Dixie Valley Well 28-33 Well History Summary

28-33 Well History	Depth
7/4/1990 Well Completed	9 5/8" liner from 5028' - 7882'
7/6/1990 Static Temperature survey 7/24/1990 Flowing Temperature survey	9300' 4100'
12/6/1990 Workover 7/1/1993 Temperature survey 9/22/1993 Workover	4000'
9/26/1993 Static Temperature survey	4970'
10/9/1993 Flowing PTS survey	9330'
4/18/1994 Workover 5/4/1994 Flowing Pressure Temperature survey 11/2/1996 Flowing Temperature survey Static Pressure survey	4242' 4259' 4259'
7/21/1998 Pull and reinstall cap tubing 10/1/1998 Flowing Temperature survey 10/3/1998 Workover	4300'
3/30/1999 Flowing Temperature survey	4500'
4/14/1999 Flowing Temperature survey 11/1/2001 7.5% HCL Acid (60,000 gals)	4474'
10/23/2003 Flowing Temperature survey	4350'

Summary

0 gauge rings 12 wire line surveys

0 Sinker Bar

1 acid stimulation

4 Work-overs

Coil tubing clean-out

Nitrogen Lifts
 capillary tubing strings

Sent: Wed 4/4/2007 12:15 PM

You forwarded this message on 4/4/2007 12:17 PM.

Jess McCulloch

From:

Jess McCulloch

To:

Doug Brown

Cc:

Subject:

Nalco history FYI

Attachments:

Excerpts from some of Stu's stuff.

Summary:

Nalco 9354 = Bad

Nalco HP-1340 = Good

Year 1999

Considered as normal operation with plant output at 62.5 MW gross at the start of the year. In the previous fall of 1998, production well workovers, mainly consisting of hangdown string replacements and cap tubing replacements were conducted during the outage in October. Production wellbores were not limited by scale build-up. Scale inhibitor was changed from Nalco HP-1340 to Nalco 9354 as a cost saving measure.

A change in down-hole carbonate scale inhibitor in 1998 resulted in accelerated scaling in all production wells and caused production well downtime beginning in late 1999 and continued through 2000.

Year 2000

A coiled tubing clean-out of 73-7 was conducted in August. When pulling the hangdown string, the abnormally heavy scaling present was the first indication that the Nalco 9354 was not totally effective in inhibiting carbonate scaling in the Dixie Valley wells. Although CT operational problems prevented a total success, Well 73-7 could be placed back in service with a gain of 3.0 MW. The plant output of 61.0 MW was higher than the output at a comparable time in 1999 (59.5 MW).

During the months of September and October, the effects of high scaling rates began to show in other weak wells in Dixie Valley. Problems were noted with 82A-7, 63-7, and 76A-7 in terms of low well head pressure. Well 76A-7 was off-line during much of this time due to a scaled-in-place hangdown string (Note 3 MW loss in September). Wells 63-7 and 82A-7 were also off-line intermittently during this timeframe.

Year 2001

During the first guarter of 2001, production showed a slight decline of perhaps 0.25 MW. This decline is attributed to two factors:

1. Modest scaling due to continued use of Nalco 9354.

1. Reservoir pressure augmentation program was hampered by injection pump failures and plant trips that caused high-rates of brine loss.

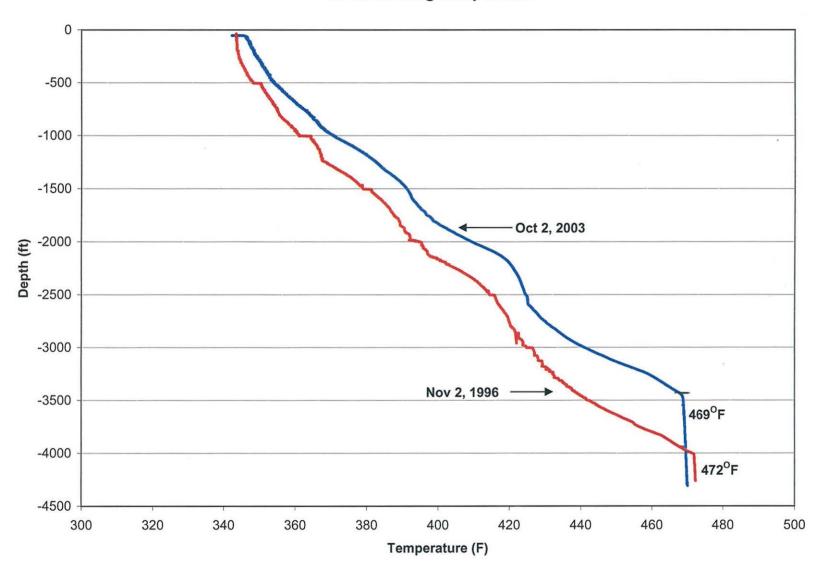
The May outage brought three improvements to the production field:

- 1. The Nalco 9354 was replaced by Nalco 1340 HP to reduce scaling rates in all production wells.
- 2. Well 63-7 was treated with acid to remove wellbore scale and scale at depth in the well.
- 3. Well 76A-7 was treated with acid to remove wellbore scale and sclae at depth in the well.

