

Class Challenge for “Reservoir Characteristics” Lecture

1. The attached pages contain temperature/pressure logs from six wells in a geothermal field. **The challenge is to identify the pressure trend(s) with depth in this field.**

The pressure trends should be drawn on the blank graph with axes of Elevation versus Pressure.

The elevations of the wellheads given below enable correction of depths to elevations. The casing depths allow identification of the open sections in each well.

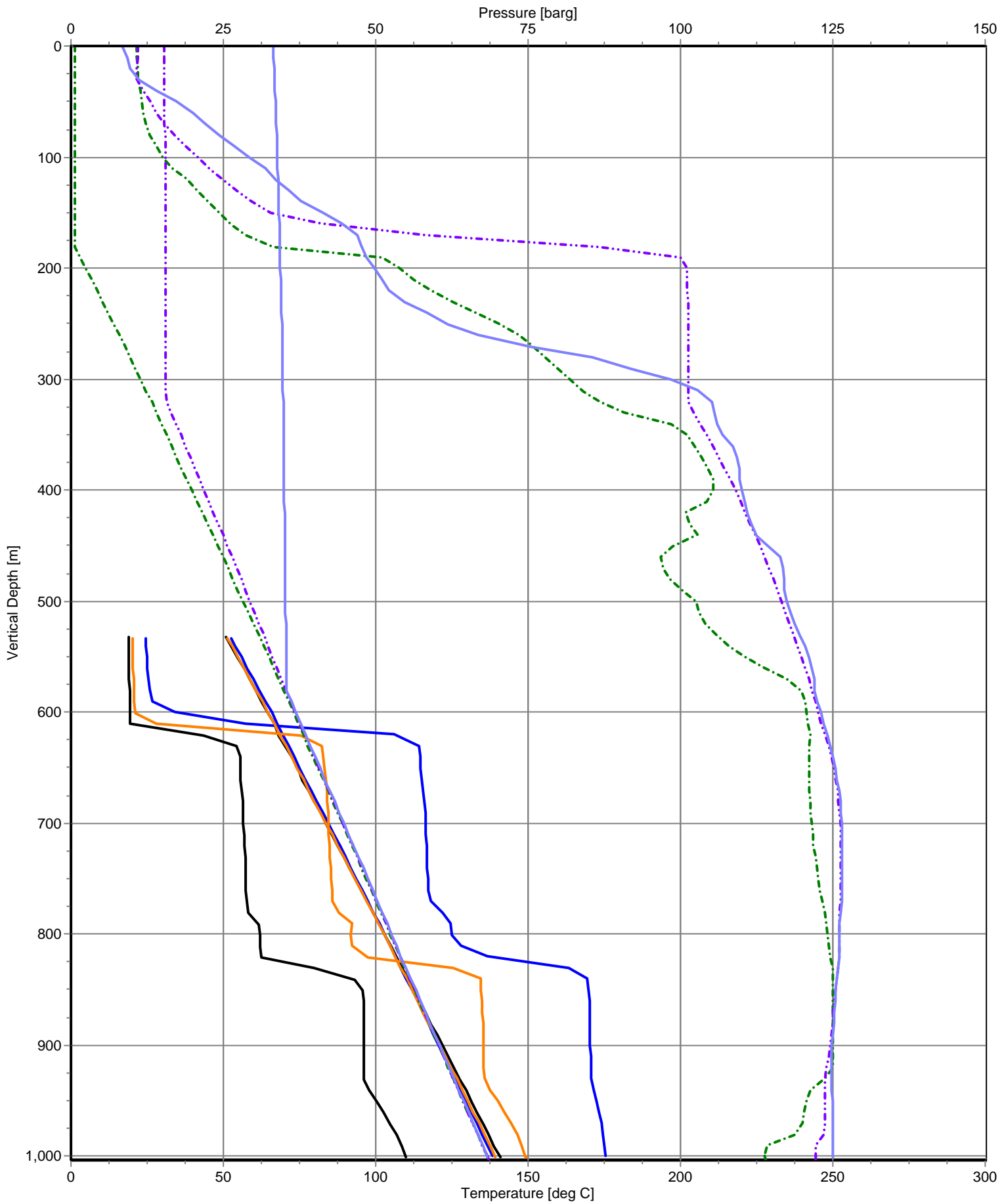
In addition to the deep well data, there are numerous cool – warm ground water wells at an elevation of 400 m asl, with water levels at around 20 m depth. These wells range up to 100 m in total depth.

