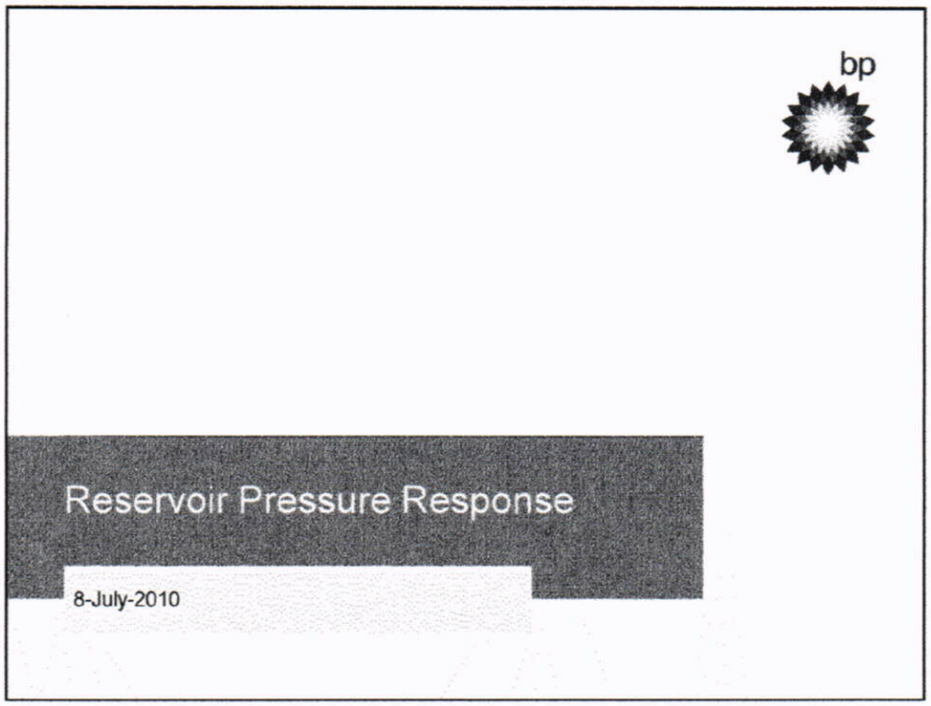

Outline

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- Modelling used preliminary slab model
  - Structural model incomplete Wed. evening
  - PIE used to cross-check
- Fixed Parameters:
  - M110 Size (45 mmrb)
- Sensitivity Parameters:
  - Aquifer: **3.8x**, 13.7x, 24x (larger aquifers with some K red'n)
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- Aquifer Impact (referenced to 4x Aquifer, 6 μsips, @35 mbd)
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  - 13.7x Aquifer +120 psi
  - 24x Aquifer +130 psi
- Compressibility
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- S.I. BHP Range (M56E, @5 hrs)
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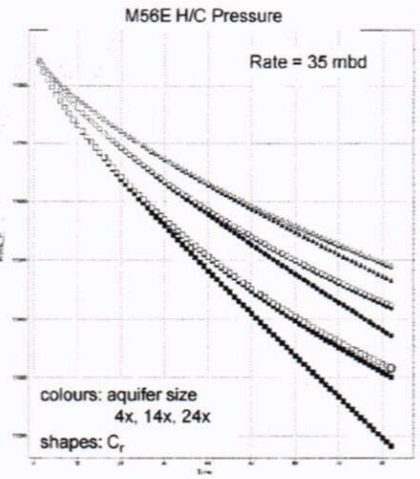

note: values reflect additional 15 days of depletion

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bp

- Bottomhole pressure changes very rapidly for first 3 hours
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  - Solution method & timesteps
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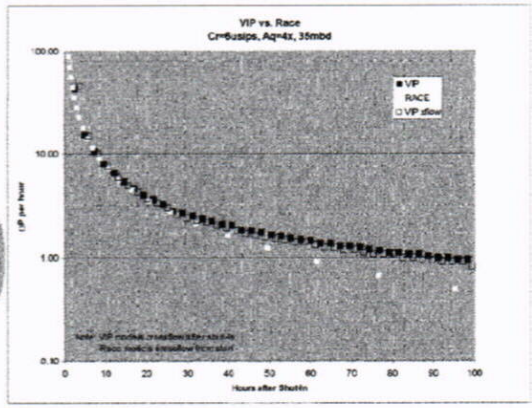

Variation of DP/Dt with Parameters: Q_o & Xflo

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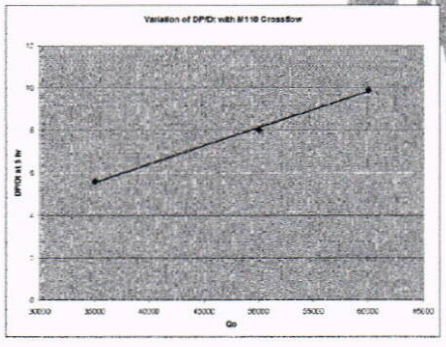

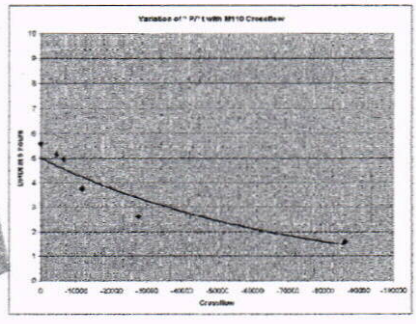

ΔP/Δt of ~1-3 psi/hour for crossflow between 0 & 30 mbd at 5 hours of shut-in

$\Delta P/\Delta t$ at 5 hours

bp

- Insensitive to:
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- Largest sensitivities:
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  - Average production rate
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- Data provided by GoMx Reservoir Team
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    - 275 mD in main M56E sand
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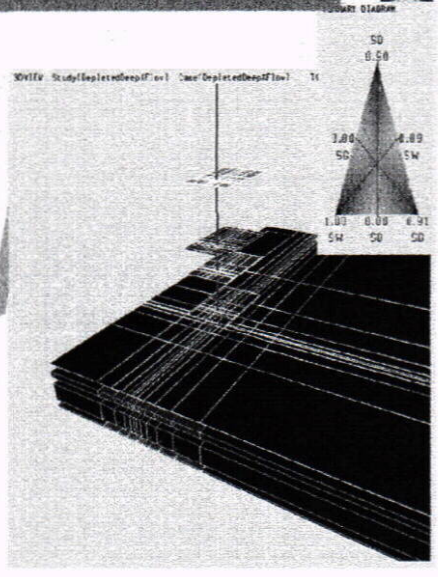

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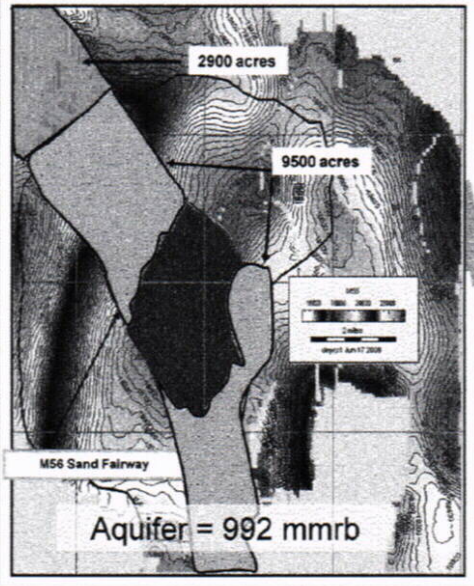

