PUBLIC POWER CORPORATION

ATHENS, GREECE

PRELIMINARY RESULTS OBTAINED DURING FIRST DAYS OF NIS-2 PRODUCTION TEST, MARCH 1985

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NATIONAL ENERGY AUTHORITY

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INTRODUCTION

The well was opened onto both measuring and cleaning lines on March 17. All flow was transferred to the measuring line on March 18. Unfortunate direction of the 3" lip employed for the first days of the test caused a great deal of the water fraction to be lost out through the silencer. On March 24 a change to a 4" lip was performed and good care taken that its direction was such that water and steam would be delivered to both silencer branches.

The first sample for chemical analysis was drawn from the high pressure line on March 19. Samples No. 1,2,3 & 5 are from this sampling point whereas sample No. 4 is from the measuring line and sample No. 6 is a brine sample from the silencer outlet.
The following memos in table form are included in this report and form the basis for the following discussion:
RESULTS OF OUTPUT MEASUREMENTS DURING FIRST DAYS OF NIS-2 PRODUCTION TEST, MARCH 1985.
FIELD CHEMICAL DATA FROM NIS-2 PRODUCTION TRST MARCH-JUNE 1985.
PROPERTIES DERIVED FROM SILICA CONCENTRATIONS OF BRINE SAMPLES FROM WELL NIS-2 DURING PRODUCTION TEST MARCH 1985.

OUTPUT

As indicated in the introduction meaningful results for enthalpy and flow were not obtained until after March 24. The first measurement only represents the part of the flow coming through the cleaning line, and the next two overestimate enthalpy and underestimate total flow, but give an approximate idea about the steam flow. The two reasonably reliable points obtained for a back pressure curve suggest an enthalpy of approximately 1600 kJ/kg and a total flow of about 45 t/h (12.5 kg/s) which suggests close to 25 t/h (7 kg/s) of steam independent of pressure, i.e. the back pressure curve is relatively "flat".

GAS CONCENTRATION

The concentration of gas on mass basis is 4-5% in the steam produced. This is quite high and indicates that special measures will have to be taken to eject gas if the well is exploited.

SILICA CHEMISTRY

All samples except sample No 3 suggest a silica concentration in the brine of the order of 600 mg/kg, indicating an inflow temperature of 260-270 C, and after comparison with measured well head enthalpy that there is a substantial steam fraction (approximately 0.3) in the deep fluid.

The pressures at which silica saturation occurs are thus 6-8 bar suggesting that well head pressures of about 10 bar ought not to cause amorphous silica deposition. It is, however clear from the results of the silencer outlet sample (No.6) that deposition is very rapid once it has started.

The silica concentration of sample No.3 will have to be redetermined independently after digestion with sodium hydroxide, since such a high silica concentration would have severe consequences if it were true and would lead to the result that well head pressure be kept at 20 bar to prevent deposition.

SCALING RATE

The fast deposition suggested by the silencer outlet sample, coupled with the fact that scaling (0.2-0.3 mm) was observed in the 3" lip pipe which was used for one week only, indicate that silica deposition will become a production problem especially as regards brine disposal. Therefore it seems imperative that the properties of the brine be studied thoroughly with respect to deposition conditions by the insertion of coupons, a "brine comb" and by bench scale studies before decisions are made regarding brine treatment.

ABBREVIATIONS USED IN TABLES

WHP: Well head pressure
L.di.: Lip diameter
W.F.: Water flow
T.F.: Total flow
ENTH: Enthalpy
Sa., sple: Sample
Wh : Water height
Xd: Steam fraction of inflow
CONDUCT.Y: Conductivity
G/COND : Gas/Condensate ratio
PASS : Pressure of amorphous silica saturation
TASS: Temperature of amorphous silica saturation
CASS: Silica concentration at amorphous silica saturation conditions

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RESULTS OF OUTPUT MEASUREMENTS
DURING FIRST DAYS OF NIS-2
PRODUCTION TEST, MARCH 1985

DATE	TIME	WHP bar g	Pc bar g	L.di. mm	W.F. kg/s	T.F. kg/s	ENTH. kJ/kg
`1985.03.17	1830`	31.00	2.50	75.0	3.77	7.95	1605
`1985.03.19	1345`	23.70	4.80	75.0	2.46	9.60	2098
`1985.03.21`	1100	21.00	4.40	75.0	2.99	9.59	1972
`1985.03.24	1600`	18.50	2.30	97.6	6.26	12.92	1583
`1985.03.25	1200`	16.90	2.20	97.6	5.84	12.33	1607
`1985.03.26`	1200	16.50	2.30	97.6	6.69	13.31	1541
`1985.03.27`	0900	12.50	2.70	97.6	6.40	13.89	1637
`1985.03.27	1200`	10.80	3.25	97.6	5.98	14.68	1756
`1985.03.27	1700`	10.20	3.20	97.6	6.12	14.70	1736

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FIELD CHEMICAL DATA FROM
NIS-2 PRODUCTION TEST
MARCH-JUNE 1985

Sa. No.	Date	Ps bar	Pc bar	BRINE PHASE Wh mm	pH/C	CO2 ppm	H2S ppm	SiO2 ppm	NH3 ppm
001	85.03.19	24.5	4.8	39	4.02/17.4	942	2.4	635	
002	85.03.21	22.0	4.4	40	4.32/17.5	740	2.9	618	
003	85.03.23	19.0	4.1	40		776	3.1	978	
004	85.03.25	8.8	2.2	63	5.29/18.5	487	1.0	622	29.0
005	85.03.25	18.0	2.2	63	4.47/18.6	637	1.2	580	
006	85.03.25	0.0	2.2	63	4.48/18.0	470	1.0	523	28.5

	CONDENSATE				TOTAL VAPOUR			
pH/C	CO2 ppm	H2S ppm	NH3 ppm	CONDUCT.Y mS/C	CO2 ppm	H2S ppm	GAS %	G/COND l/kg/C
4.58/17.7	1563	90.8		0.09/12.8	48458	899	4.9	26.9/12.8
4.58/17.7	1526	55.7		0.11/21.3	45877	1073	4.7	
4.71/17.2	1469	68.5		0.13/17.0	36025	451	3.6	29.0/17.0
4.59/17.6	1320	34.3	13.7	0.24/24.6	28195	334	2.8	17.2/24.6
4.48/16.7	1561	42.8	13.7	0.48/22.0	40752	647	4.1	12.1/22.0

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PROPERTIES DERIVED FROM
SILICA CONCENTRATIONS OF
BRINE SAMPLES FROM WELL
NIS-2 DURING PRODUCTION
TEST MARCH 1985

Sple No	Date	TSiO2 C	HSiO2 kJ/kg	Xd	PASS barg	TASS C	CASS mg/kg
001	85.03.19	271	1190	0.276	8.0	175	721
002	85.03.21	267	1163	0.285	7.3	171	699
003	85.03.23	314	1425	0.157	19.6	213	976
004	85.03.25	257	1120	0.290	5.6	162	649
005	85.03.25	258	1124	0.288	5.8	163	653
006	85.03.23	226	971	0.346	1.8	130	483