

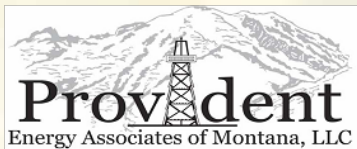
TMCBSU - Workover Candidates (North)

Re-perforation Candidates – North East (NE)

Arkanova Energy Corporation

Operator: Provident Energy Associates of Montana, LLC

Client Update
DCS NGC Team
June 4, 2010



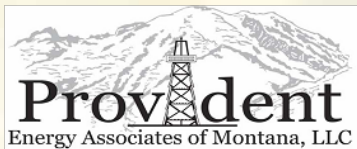
Objective

- Evaluate Active, SI and TA well in the North-East section to identify possible unperforated pay zone.
- Identify top 2 re-perforation opportunities to increase oil production in the Two Medicine Cut Bank Sand Unit (TMCBSU).

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Risk Mitigation

- Schlumberger recommends running a standard suite of logs (USI, RST, CHDT, MDT) to help determine cement integrity, water saturation, pressures and Oil Water Contact before any re-perforation campaign.
- Casing integrity test and flow assurance for surface flow lines.

Assumptions

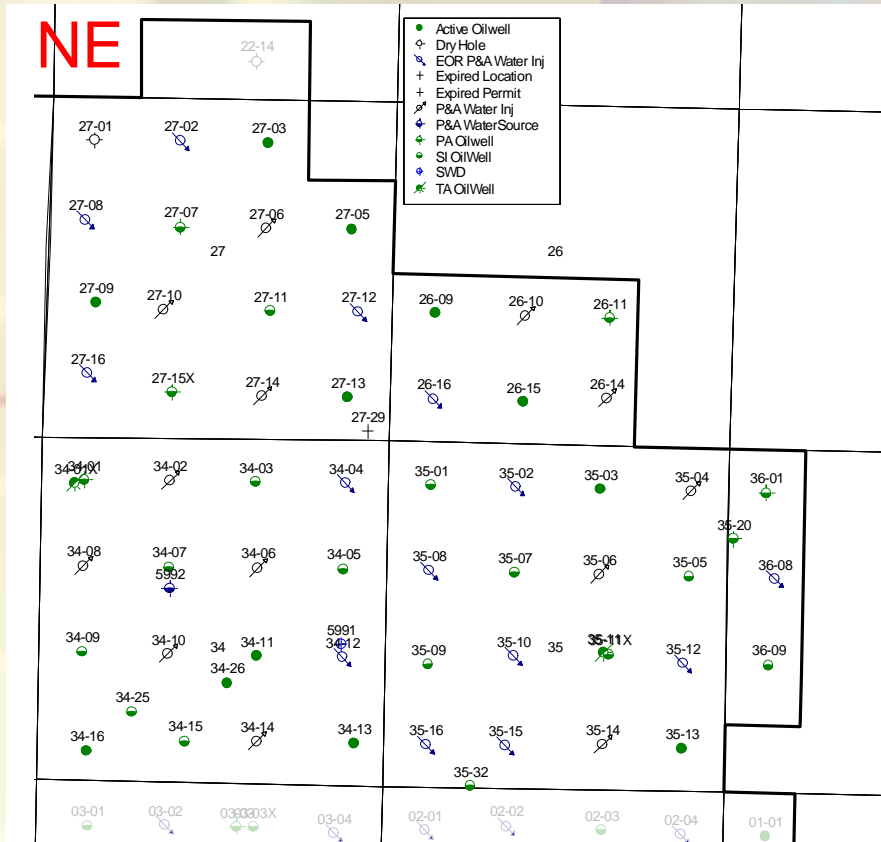
Key assumptions in this workflow to select re-perforation candidates:

- 1960 logs are not calibrated to today's standards, these logs were read at face value.
- In the absence of Gamma Ray curves, SP was used. SP is not a good indicator of Shaliness.
- Educated assumptions were made to determine if unperforated pay is already watered out.
- Good, Average or Poor candidates are chosen relative to each other and naming convention only indicates perforation eligibility.

Workflow

- Active and SI/TA wells in the North-East section of the field were initially selected with priority given to Active wells.
- Wells with unperforated sands were selected for preliminary review.
- A detailed study of available logs, well location, geology, well files and production history data was carried out.
- A comprehensive matrix decision was built to identify Good, Average and Poor re-perforation candidates.
- Candidates were identified based on a combination of factors in the matrix (Net thickness, Cut Bank Geometry, Water Cut, Oil Cum etc.)

TMCBSU – Northeast (sec 26, 27, 34, 35, 36)



12 active producers

Active		P&A	
26-09	Active_PRD	26-10	P&A_INJ
26-15	Active_PRD	26-11	P&A_PRD
27-03	Active_PRD	26-14	P&A_INJ
27-05	Active_PRD	26-16	P&A_INJ
27-09	Active_PRD	27-01	P&A_DRY
27-13	Active_PRD	27-02	P&A_INJ
34-11	Active_PRD	27-06	P&A_INJ
34-13	Active_PRD	27-07	P&A_PRD
34-16	Active_PRD	27-08	P&A_INJ
34-26	Active_PRD	27-10	P&A_INJ
35-03	Active_PRD	27-12	P&A_INJ
35-13	Active_PRD	27-14	P&A_INJ
5991	Active_DISP	27-15X	P&A_PRD

16 SI & TA producers

SI / TA			
27-11	SI_PRD	34-01	P&A_INJ
34-03	SI_PRD	34-02	P&A_INJ
34-05	SI_PRD	34-03	P&A_INJ
34-07	SI_PRD	34-04	P&A_INJ
34-09	SI_PRD	34-06	P&A_INJ
34-15	SI_PRD	34-08	P&A_INJ
34-25	SI_PRD	34-10	P&A_INJ
35-01	SI_PRD	34-12	P&A_INJ
35-05	SI_PRD	34-14	P&A_INJ
35-07	SI_PRD	35-02	P&A_INJ
35-09	SI_PRD	35-04	P&A_INJ
35-11X	SI_PRD	35-06	P&A_INJ
35-32	SI_PRD	35-08	P&A_INJ
36-09	SI_PRD	35-10	P&A_INJ
34-01X	TA_PRD	35-12	P&A_INJ
35-11	TA_PRD	35-14	P&A_INJ
		35-15	P&A_INJ
		35-16	P&A_INJ
		35-20	P&A_PRD
		36-01	P&A_PRD
		36-08	P&A_INJ
		5992	P&A_WS

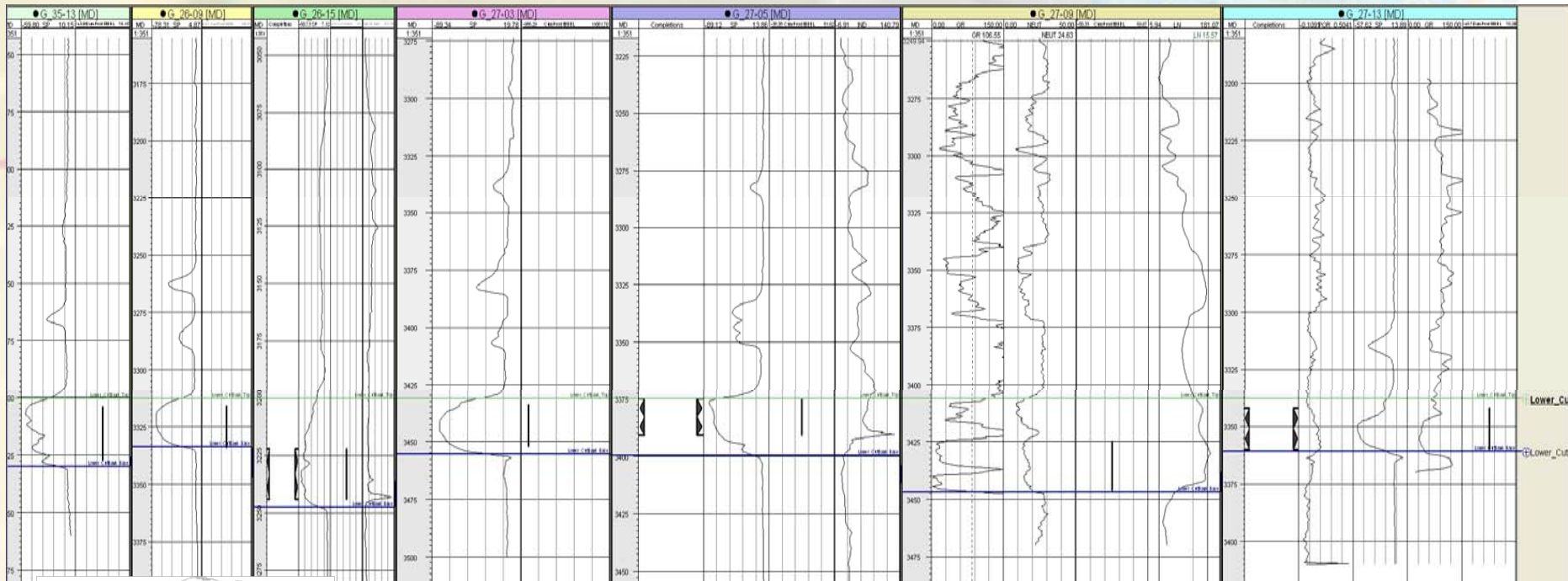
Candidates

Well Name	Checked	Status	Candidate
26-15	Yes	Active	Yes
27-09	Yes	Active	Yes
34-16	Yes	Active	Yes
34-26	Yes	Active	Yes
26-09	Yes	Active	No
27-05	Yes	Active	No
27-13	Yes	Active	No
34-11	Yes	Active	No
34-13	Yes	Active	No
35-03	Yes	Active	No
35-13	Yes	Active	No
34-01X	Yes	SI/TA	Yes
34-05	Yes	SI/TA	Yes
34-09	Yes	SI/TA	Yes
34-25	Yes	SI/TA	Yes
35-07	Yes	SI/TA	Yes
27-11	Yes	SI/TA	No
34-03	Yes	SI/TA	No
34-07	Yes	SI/TA	No
34-15	Yes	SI/TA	No
35-01	Yes	SI/TA	No
35-05	Yes	SI/TA	No
35-09	Yes	SI/TA	No
35-11	Yes	SI/TA	No
35-11X	Yes	SI/TA	No
35-32	Yes	SI/TA	No
36-09	Yes	SI/TA	No

Good Candidate
Average Candidate
Poor Candidate
Not selected for preliminary review

Petrel Logs

- Main logs used were:
- SP or GR for most wells, additional logs used if available