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Largest Aquifer Size – used as base case (will minimise depletion)

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  - Constant compressibility (too low)
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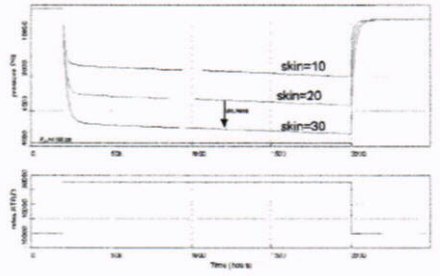
- Lack of observed depletion could be due to *fixed* seafloor pressure and *large* orifice



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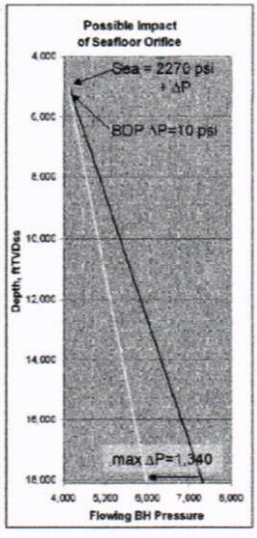

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  - Aquifer
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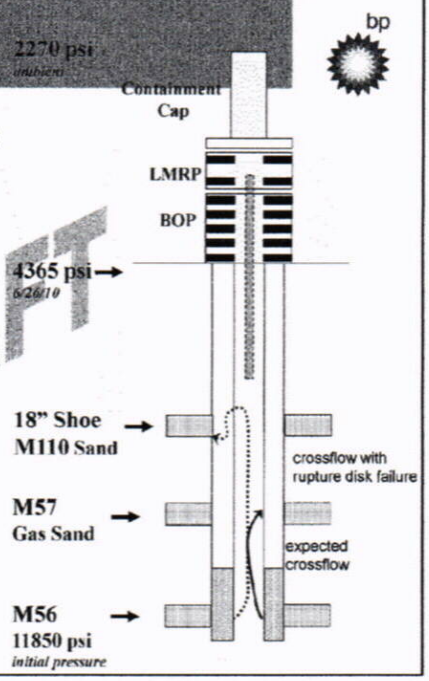

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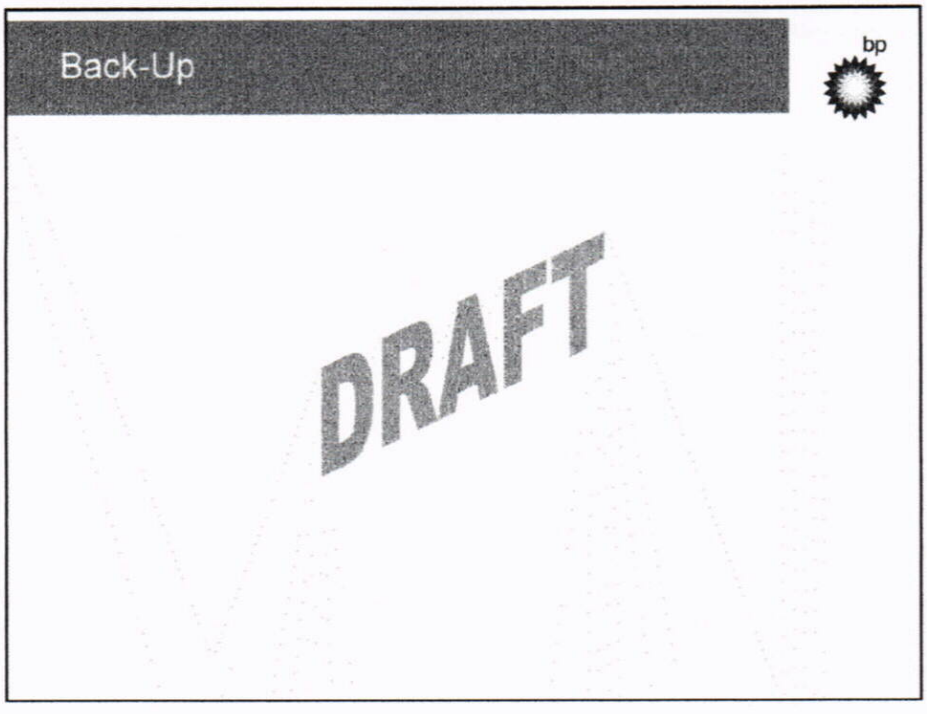

DRAFT

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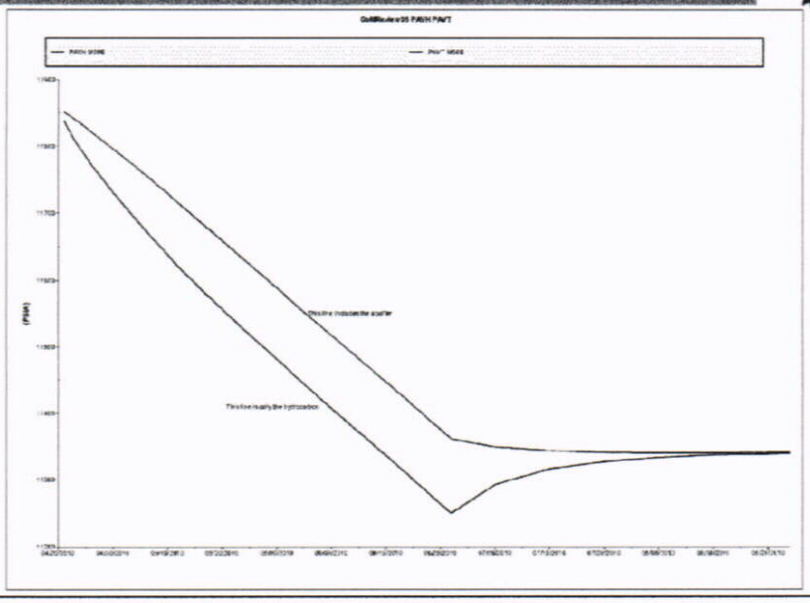

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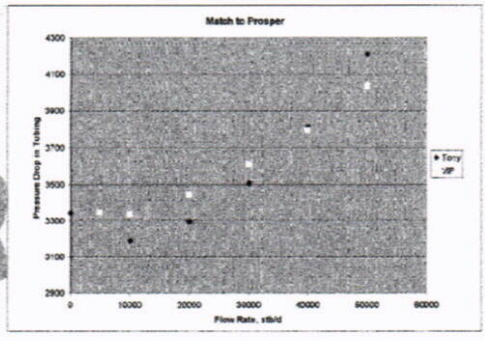

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bp

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High Wellhead Pressure

- Limited crossflow
- Well integrity above 18" shoe
  - small leak into small zone
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- Lower production (higher skin)