Minimize wellbore scaling

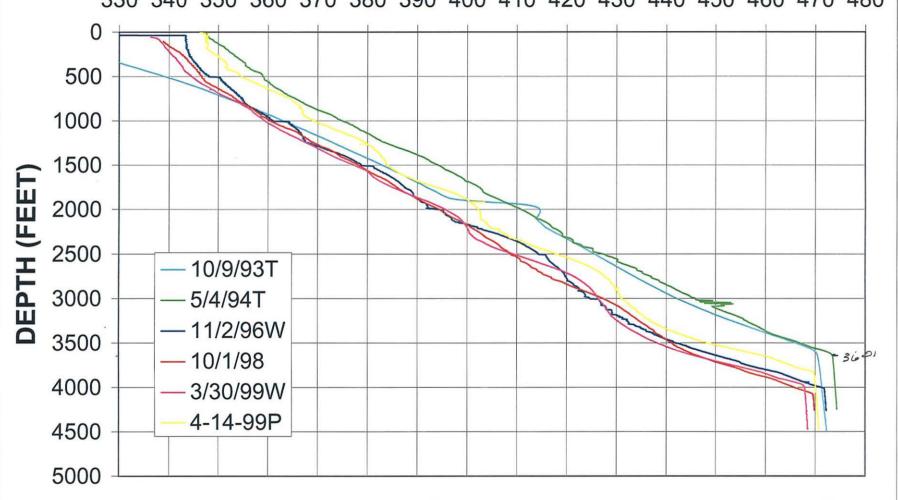
Prior to 1998, Nalco 1340 HP was used as a scale inhibitor in Dixie Valley Wells. The use of Nalco 9354 was shown to be ill-advised. Nine production wells were in service in 1998 and five of these wells required clean-outs during 2000-2001. The loss of well 82A-7 can largely be attributed to scale that developed through the use of Nalco 9354

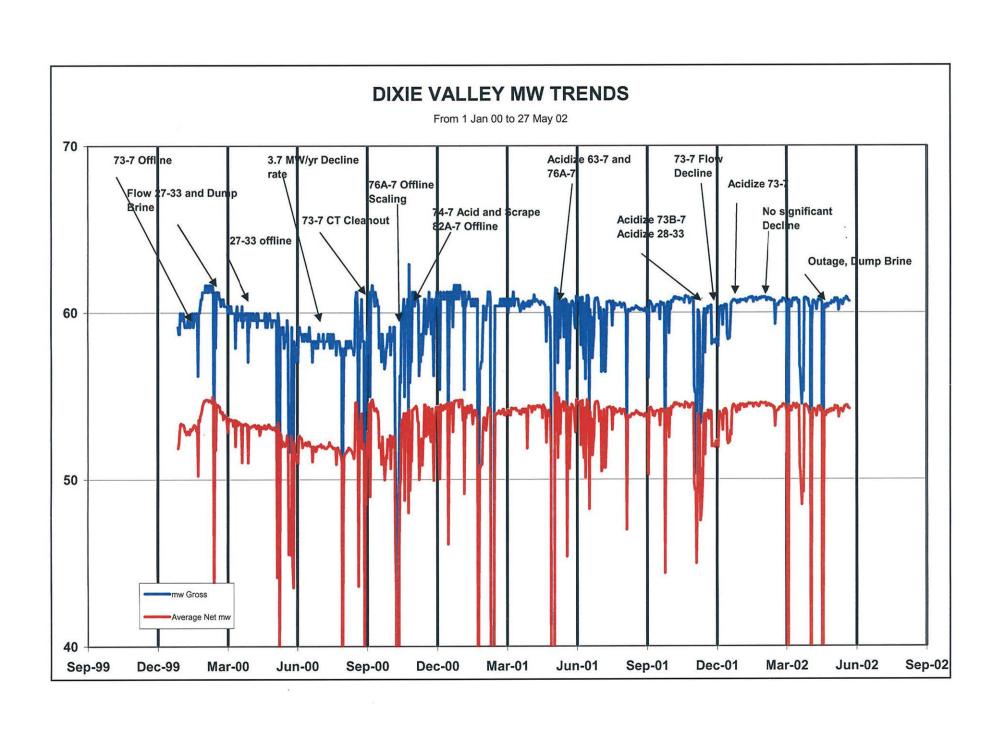
28-33 Flowing Temperature



28-33 FLOWING TEMPERATURE LOGS TEMPERATURE (F)