27-09

Re-perforation Analysis: Good Candidate

•**Status: Active**

•API: 25035051350000

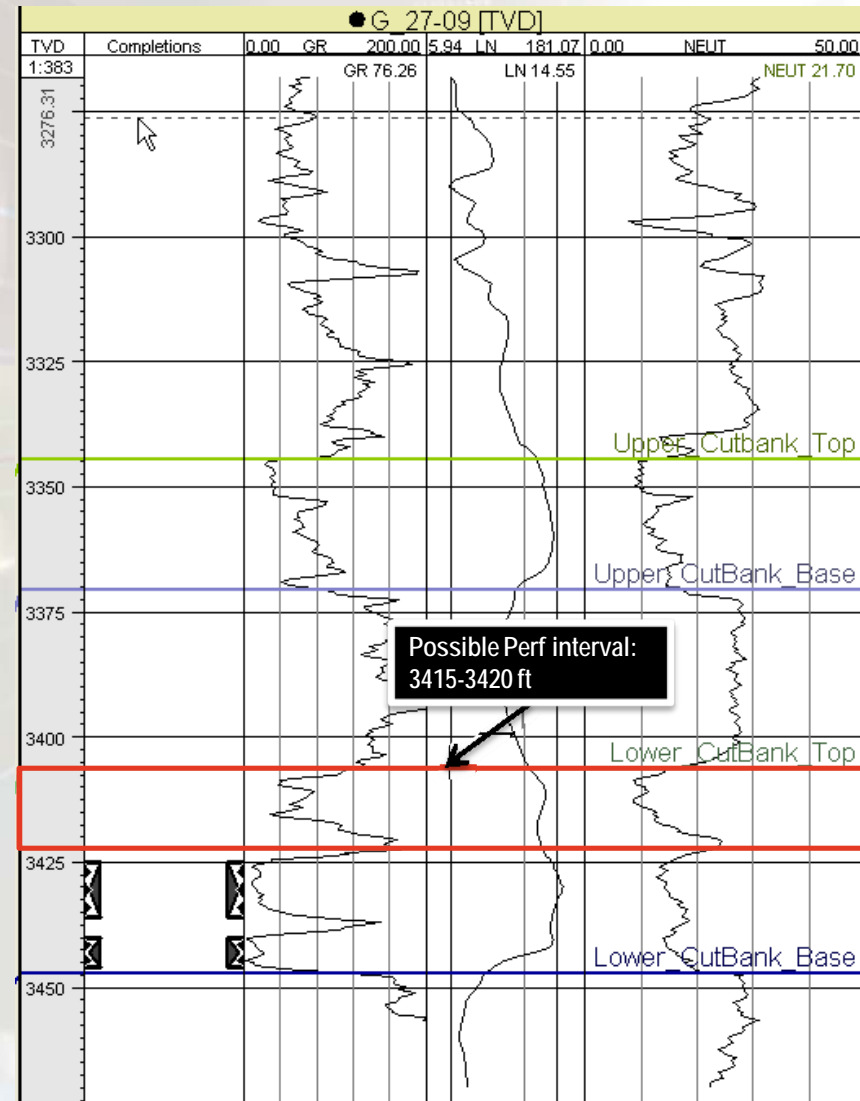
•Perforation (Ref: Well head)

•3425-3436' @ 4 SPF

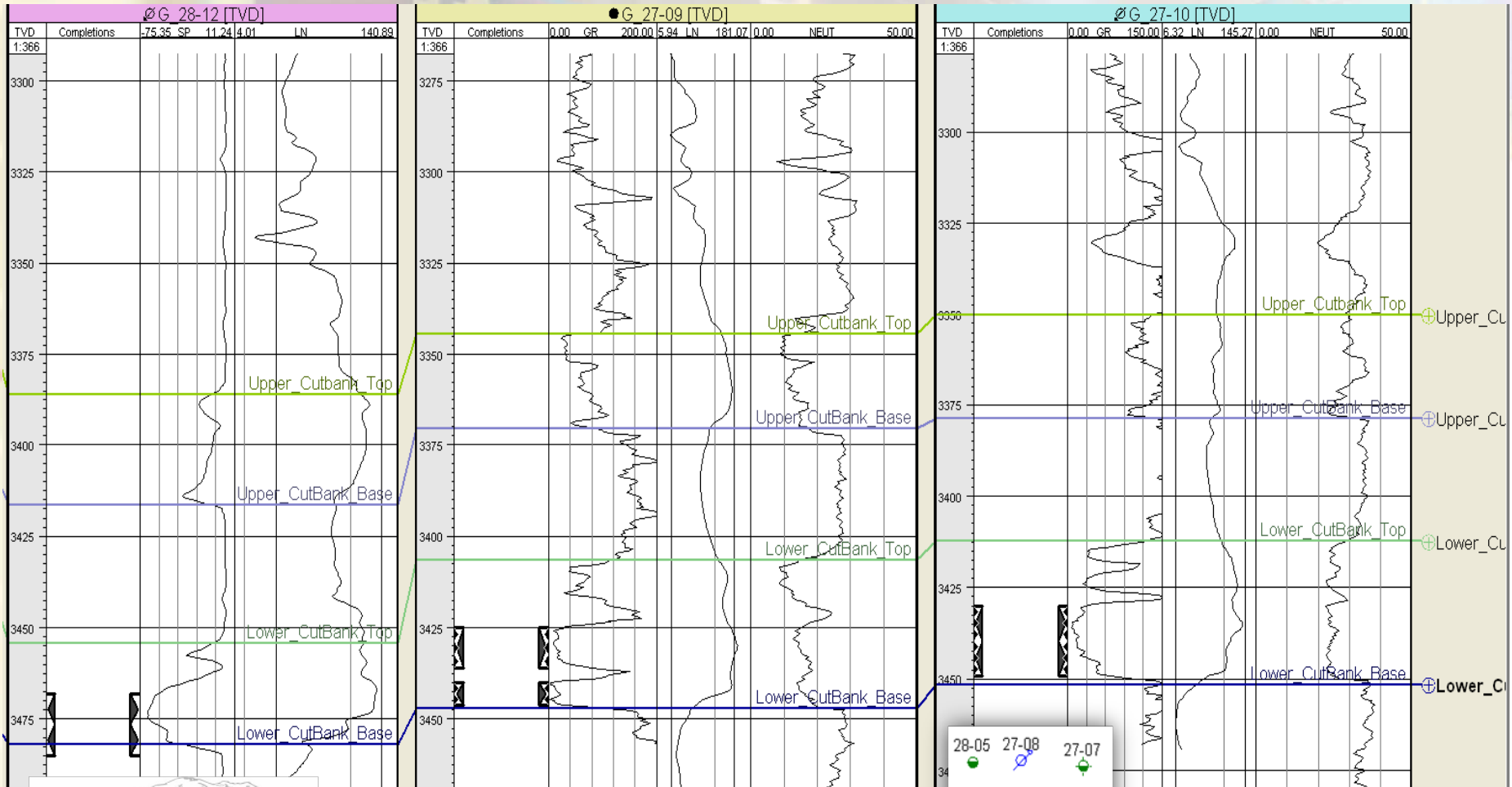
•3440-3446' @ 4 SPF

•Surrounded by injectors 27-08, 27-10, 27-16, 28-12 : only perforated at both lower lobes of sand. Strong shale breaks reduce possibility of contamination by inefficient sweep from water flood in upper lobe (3415-3420').

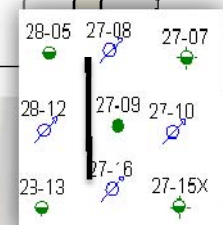
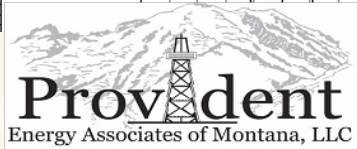
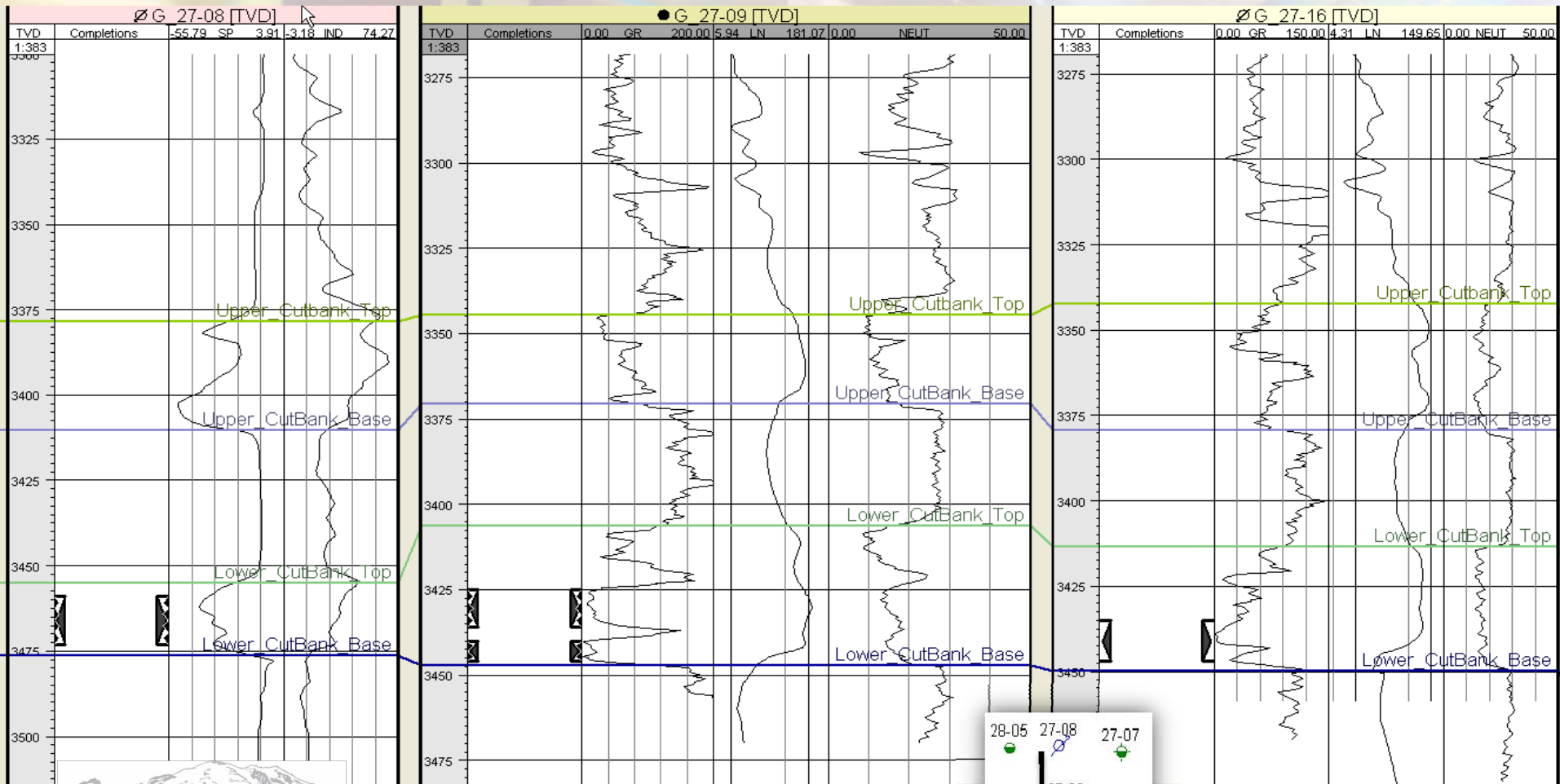
•**Note: 3415-3420 not perforated but well files indicate Sandstone, becoming fine grained and clear with live brown oil stain, fair porosity and good odor.**