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Rising THP

- Fluid Segregation
  - Only if P_{thp} < 6,650psia
  - Increase would begin at low rates or at flow cessation
- Reservoir Response (radius of investigation)
  - Aquifer size will influence P_{final}
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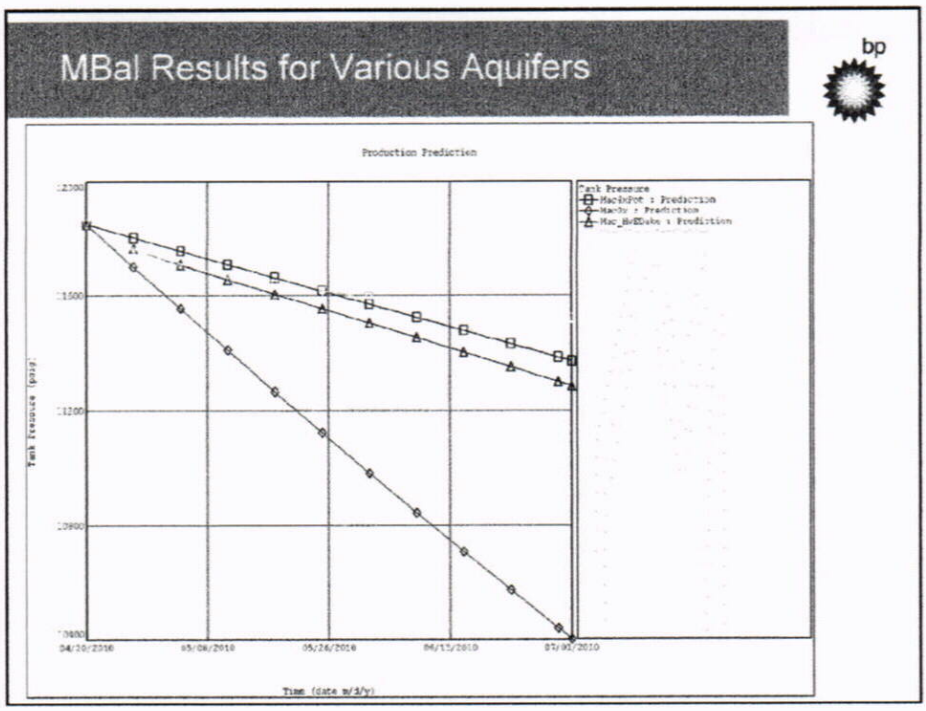
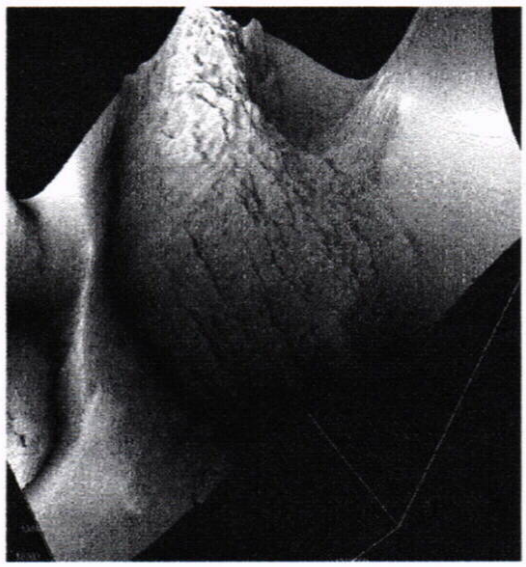
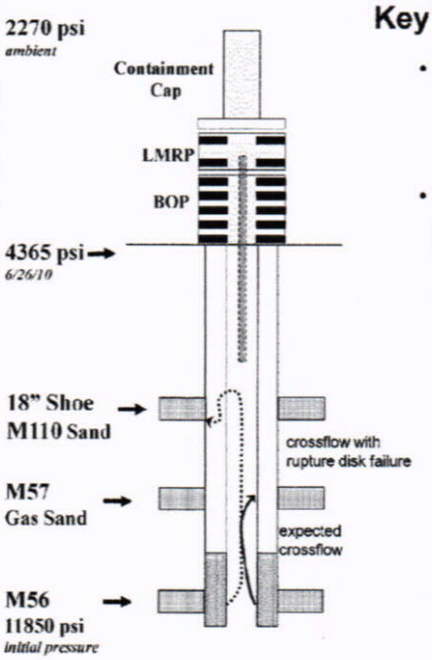
MBal Results for Various Aquifers



Future Work: Add Structure





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- M110 sand is small (5' thick), in one scenario could fill to fracture pressure in 10 days (resvr flow > 32mbd).

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- Leak off will not be detectable (constant charge from M56)
- Crossflow at 18" shoe would be detectable if "large enough"
  - *Max Q_o through 6 disks: 6000 bpd*
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Model Approach & Purpose

bp

- Model constructed to address impact of crossflow of M57B & M56A gas sands during "top kill"
  - Response of observed pressures
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- Requested to investigate whether depletion was consistent with known pressures below BOP
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- Approach
  - Simple: tight timing, multiple unknowns
  - Single layer per reservoir (M57B to M56F, with intervening shales)
  - 10 x 12 x 17; no structure

bp

Reservoir Pressure Response

8-July-2010

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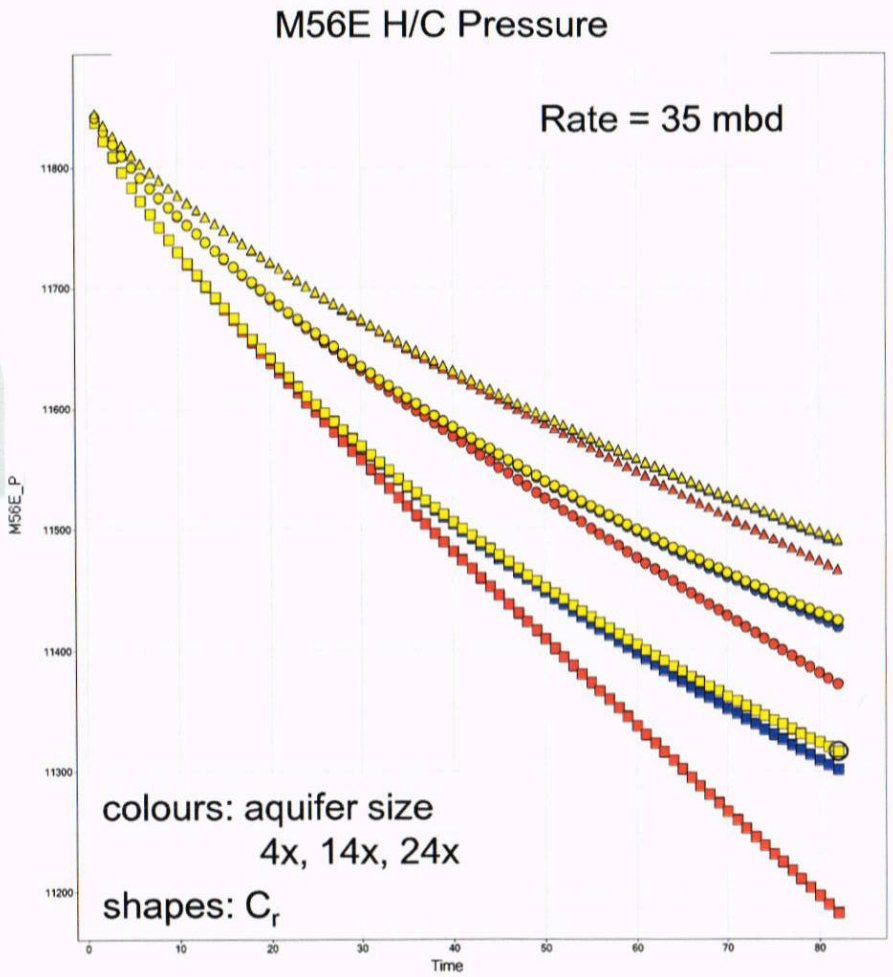