330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480





Well Completion Diagram Well 28-33 Location: SW-SW-SW Section 33 T25N-R37E Churchill County, Nevada 3501' KB, 32' Ábove Ground Level Datum: Drilled: Veco Rig #10 13 3/8" Tie Back 13 3/8" 72# L80 BTC 0-1108'KB 13 3/8 Liner Hanger ♥ 1108 KB 26" Hole @ 1330'KB 20" 94 & 106# K55 BTC @ 1318 KB Casing Pinched To 11.5" © 2967'KB Flash Point at +/- 4100'KB HangDown String 4490' Below Tubing Hanger (137 Joints of 10 Round) Two 1/4" Cop Tubing Strings Banded To HangDown String 9 5/8" Liner Honger ♥ 5028'KB 13 3/8" 87.2# SS90 & 17 1/2" Hole • 5246'KB 72# LB0 BTC 1108-5229'KB Alluvium 🗗 Surface Tuff & tuffaceous seds. & 4870'KB Tertiary basalt **©**6070'KB Miocene sediments @ 7306'KB Humboldt Lopolith @ 8648'KB Jurassic quartzite © 9106'KB 9 5/8" 43.5, 47 & 53.5# L80 BTC 12 1/4" Hole @ 7887'KB 5028-7882 KB Fracture Below 9287'KB inhibition Downhole Assembly and Cap Tubing Junk Below 9346'KB Bottom 9346'KB (10/8/93)

Oxbow 11/6/98

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4/18/1994 Workover	
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Static Pressure survey	4259'
7/21/1998 Pull and reinstall cap tubing	
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10/3/1998 Workover	
3/30/1999 Flowing Temperature survey	4500'
4/14/1999 Flowing Temperature survey	4474'
11/1/2001 7.5% HCL Acid (60,000 gals)	

- Summary 0 gauge rings 11 wire line surveys
- 0 Sinker Bar
- 1 acid stimulation
- 4 Work-overs

- Coil tubing clean-out
 0 Nitrogen Lifts
 1 capillary tubing strings

To: Bobbi Gollan, John Gastineau, Stu Johnson, Don Wells

Field	WELL	WORK	AFE No.	Report No	Date	Supervisor
Dixie Valley	28-33	Acid Stim	A1F3	1	November 1, 2001	G Davidson/S Johnson
resent Operation rell producing						
ven producing						
est'day(Oct 31, 2001)						
Time	Operation St	ummary				
	Move in and i	rig up DV cap tub	ning pulling u	nit		
	with Welaco	personnel attemp	ot to pull tubii	ng		
	pull (stretch)	320' 1/4" cap tub	ing - tubing p	arted at lubricato	r shieve	
•						
					Cost S	Summary
				Service	Hrs	Cost US\$
				upervision		
			Welaco			1,80
					 	
					+	
					†	+
					†	

					Daily Cost	1,80
	i				Previous Cost	
					Cost to Date	1,80

To: Bobbi Gollan, John Gastineau, Stu Johnson, Don Wells

Field	WELL	WORK	AFE No.	Report No	Date	Supervisor
Dixie Valley	28-33	Acid Stim	A1F3	2	November 5, 2001	G Davidson/S Johnson
Present Operation						
well producing						
1						
Yest'day(Nov 4, 2001)						
Time	Operation St	ummary				
	Move in and	rig up floor in pre	ep to pull han	g down		
	install 4" vic	piping - V101 sur	mp to 28-33 -	and set 6" centific	al pump	

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	ļ					
						77.000
						Summary
	-			Service	Hrs	Cost US\$
	•		Company 3	Supervision		
			Colorand 7	вс		
	ļ		ļ			
						<u> </u>
	ĺ				<u> </u>	
			L		Daily Cost	
					Previous Cost	1,800
					Cost to Date	

