

UPDATE ON WELLTESTING AND RESERVOIR ENGINEERING STUDIES AT TENDAHO GEOTHERMAL FIELD, ETHIOPIA

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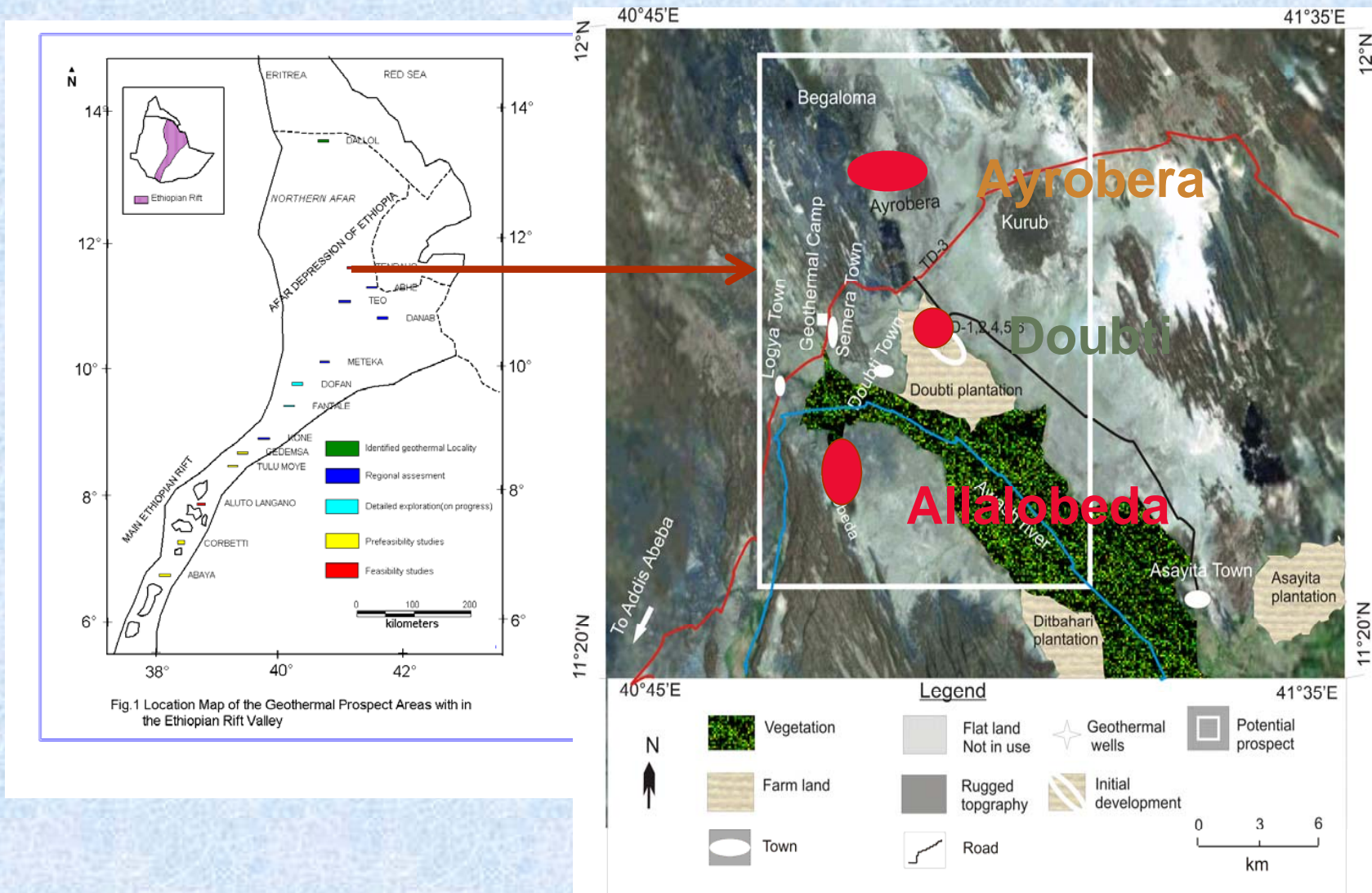
ARGeoC2
November 24- 28, 2008
Entebbe- Uganda