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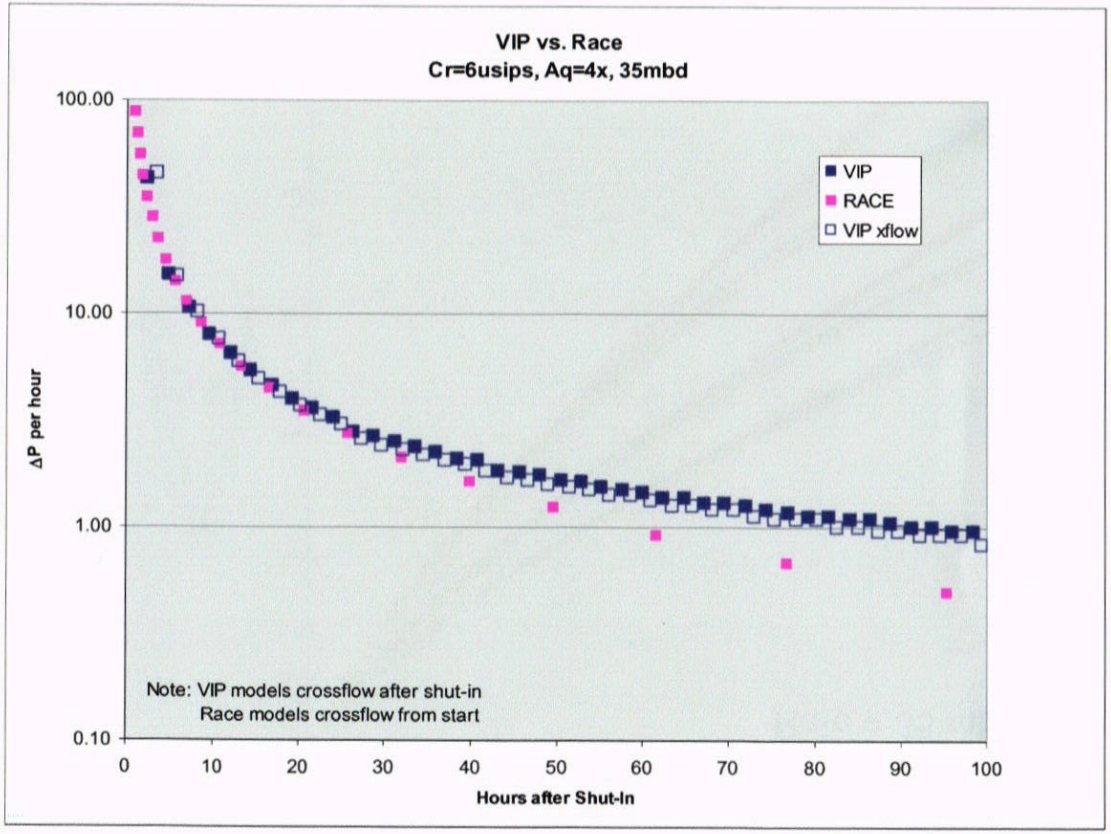

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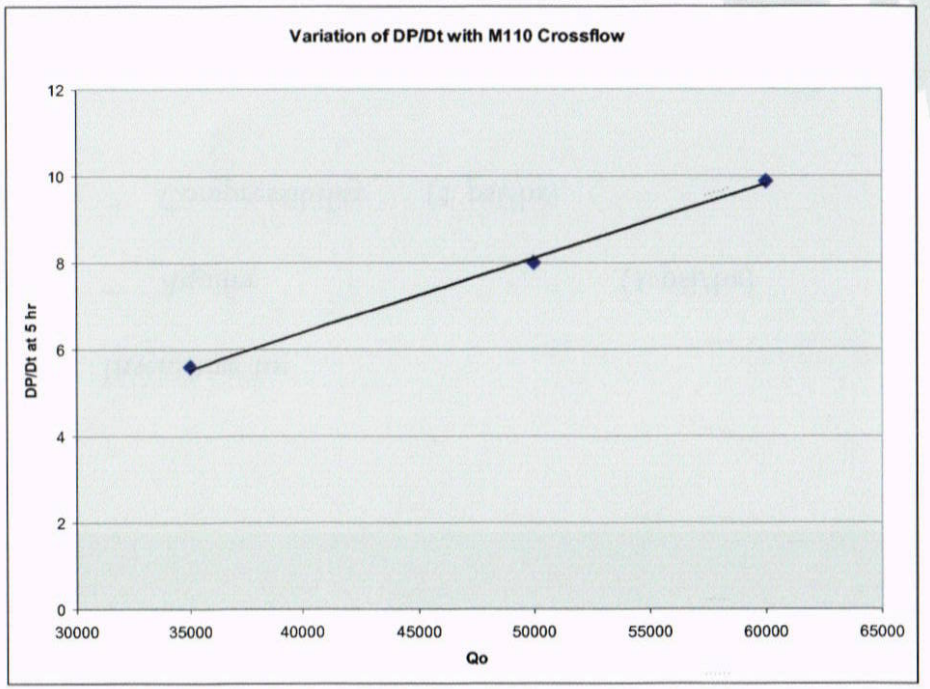

