1.8 cp.
Texsteam pump effluent = 2.0 cp.

RW-7 Pilot Polymer Flood

General Information and Comments as of 1-7-95

1-3-95:
A 50 gal. batch of P-500 (1¼ lbs. or 125 ppm) was hydrated at 3:00 p.m. 5 lbs. of KCl was also added. The meter stopped sometime between 1:00 p.m. and 3:00 p.m. due possibly to solids lodging in meter. The valve was opened to flush. Jeff adjusted the injection rate to 60.6 bbls/day. The wellhead pressure is at 435 psi.

Tank vis. = 11.9 cp.
Texsteam pump effluent = 9.0 cp.

1-4-95:
A 100 gal. batch of P-500 (2½ lbs. or 125 ppm) was hydrated at 3:15 p.m. 10 lbs of KCl was also added. The wellhead presure at 3:00 p.m. was 470 psi. The injection rate is 57.1 bbls./day.

Tank vis. = 9.7 cp.
Texsteam pump effluent = 9.7 cp.

1-5-95:
A 50 gal. batch (1¼ lbs. or 125 ppm) was hydrated at 3:25 p.m. 10 lbs. of KCl was used. This is the first batch since batch #1 that the target amount of KCl was added. The plant was down approximately 2 hrs. due to bitter cold.

The oxygen was tested before a new batch was hydrated and determined to be 4.5 ppm. The soluable iron was 4 ppm and the total iron was "off scale". These tests were performed on location using CHEMetrics test kits. Total iron was tested at the lab using the Hach Colorimeter and found to be 21.3 ppm. An additional tank sample was obtained for the purpose of beginning a "bug test".

It should be noted that while the plant was down the Texsteam pump was still injecting at 3.2 gal./hr. This had very little effect, if any, as no increase in pressure was noted.

The wellhead pressure at 12:40 p.m. was 425 psi. The injection rate is 66.3 bbls/day.

Tank vis. = 12.4 cp.
Texsteam pump effluent = 11.5 cp.

1-6-95:
A 100 gal. batch was hydrated at 2:00 p.m. 10 lbs. of KCl was used. The Texsteam pump was reset to 90% which calculates to 2.92 gal./hr. This should allow for a batch to be mixed every other day, instead of every day. The wellhead pressure at 2:25 p.m. was 475 psi. The injection rate is at 61.7 bbl./day.

Tank vis. = 9.8 cp.
Texsteam pump effluent = 9.9 cp.

1-7-95:
A 50 gal. batch (125 ppm) was hydrated at 10:30 a.m. 5 lbs. of KCl was used. The wellhead pressure at 10:40 a.m. was 485 psi. The injection rate is at 54.9 bbls./day.

Tank vis. = 10.8 cp.
Texsteam pump effluent = 10.2 cp.

RW-7 Pilot Polymer Flood

General information and comments as of 1-2-95

12-29-94:
20 lbs. of KCl was dissolved in 20 gal. of water. The KCl was allowed to dissolve overnight in the "horse tank".

12-30-94:
A 100 gal. batch of P-500 (125 ppm) was hydrated at 11:30 a.m. At 1:15 p.m. polymer injection began. The wellhead pressure was 280 psi. The approximate rate of injection is 80 bbl./day. The Texteen pump is set at 100% which calculates at 3.2 gal./hr. Before leaving, the injection rate was adjusted to 65.1 bbls/day.

Tank vis. = 13.0 cp.
Texteen pump effluent = 10.2 cp.

12-31-94:
A 100 gal. batch of P-500 (125ppm) was hydrated at 9:30 a.m. to the 40+ gal. still remaining in tank. NO KCl was used. The wellhead pressure is at 300 psi. The injection rate was determined to be 50.3 bbls/day.

Tank vis. = 17.5 cp.
Texteen pump effluent = 17.4 cp.

1-1-95:
A 90 gal. batch of P-500 was added to the 40+ gal. still remaining in tank. The same amount of dry polymer was weighed as if this had been a 100 gal. batch. Again, NO KCl was added. The wellhead pressure is at 350 psi. The injection rate was not determined.

Tank vis. = 20.5 cp.
Texteen pump effluent = 21.1 cp.