OUTLINE

- **TENDAHO GEOTHERMAL FIELD**
- **HISTORY OF TENDAHO GEOTHERMAL EXPLORATION**
- **SALIENT WELL DATA**
- **WELL TESTING & MEASUREMENTS**
- **PROBLEMS ENCOUNTERED DURING WELL TESTING**
- **SUMMARY & RECOMMENDATIONS**

TENDAHO GEOTHERMAL FIELD



TENDAHO GEOTHERMAL FIELD EXPLORATION HISTORY


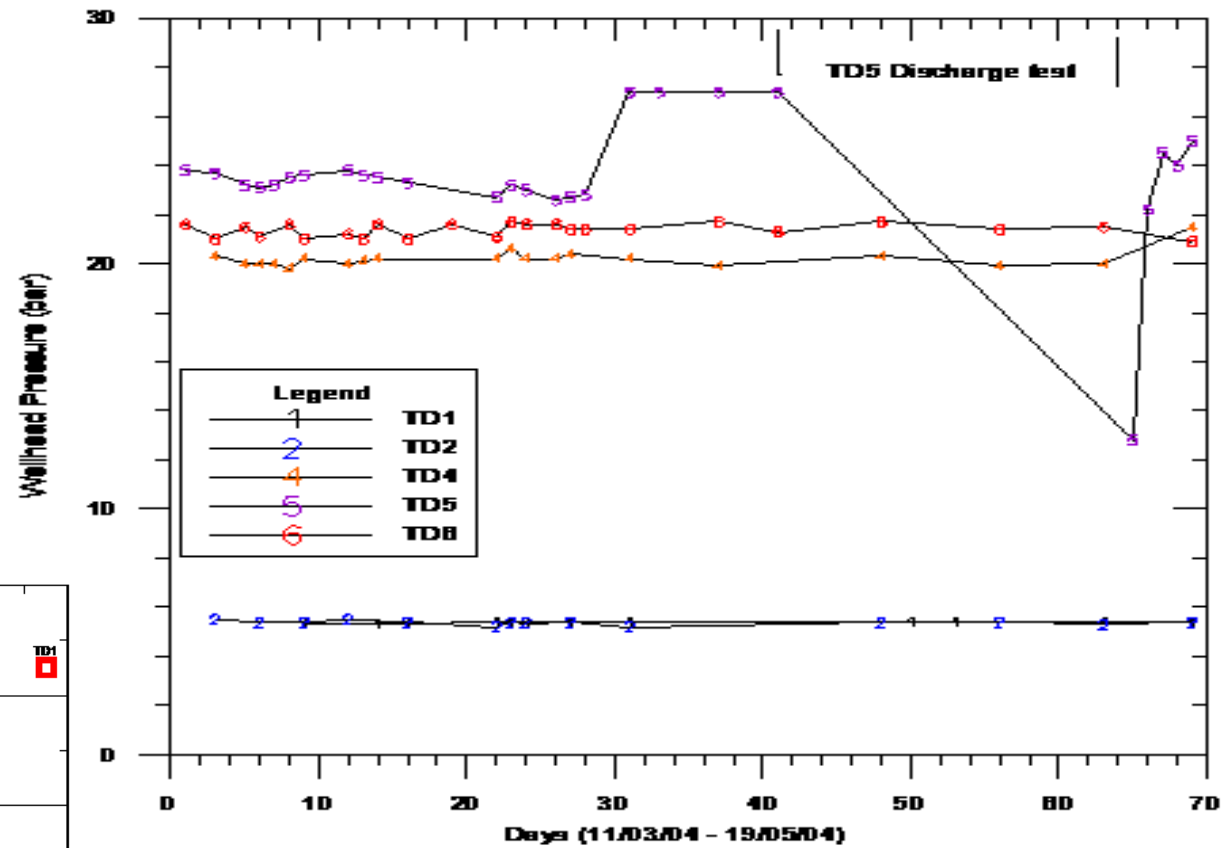
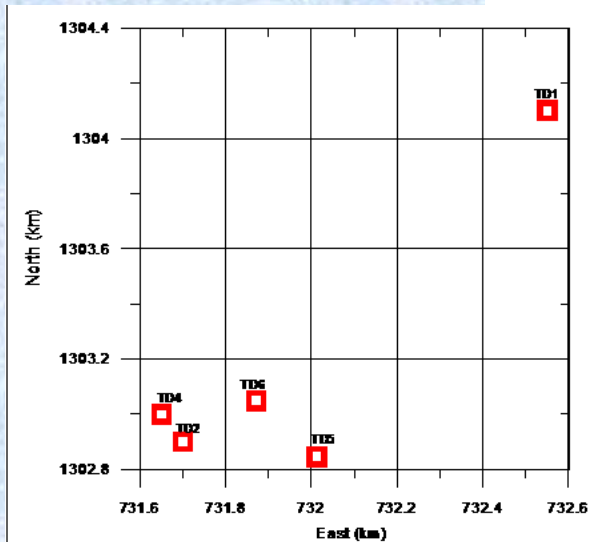
- ◆ **RECONAASSANCE SURVEY (1969/70)**
 - ◆ **PRE-FEASIBILITY STUDY (1979/1980)**
 - ◆ **TECHNO ECONOMIC STUDY (1982)**
 - ◆ **DRILLING OF 3 DEEP & A SHALLOW WELLS (1993-1995)**
 - ◆ **2 SHALLOW WELLS DRILLING (1997-1998)**
 - ◆ **WELL TESTING, GEOSCIENTIFIC & FEASIBILITY STUDIES (1998- 2007)**
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TABLE 1. SALIENT DATA ON THE EXPLORATORY WELLS DRILLED AT TENDAHO