To: Bobbi Gollan, John Gastineau, Stu Johnson, Don Wells

Dixie Valley 28-33 Acid Stim A1F3 3 November 6, 2001							
Formation with the second seco	G Davidson/S Johnson						
Present Operation Presen							
move in and rig up Bragg crane - continue to pull tubing							
Yest'day(Nov 5, 2001)							
Time Operation Summary							
0100 perform productivity test - Shut in well							
0500 WHP 119 psi - blow down WHP tp 50 psi	Į.						
Start water at 6 bpm - kill well after 30 minutes - continue water at 1 bpm							
0700 move in and rig up Bill's power tongs - DV crane and related equipment							
start to pull 1.9" tubing - discover 2 external 1/4" cap tubing strings present and can							
not pull thru 3" hang down landing spool	Į.						
lower floor - tear out 10" flow "t" and lay down jt #1 pull 26 joints (of 136) jts tubing c/w 2 external cap tubes and 1 internal cap tube							
DV crane hydraulic failure - hydraulic over heat	į						
1900 set tubing in slips (well open) - shut down for night							
continue pumping water at 1 bpm to keep well dead o/n							
Note: Slight glaze of scale evident joints 1 - 27							
Total water pumped to 2400 hrs: ~1290 bbls	Ī						
Cummulative water pumped: ~1290 bbls							
	į.						
×9	ummary						
Service Hrs	Cost US\$						
Company Supervision							
Colorado TBC	<u> </u>						
Bills Power Tongs	 						
1.00.000	 						
	ļ						
Daily Cost	4 000						
Previous Cost	1,800						
Cost to Date							

To: Bobbi Gollan, John Gastineau, Stu Johnson, Don Wells

Field	WELL	WORK	AFE No.	Report No	Date	Supervisor	٦
Dixie Valley	28-33	Acid Stim	A1F3	4	November 7, 2001	G Davidson/S Johnson	
Present Operation							<u></u>
run 1.9" tubing							
Yest'day(Nov 6, 2001)	\neg						
Time	Operation Su	ummary					
							٦
-	continue pun	nping water - 1 bp	om				
0700		ing tubing with D		•			
0900	1	rig up Bragg cran	. ,				- [
				evident (approx.	2420 - 3860 ft.)		
		und clay & soot ir			400		
1500		g tuping (and 3 x ' - shut in well	1/4" cap stri	ings) - total joints	130		1
1900		rig up Halliburton	,				
		safety meeting					
		surface lines tp	2000 psi - Ol	‹			
	l ^a	•	•		r going into well thru - ou	it hang down pull)	- [
					nd 3gal/1000 hai85m	• • • • • • • • • • • • • • • • • • • •	ļ
	pump 50 bbls	s water - complete	e 900 bbl dis	placement with 6"	cent. Pump at sump		-[
2030	well on vacuu	um through out jo	ob - shut in w	reit			Ì
	rig out Hallib						- }
ļ	Note: all acid	Ī					
	Todal materia			. 2240 654-			
		numped to 2400 h water pumped:		~2248 bbls ~3538 bbls			
	Commonance	water pumpeu.		3330 0013			
	(10000
							-
					Cost	Summary	
			<u> </u>	Service	Hrs	Cost US\$	_
	İ		Company S	Supervision	<u> </u>		4
	ļ		0.1		 		4
	ĺ		Colorand 1		 	 	
			Bills Powe Halliburtor		+	84,65	57
	}		riambur tor	(Jaciu)		34,00	~
	į				 	 	ᅦ
	1		 		 	 	ㅓ
	}						7
	ţ						
					Daily Cost	84,65	57
1	Ţ				Previous Cost	1,80	20
						86,45	

To: Bobbi Gollan, John Gastineau, Stu Johnson, Don Wells

Field	WELL	WORK	AFE No.	Report No	Date	Supervisor]
Dixie Valley	28-33	Acid Stim	A1F3	5	November 8, 2001	G Davidson/S Johnson	
Present Operation	7						
run 1.9" tubing - lift well							7
, , , , , , , , , , , , , , , , , , , 	_						
Yest'day(Nov 7, 2001)	0 4 0			1			5716
Time	Operation Su	immary					
0700	install 10" flo	w "t" - start wate	r at 1 hom fr	om sump			
0.00		1.9" hang down					6000
1230				ow landing spool			
	shut in water						
1800		ig up Halliburton					
	1	well - rate 1000 :		4.00			100
		to 1200 scfm - we		t 110w nt - well would not	flow		
2200	1	? - total pumped 2		it - well would not	IIOW		188
		heat over night	240 000 007				
	shut in well	•					
	Ì						
							2000
							250
				400 561-			
		umped to 2400 hr water pumped:	'S:	~400 bbis ~4000 bbis			
	Cammalative	water pumpeu.		4000 0015			
	}						
	ĺ						
							200
	Ì						
			Γ		Cost S	Summary	
			 	Service	Hrs	Cost US\$	
			Company :	Supervision			
			Colorand 1				
	}		Bills Powe		<u> </u>	10,41	17
	ļ		Halliburtor		 		
			Bragg Crai	rre	 	3,60	<u>'''</u>
)				 	 	-
	}		 		 	 	-18
			ļ		1	1	
]						
	1				Daily Cost	14,01	- 13
					Previous Cost	86,45	
)				Cost to Date	100,47	74

