



Case Study 1935

Shallow Vertical Oil Well Cleanout Activities in East
Central Alberta Canada

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Presented by: ADL Oilfield Services

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Case Study for ADL Oilfield Services

Company Profile

Since 2004, ADL has provided expert well stimulation and remediation services, using a precision Stable Foam generating system to successfully complete over 750 vertical and horizontal wells; including injection, disposal and production wells, plus pipeline cleanouts, remediation projects and foam assisted drilling. Major Oil & Gas producers look to ADL as the industry benchmark for generating Stable Foam at surface.

Business Situation

High consumer demand, coupled with a strategic need to sustain long term energy self-reliance, natural gas and tar sands represent the raw fuels of the future. Thousands of new wells are drilled yearly, while thousands more decline in production. A portion of the wells in decline are suffering from residual debris including bitumen, wax, clay and sand, due to formation collapse and also at times, caused by remedial well activities. High well pressures can drive debris further into the formation, with subsequent reduction in productivity.

Clients typically contact ADL Services when conventional methods of well cleaning fail, including: chemical flushing, slick water applications, pressurized gas or hydraulic applications and even re-fracturing.

Technical Situation

The following well case study represents a typical well condition assessed and addressed by ADL Services. The well is listed by location, characteristics and condition. The UWI number and sensitive owner information are withheld. The subject well includes background, description, solutions and objective well production before and after ADL Services intervention.

Well 1935 – Provost, Alberta Canada

This vertical oil well was drilled, cased in May 2000, jet perforated and fractured in June 2000, the subject well commenced production in July 2000. The ADL field assessment noted the well was not in active at the time of ADL servicing. A thorough cleanout was needed.