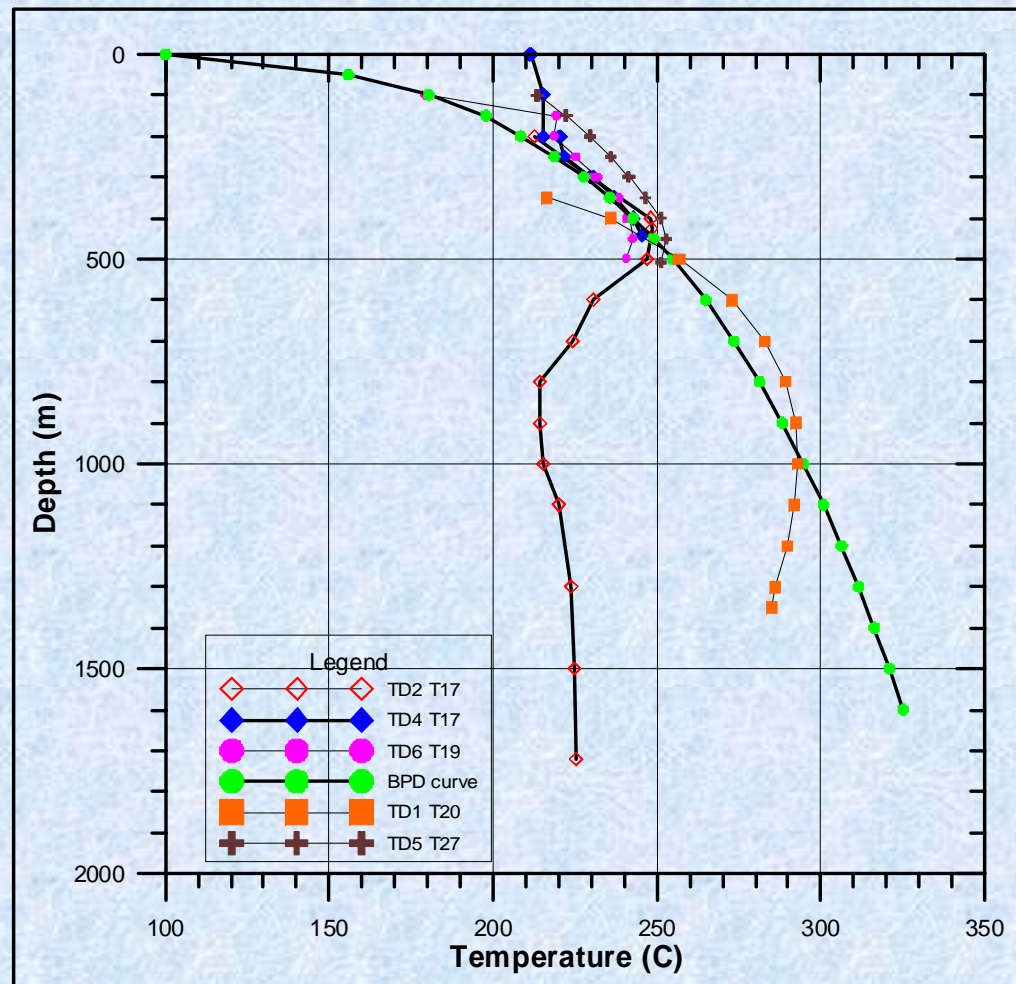
Well No.	TD1	TD2	TD3	TD4	TD5	TD6
Drilling period	20/10/93 - 27/02/94	13/03/94 - 10/05/94	07/09/94 - 19/10/94	27/04/95 - 09/05/95	20/12/97 - 14/01/98	01/02/98 - 20/02/98
Drilled depth (m)	2196	1811	1989	466	516	505
Elevation (m.a.s.l)	365.9	365.7	366.8	365.2	366.3	366
Permeable zones	400-600* 1200-1300	220-500* 1200-1300	50-200*	220-466	220-516	220-505
Maximum Down-hole Temp. (°C)	278	245	198	245	253	245
Total mass flow (kg/s)	-	15 @3.4b	-	70 @12b	48.5 @ 9.4b	38 @5b
Status of the well	Non-productive	Productive	Non-productive	Productive	Productive	Productive
Note: * Cased						