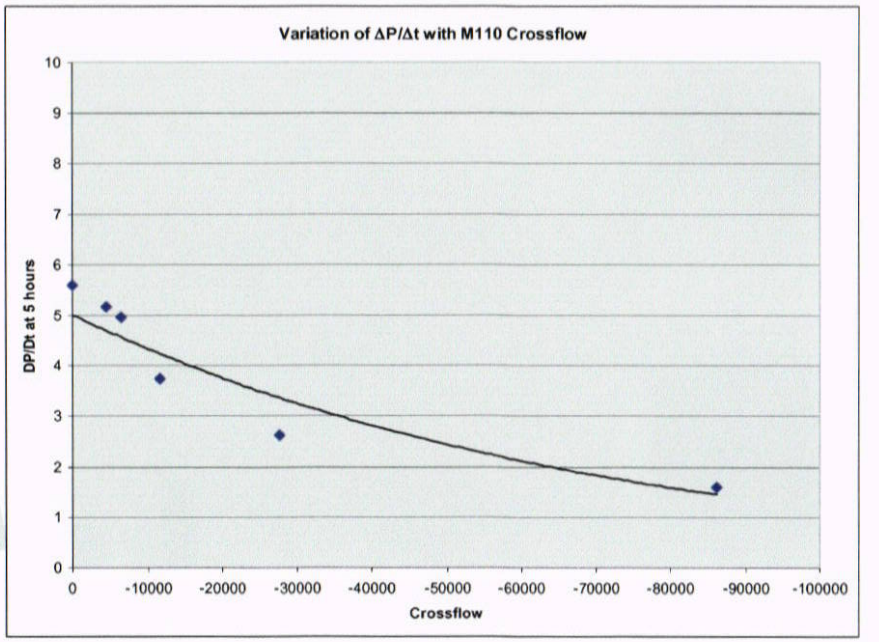

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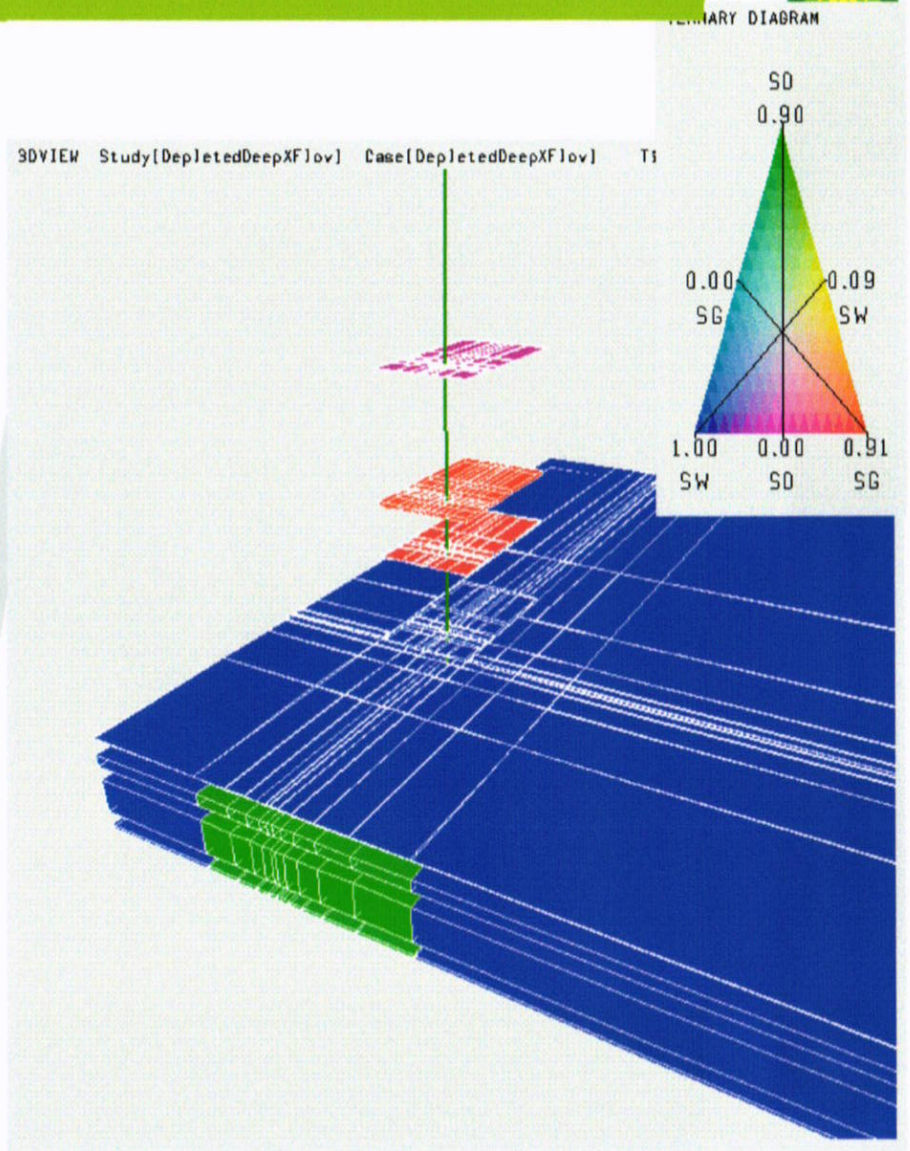

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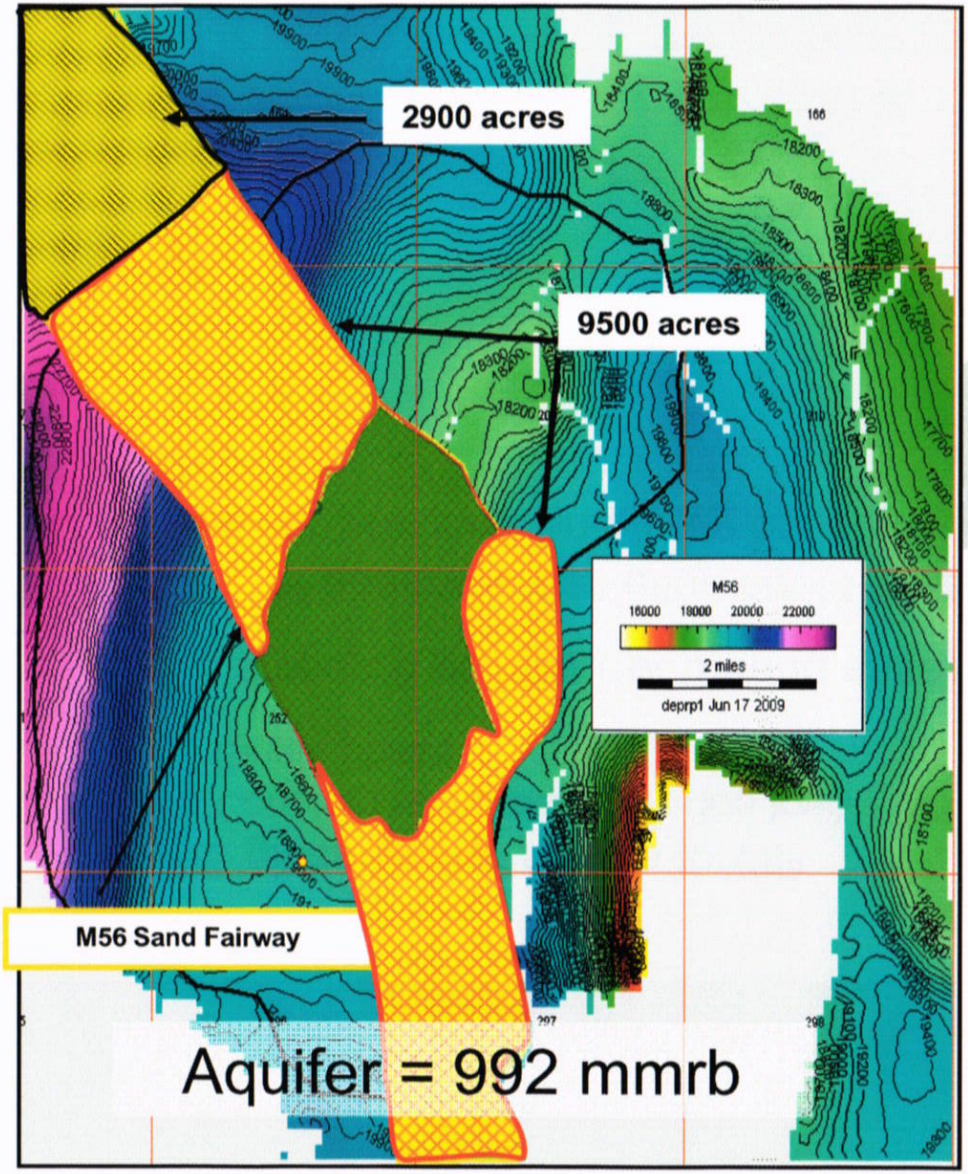