Also, a steam-heated spring flows to the surface at 390 m asl, and there are extensive areas of steaming ground between 400 and 500 m asl.

2. Once pressure control points have been identified on the graph, what is the slope (pressure gradient) of the main reservoir (in m/bar)
3. Can you infer a composite temperature – depth trend by comparing the hottest profiles in each well?

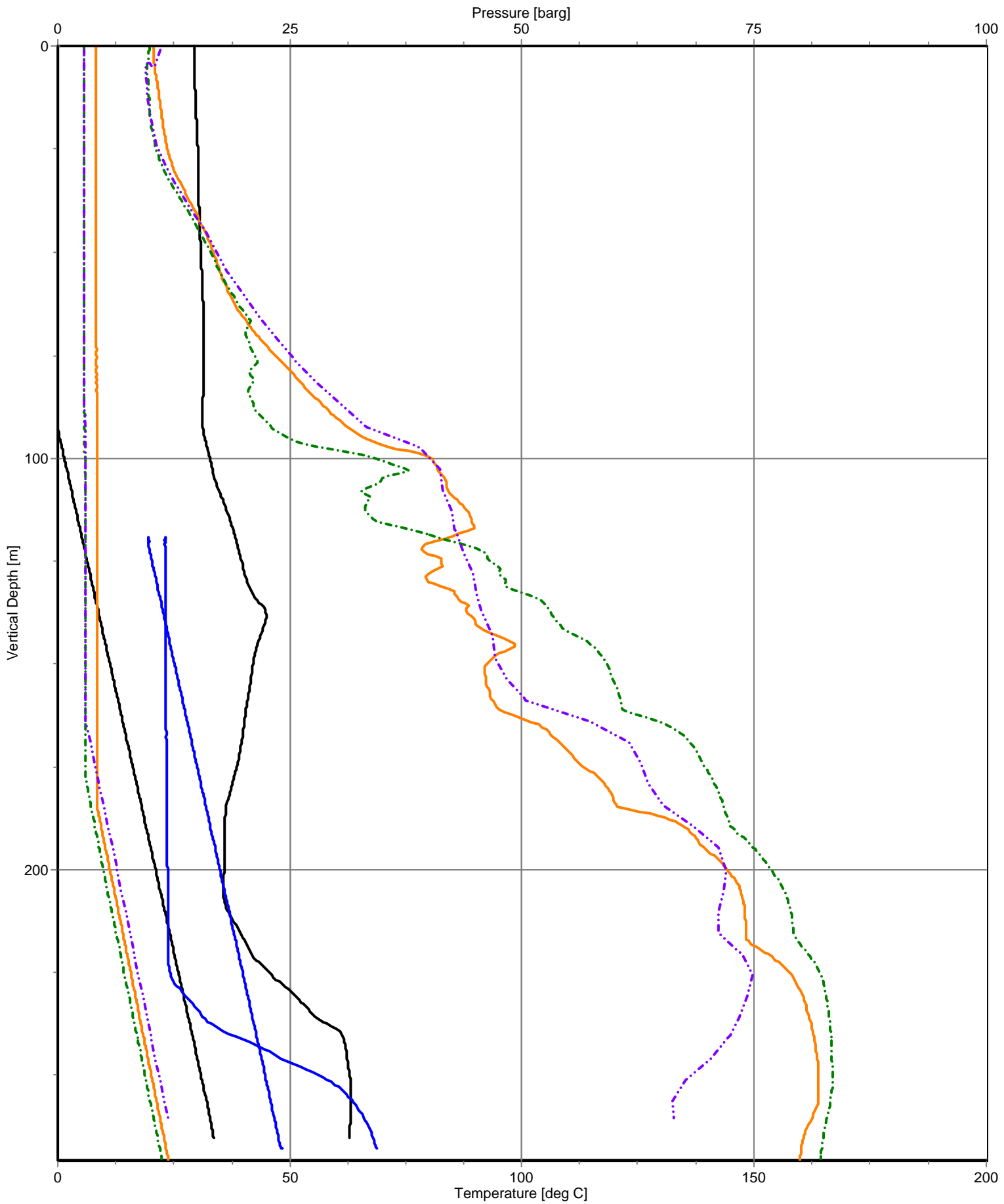
	Wellhead Elev (m asl)	Cased Depth (m)	Max. Depth (m)
TH06	414	589	1004
TH07	402	122	277
TH09	510	881	2417
TH11	472	839	1995
THM13	415	222	333
THM19	465	192	380