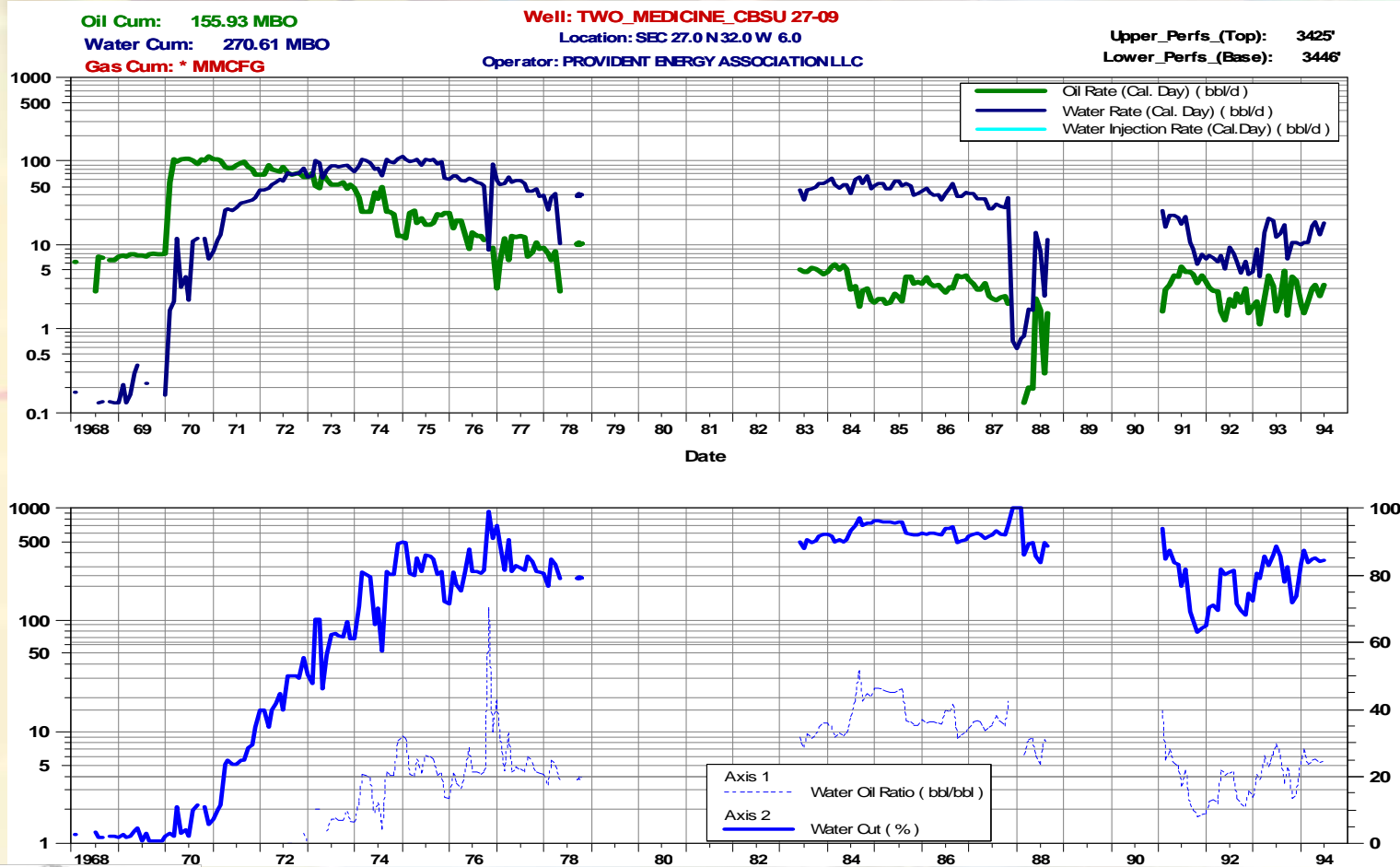
27-09 flanked by Injectors on 4 sides



27-09 flanked by Injectors on 4 sides



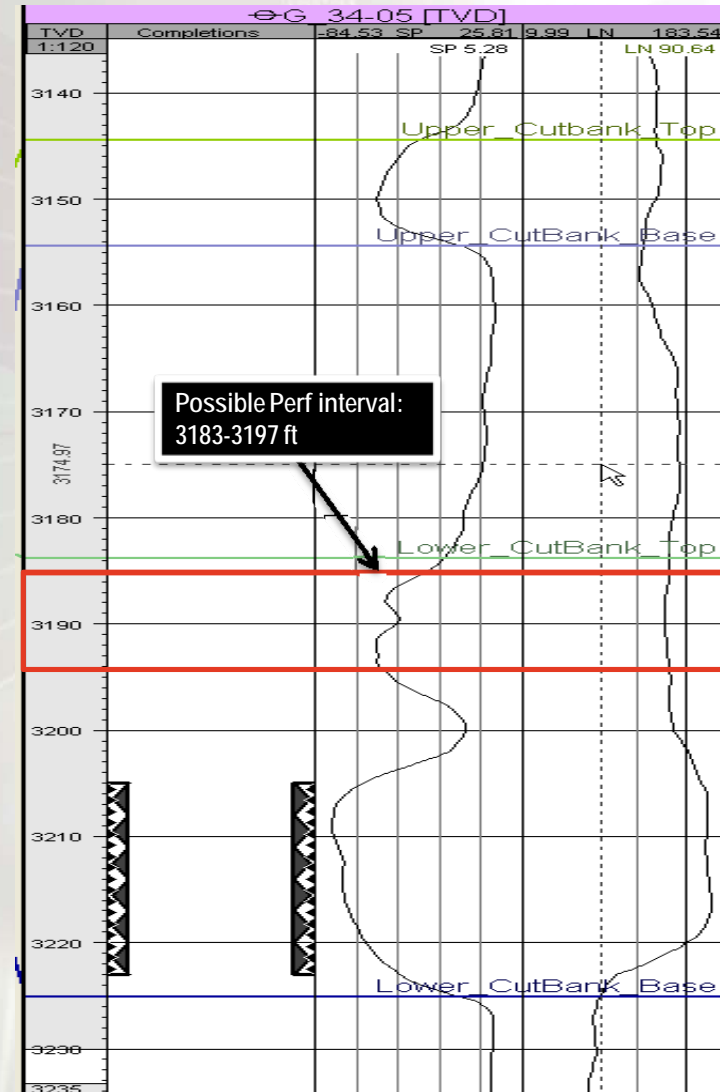
27-09



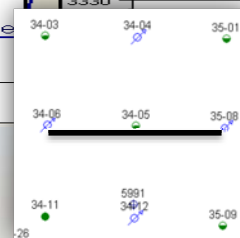
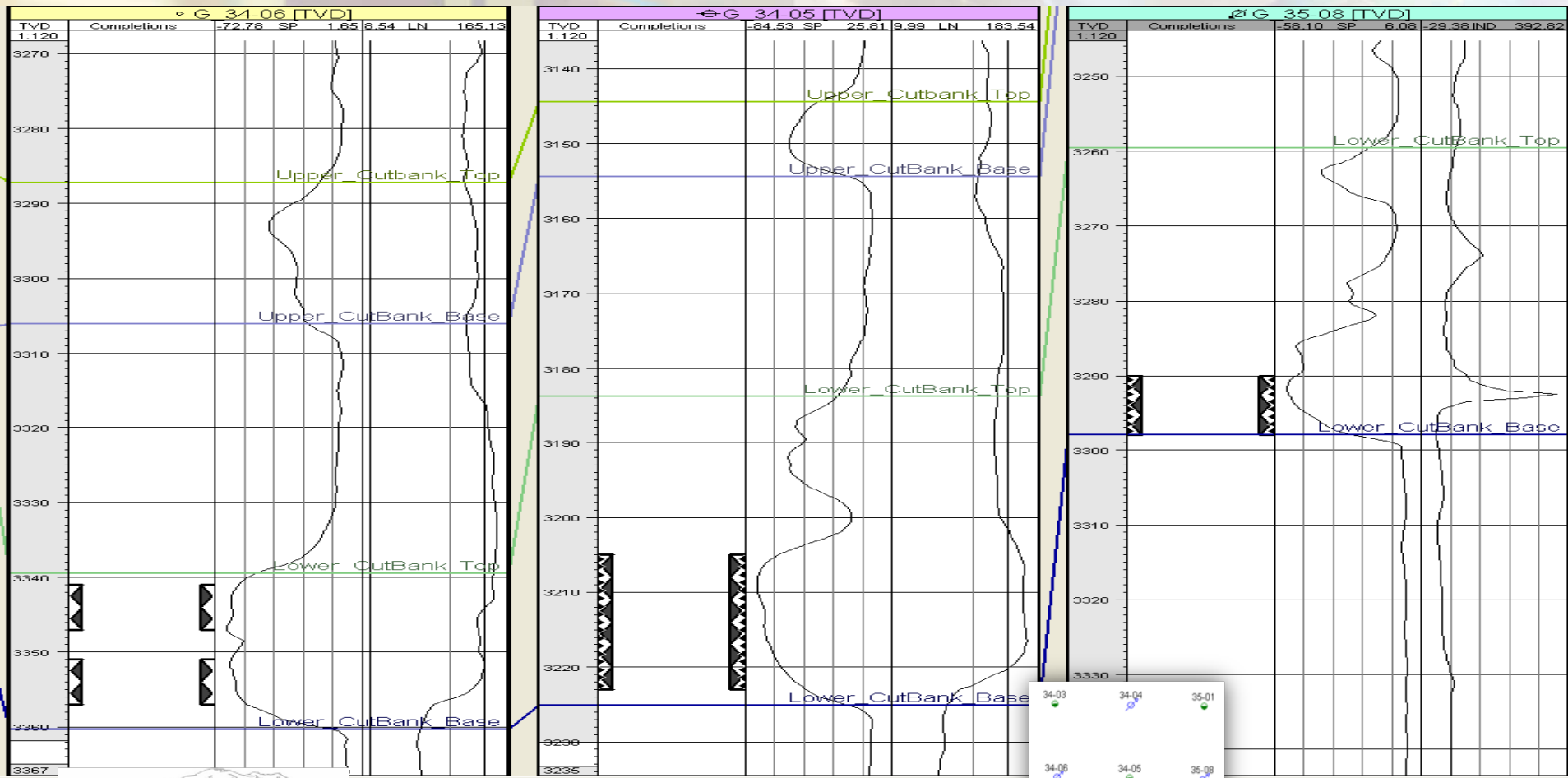
34-05

Re-perforation Analysis: Good Candidate

- **Status: SI/TA**
- API: 25035072790000
- Perforation (Ref: Well head)
 - 3205-3223' @ 4 SPF
- Well TA'd - bridge plug @ 3105' KBM with 2 sacks cement.
- 2004 – well files indicate well equipment not available, electrical lines down.
- Unperforated zone in upper and lower end of sand:
 - 3183-3197ft
 - Water Cut 79%
 - Produced oil above field average (7bbl/d in Mar '78)
 - Lower zone chances of being watered out are high.
 - Small shale break between 3196 – 3203' to provide reasonable separation between perforated zone below.
- Surrounded by injectors 35-08,34-12,34-06,34-04 – perforated at both upper and lower lobes of sand. Possibility of contamination by inefficient sweep from water flood in upper lobe (3185'-3197').
- Other comments: Located adjacent to battery.