WELLHEAD PRESSRE (STATIC)

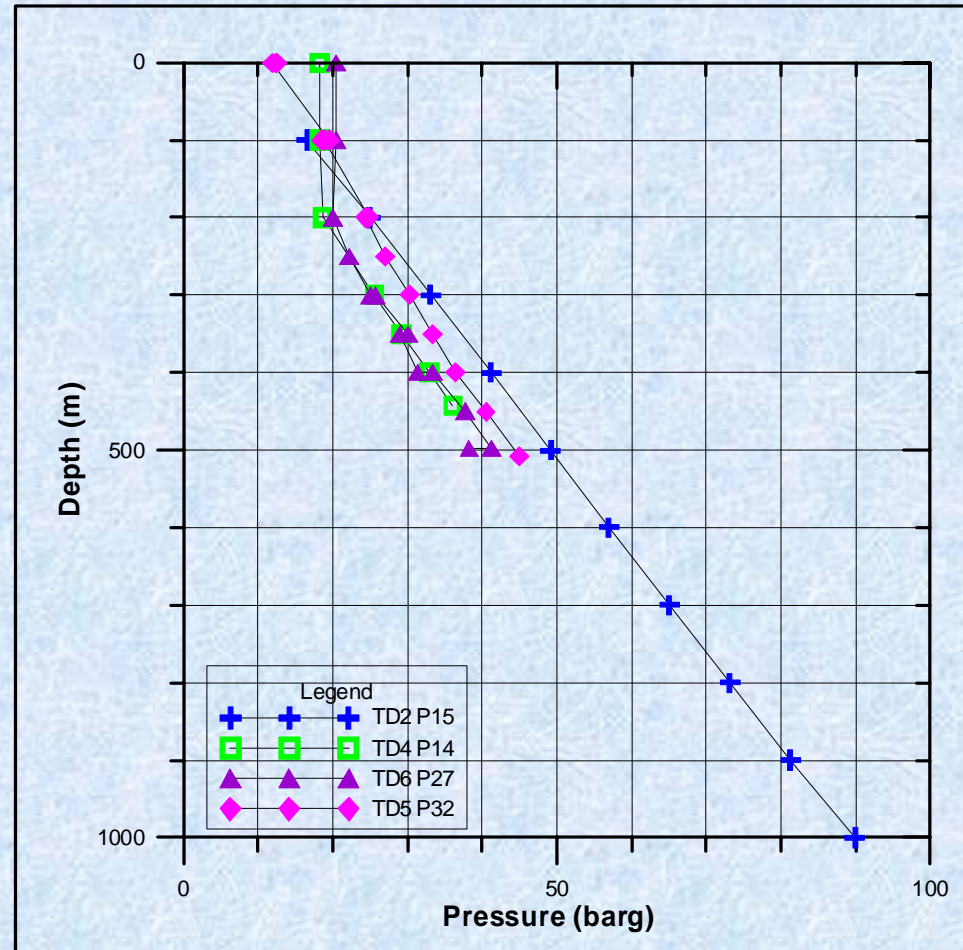
LOCATION OF TENDAHO GEOTHERMAL WELLS



Temperature Profiles of Tendaho Geothermal wells (Static 2007)



Downhole Pressure Profiles of Tendaho Geothermal Wells (static 2007)