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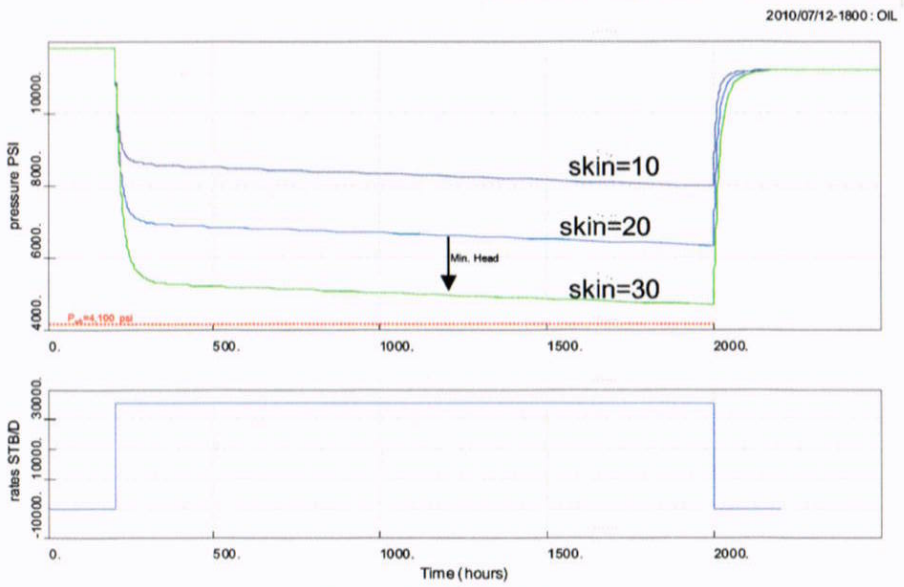

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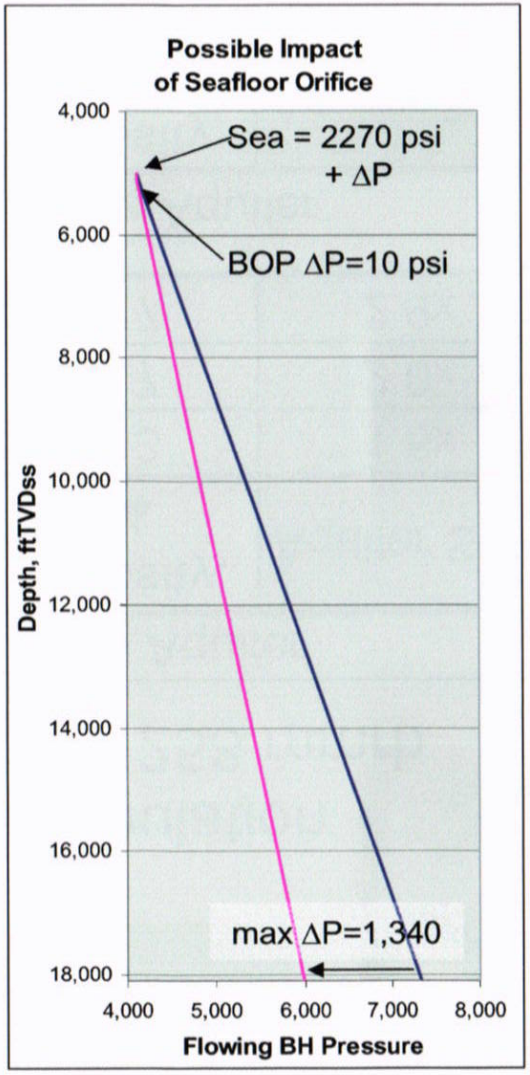

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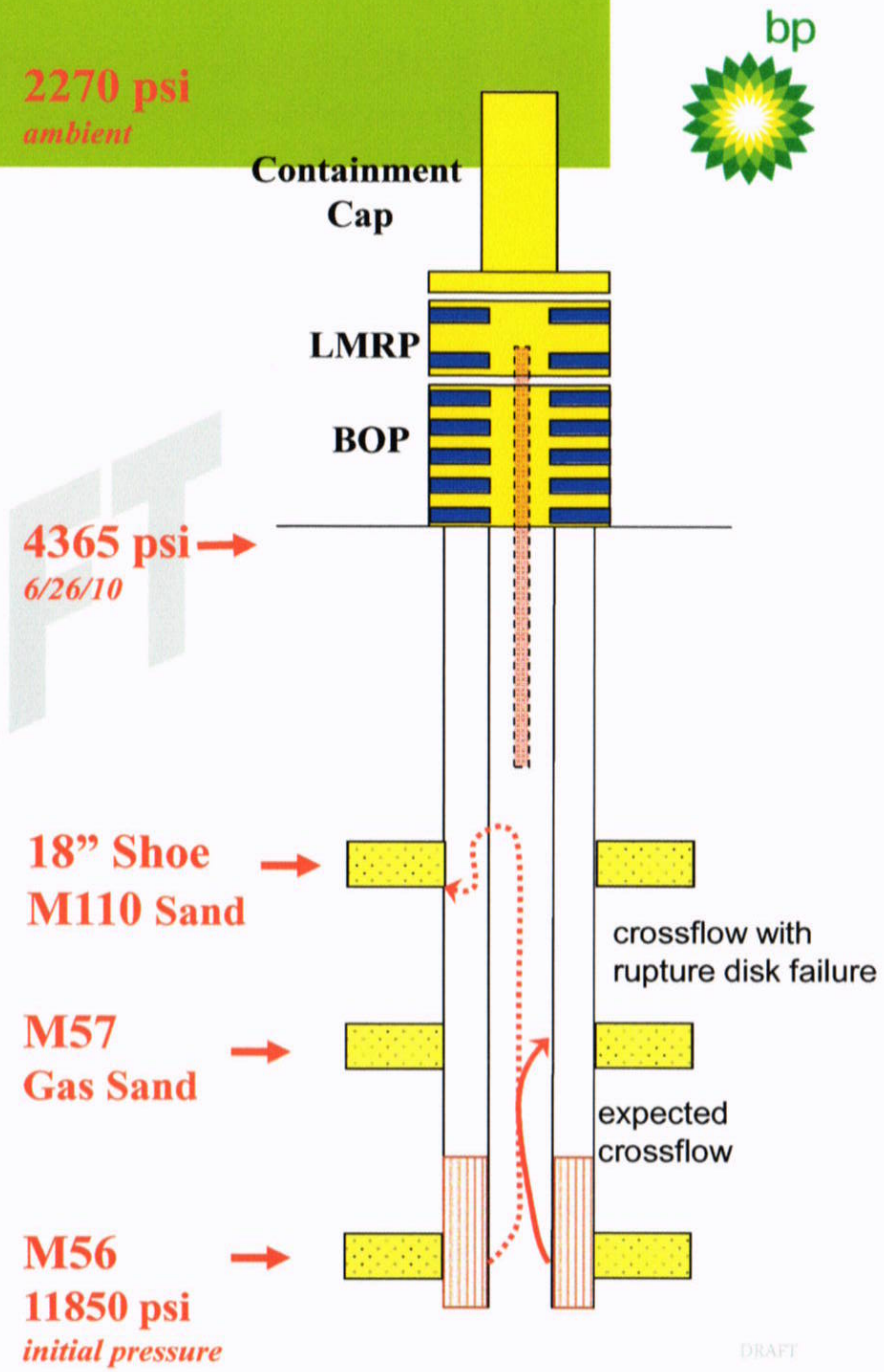