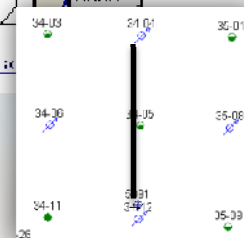
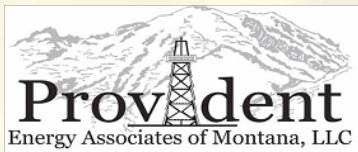
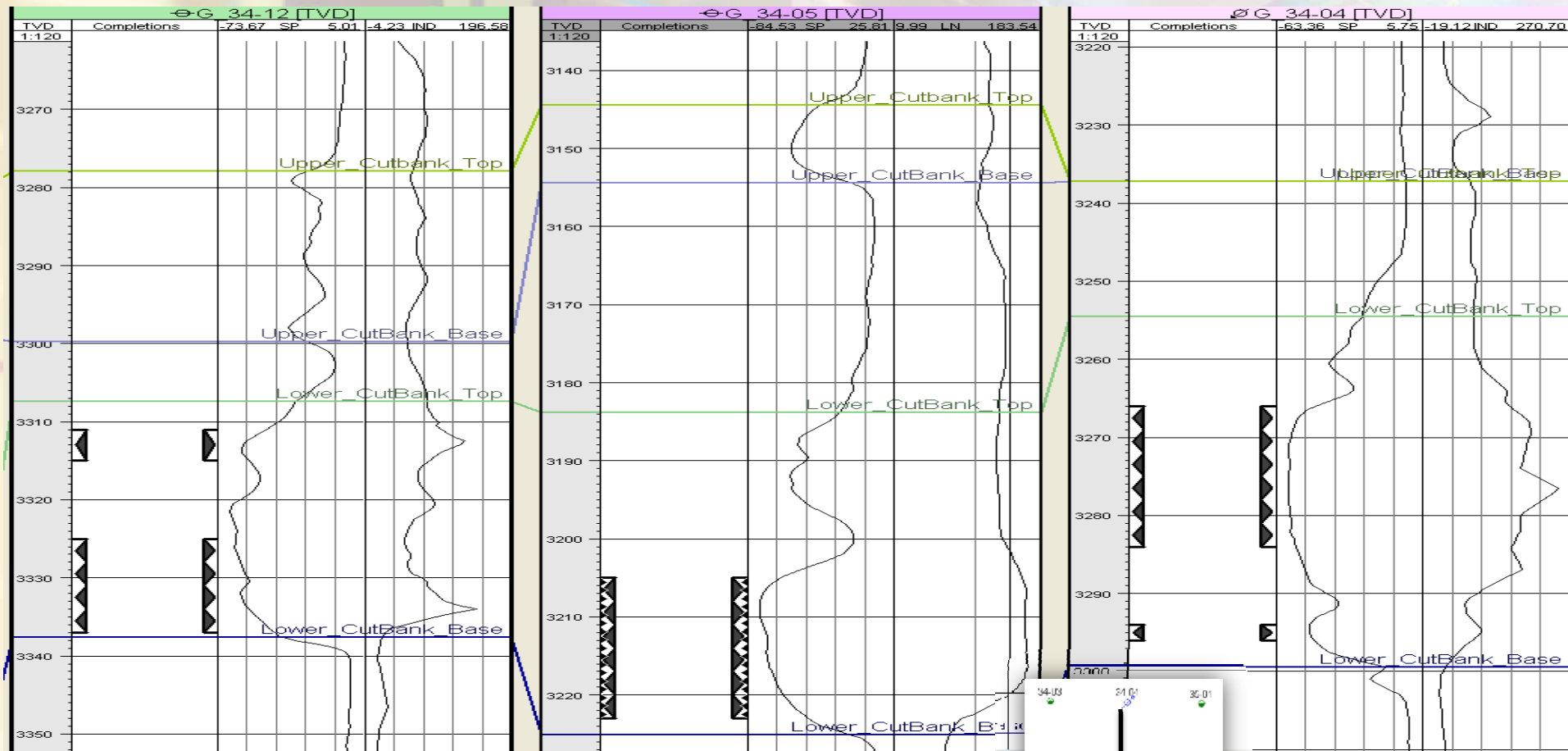


34-05 flanked by Injectors on 4 sides



Cross Section

34-05 flanked by Injectors on 4 sides



Cross Section

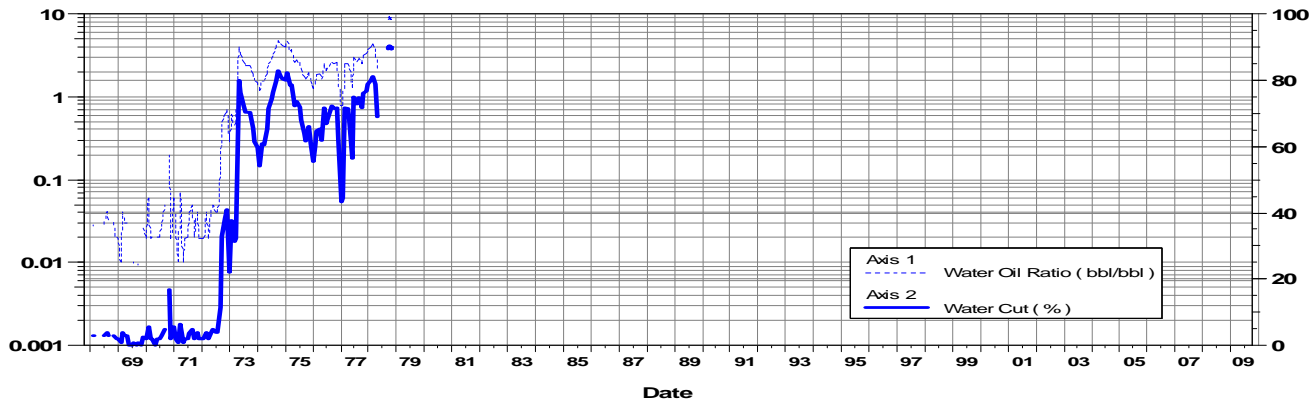
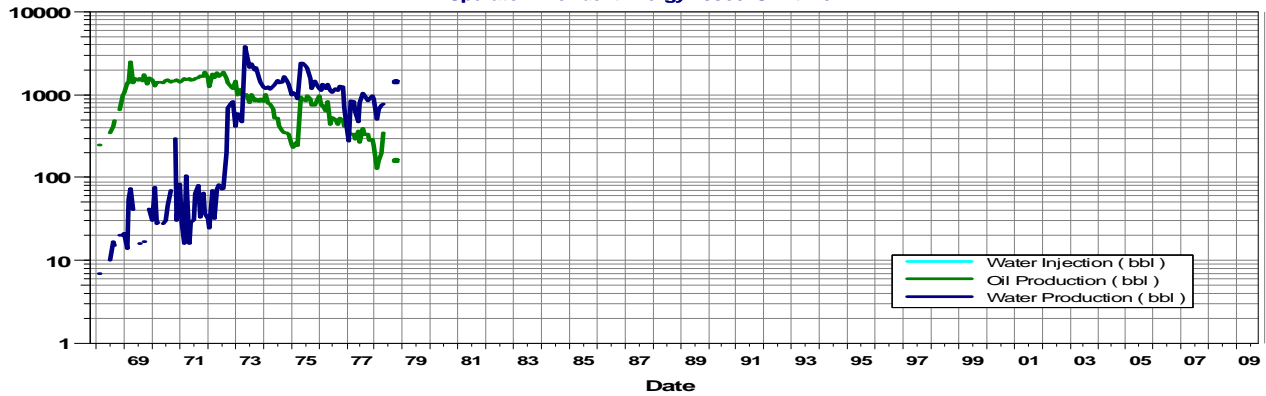


34-05

Oil Curr: 116 MBO
Gas Curr: * MMCFG
Water Curr: 88 MBW

Well: 34-05

Location: SEC 34.0 N 32.0 W 6.0
Operator: Provident Energy Assoc. Of Mt Lic



34-16

Re-perforation Analysis: Average Candidate

• **Status: Active**

• API: 25035050230000

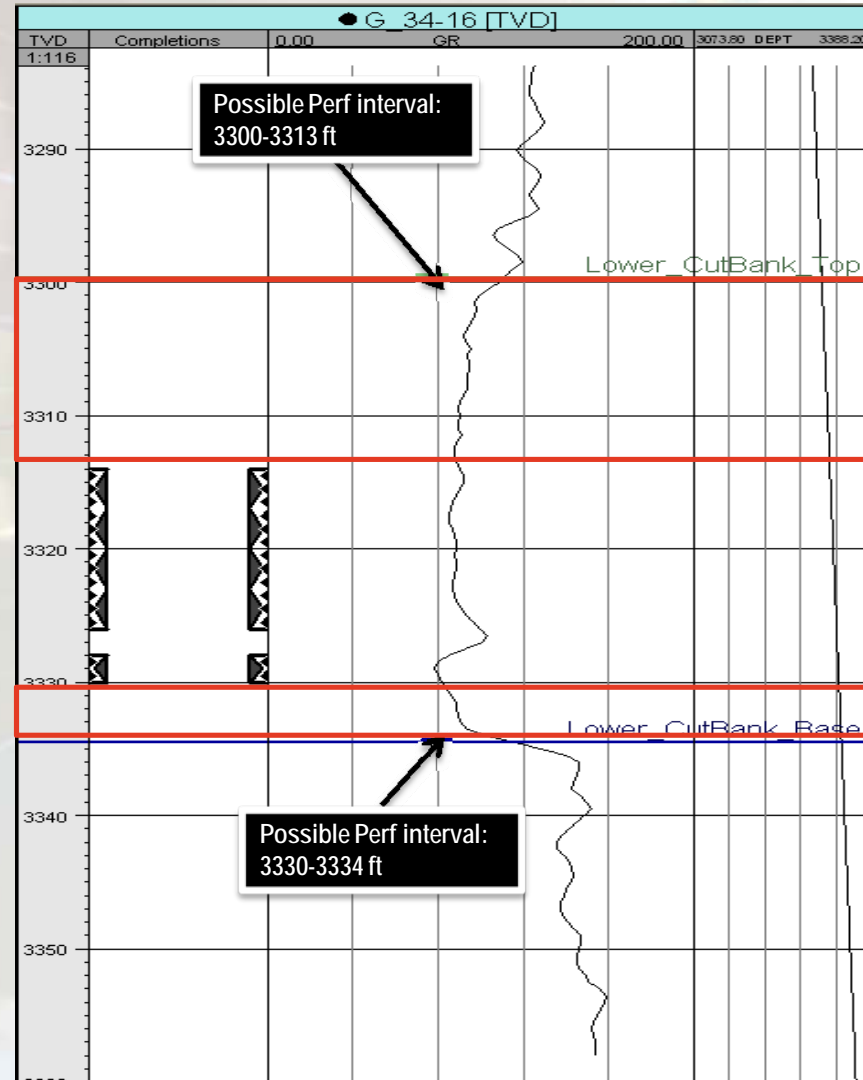
• Perforation (Ref: Well head)