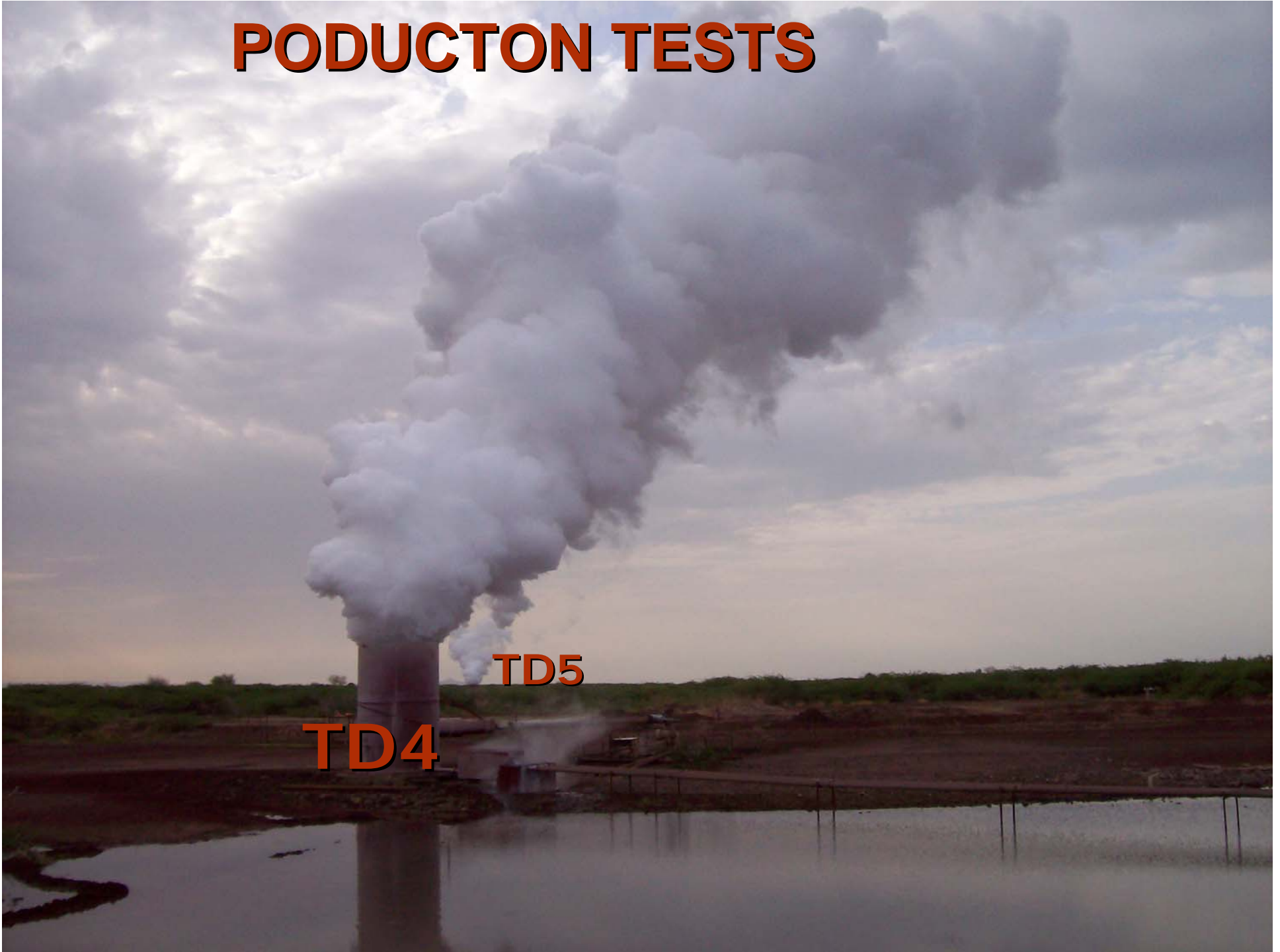
GO-DEVIL RUN



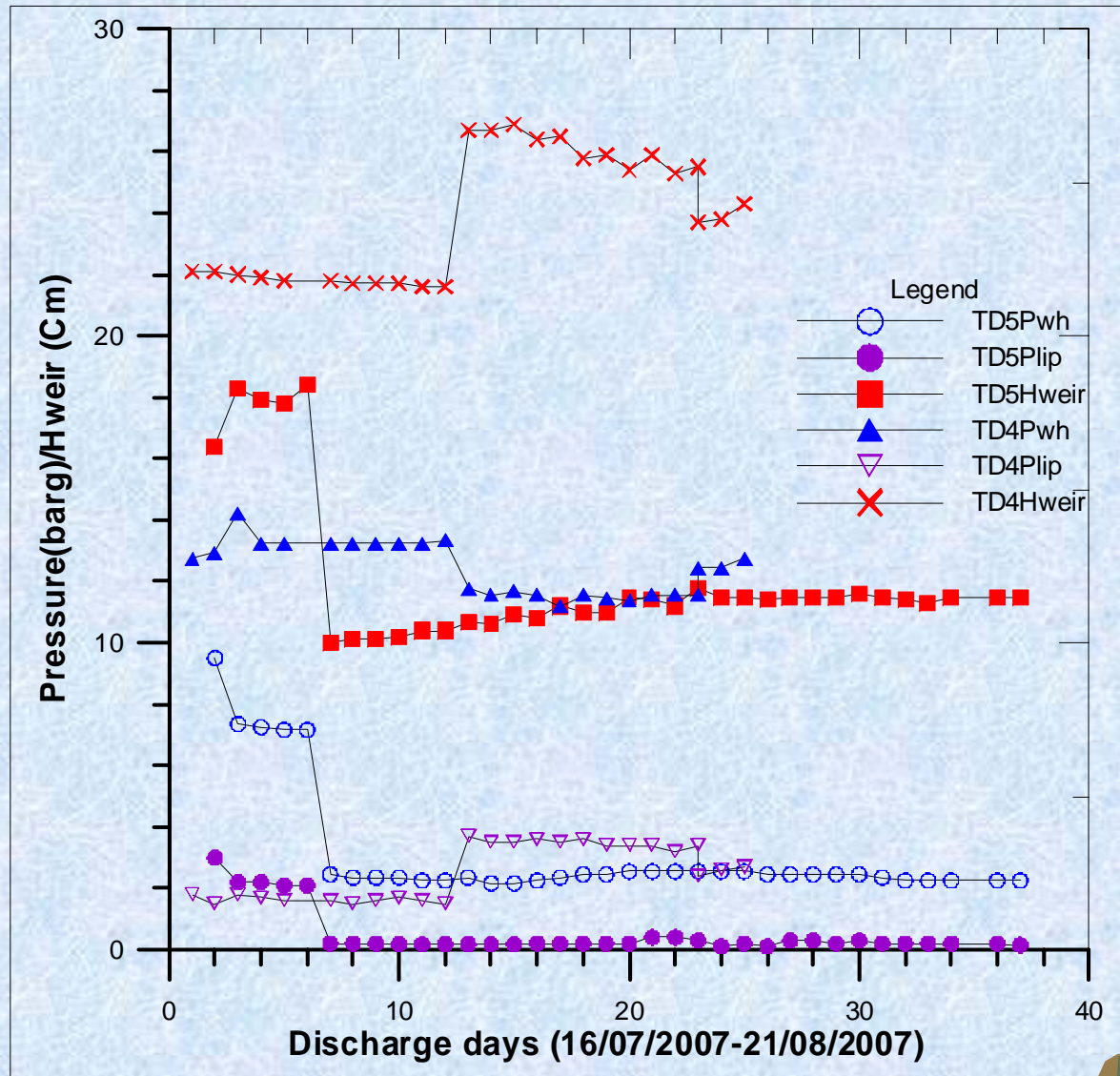
