



**GUIDELINES TO ASSESSING THE  
SUSTAINABILITY: THE AHUACHAPAN  
GEOHERMAL FIELD CASE,  
preliminary results.**

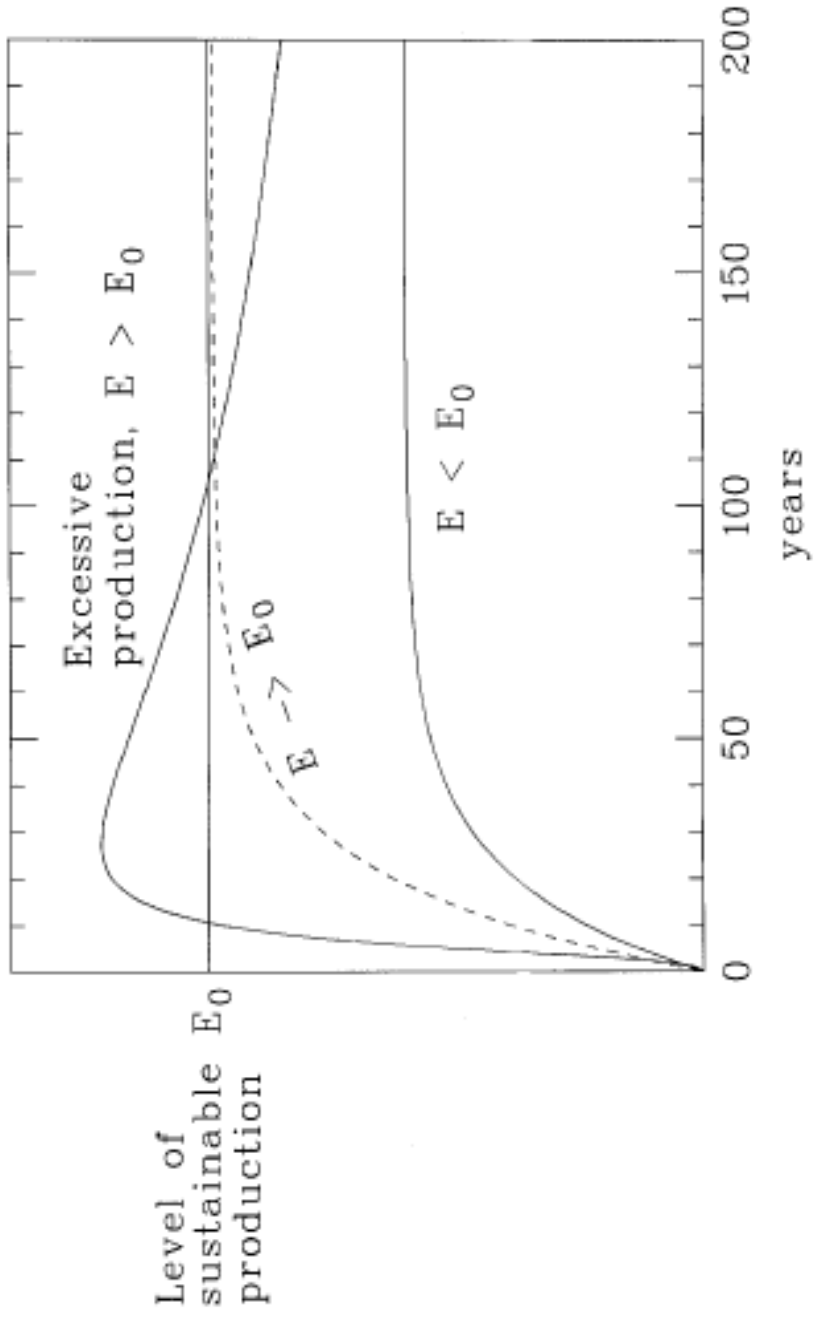
**Manuel Monterrosa**

Sustainability modeling workshop, Taupo November 10th, 2008

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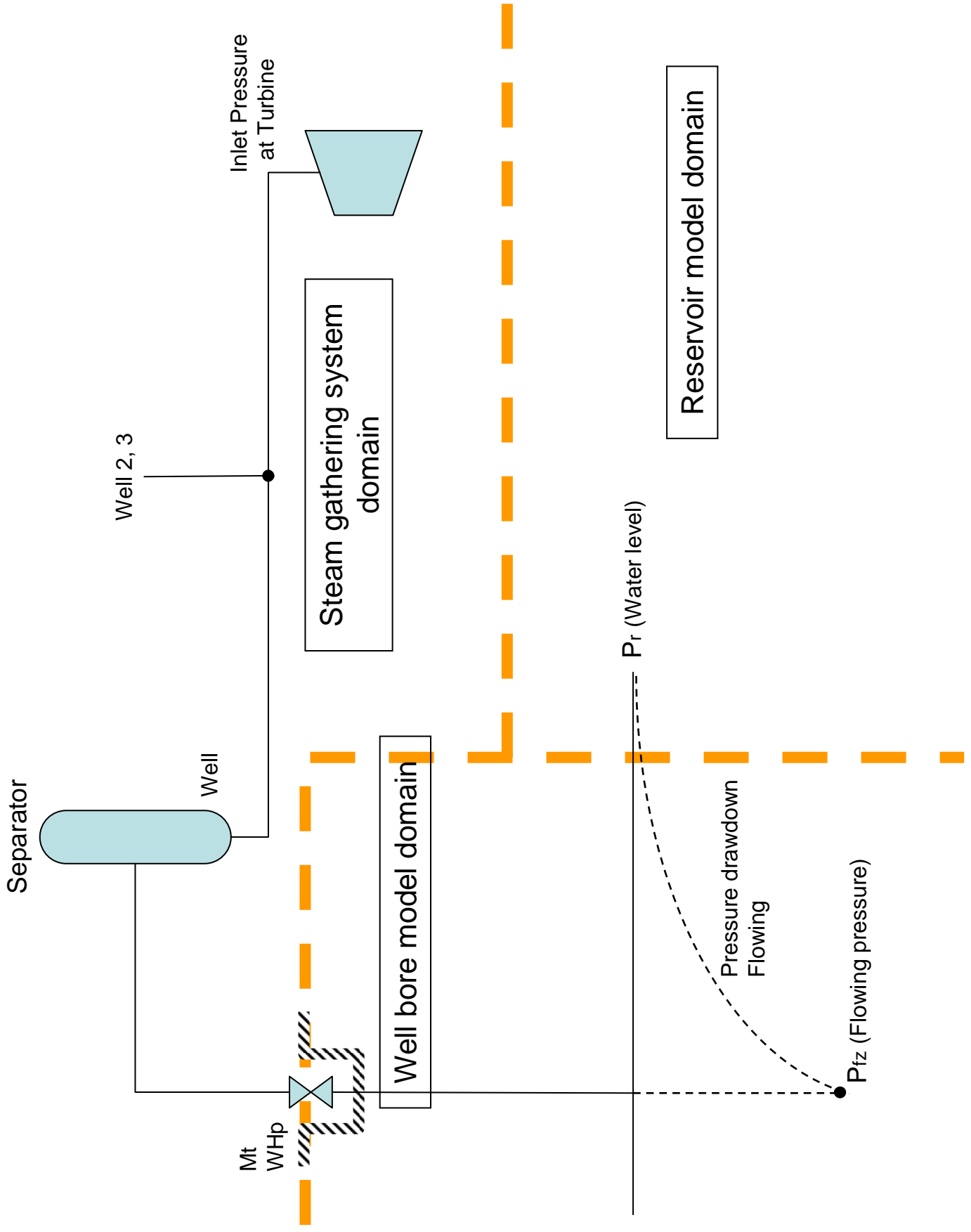
- Scope of the study
- Previous works
- Methodology description
- Preliminary results of the Ahuachapan Field
- Conclusion

# Previous related works



# Main issues for the sustainability assessment

- To establish policies of sustainability for LaGeo.
- To define a methodology to assess the sustainability for geothermal field under commercial exploitation.
- To implant an improved field management considering the sustainability policies
- To define upcoming works in order to guarantee the long term operation of the power plant.