Reservoir DownHole



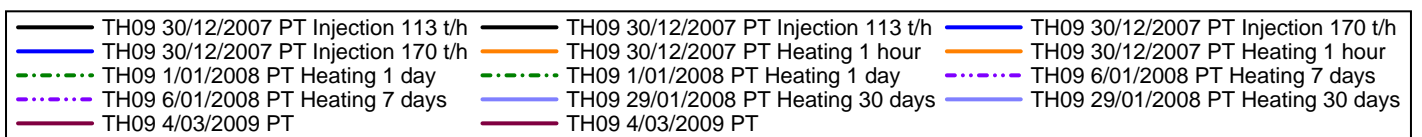
- | | | |
|------------------------------------------|-----------------------------------------|------------------------------------------|
| — TH06 20/10/2005 PT 182 T/hr 1.2 m/s | — TH06 20/10/2005 PT 182 T/hr 1.2 m/s | — TH06 20/10/2005 PT 45 T/hr 0.6 m/s |
| — TH06 20/10/2005 PT 45 T/hr 0.6 m/s | — TH06 20/10/2005 PT 92T/hr 0.6 m/s | — TH06 20/10/2005 PT 92T/hr 0.6 m/s |
| - - - TH06 27/10/2005 PT Heating 7 days | - - - TH06 27/10/2005 PT Heating 7 days | - - - TH06 17/11/2005 PT 4 weeks Heating |
| - - - TH06 17/11/2005 PT 4 weeks Heating | - - - TH06 9/05/2006 PT 3.5 months shut | - - - TH06 9/05/2006 PT 3.5 months shut |