PODUCTON TESTS

TD4

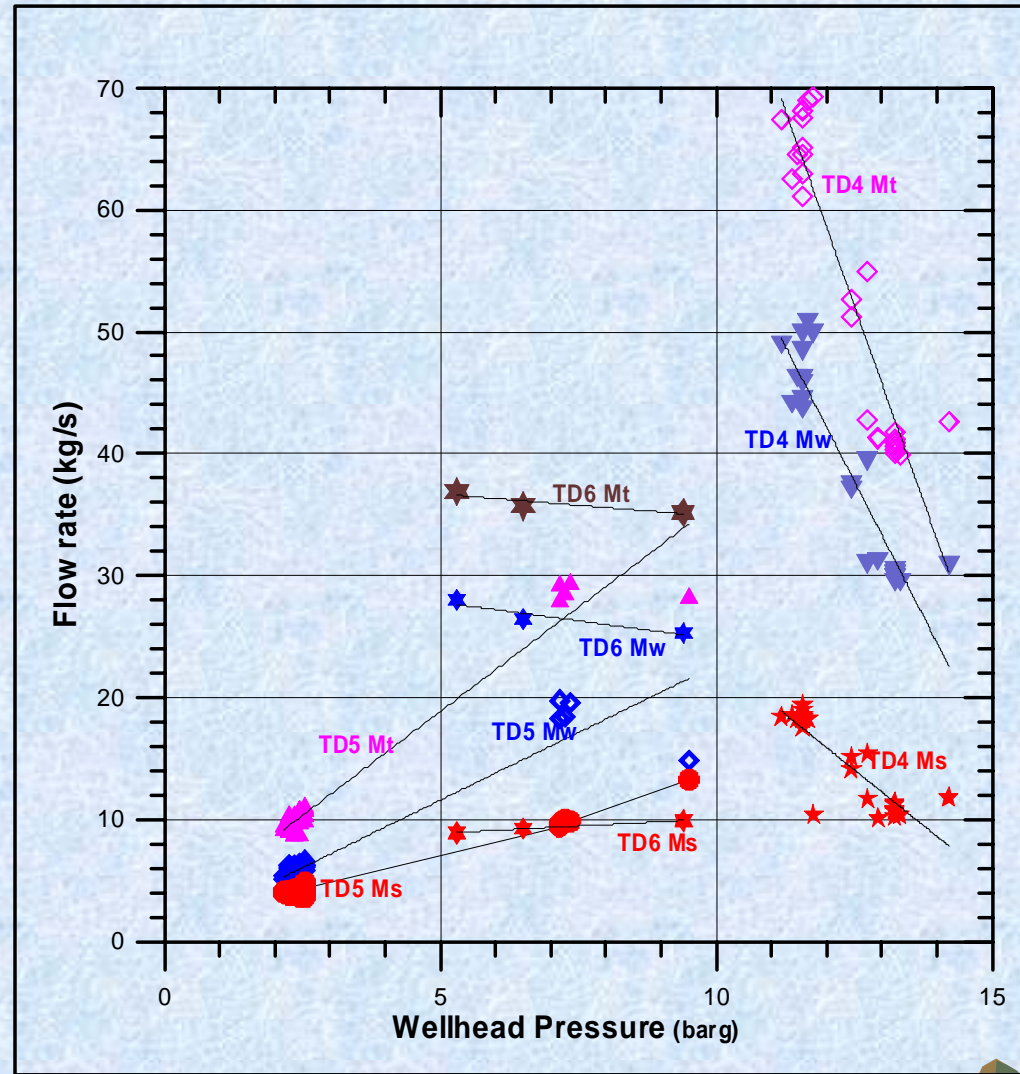
TD5



Flow Tests Wells TD4 & TD5 (Field Measurements 2007)



Shallow Wells Flow Tests (calculated results)