Separator

Well 2, 3

Well

Mt  
WHp

Inlet Pressure  
at Turbine

Steam gathering system  
domain

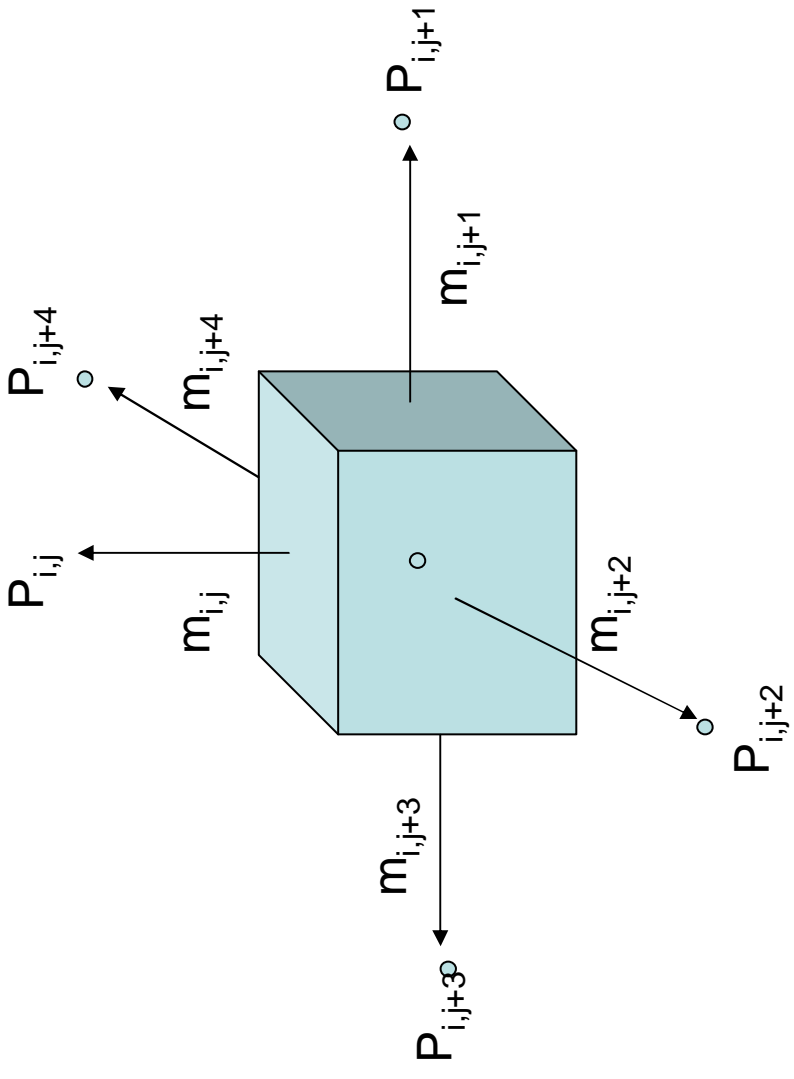
Well bore model domain

P<sub>r</sub> (Water level)

Reservoir model domain

Pressure drawdown  
Flowing

P<sub>fz</sub> (Flowing pressure)