1-2-95:
A 50 gal. batch of P-500 (125ppm) was hydrated at 3:15 p.m. Also added was 5 lbs. of KCl (difficulty in dissolving KCl). The wellhead pressure is at 385 psi. The injection rate was determined to be 43.4 bbls./day.

Tank vis. = 17.6 cp.
Texteen pump effluent = 16.5 cp.

RW-7 Pilot Polymer Flood
Information and Comments as of 2/11/95

2-5-95:
No testing or mixing (Sunday).

2-6-95:
A 130 gal. batch was mixed (12.5 lbs. or approx. 500 ppm). This is the first batch of 500 ppm. The Texsteam pump was adjusted to 100% which calculates to 2.92 gal/hr. No KCl used. One pt. of glutaraldehyde was poured on top of tank. The pipe that is in the effluent end of centrifugal pump was flattened to an opening of approximately 1/32 to 1/8 inch. This was done on Wendell's recommedation in order to create a greater "swirling" action in tank. No pH tests taken.

The wellhead pressure at 2:55 p.m. was 475 psi. The injection rate was 46.9 bbls/day.

Tank vis. = 53.5 cp.
Texsteam pump effluent = 52.4 cp.
Wellhead = 1.8 cp.

2-7-95:
No testing or mixing.

2-8-95:
It appears that the swirling action has greatly decreased the amount of slurbs/fisheyes noted in previous batches. A 115 gal. batch (11.5 lbs. or 500 ppm) was mixed. No KCl used. One pt. of glutaraldehyde was poured on top of tank. The water is gray. The eductor is leaking around the bushing but doesn't appear to cause diffilculty in hydrating.

The wellhead pressure at 10:45 a.m. was 465 psi. The injection rate was still 46.9 bbls/day.

Tank vis. = 460.0 cp.
Texsteam pump effluent = 440.0 cp.
Wellhead = 1.9 cp.

2-9-95:
No testing or mixing.

2-10-95:
No slurbs were found in tank. The swirling/jetting action of flattened pipe is working. Approximately 110 gal. of water was mixed with 10 lbs. dry polymer (500 ppm). The 110 gal. is approximate because the meter to tank malfunctioned. It is now necessary to use the calibrated "stick" to guage water volume. The meter apparently can't handle the large volume of water passing through it in a very short period of time. The water is gray. No KCl used. One pint of glutarhyde was poured on top of tank. The Texsteam pump was checked for flow rate and determined to be 3.1 gal/hr (set on 100%). This 3.1 is in contrast to the 2.92 that was calculated on 2-6-95 when the pump was adjusted from 90% to 100%. It was initially thought that the Texsteam pump would slow down due to a more viscous polymer soln. passing through. This evidently happened only momentarily because at 100% the pump is injecting at the same rate as less viscous polymer solns.

The wellhead pressure at 10:15 a.m. was 480 psi. The injection rate was 49.1 bbls/day. No pH readings were obtained due to faulty pen.

Tank vis. = 188 cp.
Texsteam pump effluent = 180 cp.
Wellhead vis. = 1.5 cp.

2-11-95:
Only 9 lbs. of dry polymer was hydrated in 100 gal. because the 2 micron filter to tank is plugging. When this filter plugs, it doesn't allow water to pass fast enough through eductor to "wet" the large amount of dry polymer. The eductor continues to totally or partially plug after each batch. The eductor appears to work much better and with only minimal plugging when water is run rapidly through it. Cleaning of the eductor is now performed on location using alcohol, injection water and paper towels.

The wellhead pressure at 8:55 a.m. was 465 psi. The injection rate was 43.4 bbls/day. No pH readings were obtained.

Tank vis. = 173 cp.
Texsteam pump effluent = 170 cp.
Wellhead vis. = 1.8 cp.

Lanny

RW-7 Pilot Polymer Flood
Information and Comments as of 2-18-95

2-12-95:
A 90 gal. batch was mixed (14 lbs) on Sunday due to increased speed of Texsteam pump. One pint of glutaraldehyde was poured on top of tank. No KCl used. The 2 micron filters to the tank were changed. The wellhead pressure at 3:20 p.m. was 481 psi. The injection rate was 44.6 bbls/day.