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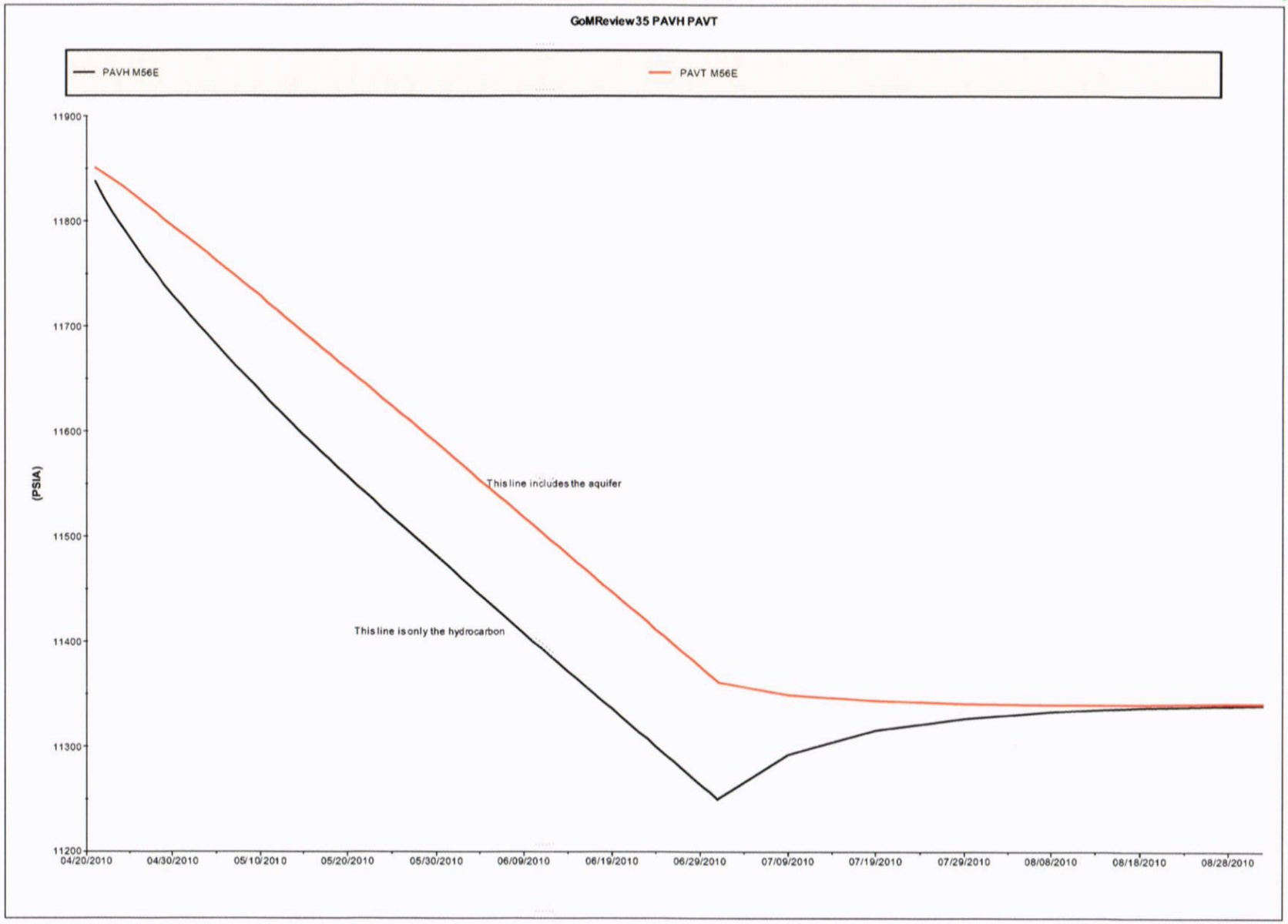

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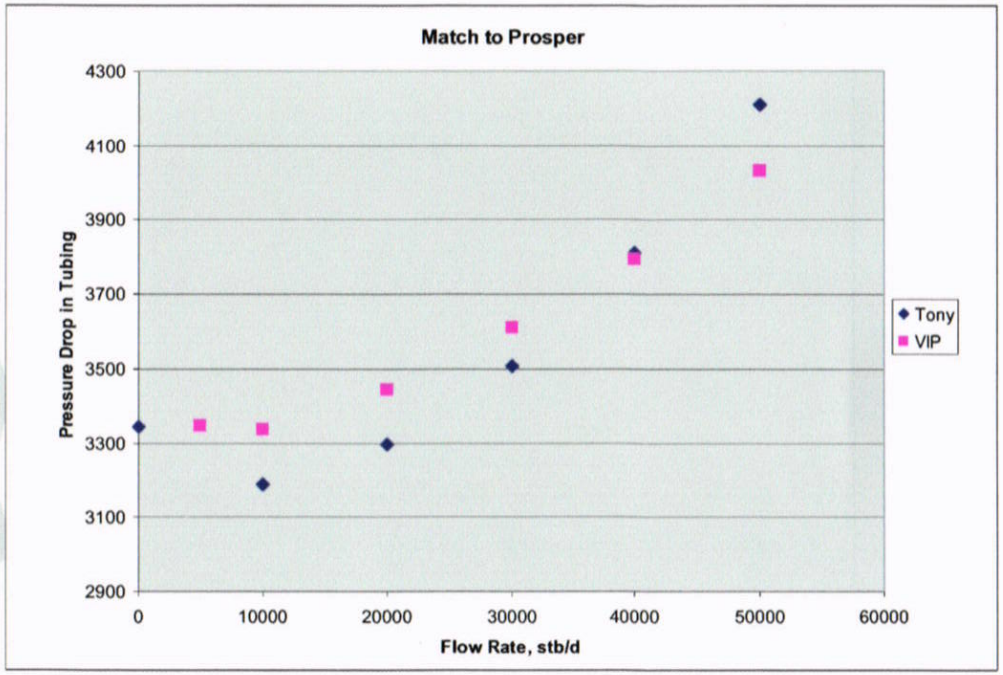