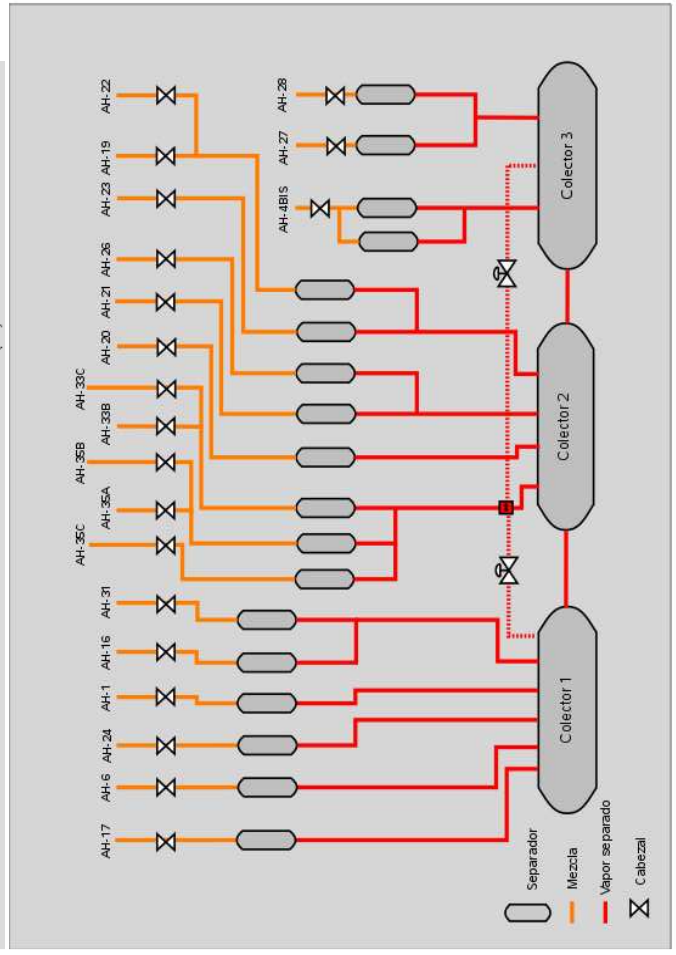
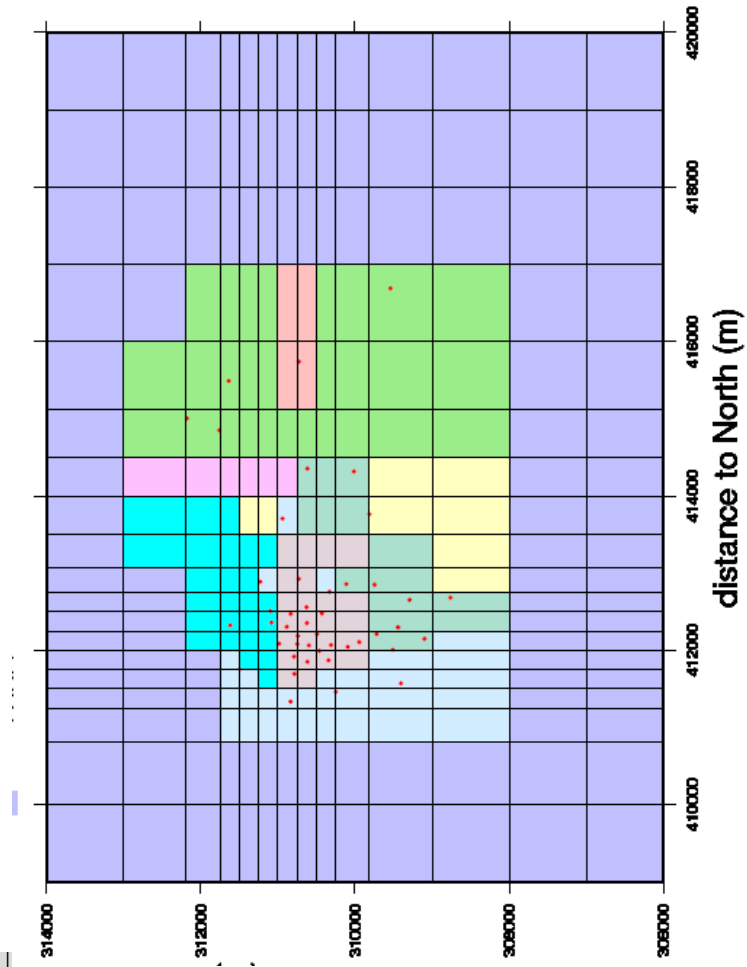
