XI

Chemical Analysis of Fresh Water

Analytical Laboratory Report for:

ChevronTexaco

BJ Unichem Chemical Services

UNICHEM Representative: Offutt, John

Production Water Analysis

Listed below please find water analysis report from: Central Vacuum Unit, Water Supply Well 1

Lab Test No:	2003135449	Sample Date:	08/22/2003
Specific Gravity:	1.002		
TDS:	644		
pH:	6.76		

Cations:	mg/L	as:
Calcium	24.06	(Ca^{++})
Magnesium	12.07	(Mg^{++})
Sodium	119	(Na^{+})
Iron	0.00	(Fe^{++})
Barium	0.11	(Ba^{++})
Strontium	0.72	(Sr^{++})
Manganese	0.00	(Mn^{++})
Anions:	**mg/L**	**as:**
Bicarbonate	220	(HCO_3^{-})
Sulfate	50	($SO_4^{=}$)
Chloride	218	(Cl^{-})
Gases:		
Carbon Dioxide		(CO_2)
Hydrogen Sulfide		(H_2S)

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DownHole SAT™ Scale Prediction @ 100 deg. F

Mineral Scale	Saturation Index	Momentary Excess (lbs/1000 bbls)
Calcite (CaCO3)	.108	-.464
Aragonite (CaCO3)	.0917	-.555
Witherite (BaCO3)	< 0.001	-5.5
Strontianite (SrCO3)	.00846	-1.82
Magnesite (MgCO3)	.0513	-.844
Anhydrite (CaSO4)	.00587	-288.16
Gypsum (CaSO4*2H2O)	.00721	-291.65
Barite (BaSO4)	.596	-.044
Celestite (SrSO4)	.0038	-50.96
Silica (SiO2)	0	-57.08
Brucite (Mg(OH)2)	< 0.001	-1.58
Magnesium silicate	0	-78.7
Siderite (FeCO3)	0	-.0444
Halite (NaCl)	< 0.001	-145532
Thenardite (Na2SO4)	< 0.001	-33592
Iron sulfide (FeS)	0	-.185

Interpretation of DHSat Results:

The Saturation Index is calculated for each mineral species independently and is a measure of the degree of supersaturation (driving force for precipitation) under the conditions modeled. This value ranges from 0 to infinity with 1.0 representing a condition of equilibrium where scale will neither dissolve nor precipitate. Values less than 1.0 are undersaturated and values greater than 1.0 are supersaturated. The scale is logarithmic, i.e. a Saturation Index of 3 is 10 times more saturated than a value of 2.

The Momentary excess is a measure of how much scale would have to precipitate to bring the system back to a non-scaling condition. This value ranges from negative (dissolving) infinity to positive (precipitating) infinity. The Momentary Excess represents the amount of scale possible while the Saturation Level represents the probability that scale will form.