



Case Study 3071

Shallow Vertical Gas Well Cleanout Activities in North
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 3071 - Decrene, Alberta Canada

This shallow, vertical natural gas well was initially drilled and sampled in November of 2007, followed by final well casing in January 2008, with gas flow commencing in March of 2008. During initial site exploration and sampling, field solvent tests defined heavy amounts of bitumen and paraffin. Recommendations from the sampling consultant called for a two part solvent application followed with a foam cleanout and to continue subsequent foam cleanouts on an as needed basis throughout the life of the well.

Six subsequent well work overs, involving four perforations (in January 2008), were performed. Initial well perforations were at 549.0m or 1,797.9ft-1,801.2ft, 407.0m or 1,330.4 – 1,335.3ft, 399.0m or 1305.8ft – 1,309.1ft and finally at 393.5m or 1,286.1 – 1,291.0ft. A bridge plug was installed at 1,784.3ft and a packer was installed at 1,323.2. The well was not fractured. The initial well production was noted at 8em³/day in March 2008, but lost significant production by April 2008. The ADL field assessment noted the well was affected by significant amounts of bitumen and paraffin.

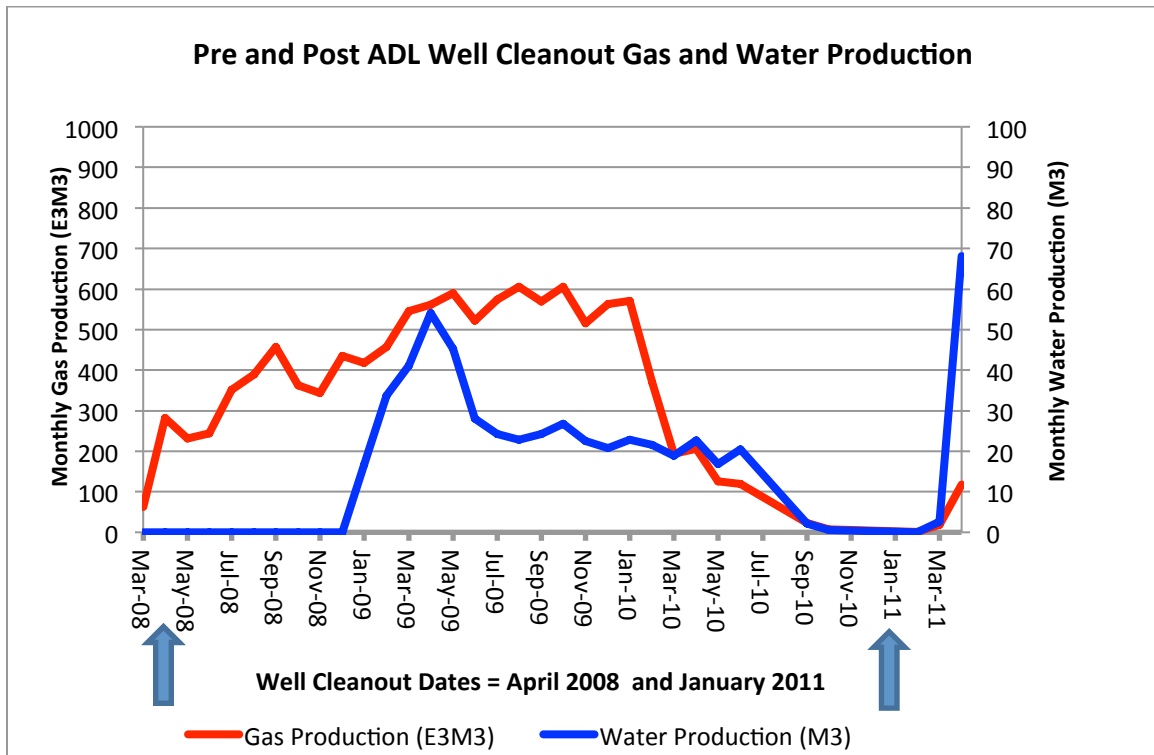
Solution

The ADL Work Design Plan was executed in April 2008 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 a subsequent chemical application with a defined the target application.

Project staff targeted stable foam contact at 536.0m with a chemical treatment mutual solvent. Coil tubing delivered the Stable Foam to the designated target area at a low rate and pressure. The foam generated at surface was sampled to assure adequate foam quality. The Stable Foam density was customized to the predetermined foam density customized specifically for the personality and needs of the well.

Benefits

Well production significantly improved from 62.9e3m³/month to 282.5e3m³/month. The following graph depicts well gas production before and after the ADL Stable Foam cleanout:



ADL Stable Foam extracted approximately 0.5m³ of heavy bitumen and paraffin. Based on examination of debris contents and the volume of residuals extracted, it was concluded both bitumen and paraffin accumulation was the primary cause of gas volume decline.

The Stable Foam application process required 5 project hours to assess, stage, execute and complete, including a chemical soak. The well data shows increased post cleanout gas production with sustained gas production spanning 2 years. Post cleanout monitoring by ADL staff encouraged the well operator to not over produce the well, resulting in less stress to the formation and sustained production.

A second ADL cleanout application was requested and provided in January of 2011. Due to the inflow of water, 1.5m³ of water was recovered during the cleanout.

The above graph shows increased latent water production. The ADL consulting team recommended the installation of a water pump to extract water infiltration. Gas production was restored once a plunger lift system was installed.

Actual 30-Day Pre-Cleanout Oil/Gas Production (M ³ , BOE, Mcf)	Actual 30-Day Pre-Cleanout Production Revenue (\$)*	Actual 30-Day Post-Cleanout Oil/Gas Production (M ³ ,BOE, Mcf)	Actual 30-Day Post-Cleanout Production Revenue (\$)*	Actual 120-Day Post-Cleanout Oil/Gas Production (M ³ , BOE, Mcf)	Actual 120-Day Post-Cleanout Production Revenue (\$)*	Total Annualized Post Cleanout Oil/Gas Production (over 12-month period) (M ³ , BOE, Mcf)	Total Annualized Post Cleanout Production Revenue (Enterprise) (\$)*
62,900 (M ³) 382.98 (BOE) 2220.4 (Mcf)	\$9,992	282,500 (M ³) 1720.04(BOE) 9972.25 (Mcf)	\$44,875	1,109,000 (M ³) 6752.31 (BOE) 39147.7 (Mcf)	\$176,165	3,327,000 (M ³) 20256.94 (BOE) 117443.1 (Mcf)	\$528,494

* Revenues based on the current values of \$95/BOE (for Oil) and \$4.50/Mcf (for Gas).

Summary

The subject natural gas well production was affected by significant amounts of bitumen and paraffin, resulting in significant production obstructions and disappointing new well output. The well was not fractured at start up.

ADL serviced the well with a nitrogen enriched Stable Foam and a customized designed density delivered at a low rate and pressure, coupled with a chemical soak, removing 0.5m³ of bitumen and paraffin from the well. Post cleanout gas production was not only restored, but significantly improved and sustained for over 2 years, followed by a second cleanout event and subsequent production enhancement.

The quantified return on investment is projected to be within 1 month of post cleanout well operation, with sustained high production and impressive revenues, more than substantiating the value of the ADL service investments.