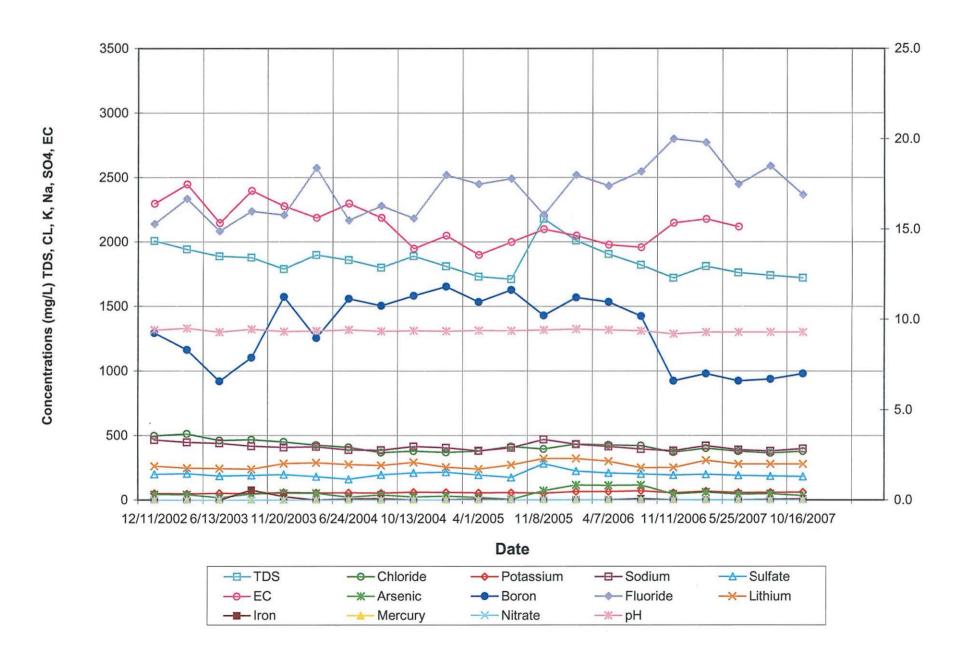
To: Bobbi Gollan, John Gastineau, Stu Johnson, Don Wells