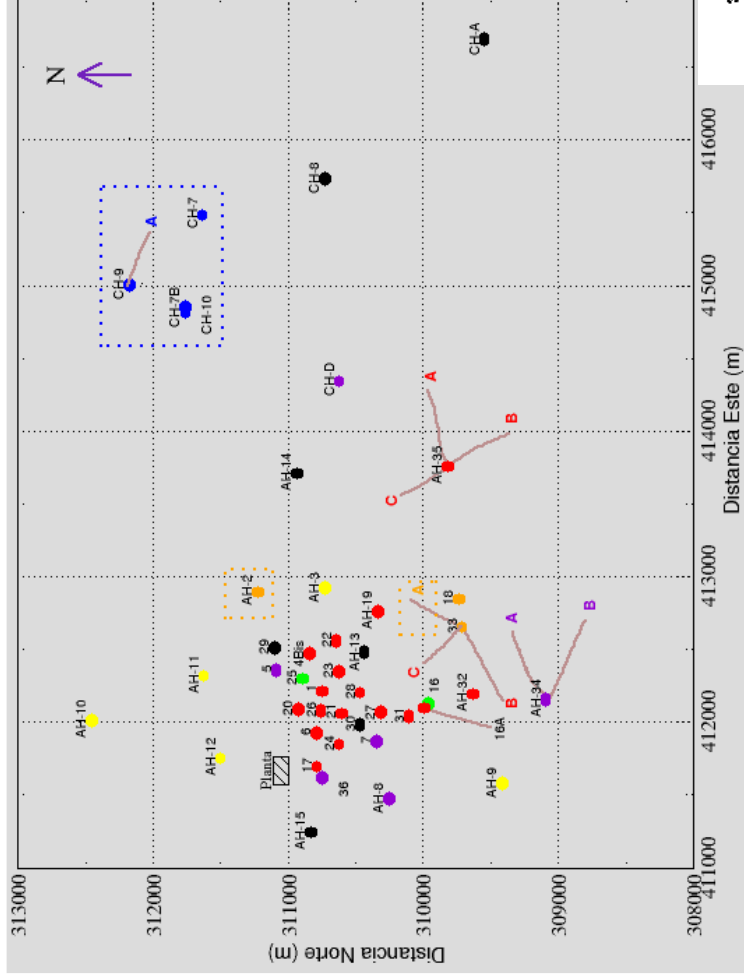
$$P_{i,j} = \text{Average}(P_{i,j} + P_{i,j+n})$$