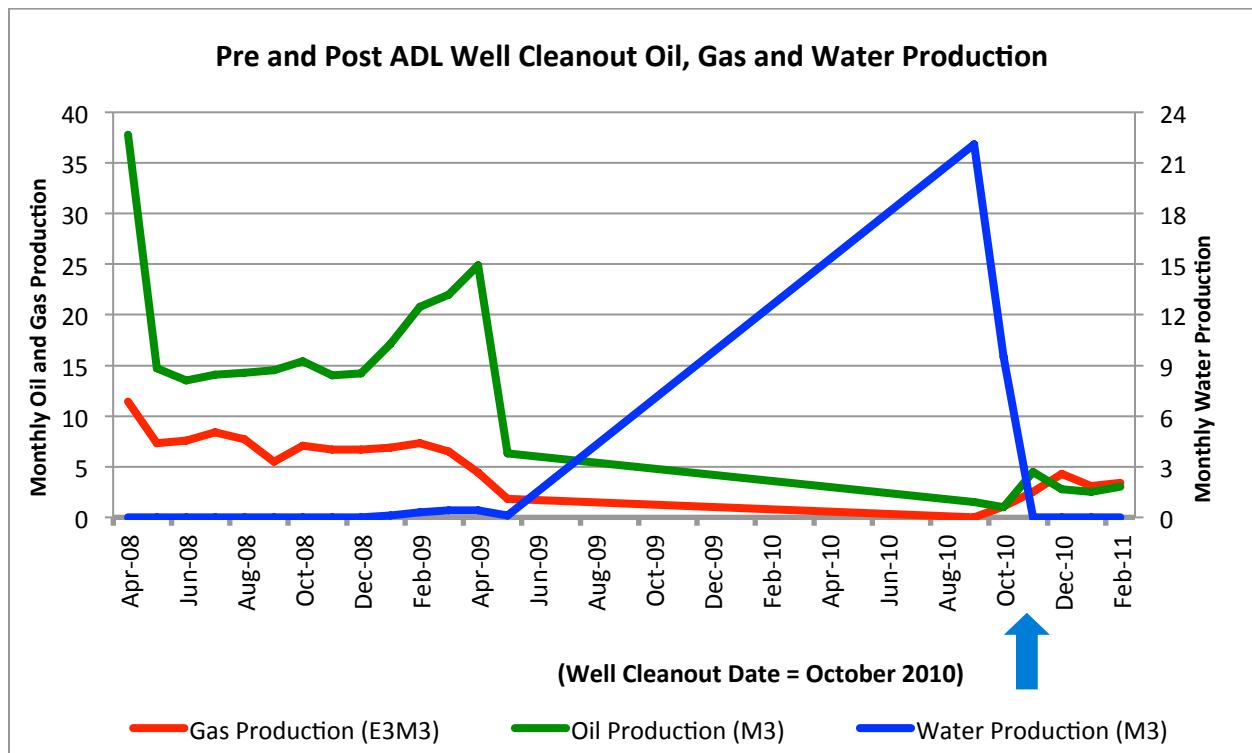
Solution

The ADL Work Design Plan was executed in October of 2010 including: a structured methodology focused well survey and schematic reviews, work layout targeting foam to the point of need, sampling, safety protocol, work execution, monitoring, reporting and cleanup. Particular well behaviors or personality was determined, allowing for customized foam design (both content and delivered volume), as well as defined the target application. A total length of 1200m of 60.3mm jointed tubing delivered Stable Foam to the designated target area. The foam generated at surface was sampled to assure adequate foam quality. After testing, the foam was delivered to the designated target zone at the predetermined foam density customized specifically for the personality and needs of the well.

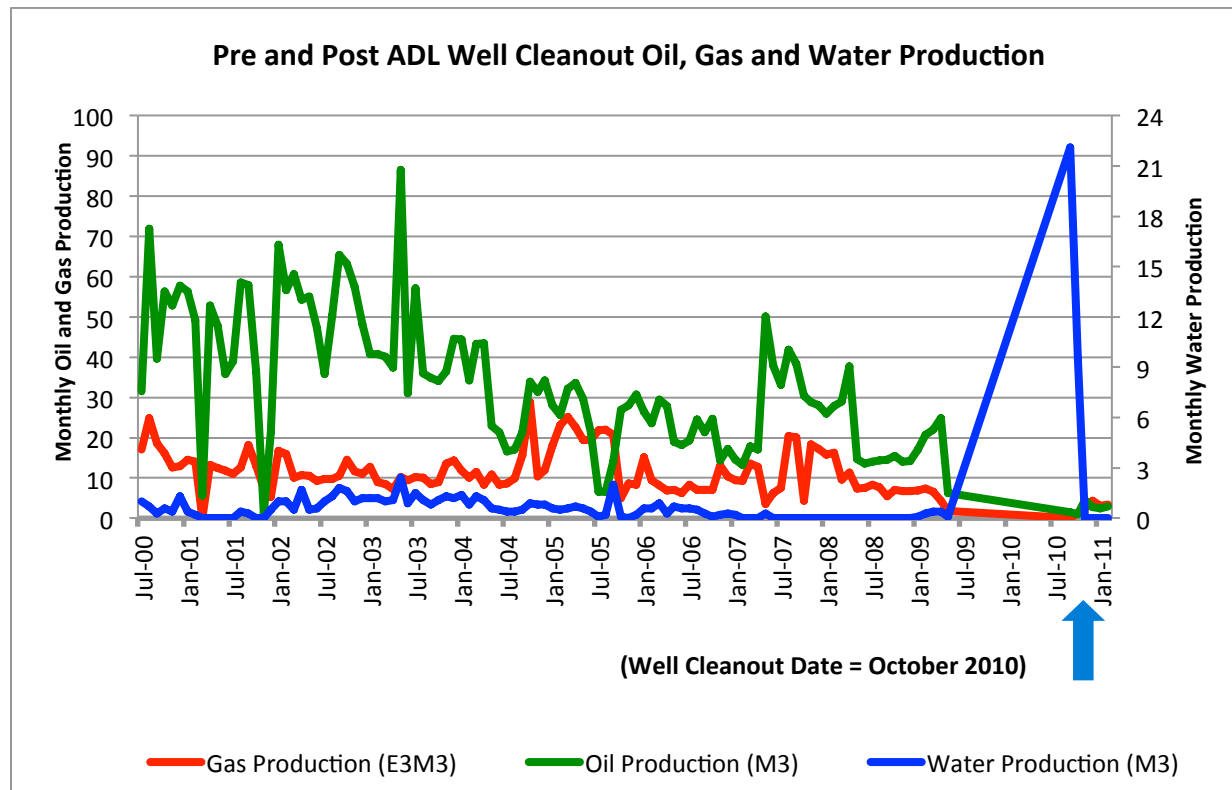
The project Cleanout Report notes reflect 3.10 m³ Stable Foam extracted 3.5 m³ of sand and 4.1 m³ of fluid. After a total project time of 5 hours, the oil well was then placed back into production experiencing initial water flow as the formation pressure was relieved, followed by restored oil production.