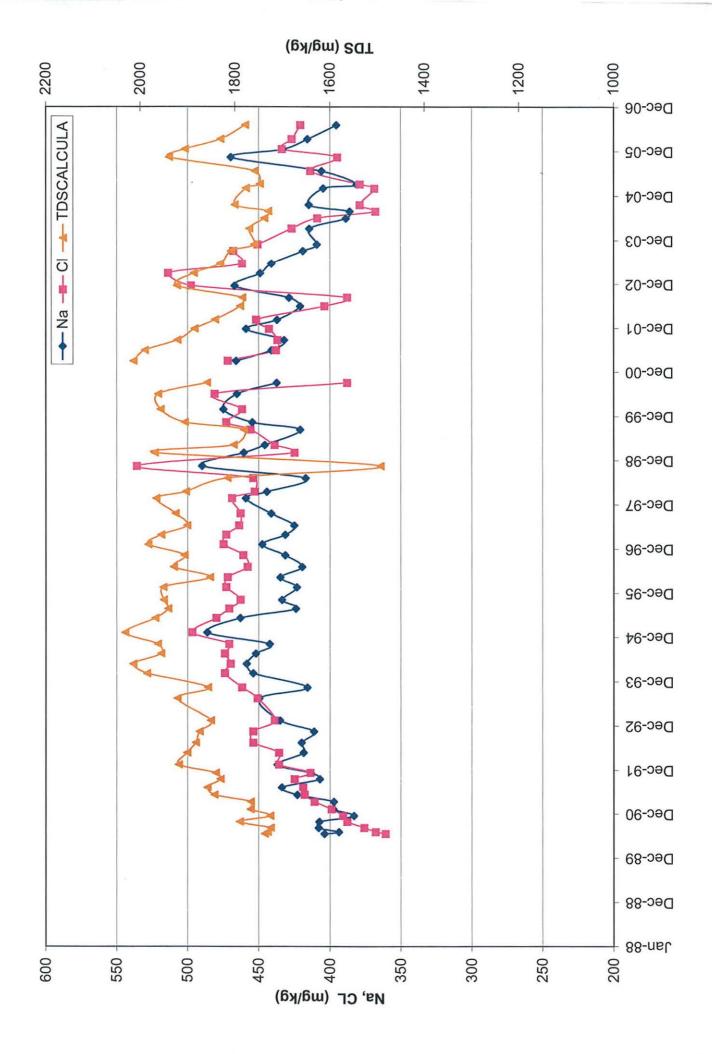
From: Greg Davidson

7

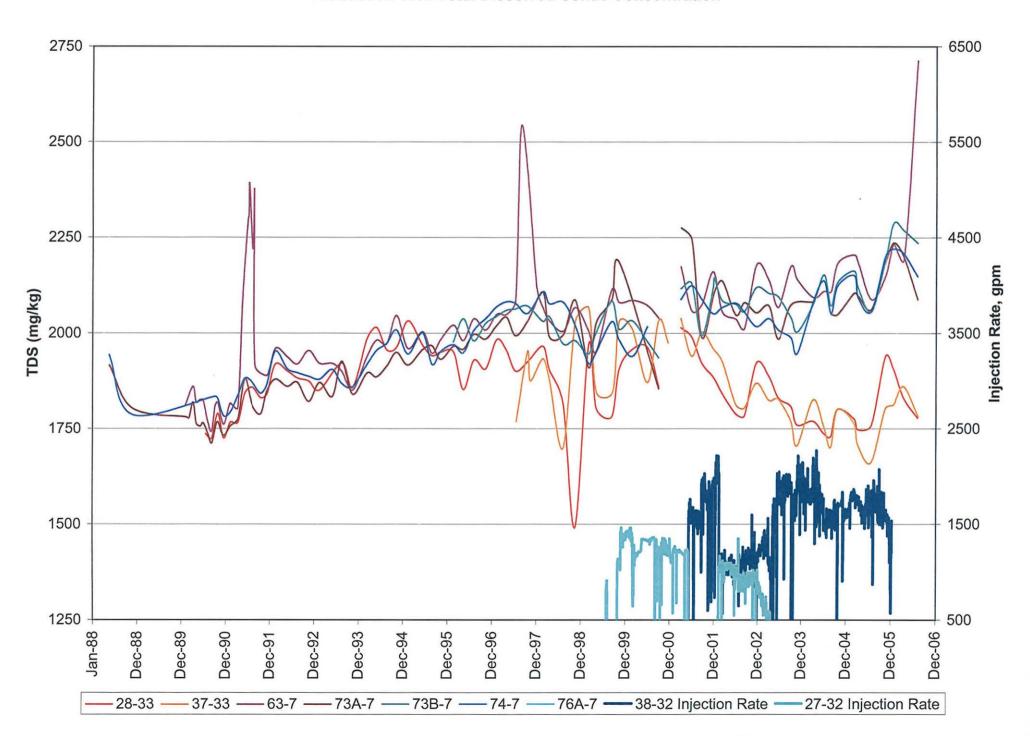
Field	WELL	WORK	AFE No.	Report No	Date	Supervisor
Dixie Valley	28-33	Acid Stim	A1F3	6	November 9, 2001	G Davidson/\$ Johnson
resent Operation						
well producing to plant						
'est'day(Nov 8, 2001)						
Time	Operation St	ummary				
**************************************		·····				
0800	I	100 scfm - Increa				
1110				ation grey foam th	nen to steam	
1155		2 - total used (tot				
****	(=	urton - leave wel	•			
1300	1		oing unit and i	run 4507' 1/4" cap	tuoing	
1500	start inhibitor		onnous dat-	wall appliance to	a warm wa	
1000	perioriii prod	ucuvity test * eri	oneous data -	well continues to	o warm up	
	tear out floor	water lines and	related equin	mant - ra inctall r	permanent wellhead platf	0rm
	clean up loca		reated equip	mem - re-motan p	remanent wenneau plati	01111
	arcan aproca					
	1	AFE Estmated	Cost:	114,008	3	
	[Supplement (pu		14,000		
		Total AFE Budg		128,008		
		Actual Field Es		131,395		
	-			,		
]					
		Final Report				
	ļ					
				····	Cost S	Summary
				Service	Hrs	Cost US\$
	1		Company S	upervision	<u> </u>	1,00
			Colorado T		pump	1,02
			Colorado T		labor	1,95
			Bills Power		 	
			Halliburton		T	
	1		Halliburton		 	25,44
			i rattibul ton	NZ		
			nambar ton	NZ	Vic Piping	
	}		Transparton	NZ	Vic Piping	
			nambarton	NZ	Vic Piping	
			Trainbarton	NZ	Vic Piping	
			Tamparton	NZ	Vic Piping	
			Tamburton	NZ		1,50
			i i ambut ton	N2	Vic Piping Daily Cost Previous Cost	30,92 1,00
			, iamput con	NZ	Daily Cost	30,92