Tank vis. = 324. cp.
Texsteam pump effluent = 312. cp.
Wellhead = 2.1 cp.

2-13-95: No testing or mixing.

2-14-95:
Only 15 lbs. of dry polymer was hydrated in 120 gal. water. The target amount of 20 lbs. was not achieved because the 2 micron filter plugs to rapidly to maintain a rapid volume of water thru eductor. CHANGED 10 MICRON AND 75 MICRON FILTERS. The last pint of glutaraldehyde was poured on top of tank. The water is rusty in color. The wellhead pressure at 10:45 a.m. was 445 psi. The injection rate was 30.9 bbls/days. Before leaving, the injection rate was adjusted to 56.6 bbls/day with the corresponding pressure at 425 psi.

Tank vis. = 1,250. cp.
Texsteam pump effluent = 1,196. cp.
Wellhead = 2.4 cp.

2-15-95: No testing or mixing.

2-16-95:
22 lbs. dry polymer was hydrated in 130 gal. water. One quart of slurbs/fisheyes was removed from bottom of tank. One quart of formaldehyde was poured on top of tank. The Texsteam pump flow rate was recalculated and determined to be 2.96 gal/hr. The 2 micron filter to tank was changed to a 5 micron filter. In cleaning the eductor, a paper towell was dropped in tank. The wellhead pressure at 1:40 p.m. was 485 psi. The injection rate was 70.9 bbls/day. Before leaving, the injection rate was adjusted to 45.7 bbls/day. with the corresponding pressure at 460 psi.

Tank vis. = 820. cp.
Texsteam pump effluent = not determined.
Wellhead = 2.1 cp.

2-17-95: No testing or mixing.

2-18-95:
24 lbs. dry polymer was hydrated in 120 gal. water. One quart of formaldehyde was poured on top of tank. Texsteam pump has slight leak. The 5 micron filter to tank was checked and found to be OK. The paper towell couldn't be found in tank. The wellhead pressure at 9:55 a.m. was 495 psi. The injection rate was 89.1 bbls/day. Before leaving, the injection rate was adjusted to 54.9 bbls/day with the corresponding pressure at 475 psi.

Tank vis. = greater than 2000 cp.
Texsteam pump effluent = greater than 2000 cp.
Wellhead = 1.8 cp.

RW-7 Pilot Polymer Flood
Information and comments as of 2-25-95

2-19-95: No testing or mixing.

2-20-95:
The mystery of the paper towell has been solved! Jeff fished paper towell on 2-17-95. Changed 10 micron and 75 micron filters. Only approx. 50 gal. of polymer soln. from tank was injected into wellhead from Sat. a.m. to Mon. a.m., due to the faulty Texsteam pump. The Texsteam pump was overhauled by Wendell with my assistance. The opposite side of Texsteam pump is now in use. This will allow for an injection rate of 5 gal/hr from the pump. However, the Texsteam pump injection rate is set at 3.65 gal/hr. A new pressure guage was installed on the Texsteam pump to monitor its performance. A ball valve was also installed on the effluent side of the Texsteam pump to ease in the obtaining of viscosity samples.

Didn't hydrate any dry polymer into tank due to the high viscosity. Only injection water along with one quart of formaldedhyde was added to tank. The wellhead pressure at 10:30 a.m. was 410 psi. The injection rate was not determined this morning. However, the 3 day injection avg. obtained from Jeff was approx. 36 bbl/day. **This is a good time to note that all the bbls/day values given in this pilot polymer flood test are based on a 30 minute reading of the meter.** Before leaving, the injection rate was adjusted to 54.9 bbls/day, with the corresponding pressure at 380 psi.

Tank vis. = greater than 2000 cp.
Texsteam pump effluent = not determined
Wellhead vis. = 1.2 cp. (low due to Texsteam malfunction)

2-21-95:
A 12 lb. batch in approx. 80 gal. water was mixed by Wendell. The wellhead pressure at 6:00 p.m. was 480 psi. The injection rate, based on a 24 hr. period instead of the 30 minute reading, was 46 bbls/day. No vis. samples obtained.