- 3314-3326' @ 4 SPF
- 3328-3330' @ 4 SPF

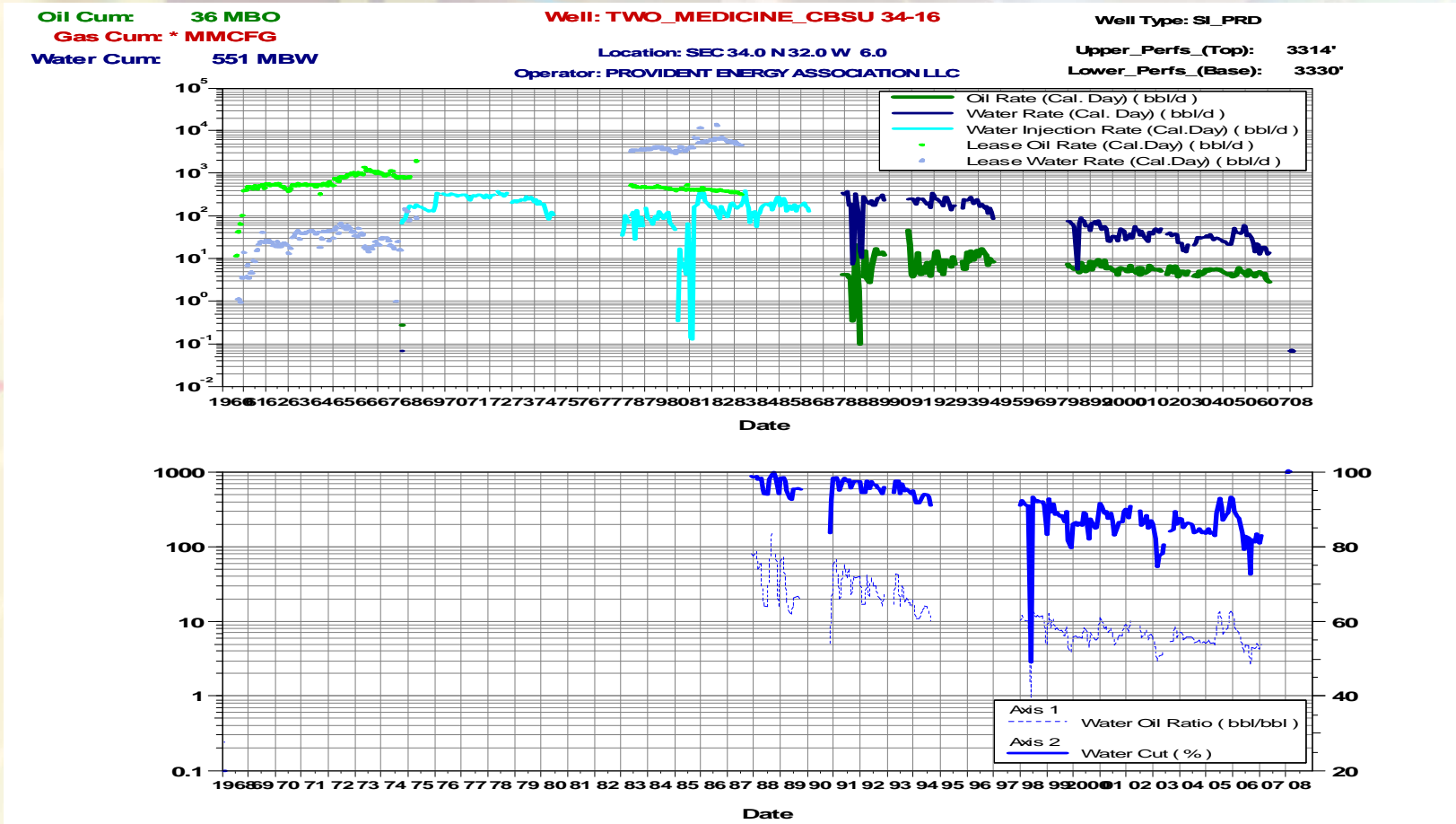
• Well converted from Injection status to producer - Dec '87

• Unperforated zone in upper and lower end of sand:

- 3300-3313ft
- 3330-3334ft
- High Water Cut (81%).
- Water production historically higher than field average.
- Lower zone chances of being watered out are high.
- Upper zone closest analog is 34-25 (shows lower resistivity, porosity)



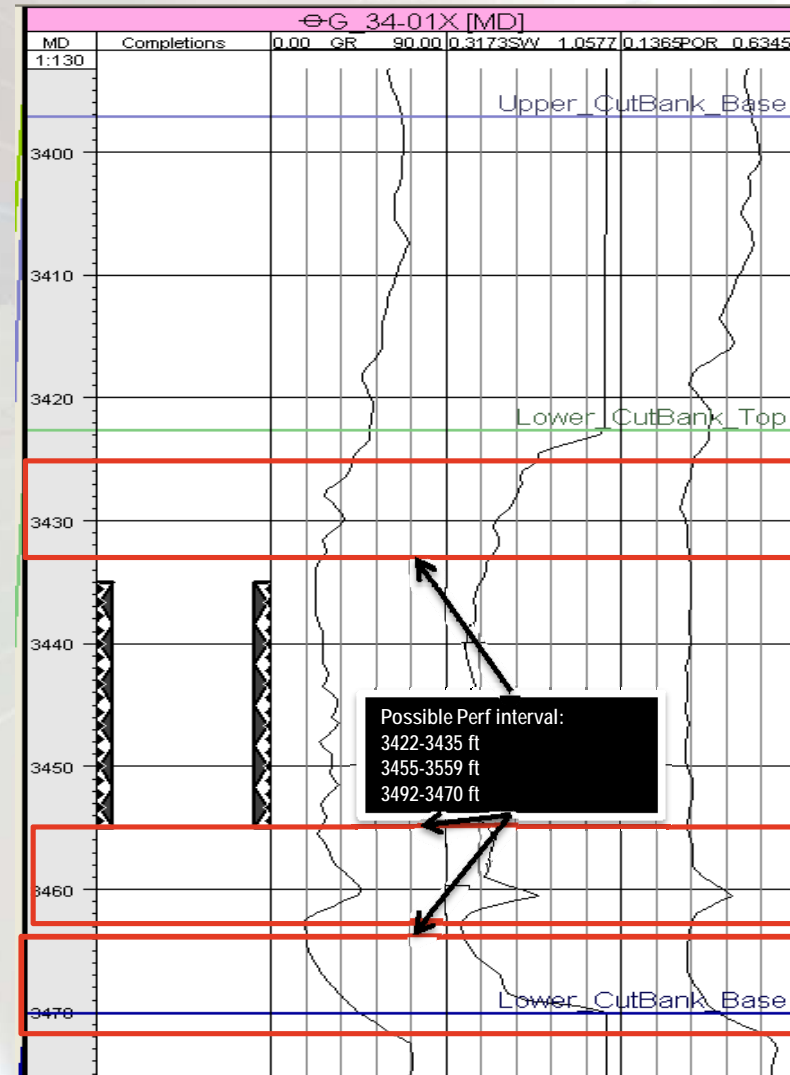
34-16



34-01X

Re-perforation Analysis: Average Candidate

- **Status: SI/TA**
- API: 25035214010000
- Perforation (Ref: Well head)
 - 3435-3455' @ 4 SPF
- Unperforated zone in upper and lower end of sand:
 - 3422-3435ft
 - 3455-3559ft
 - 3492-3470ft
- Distinct shale break present between 3459-3461'.
 - Well files indicate live oil in sample 3460-3470' MD
 - **Sandstone as above: Many coarse broken black chert pebbles: Much live oil in sample**
- Poor oil cum (2.17 Mbbl), water cut 84%.
- Consistent porosity response (18%) throughout Lower Cut Bank.



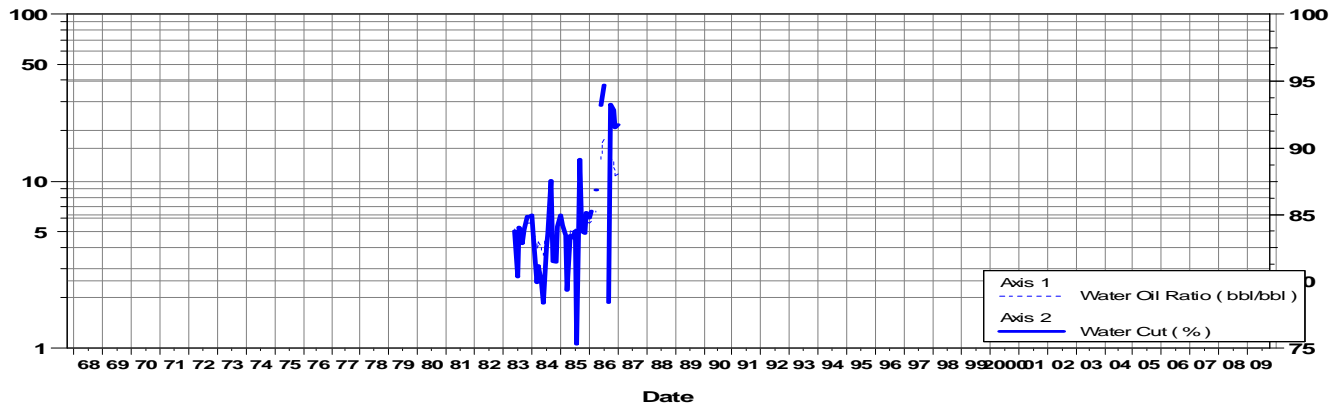
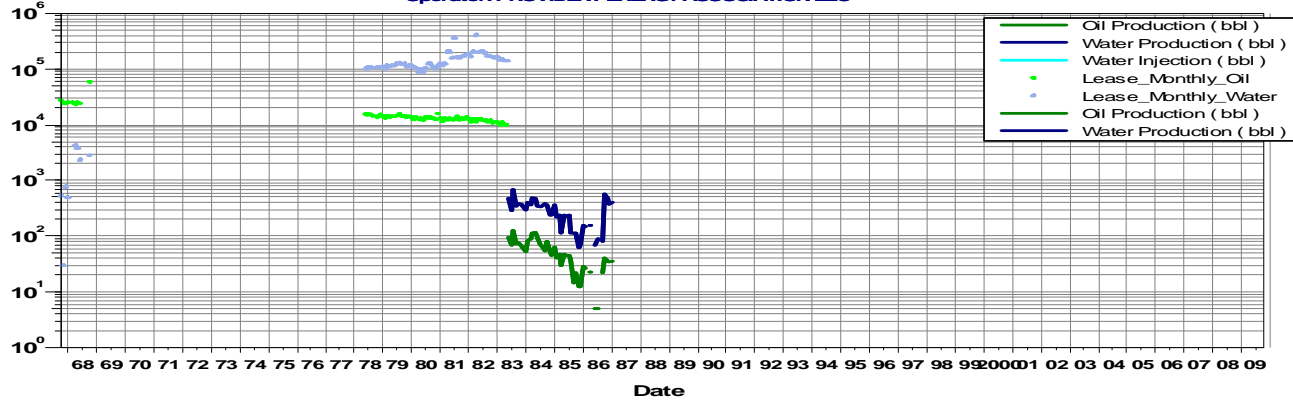
34-01X

Oil Cum: 2 MBO
Gas Cum: * MMCFG
Water Cum: 12 MBW

Well: TWO_MEDICINE_CBSU 34-01X

Location: SEC 34.0 N32.0 W 6.0

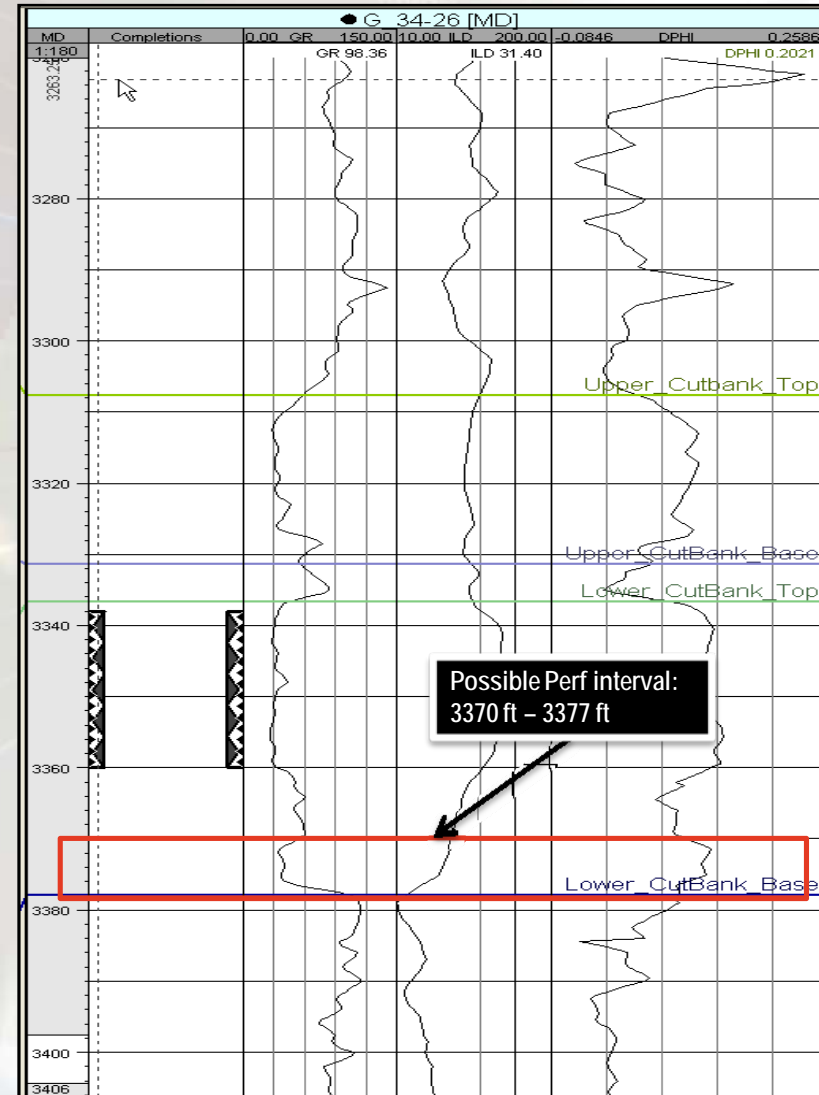
Operator: PROVIDENT ENERGY ASSOCIATION LLC