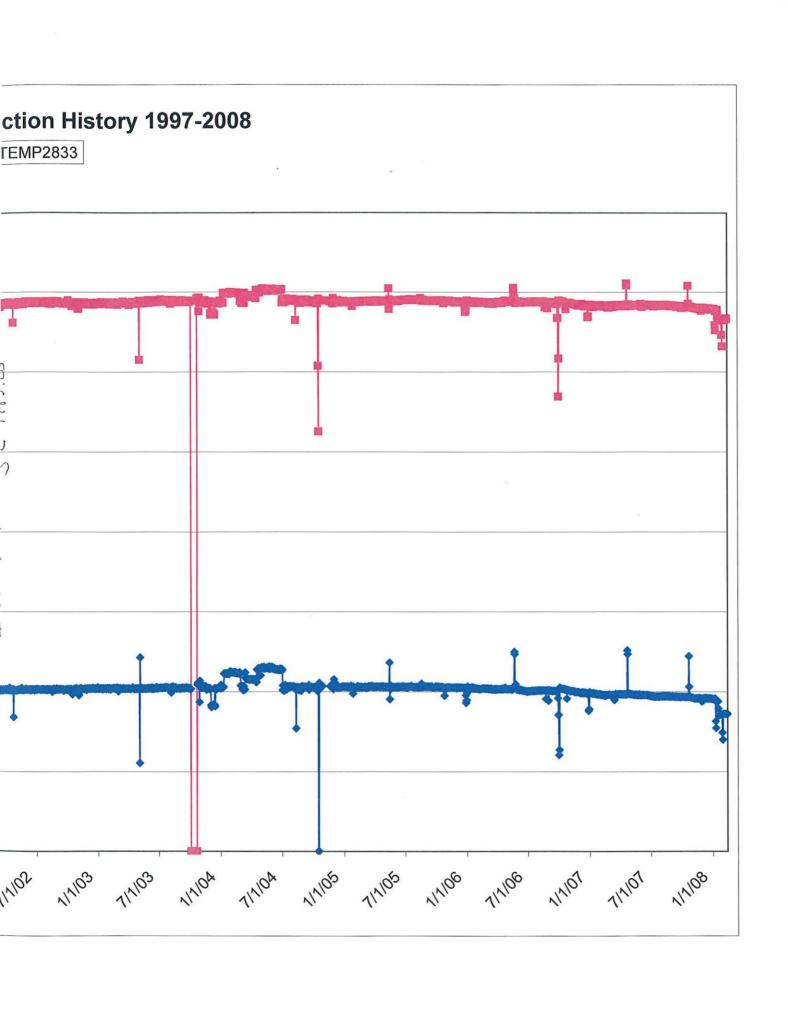
Caithness Dixie Valley, LLC Well 28-33 Water Analyses

