Case Study 1121

Shallow Vertical Gas Well Cleanout Activities in NE 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 1121 - Redfish, Alberta Canada

This shallow, vertical natural gas well was drilled and cased in February 1999, with gas flow commencing in March of 1999. One additional work over involved the insertion of a cement plug (in January 2001), was performed in an effort to isolate and sustain well production.

The ADL field assessment noted the well was barely in production at the time of ADL servicing. Due to difficult remote access, this well provided winter access only. The well was found to be loaded with water. A thorough cleanout was needed in an effort to allow the well to produce on its own throughout the summer season.

Solution

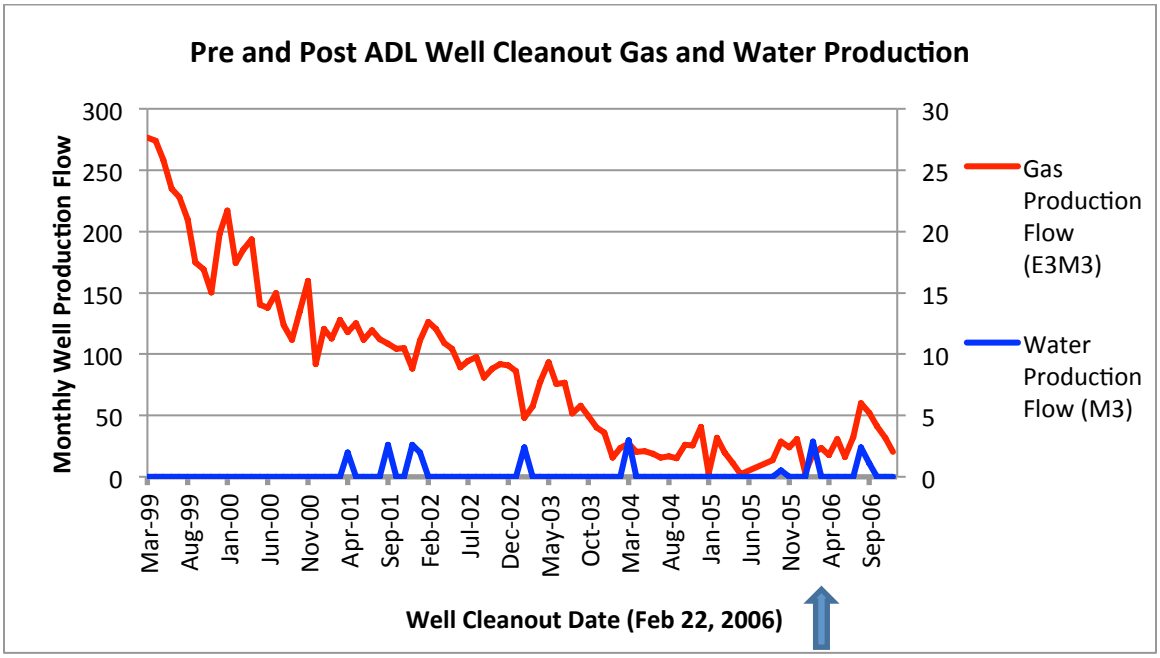
The ADL Work Design Plan was executed in February 2006 including: a structured methodology focused well survey and schematic reviews, work layout targeting foam to the point of need, sampling, safety protocol, work execution, monitoring, reporting and cleanup. Particular well behaviors or personality was determined, allowing for customized foam design (both content and delivered volume), as well as defined the target application.

Coil tubing delivered Stable Foam to the designated target area. The foam generated at surface was sampled to assure adequate foam quality. Stable Foam was delivered to the well at a low rate and pressure. 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 Stable Foam extracted mud, heavier at the beginning of the extraction process (15% by content) fading to 2% after the surge, with only a trace of mud found in the Stable Foam at the end of the approximate 90 minute extraction period. Shut In Casing Pressures (SICP) were 135kPa before cleanout and 840kPa post cleanout. Shut In Tubing Pressures (SITP) were 1000kPa before cleanout and 840kPa post cleanout. The well was then placed back into production.