Reservoir DownHole

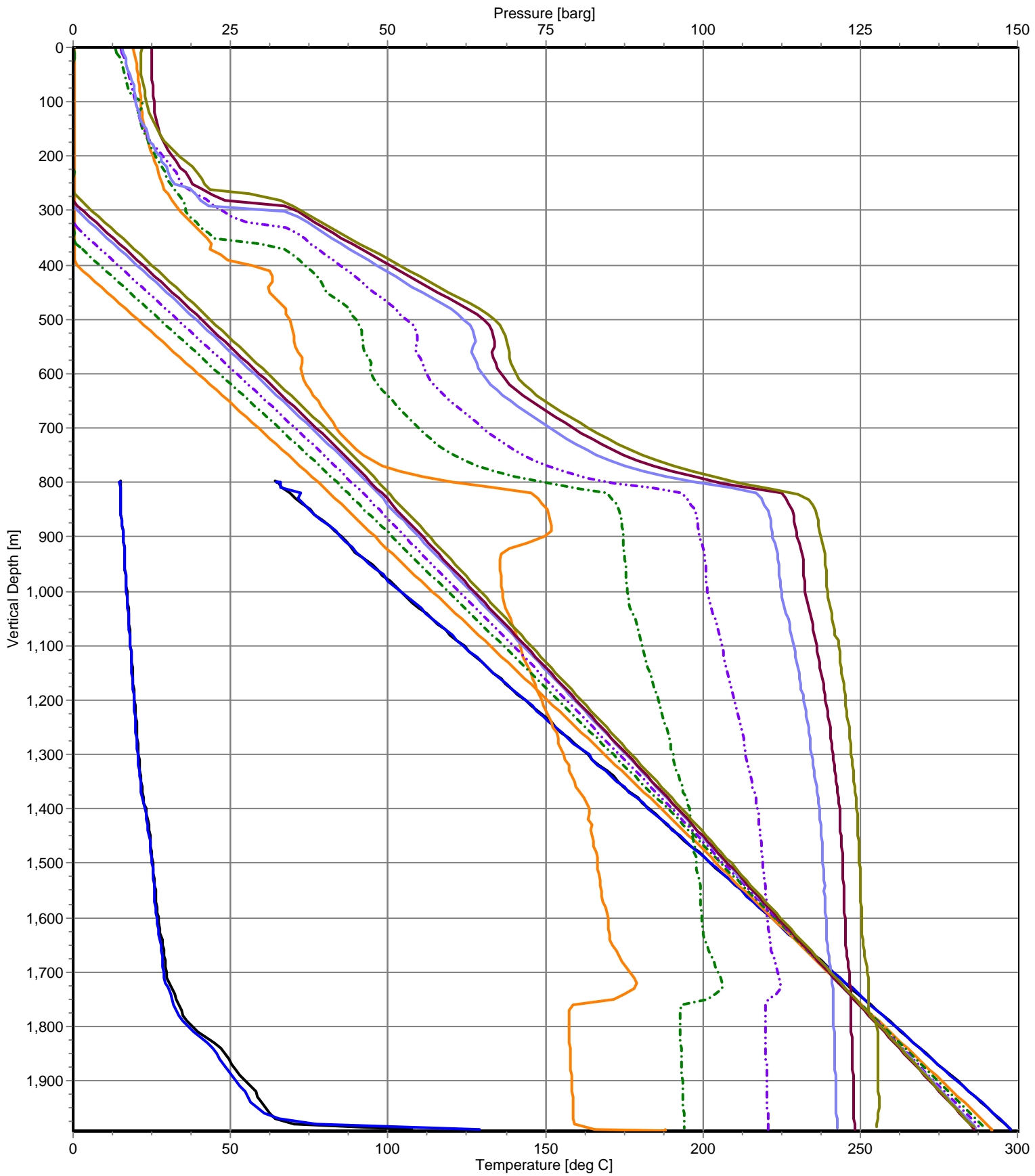


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|---------------------------------------|-------------------------------------|---------------------------------------|
| — TH07 5/02/2006 PT 1 hour shut | — TH07 5/02/2006 PT 1 hour shut | — TH07 5/02/2006 PT 34 T/hr injection |
| — TH07 5/02/2006 PT 34 T/hr injection | — TH07 1/03/2006 PT 24 days shut | — TH07 1/03/2006 PT 24 days shut |
| — TH07 13/04/2006 PT Shut 9.5 Weeks | — TH07 13/04/2006 PT Shut 9.5 Weeks | — TH07 26/11/2009 PT Bleed |
| — TH07 26/11/2009 PT Bleed | | |