Benefits

The following graph depicts well oil production just before and immediately after the ADL Stable Foam cleanout:



The extended well production, depicted in the below graph, shows a classic descending well production curve of nearly 12 years of continuous operation. Minor oil production peaks and valleys can be seen due to oil pump play out, as worn pumps were replaced with new ones over time. Projection of this production curve without cleanout assistance marks the end of well life at the time of the October 2010 cleanout event.



Based on examination of extracted debris, it is concluded the well production was affected by excess sand accumulation within the well and formation. The Stable Foam application process required 5 project hours to assess, stage, execute and complete.

Return on investment for one project day of assessment and cleanout potential is encouraging with the restoration of oil production. ADL will monitor the behavior and production of this restored well over the coming months.

30 Day Pre Cleanout – Post Cleanout Projected Production Revenue

	Pre-Cleanout Production (M3)	Pre-Cleanout Production (BOE)	Pre-Cleanout Production Mcf gas	Pre-Cleanout Production Revenue	Post Cleanout Production (M3)	Post Cleanout Production (BOE)	Post Cleanout Production (Mcf)	Revenue Yield
Oil	1.5	9.43	N/A	\$896	1.0	6.29	N/A	\$598
Gas	0	0	0	\$0	1,100	6.70	38.83	\$175

60 – 90 Day Post Cleanout Projected Production Revenue

	60 Day Post Cleanout Production (M3)	60 Day Post Cleanout Production (BOE)	60 Day Post Cleanout Production Mcf gas	60 Day Post Cleanout Production Revenue	90 Day Post Cleanout Production (M3)	90 Day Post Cleanout Production (BOE)	90 Day Post Cleanout Production (Mcf)	90 Day Post Cleanout Revenue Yield
Oil	5.5	34.59	N/A	\$3,286	8.3	52.21	N/A	\$4,960
Gas	3,600	21.92	127.08	\$572	7,900	48.10	278.87	\$1,255

120 Day Post Cleanout Projection Revenue & Annualized Revenue

	120 Day Post Cleanout Projected Production (M3)	120 Day Post Cleanout Production (BOE)	120 Day Post Cleanout Production Mcf gas	Total Production Revenue Yield 120 Day Post Cleanout	Total Annualized Production 12 months (M3)	Total Annualized Production 12 months (BOE)	Total Annualized Production 12 months (Mcf)	Total Annualized Projected Revenue 12 months
Oil	10.8	67.93	n/a	\$6,453	32.40	203.79	N/A	\$19,360
Gas	11,000	66.98	388.30	\$1,747	33,000.00	200.93	1164.90	\$5,242

Notes

*Revenues based on the BOE (Oil) value of **\$95**

*Revenues based on the gas Mcf value of **\$4.50**

The 30-day Pre-Cleanout Production and the 30/60/90/120-day Post-Cleanout data is based on actual Oil & Gas Production values for each well

**Total Annualized Post-Cleanout Production values were calculated based on 3x the 120-day actual Oil & Gas Production values for each well

*The 30-day Pre-Cleanout and the 30/60/90/120-day Post-Cleanout revenues are based on actual Oil & Gas Production values for each well

**Total Annualized Post-Cleanout Revenues calculated based on 3x the 120-day actual Oil & Gas Production values for each well Assumes 1 BOE of natural gas = 164.24m3, per the *Fundamentals of Natural Gas: An International Perspective*, published by Pennwell, 2006 (publishers of Oil and Gas Journal)

Well productivity for the 30 day period prior to the cleanout intervention shows 1.5m³ of Oil and 0m³ of Gas production with respective BOE equivalents of 9.43 and 0 projecting an estimated overall revenue value of \$896. Post cleanout production was significantly higher increasing production to 1,100 m³ in Gas and maintained a stable Oil production with estimated projected revenues of \$598 in Oil and \$175 in gas after only 30 days. The combined annualized revenue of \$24,602 shows a significant return on investment.

Summary

This subject oil well production was restricted due to debris accumulation directly impacted by a steady decline of oil production over time. The long view production curve indicated this well was nearing the end of its life. Given field assessment of the well, ADL project staff designed a customized Stable Foam makeup and application.

After 5 project hours, subsequent excess formation sand was effectively removed. Inflow was restored and put back into production, extending the active life of this well. Well production will be monitored to define the return on investment based on extracted product over the coming weeks.