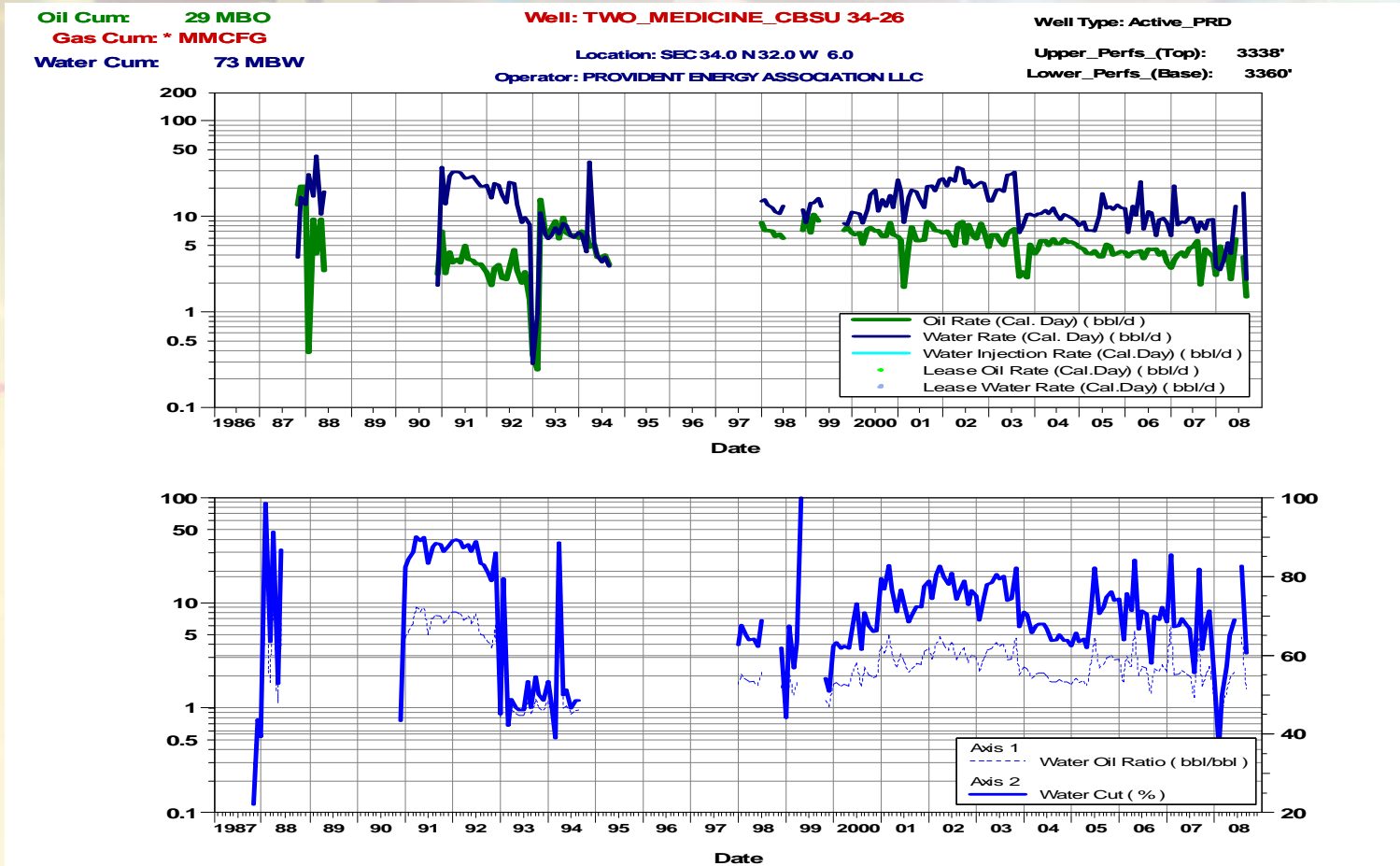
34-26

Re-perforation Analysis: Poor Candidate

- **Status: Active**
- API: 25035217830000
- Perforation (Ref: Well head)
 - 3338-3360' @ 2 SPF
- Unperfed zone in lower end of sand:
 - Location: 3370-3377ft.
 - No clear shale breaks indicating zonal isolation.
 - GR, ILD, DPHI curves indicate shaly sand.
 - Higher chances of being watered out.
 - Decreasing resistivity response compared to perforated sand above.



34-26

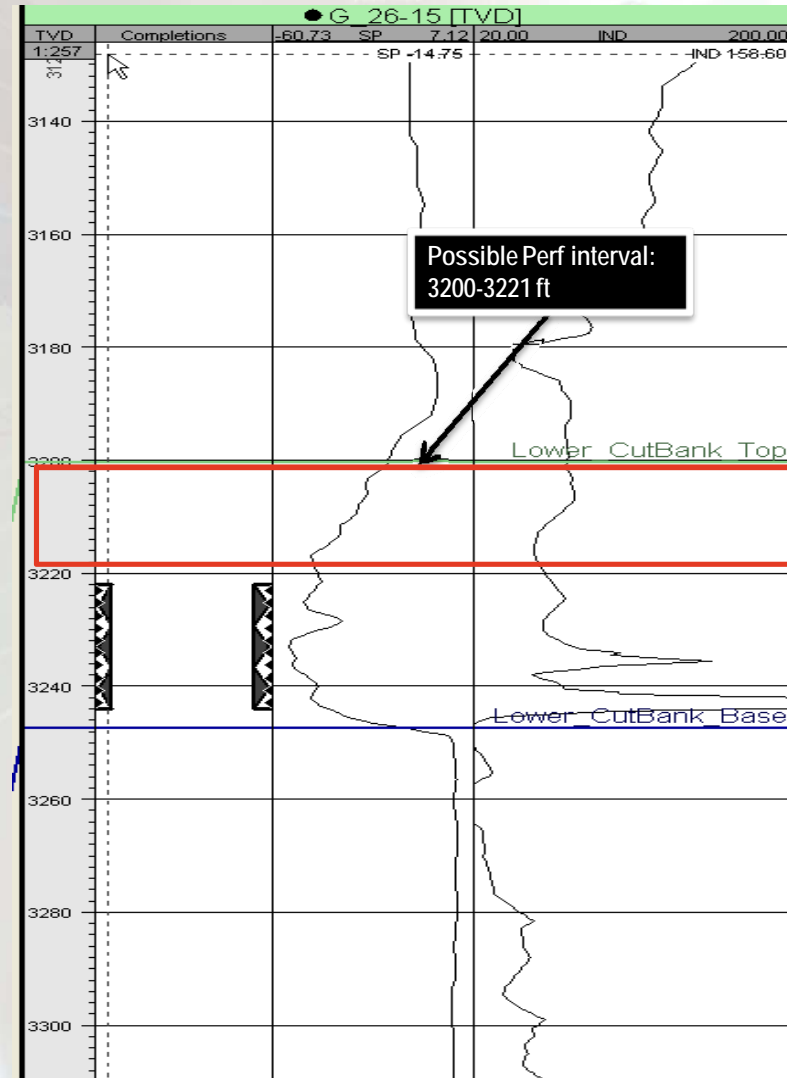


26-15

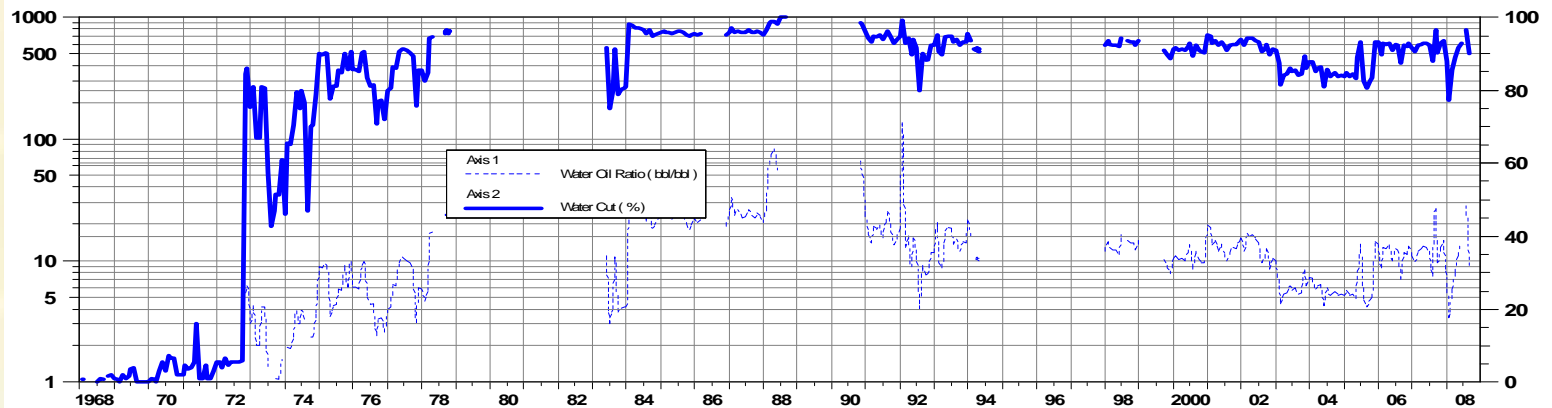
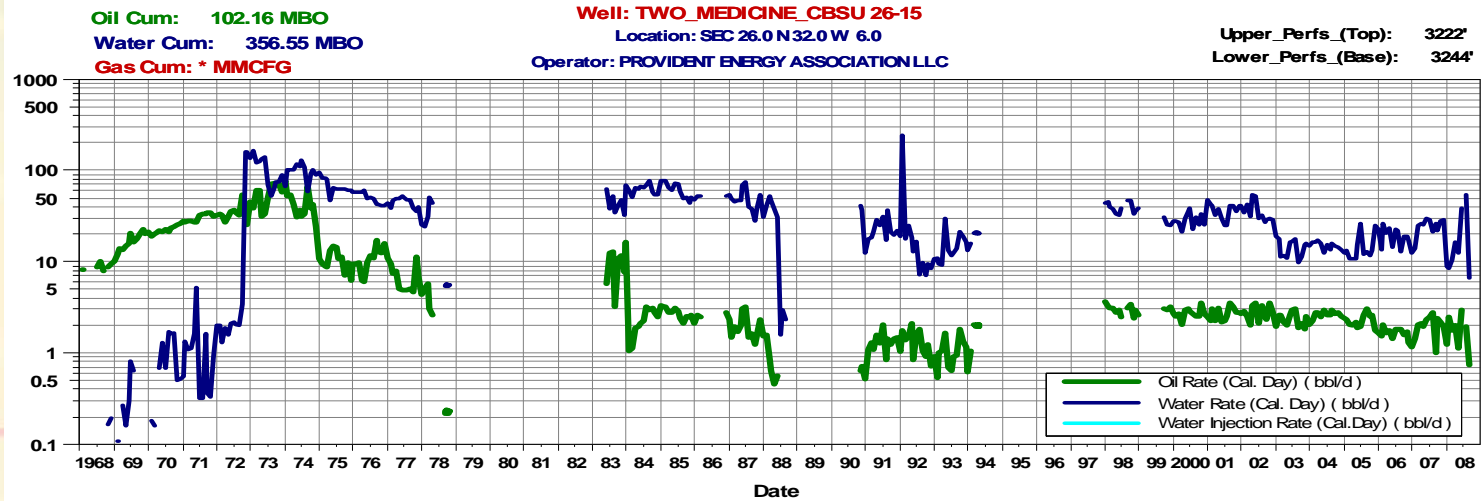
Re-perforation Analysis: Poor Candidate

•Status: Active

- API: 25035071970000
- Perforation (Ref: Well head)
 - 3222.5 - 3226' @ 4 SPF
 - 3232 - 3244' @ 4 SPF
- Unperforated zone in upper end of sand:
 - 3200-3221ft
 - High Water Cut (88%).
 - Lack of clear shale break indicates higher chances of being watered out in unperforated upper zone.
- Well located next to new proposed NE infill well (between 26-15 and 35-03). Suggest not recompleting for pressure maintenance reasons.