Reservoir DownHole

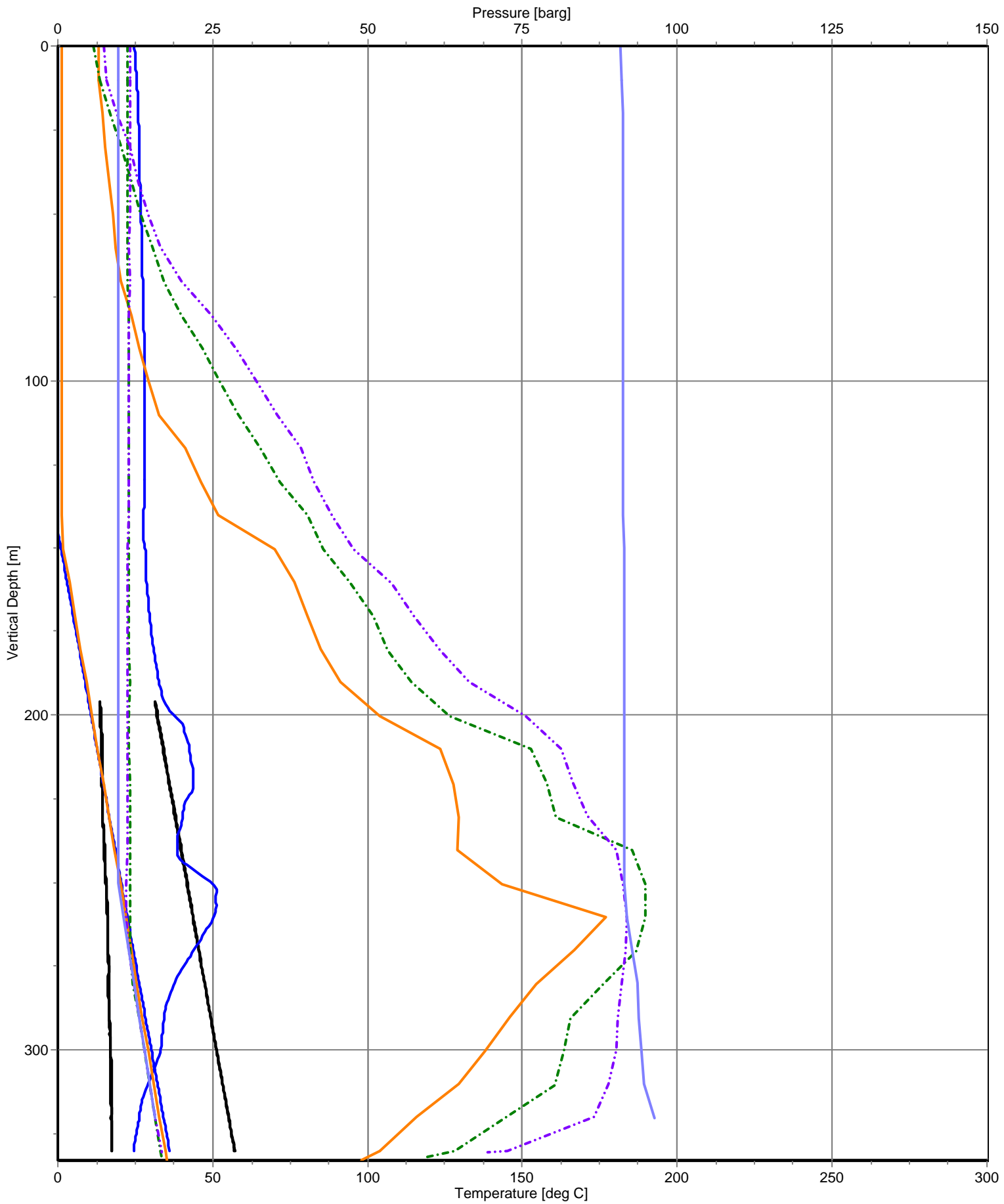


Reservoir DownHole



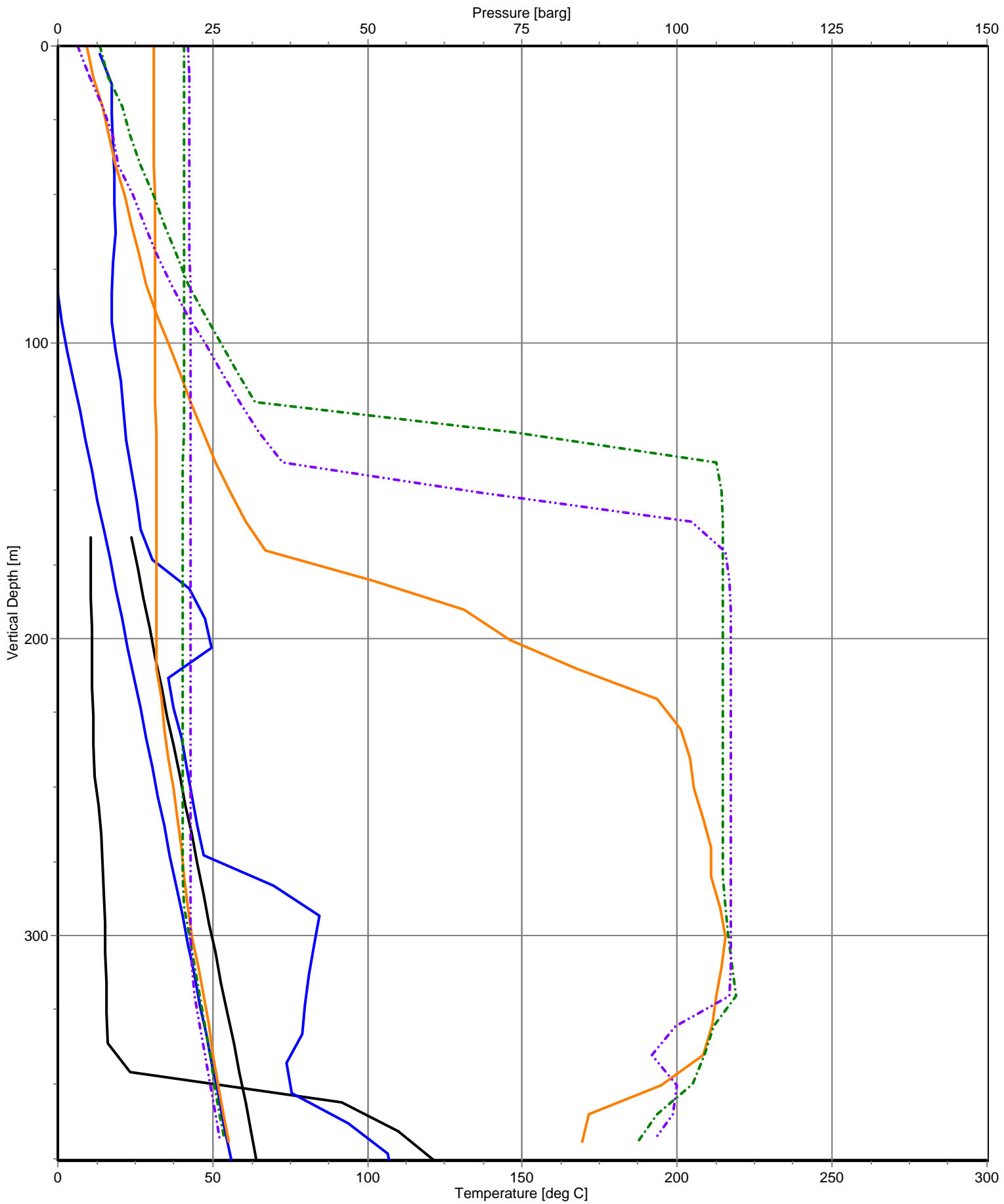
- | | |
|------------------------------------------|------------------------------------------|
| — TH11 25/10/2006 PT 0.6m/s 163t/h Uplog | — TH11 25/10/2006 PT 0.6m/s 163t/h Uplog |
| — TH11 25/10/2006 PT 1.2m/s 163t/h Uplog | — TH11 25/10/2006 PT 1.2m/s 163t/h Uplog |
| — TH11 26/10/2006 PT 1 Day Heating | — TH11 26/10/2006 PT 1 Day Heating |
| -.- TH11 28/10/2006 PT 3 days Heating | -.- TH11 28/10/2006 PT 3 days Heating |
| -.- TH11 1/11/2006 PT 7 Days Heating | -.- TH11 1/11/2006 PT 7 Days Heating |
| — TH11 22/11/2006 PT 28 days shut | — TH11 22/11/2006 PT 28 days shut |
| — TH11 11/01/2007 PT Heating 11 weeks | — TH11 11/01/2007 PT Heating 11 weeks |
| — TH11 14/04/2009 PT Shut | — TH11 14/04/2009 PT Shut |

Reservoir DownHole



- | | | |
|--------------------------------------|--------------------------------------|------------------------------------|