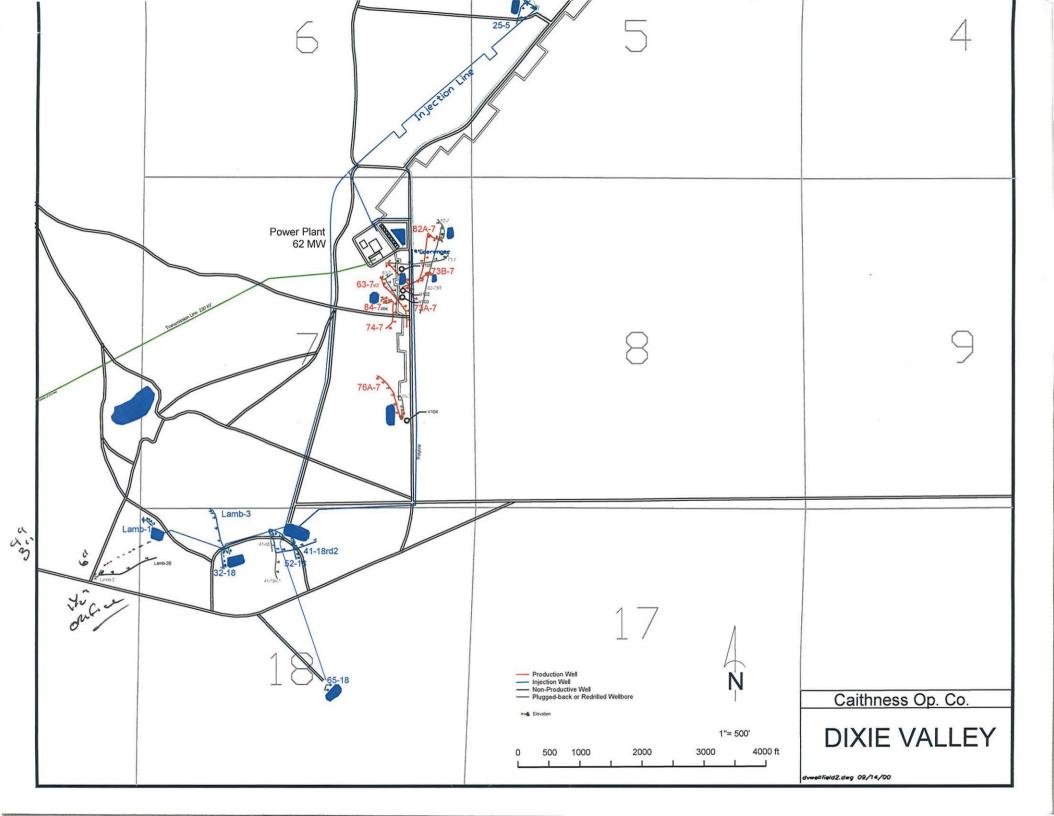




Dixie Valley
Production Well Total Dissolved Solids Concentration







mudded May 2, 1990 completed July 4 TD= 9507 28-33 n 472 lotton flowing temp 470.75 @ 4474 ft 11-02-96 472, 2F 1993 Workovor Scale 3/8" Much above 3120' clean below 3120' (no seale) between Flash pt 3600 to 108 108
3600 to 1145APT 10.
3600 Jt 3660.4-3674.7
Fluid entry 4790F @ 470.5220F
to 470.5730F ELASA PT 10-9-93 3660.4-3674.7 @ 470.522°F Spinner shows main fracture between 9133 and 9146 P @ 2618 psia @ 9330 m 1990 premie was 2759-2766 psiq drilled - complete 4-July -90 TD mea = 1000 9507 TD act = \$507 9482 prod 43% 9390-9420 Ptzro 9 450 9370 9350 9100-9120

9290 - 9315

10/9/01 from request for acid cleanout 28-33- strongest producer @ DIKI'e on line 7 years without scale cleanout longest of any well Use N 9354 inhibitor (not fully effective) production declues 200 Kph since 1997 Sleam prod. 1.2 MW 4/May 194 Flow rate 956 KpH Lin 108 0-5740 - alluvium?

5740 - 8650 - alluvium?

8650 - 8050 - allityte tuff + basat

9050 - 8500 allityte

9750 - 8500 allityte 8650 top of Jurassic Flash pt at Molection pt

out put large approxulel 11 MW on stand along home producting 18 KPH/psi

double other wells menned T 477°F

	Werken 4.	27-04	11-31-02	7-27-1	1 62 -13 0	1 01-24-00
	,	0,01	1-31-02 472 quat o	1	02-73-0	1 51-27 55
11	11111 -				11.15	11.50
Ng	414.5		459	441.0	6 448.3	454
K	56,26		.62,45	64,9	6 58.7	74.9
Ca	5,32		7,21	7.13	6.47	8.8
Mg				-		
Fe	-		. 055	-		.1
AI	_		_	_		
5102	538		548	644.8	587	342
B	8.97		10	10,88	9.86	11.68
4	2,07		1.98	1,59	2.11	2.58
Total Alkalin	na					
14103	156,90		167	188	199	153
603	39.20		21,5	31,2	23,9	28
cl	427,00	4	143	438	463	473
F	18,4		16	16.9	15.8	15.2
504	182	2	234	242	238	221
1						

MONTH CALL				101
			10-07-	Flowh % 16.09 %
	10-2-98	1\$-5-09	19	12-12-95
Ng	417.1	441.276	419.60	433,687
K	63.89	*	71,727	70.865
Cg	8.54	8.17	8,358	9.19
Mc	Ċ	~		
FE	.02	.029	1.48	1.55
Sio	53315	609.05	622857	628,565
3	10.65	10,202	10.523	10.456
41	1.75			
			*	
Tobel Al en				
1403	140	148	126	132.
COZ	3/	30,3	43	35.
ci	454	463	458	463
1=	15	16.44	15	16.45
SOG	211	200	214	214
1			/	

28-33 pulled tubing 11/2001 pulled tubing 2 Shutins of al hear 01poss flushed with cold water during shutin's - poessible source of My around 2000, all three theels 28,-33, 27-33, \$7-33 were flowed, increased premie in 28-33