26-15



34-09

Re-perforation Analysis: Poor Candidate

- **Status: SI/TA**

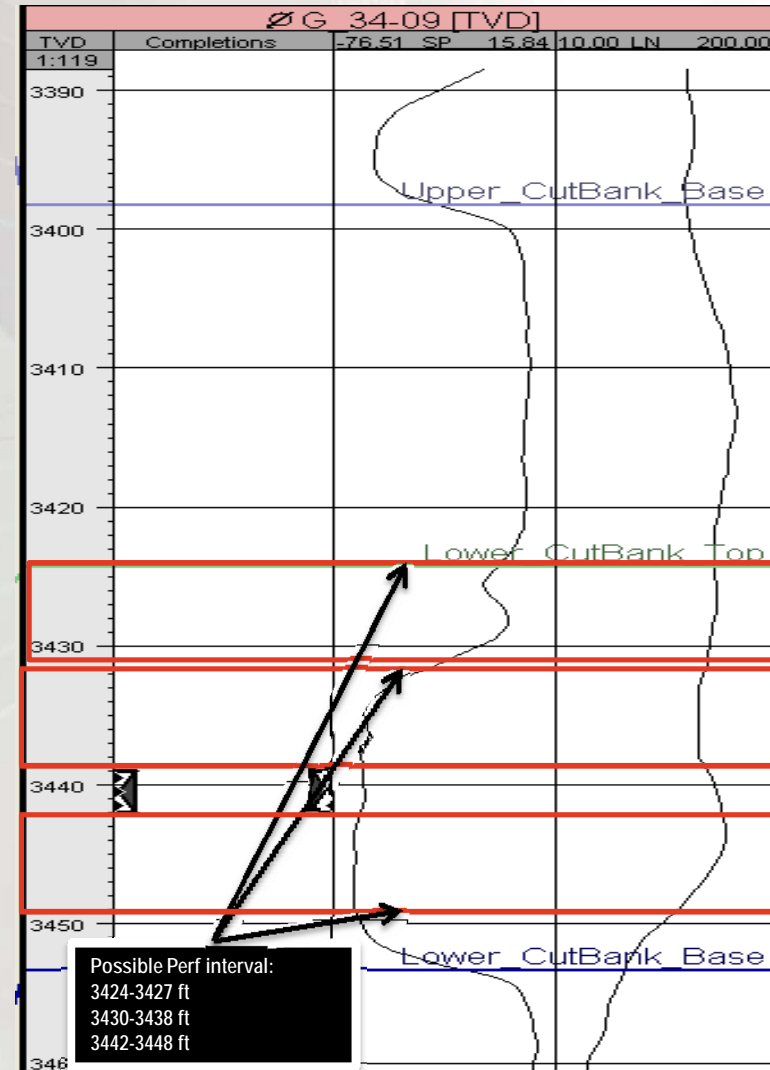
- API: 25035050420000
- Perforation (Ref: Well head)
 - 3338-3360' @ 4 SPF

- Unperforated zone in upper and lower end of sand:

- 3424-3427ft
- 3430-3438ft
- 3442-3448ft

- Dec '98 – Well shut in due to Uneconomical production.

- 98% Water cut. No clear shale breaks indicating zonal isolation.
- Higher chances of lower zone being watered out.
- Resistivity response higher below perforation, fining upward above perforation.

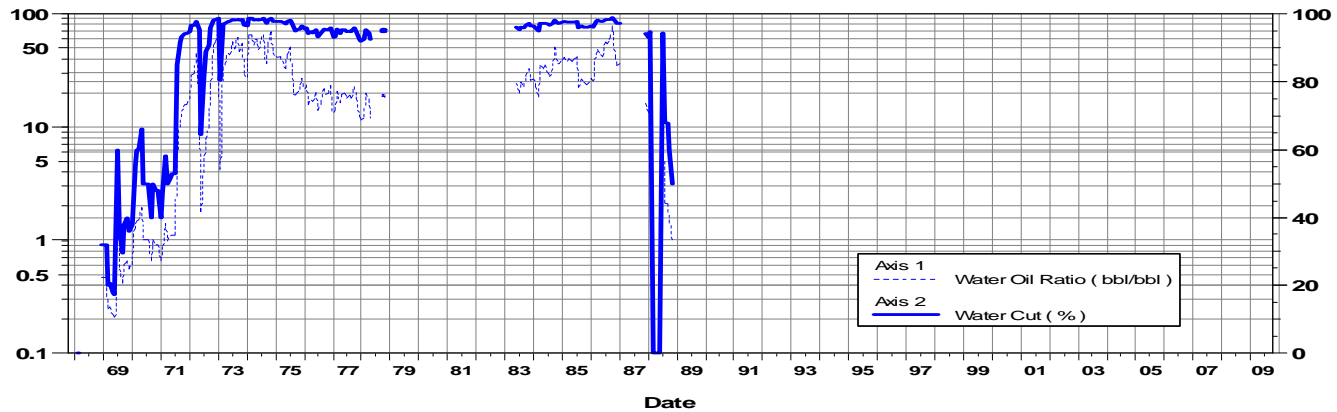
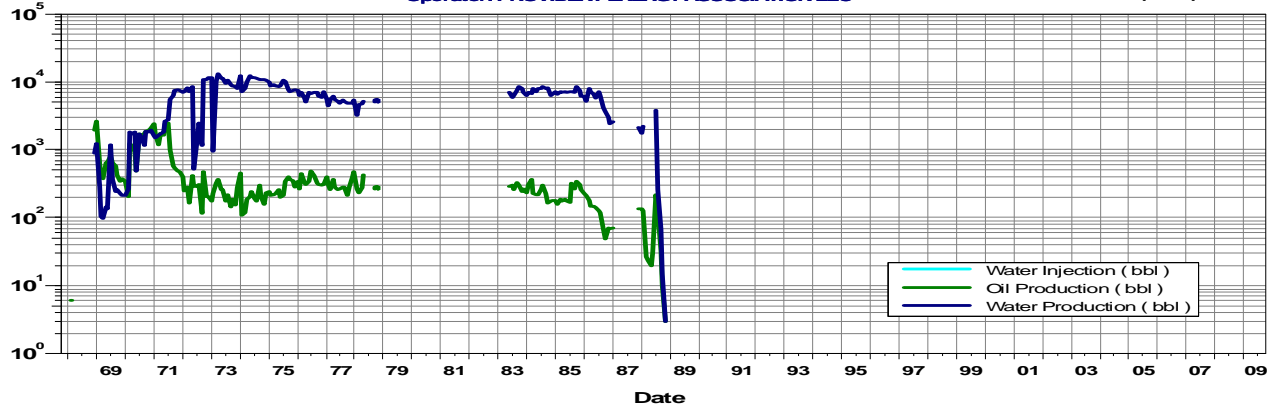


34-09

Oil Cum: 74 MBO
Gas Cum: * MMCFG
Water Cum: 960 MBW

Well: TWO_MEDICINE_CBSU 34-09
Location: SEC 34.0 N32.0 W 6.0
Operator: PROVIDENT ENERGY ASSOCIATION LLC

Upper_Perfs_(Top): 3439'
Lower_Perfs_(Base): 3442'



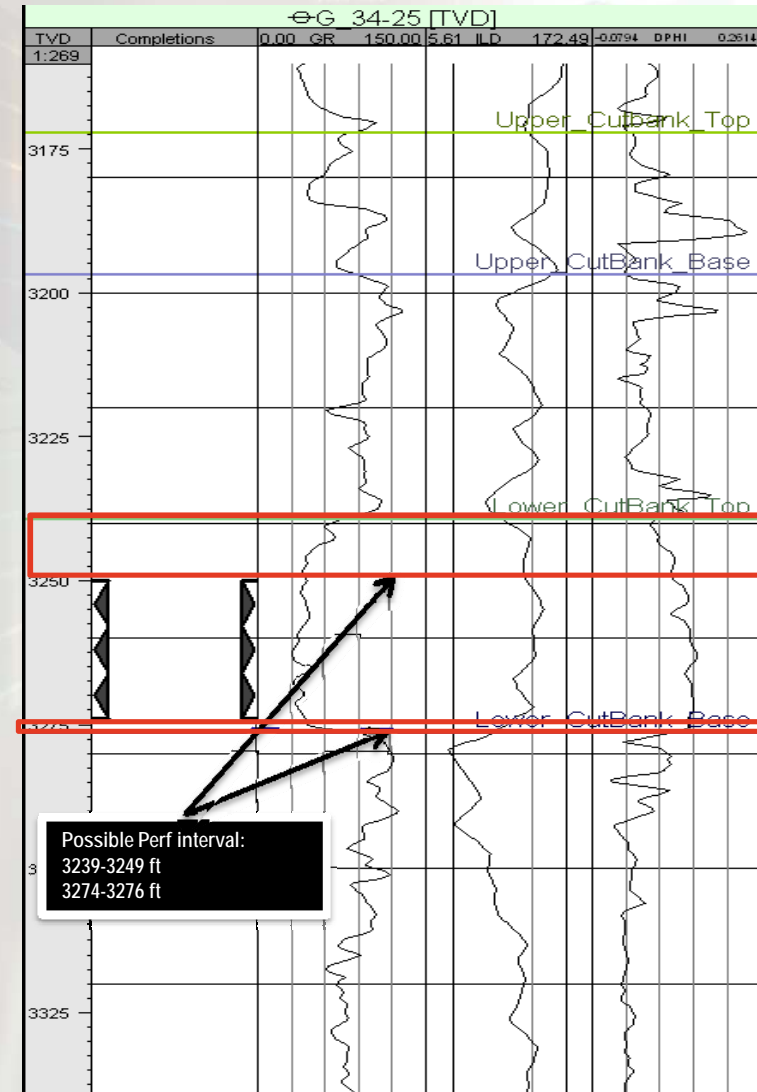
34-25

Re-perforation Analysis: Poor Candidate

- **Status: SI/TA**
- API: 25035217850000
- Perforation (Ref: Well head)
 - 3250-3274' @ 2 SPF

- Unperforated zone in upper and lower end of sand:
 - 3239-3249ft
 - 3274-3276ft

- No clear shale breaks present.
- 76% Water cut, low oil cum (1.40 Mbbl)
- Well located adjacent to Injector (34-10) with high injection radius (1120 ft).
- Higher chances of lower zone being watered out.
- Upper zone logs show increasing shale trend, quality of sand average at best.