2-22-95:
The meter to wellhead is not turning. The meter reading calculates that only 14 gal. of water was injected into well in the last 24 hrs. However, the Texsteam pump continued to operate. The wellhead pressure at 12:00 p.m. was 435 psi. The injection rate, based on a 24 hr. period was 0.33 bbls/day.

16 lbs. dry polymer was hydrated in 80 gal. water. One quart of formaldehyde was poured on top of tank. The 5 micron filter to tank was changed. A new globe regulating valve was installed by Wendell to better regulate injection rate to RW-7. The Texsteam pump has a slight leak around plunger. Before leaving, the injection rate was adjusted to 49.7 bbls/day with the corresponding pressure at 440 psi.

Tank vis. = 798 cp.
Texsteam pump effluent = 844 cp.
Wellhead vis. = 2.7 cp.

2-23-95:
No polymer mixed due to thickness of polymer soln. However, 60 gal. water was added to tank. No pressure or injection rates were obtained. One polymer sample at the wellhead was obtained. The 75 micron filter was changed by Jeff.

Wellhead vis. = 2.3 cp.

2-24-95:
9 lbs. dry polymer was hydrated in 60 gal. water. One quart of formaldehyde was poured on top of tank. The Texsteam pump was adjusted to approx 5.0 gal/hr. The oxygen content of tank was 3.5 ppm (CHEMetrics test kit). The wellhead pressure at 12:30 p.m. was 425 psi. The injection rate was 43.4 bbls/day.

Tank vis. = 481 cp.
Texsteam pump effluent = not determined
Wellhead vis. = 1.3 cp.

2-25-95:
15 lbs. dry polymer was hydrated in 100 gal. water. One quart of formaldehyde was poured on top of tank. The meter to wellhead was not turning, indicating that only 54 gal. was injected from 1:00 p.m. Friday to 9:00 a.m. Saturday. The Texsteam pump still has a slight leak. The wellhead pressure at 9:00 a.m. was 435 psi. The injection rate was 1.3 bbls/day. Before leaving the injection rate was adjusted to 48.9 bbls/day with the corresponding pressure at 465 psi.

Prior to obtaining a wellhead sample of polymer soln., the injection rate was adjusted from 0 to 48.9 bbls/day. Perhaps a wellhead sample should have been obtained before adjusting injection rate. As it is now, the wellhead sample will reflect the new injection rate. In other words, the viscosity would have been higher, based on the fact that only 54 gal of injection water mixed with approx. 100 gal. of polymer soln.

Tank vis. = 1,616 cp.
Texsteam pump effluent = 1,588 cp
Wellhead vis. = 2.1 cp.

April 28, 1986:

Placed well back on injection at 11:00 a.m.

April 29, 1986:

13 BBls. @ 450 psi

April 30, 1986:

9 BBls. @ 330 psi

May 1, 1986:

4 BBls. @ 470 psi

May 2, 1986:

28 BBls. @ 380 psi

May 3, 1986:

25 BBls. @ 390 psi

April 30, 1987:

Reason for Job: To lower pressure on polymer block and increase inj.

Current: 40 B/D & 580 psi
Rec.: 40 B/D

Broke down wellhead, well did not backflow. Ran string 1". Set down on soft bottom at 700'. Washed & reamed to 709'; getting mostly scale. Pulled 1" to 670' and spotted 2 carb. acid. Displaced out of 1". Let set approximately 30 minutes. Set on bottom and washed up; getting very small amount broken down polymer. Pulled 1" up to 670'. Spotted 1 carb. acid and displaced out of 1". Hooked mini pump to well and worked into perfs with 2 bbls. fluid at very slow rate. Left 1" in hole and shut down.

May 1, 1987:

Pulled 1" and hooked onto injection.

May 2, 1987: 25 B/D @ 580 psi

May 3, 1987: 1 B/D @ 630 psi

May 4, 1987: 0 B/D @ 560 psi

June 9, 1987:

Reason for Job: To Increase Injection
Current: 1 B/D @ 580 psi
Rec.: 40 B/D

Broke down wellhead - did not backflow. Ran 1"; hit bridge at 650'. Washed and spudded through bridge (approx. 8") getting out polymer film and scale. Set on bottom at 710', washed well getting very small amount of scale. Pulled 1" up to 670'. Spotted 2 carb. acid and worked into perfs with 2 bbls. water, taking approx. 45 min. Well taking fluid at 300 psi. Opened well and blew down. Pulled 1" and put back onto injection.

