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Production characteristics of wells on the Reykjanes Penisula

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PRODUCTION CHARACTERISTICS OF WELLS ON THE REYKJANES PENINSULA.

Output

The maximum output from the wells is very high and the wells will produce up to 180 kg/s of brine-steam mixture when fully open. A flow of not more than 100-125 kg/s is advisable in the long run to minimize damage to wellhead due to erosion. The inflow temperature and enthalpy of flow varies between areas on the peninsula.

The following table lists output of typical wells from the three geothermal areas explored so far.

TYPICAL OUTPUT FROM WELLS.

Area	Well no.	Deep-temp. (°C)	WH-press. (barg)	Total flow (kg/s)	En-thalpy (kJ/kg)	Steam 9 barg (kg/s)	Steam 0 barg (kg/s)	Brine 0 barg (kg/s)
Svartsengi	9	241	17	100	1040	14	13	73
Eldvörp	2	262	22	100	1340	29	11	60
Reykjanes	9	296	28	125	1320	35	14	76

Chemical composition

Deep-brine

The salinity of the inflowing fluid varies from 2/3 of the salinity of the sea in Svartsengi and Eldvörp to almost the sea salinity in the Reykjanes wells. The following table lists the major constituents of the deep brine.

TYPICAL COMPOSITION OF DEEP-BRINE.

	Svartsengi Well no. 9	Eldvörp Well no. 2	Reykjaanes Well no. 9
Temperature (°C)	241	262	296
Enthalpy (kJ/kg)	1040	1340	1320
SiO2 (mg/kg)	405	460	570
Na (mg/kg)	6550	6500	9100
K (mg/kg)	980	1130	1380
Ca (mg/kg)	1050	890	1480
Mg (mg/kg)	0.96	0.49	0.86
SO4 (mg/kg)	33	26	18
Cl (mg/kg)	12700	12700	17600
F (mg/kg)	0.11	0.13	0.15
Diss.sol (mg/kg)	21500	22100	30200
CO2 (mg/kg)	530	780	1830
H2S (mg/kg)	6.4	10	57
H2 (mg/kg)	0.01	0.11	0.18
CH4 (mg/kg)	0.06	0.06	0.09
N2 (mg/kg)	0.3	9.7	7.0

Steam

When the brine flashes in the well and in the separator at well-head the gases are stripped almost completely from the brine into the steam fraction. The concentration of gases in the steam will depend on the separation pressure as shown in the following table.

TYPICAL CONCENTRATION OF GASES IN STEAM (%)

Area	Well no.	Separating pressure 9 barg	6 barg	0 barg
Svartsengi	9	0.39	0.32	0.20
Eldvörp	2	0.98	0.91	0.71
Reykjanes	9	0.68	0.63	0.47

Fluctuations in gas concentrations have been observed and the above

values are only indicative. The separated steam will contain carry-over of salts dissolved in the brine, depending on the efficiency of the separating apparatus.

Some silica will dissolve in the steam irregardless of separating effiency and approximately 0.09 mg/kg of SiO_2 will dissolve in steam from Reykjanes well 9 at a separating pressure of 9 barg.

Condensate

When the steam is condensed, the noncondensable gases will separate from the dondensate. Small fraction of the acid gases CO_2 and H_2S will dissolve in the condensate and acidify it. The following table lists chemical composition of condensate and non-condensable gases.

TYPICAL COMPOSITION OF CONDENSED STEAM

		Svartsengi Well no. 9	Eldvörp Well no. 2	Reykjanes Well no. 9
Separating pressure (barg)		17.7	13	26.5
Condensing temp. (°C)		21	9	27
Cas/cond.-ratio (l/kg)		3.1	5.9	3.7
Condens:	pH	4.4	4.4	4.3
	CO_2 (mg/kg)	1430	1970	1240
	H_2S (mg/kg)	43	48	72
Gas:	CO_2 (%)	98.2	97.3	96.4
	H_2S (%)	1.04	1.1	2.5
	H_2 (%)	0.04	0.5	0.1
	CH_4 (%)	0.04	-	0.02
	N_2 (%)	0.55	1.1	1.0