



## Case Study 0313

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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 0313 - Nina, Alberta Canada

This shallow, vertical natural gas well was drilled and cased in January 2004, with gas flow commencing also in January of 2004. Three subsequent work overs, involving repeated perforations (in January 2004), were performed in an effort to commence well production. Initial well perforations were at 472.8 – 477.8m or 1,551.2ft, 480.4 – 481.4m or 1,576.1 – 1,579ft and finally at 482.6 – 485.0m or 1,583.3 – 1,591.2ft.

The ADL field assessment noted the well was affected by significant amounts of bitumen.

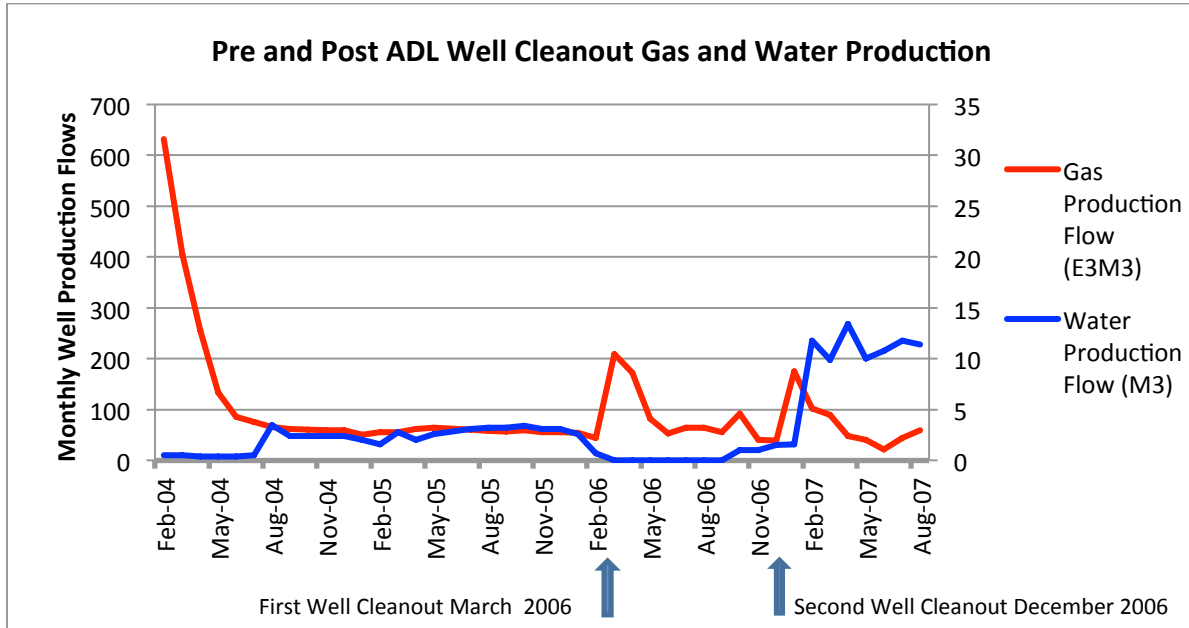
### Solution

The ADL Work Design Plan was executed on March 12, 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 a subsequent chemical application with a defined target application. Project staff targeted foam contact at 482.6 – 485.0m. Coil tubing delivered Stable Foam to the designated target area. The foam generated at surface was sampled to assure adequate foam quality. The Stable Foam density was

delivered to the predetermined foam density customized specifically for the personality and needs of the well.

## Benefits

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



ADL Stable Foam extracted a total of approximately  $1.50\text{m}^3$ , or 396 gallons of heavy bitumen. Based on examination of debris contents and the volume of bitumen extracted, it was concluded bitumen accumulation was the primary cause of gas volume decline.

The Stable Foam application process required 7 project hours to assess, stage, execute and complete, including a 90 minute chemical soak. The well data shows increased post cleanout gas production with sustained gas production spanning 10 months. 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 December of 2006. Similar increases in gas production were achieved, further extending the productive life of the well. The above graph clearly shows increased water production, preventing the well from stable gas production. The ADL consulting team recommended a capillary soap injection, or siphon string application in an effort to control water predominance and improve gas production.

### 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
44,100	268.51	1,556.73	\$7,005	209,400	1,274.96	7,391.82	\$33,263

### 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
381,500	2,322.82	13,466.95	\$60,601	463,100	2,819.65	16,347.43	\$73,563

### 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
516,400	3,144.18	18,228.92	\$82,030	1,549,200	9,432.54	54,686.76	\$246,090

#### 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 44,100 m<sup>3</sup> of production with a BOE equivalent of 268.51 projecting an estimated revenue value of \$7,005. Post cleanout production was significantly higher increasing production to 209,400 m<sup>3</sup> with estimated projected revenues of \$33,263 after only 30 days. The annualized revenue of \$246,090 shows a significant return on investment.

## Summary

The subject well was affected by significant amounts of heavy bitumen resulting in significant gas production. ADL serviced the well with Stable Foam and a chemical soak, removing significant amounts of heavy bitumen from the well 1.50m<sup>3</sup> bitumen, (396 gals). Post cleanout gas production was restored and sustained for over 10 months followed by a second cleanout and production enhancement.

Substantial increase in production and values and subsequent estimated projected revenues generated significant return on investment.