"Salvage That Water-Logged Gas Production"

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AMOCO Production

Older wells become marginal due to a variety of production problems. AMOCO's Carthage team looked into a revolutionary new method to increase production in two producing zones, in their area of responsibility.

Travis Peak Production.

The Travis Peak produces from a salt-bearing zone. Excellent producing wells will produce over one MMCFD. Salt builds up with the produced gas and has to be removed weekly. This requires one to two days of wireline work or coiled tubing service to remove the salt covering the perforations. This service, plus the lost production, reduces the potential profits of these wells. Steve Holland and John Conway contacted Downhole Injection Systems and discussed the problem and, together, they designed a more cost-effective system to remove the salt.

The first well selected on December 19, 1995, was the Burnett Bros. No. 25, which is a "Slim Hole" (2⅞") completion. The salt buildup of ±200' was removed and the Downhole Injection System was run inside the production tubing to a depth below the bottom perforations. The Downhole Injection System was secured and readied for chemical injection on a 24-hour basis. A simple surface system allows total control of fluid and chemical mix to be injected downhole for removal of the salt buildup. A mix of KCL fluid and Foamier was selected for

removal of the salt. With continuous 24-hour injection, fluid rates and chemical inhibitors can be adjusted or completely changed, as required.

Within a few hours, production increases could be seen. The new system was adjusted for rates of fluid needed for salt removal. Initially, injection rates of up to 15 barrels per day were used. As a result of this large amount, the well had too much fluid buildup; however, a quantity of Foamier was injected down the hole and within 24 hours, the additional fluid was unloaded and the well was back on production with an increase of over 40%. This well has been operating with no salt buildup or down time since December, 1995.

The optimum KCL Foamier rate to keep the perforations clean and flowing at its maximum is one to two barrels, per day. **To date, there are five Travis Peak, and four Cotton Valley wells on production with this system -- all with increases in production and no down time.**

Cotton Valley Production.

The Cotton Valley is a deep producing field with large volumes of fluid buildup. The completions are unlike the Travis Peak wells. The Cotton Valley wells have Packers that are set 800' to 1,100' above the producing zone. We run the small tubing through the production tubing, through the Packer, and down into the bottom of the producing zone. At this point, we inject a foaming agent to lighten the produced fluid, and carry that fluid out of the well. This system in all cases has increased gas production well over 40%.

Other Applications.

Now, we have the capacity to easily deliver chemicals to the source of the problem. The small tubing can be used for accurate delivery of chemicals such as corrosion, scale and paraffin inhibitors, foaming agents and methanol. **This system ensures delivery of chemical treatment without interrupting production**. A precise placement of chemical at the bottom of the production string is a potential solution for many production problems.

Stainless steel tubing is used in most of the installations. The use of a revolutionary new tubing is expected to be available in the first quarter of 1997. This tubing will allow systems to be run in very deep to ultra deep wells.

Carthage Field (5 Travis Peak and 2 Cotton Valley Wells)

Well	
Burnett Bros. No. 25-TP	December 19, 1995
Burnett Bros. No. 26-TP	January 5, 1996
Burnett Bros. No. 27-TP	February 29, 1996
CGU No. 15-4-TP	May 16, 1996
Burnett Bros. No. 19-CV	June 17, 1996
Burnett Bros. No. 20-CV	July 9, 1996
CGU No. 14-8-TP	October 4, 1996

Blocker Field (2 Cotton Valley Wells)

Well	
Rode No. 04-CV	October 15, 1996
Fitzgerald No. 01-CV	December 3, 1996

Travis Peak Project, Using Downhole Injection System, Inc.

Assumptions: 6,500' T.D.
500MCFGD
$2.50/MCF
Salt blockage problem -- decreasing production

		Annual
A.	Current Operations	
1.	Wireline cost - 4 days/month @ $800/day	$ 38,400
2.	Lost production - SI for wireline cleanout - 4 days/month, 500MCFGD @ $2.50/MCF = $1,250/day	60,000
3.	Lose 10% of the effective monthly production due to sale buildup - 10% of 500MCFGD is 50MCFGD @ $2.50/MCF = $125/day	45,000
	Total Annual Cost:	$143,400
B.	D.I.S.	
1.	System cost	$ 15,000
2.	Chemical tank and installation	2,000
3.	Water truck - $50/hour @ 4 hours/month	2,400
4.	Chemicals	
(a)	Biocide - using 0.50 gallon/day @ $10/gallon = $5.00/day	1,800
(b)	Soap - using 1.00 gallon/day @ $4.00/gallon - $4.00/day	1,500
	Total First Year Cost:	$ 22,700

C. Benefits of Using D.I.S. Process.

1.	First year benefit ($143,400 - $22,700)	$120,700
2.	Second year benefit ($143,400 - $5,700) (See B. 3 and 4)	$137,700
	Total Accrued Benefits First Two Years	$258,400

Cotton Valley Project, Using Downhole Injection System, Inc.

Assumptions: 9,600' T.D.
Packer set @ 8,600'. The injection mandrel is run through the Packer and set @ 9,350'. Top of the perforations @ 8,750' and bottom of the perforations @ 9,450'.
200MCFGD
$2.50/MCF
Fluid buildup problem

		Annual
A.	Current Operations	
1.	Production Intermeter - Shutting in for pressure buildup causes loss of production. Lose 200MCFGD, 2 days/week = 400MCF/week, which is 20MMCF/year @ $2.50/MCF	$ 50,000
	Total Annual Cost:	$,50,000
B.	D.I.S. Cost.	
1.	System cost	$ 19,200
2.	Chemical tank and installation	2,000
3.	Water truck - $50/hour @ 4 hours/month	2,400
4.	Chemicals	
(a)	Biocide - using 0.50 gallon/day @ $10/gallon = $5.00/day	1,800
(b)	Soap - using 6.60 gallons/day @ $4/gallon = $26.40/day	9,500
	Total First Year Cost:	$ 34,900

Increase in Production Utilizing D.I.S.

CASE I:	40% increase	
	80 MCFGD @ $2.50/MCF = $200/day	$ 72,000
	Regain lost production (see A.1 above)	50,000
		$122,000
	Less Cost of D.I.S.	34,900
	Total First Year Benefits:	$ 87,100
	Total Second Year Benefits (see B.3 and 4 above):	$108,300

CASE II:	60% increase	
	120MCFGD @ $2.50/MCF = $300/day	$ 108,000
	Regain lost production (see A.1 above)	50,000
		$158,000
	Less Cost of D.I.S.	34,900
	Total First Year Benefits:	$123,100
	Total Second Year Benefits (See B.3 and 4 above):	$144,300
	Total Accrued Benefits First Two Years:	$267,400