June 10, 1987: 65 B/D @ 280 psi
June 11, 1987: 60 B/D @ 340 psi
June 12, 1987: 52 B/D @ 350 psi
June 13, 1987: 49 B/D @ 550 psi

April 21, 1988:

Reason for Job: To increase injection Current: 23 B/D @640 psi
Rec: 40 B/D

Ran String 1" with jet and bit. Sat down at 687'. Washed and spud to 690'. Plugged 1". Pulled 1" and cleaned, ran back in, washed to 701', could not make further. Washed clean. Pulled up and jetted perfs. Spotted 20 gal 28% acid, worked into perfs with 1 bbl. Let set and work 30 minutes. Washed clean. Spotted 35 gal. 28% acid and worked into perfs with 3-4 bbls. Shut in at 450#.

4-21-88: Well on vacuum. Pulled 1" and put onto inj.
4-22-88: 34 B/D @ 100 psi
4-23-88: 45 B/D @ 180 psi
4-24-88: 45 B/D @ 180 psi

After 700 lbs. sand, dropped 100 lbs. of rock salt.
Second Break: 1800 psi
Treated with remaining 700 lbs. sand, at 1300-1400 psi.
Flushed with 8 bbls.
Shut-in pressure 200 psi
Rate: 15.0 bbls./min.
Concentration: 0.75 lbs./gal.

August 31, 1983:

25 bbls. @ 0 psi

January 12, 1984

Ran Temperature Survey. Shut-in at 7:30 a.m., over hole at 9:00 a.m., logger's T.D. at 708'. Well appears to be taking water only at the top set of perforations.

February 23, 1984:

P.B.T.D.: 709½'

Using TOP Wireline Services, Inc., ran Differential/Gradient Temperature Survey.

Logger's T.D.: 705' Shut-In Time: 18 hrs 20 mins.

Well was a vacuum prior to logging. The entire zone is taking all the water - 651'-665'

March 26, 1986:

Reason for Job: Profile Modification Treatment

Mixed with 40 BBls. fresh water, 77 lbs. synthetic polymer (5,500 ppm), 14 lbs. Sodium Thiosulfate (1,000 ppm), 3.5 lbs. Sodium Dichromate (250 ppm), 140 lbs. NaCl, 14 lbs. $CaCl_2$. Began injection polymer solution at 33 B/D rate at 3:00 p.m. In line mixed Sodium Dichromate and Sodium Thiosulfate. Continued pumping producer K-43. Initial injection pressure was 0 psi.

March 27, 1986:

Mixed additional 38.5 lbs. polymer, 7.0 lbs Sodium Thiosulfate, 1.8 lbs. Sodium Dichromate, 70 lbs. NaCl, 7 lbs $CaCl_2$ in 20 BBls. fresh water. Continued injecting solution at 33 B/D rate. At 4:00 p.m. pressure was 180 psi.

March 28, 1986:

At 9:00 a.m. pressure was 270 psi. At 3:00 p.m. pressure 280 psi. Stopped injection at 10:00 p.m. Injected total of 60 BBls.

March 31, 1997:

Using J & K, Inc., ran MIT; well passed.

June 5, 1998:

Ran SLM. Bottom @ 652'.

July 20, 1998:

Set up Company pulling unit and ran jet bit on 1" pipe. Hit a soft bridge at 650'. Washed well to total depth of 710'. Pulled up 1" to perforations of 651'-665'. Dropped ball and jetted perforations.

After jetting, spotted 50 gallons 28% acid, one gallon Goldtreat, one gallon ESA-96, one quart ESA-91, and one pint ESA-50 on perforations and displaced with four barrels of injection water. Let set overnight.

July 21, 1998:

Repeated above procedure. Resumed normal injection rate.

July 22, 1998:

42 bbls. @ 480 lbs.

July 23, 1998:

54 bbls. @ 500 lbs.

July 24, 1998:

54 bbls. @ 500 lbs.

July 25, 1998:

49 bbls. @ 520 lbs.