Benefits

The following graph depicts well gas production before and after the ADL Stable Foam cleanout:

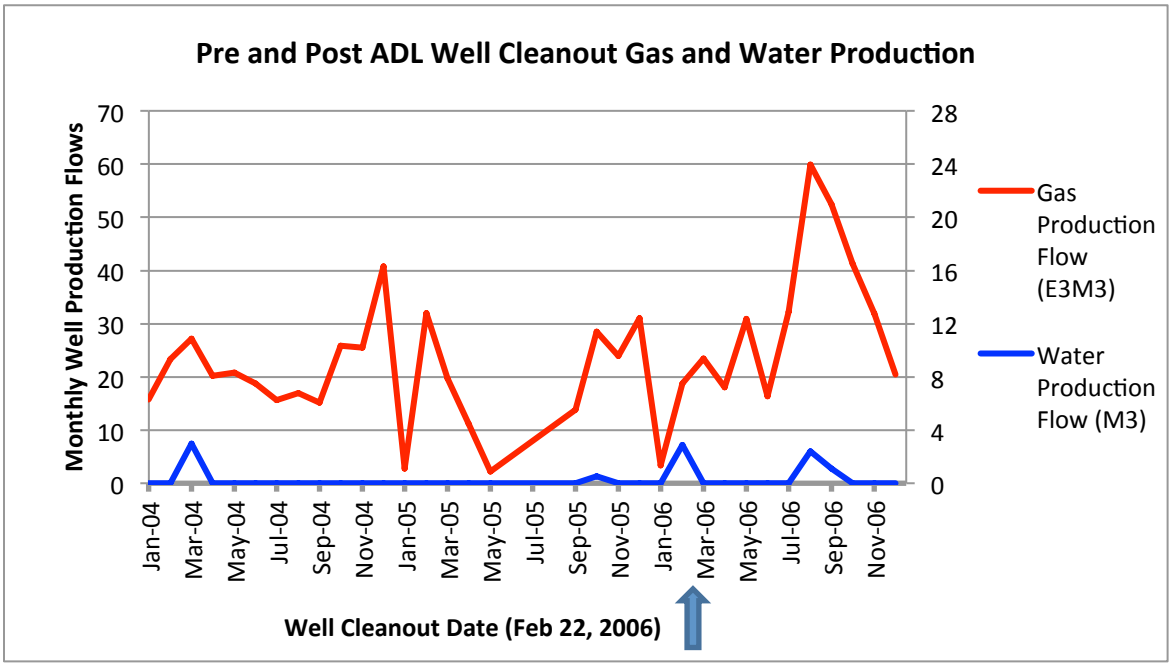


The extended well production, depicted in the above graph, shows a classic well production curve descending in gas production over nearly 8 years of continuous operation. Projection of this production curve without cleanout assistance marks the end of well life near the time of the February 2006 cleanout event.

Based on examination of extracted debris, it is concluded the well production was affected by mud and water intrusion, caused by a reduction in presiding gas pressure. With the return of gas flow and good shut in pressure, the water (prevalent before the cleanout) was displaced, resulting in extended well life and gas production.

The Stable Foam application process required 8 project hours to assess, stage, execute and complete.

Sustained gas production continued through the remainder of 2006, as depicted below:



Return on investment for one project day of assessment and cleanout is substantial noting the significant rise in sustained gas pressure and volume through the 2006.

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
3,300	20.09	116.49	$524	18,700	113.86	660.11	$2,970

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
42,100	256.33	1486.13	6,688	60,100	365.93	2,121.53	$9,547

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
91,000	554.07	3,212.30	$14,455	273,000	1,662.20	9,636.90	$43,366

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 3,300m^3 of production with a BOE equivalent of 20.09 projecting an estimated revenue value of $524. Post cleanout production was significantly higher increasing production to 18,700m^3 with estimated projected revenues of $2,970 after only 30 days. The annualized revenue of $43,366 shows a significant return on investment.

Summary

This subject natural gas well was a water producer, directly impacted by a steady decline of gas flow and pressure. The long view production curve indicated this well was nearing the end of its productive life. Given field assessment of the well, ADL project staff designed a customized Stable Foam makeup and application delivered to the well at a low rate and pressure.

After 8 project hours, subsequent formation mud and water was effectively removed. The well gas pressure was returned and was sustained over a significant period, considering the advanced age of this remote well.

Therefore, it can be seen the return on investment is more than substantiated by the value of sustained production.