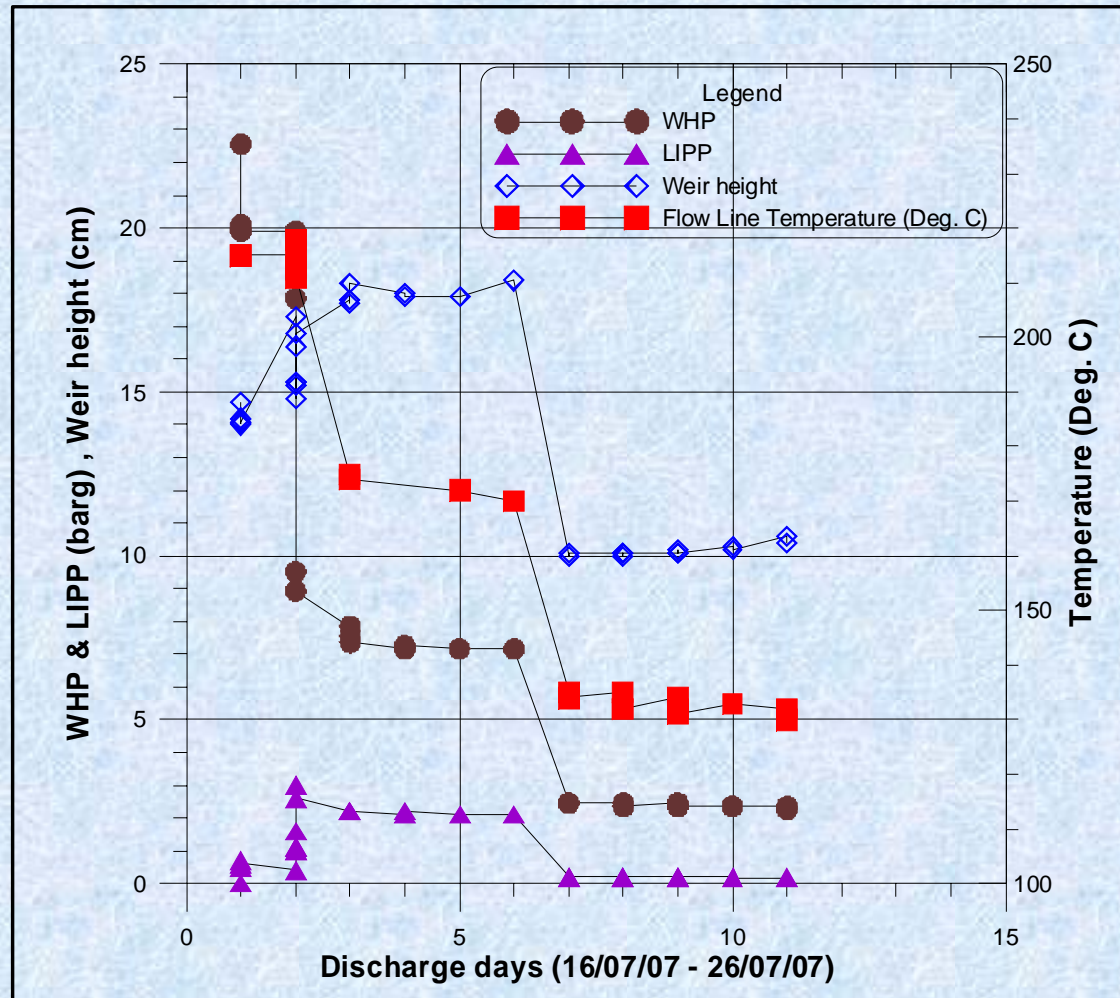


Problems Encountered During Well Testing

- ◆ Production decline at well TD5
- ◆ Steam leakage at TD4 wellhead

Production Decline Well TD5

(Field measurement 2007)







25/08/20

SUMMARY & RECOMMENDATIONS

- ◆ Existence of shallow geothermal reservoir confirmed
- ◆ Reservoir temperature 220-250°C, BPD curve
- ◆ Relatively high permeability, Geo-fluid low salinity & non-condensable gas
- Evaluate & determine condition of well TD5
- Investigate distribution & magnitude of hydrothermal activities around the shallow wells
- Locate deep reservoir & drill exploratory wells

THE END

THANK YOU