| THM13 24/08/2008 PT Injection 11 t/h | THM13 24/08/2008 PT Injection 11 t/h | THM13 24/08/2008 PT Heating 1 hr |
| THM13 24/08/2008 PT Heating 1 hr | THM13 25/08/2008 PT Heating 1 Day | THM13 25/08/2008 PT Heating 1 Day |
| THM13 1/09/2008 PT Heating 8 Days | THM13 1/09/2008 PT Heating 8 Days | THM13 7/10/2008 PT Heating 5 weeks |
| THM13 7/10/2008 PT Heating 5 weeks | THM13 3/02/2010 PT | THM13 3/02/2010 PT |

Reservoir DownHole



— THM19 16/06/2009 PT 34t/h injection	— THM19 16/06/2009 PT 34t/h injection	— THM19 16/06/2009 PT 1 hour heating
— THM19 16/06/2009 PT 1 hour heating	— THM19 17/06/2009 PT 1 dat heating	— THM19 17/06/2009 PT 1 dat heating
— THM19 23/06/2009 PT 7 day heating	— THM19 23/06/2009 PT 7 day heating	— THM19 14/07/2009 PT 4 week heating
— THM19 14/07/2009 PT 4 week heating		

Well #	elev masl	perm depth (m)	perm elev (masl)	Press (bar g)	Temp (C)	liq, vap, both?
TH06	414					
TH07	402					
TH07	402					
TH09	510					
TH09	510					
TH11	472					
THM13	415					
THM19	465					
THM19	465					
spring	390					
g-water top	400					
g-water bot.	400					