Estimation of reservoir pressure in one specific node

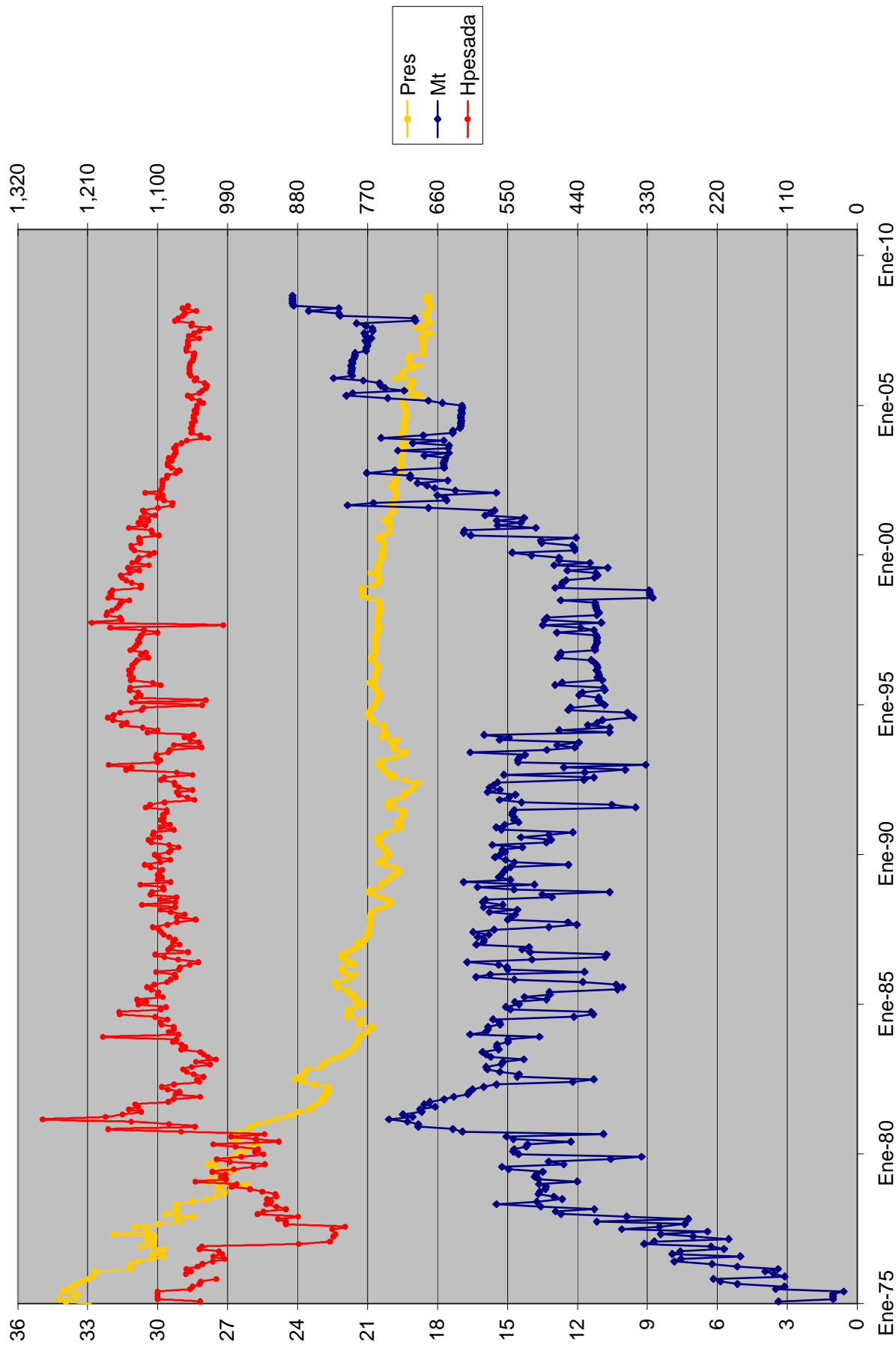
# Well location at the Ahuachapan field

## Numerical grid for 3D model

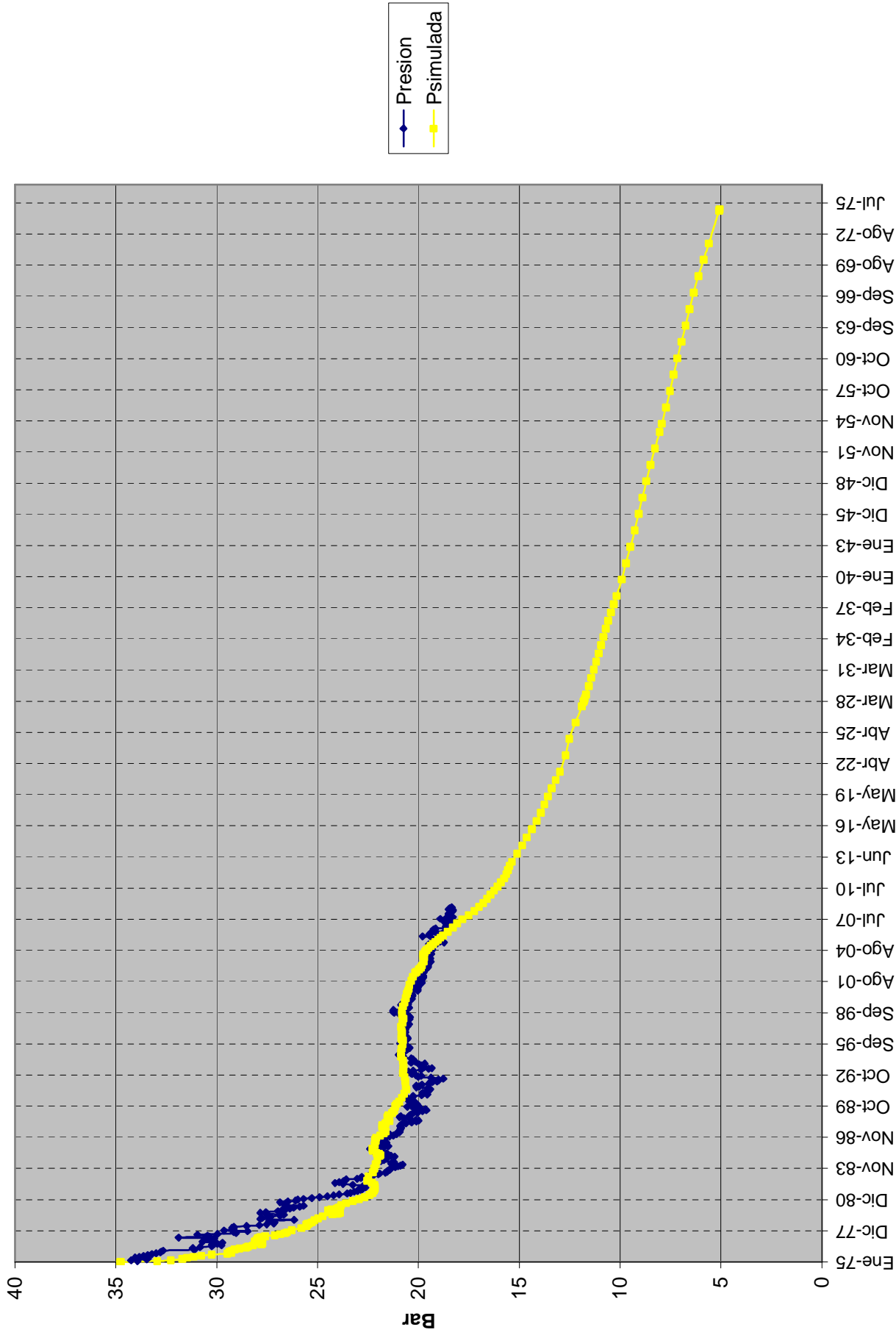
### Steam gathering system



# Production history of the field



# 100 years forecasting



# Steam production forecasting

Pozo	WHP (2008)	mv	WHP (2025)	Mv	WHP (2075)	Mv
AH-6	5.5	8.7	5.2	5.0	5.2	3.6
AH-19	7.9	5.5	7.9	5.2	7.8	4.0
AH-28	6.3	4.5	6.1	4.0	6.4	3.5
AH-33B	7.1	8.6	7.6	6.5	7.6	5.8
AH-35A	7.9	8.0	7.9	6.2	8.0	5.1

# Conclusions

- This methodology is useful to predict the whole performance of a real geothermal field under commercial exploitation.
- The results presents steam production decline in all the scenarios despite of the flowing enthalpy was considered fairly constant, this situation is not happening in all wells. Some wells trend to boiling so its enthalpy increases up dry steam but another ones behave with decline enthalpy which are affected by cooling due injection or surrounding aquifers inflow. This condition must be carefully estimated for well by well analysis.

# Conclusions..

- In order to achieve sustainable level for as least 100 years, the future field management will consider among the reduction of power production, the expansion of the actual steam field, and the updating periodically of the gathering systems and the power plant.
- More effort must be done to improve the knowledge of the hot recharge flow rate of the reservoir, the thermal breakthrough effects due to injection, the type and location of the border of the systems and finally boiling/cooling condition which is affecting the performance of the wells.