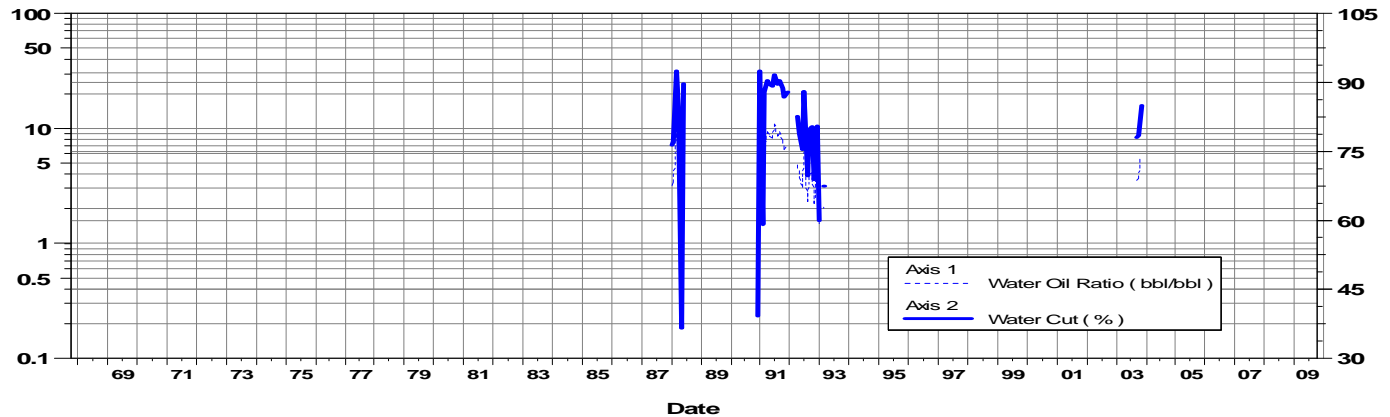
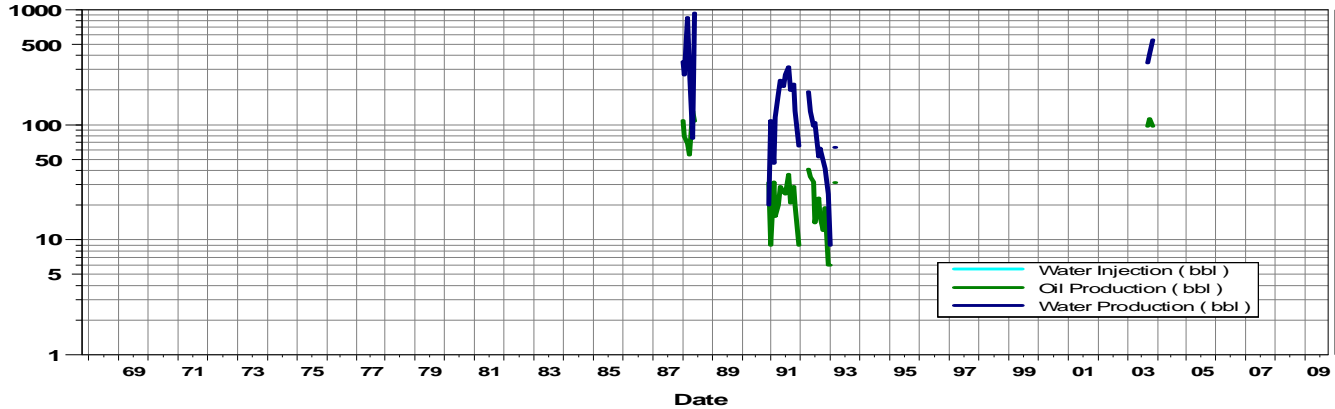
34-25

Oil Cum: 1 MBO
Gas Cum: * MMCFG
Water Cum: 7 MBW

Well: TWO_MEDICINE_CBSU 34-25

Location: SEC34.0 N32.0 W 6.0
Operator: PROVIDENT ENERGY ASSOCIATION LLC

Upper_Perfs_(Top): 3250'
Lower_Perfs_(Base): 3274'



35-07

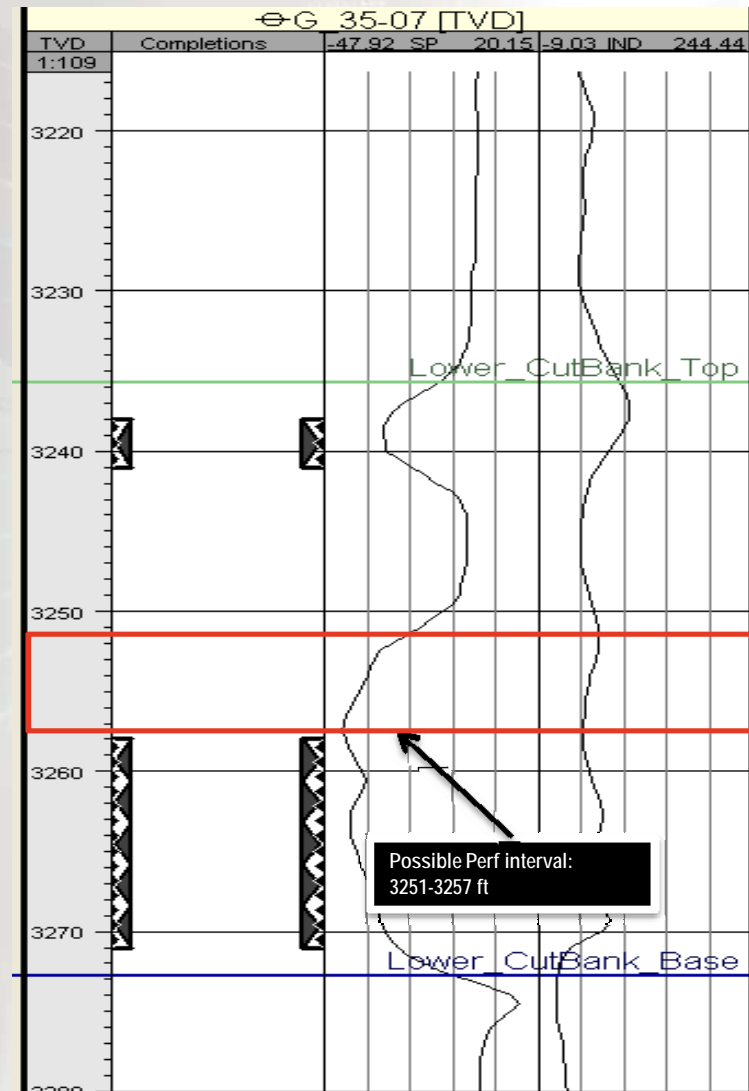
Re-perforation Analysis: Poor Candidate

•**Status: SI/TA**

- API: 25035071880000
- Perforation (Ref: Well head)
 - 3238-3241' @ 4 SPF
 - 3258-3271' @ 4 SPF

- Unperforated zone in upper end of sand:
 - 3251-3257 ft

- Shale break present between both perforated intervals.
- Unperforated zone - No clear shale breaks present.
 - Decreasing resistivity here – similar to shale zone above indicating possible poor sand.
- Last reported Water cut (Apr '94) close to 100%, poor production trend.



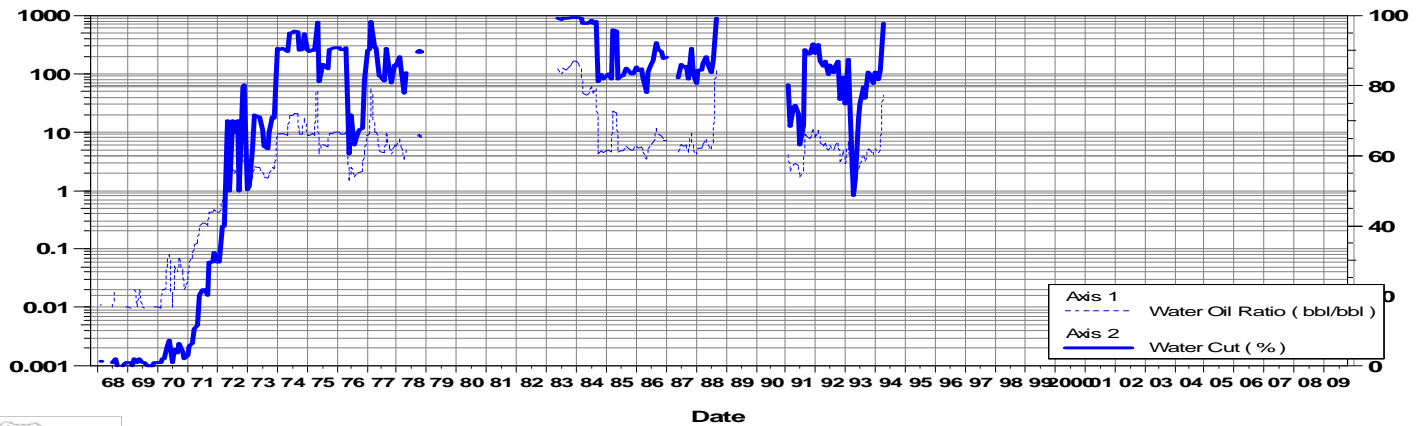
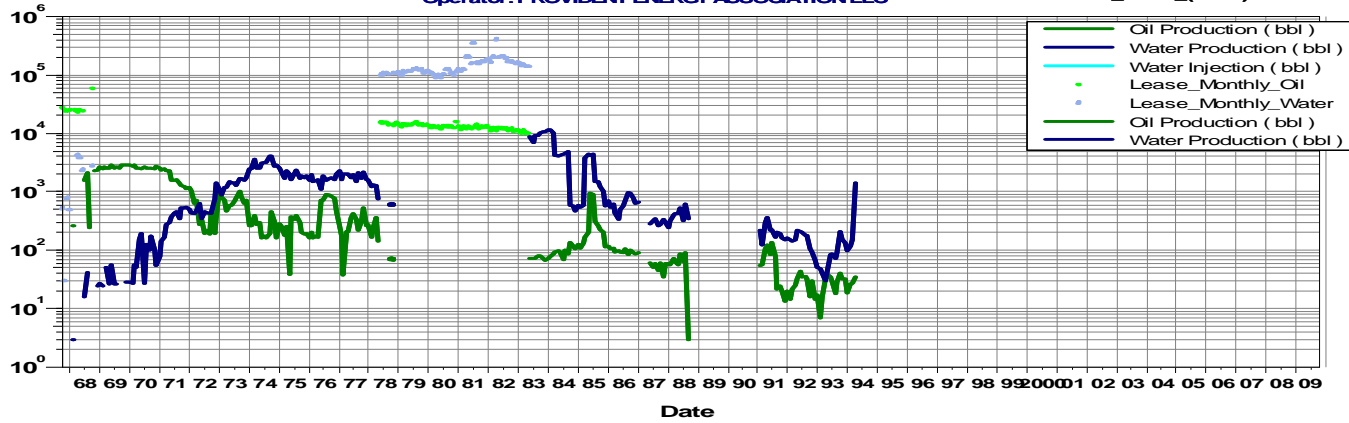
35-07

Oil Cum: 135 MBO
Gas Cum: * MMCFG
Water Cum: 311 MBW

Well: TWO_MEDICINE_CBSU 35-07

Location: SEC 35.0 N32.0 W 6.0
Operator: PROVIDENT ENERGY ASSOCIATION LLC

Upper_Perfs_(Top): 3238'
Lower_Perfs_(Base): 3271'



Conclusions

- Top 2 candidates were identified based on available log data.
- Schlumberger recommends running a standard suite of logs before any re-perforation campaign (particularly to obtain current water saturation)
- Agree upon final candidate selection to proceed with reactivation/re-perforation program