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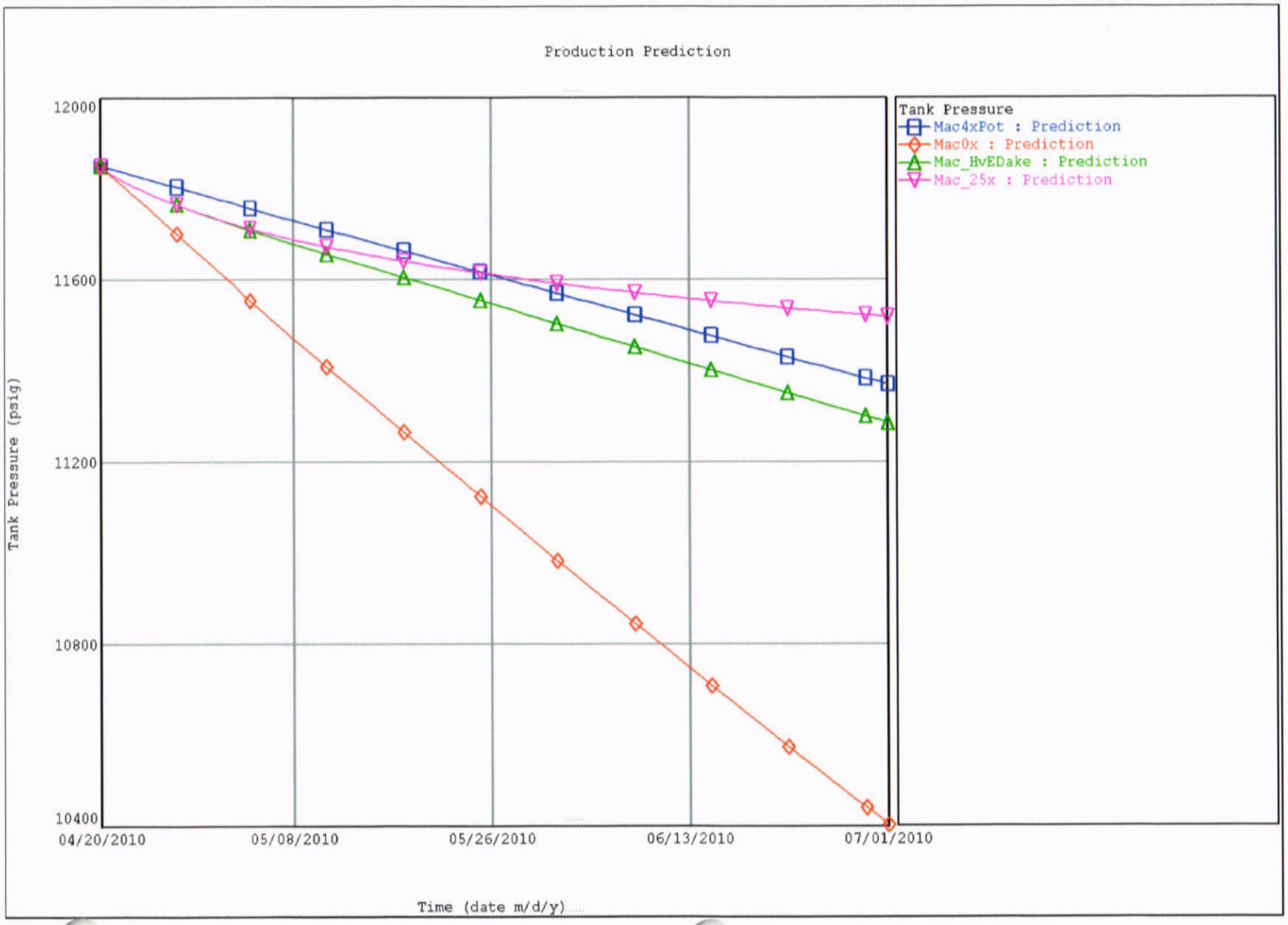

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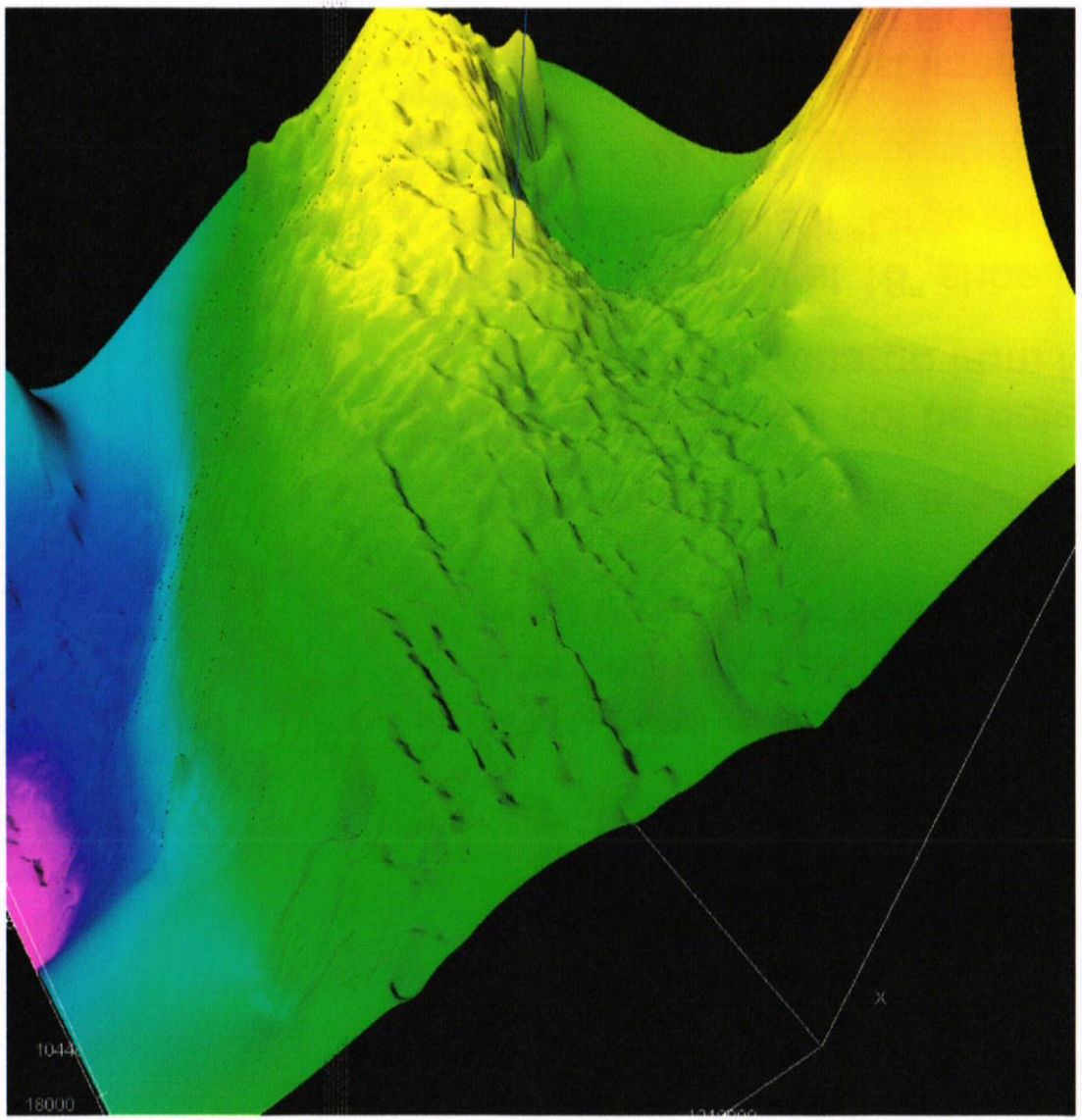

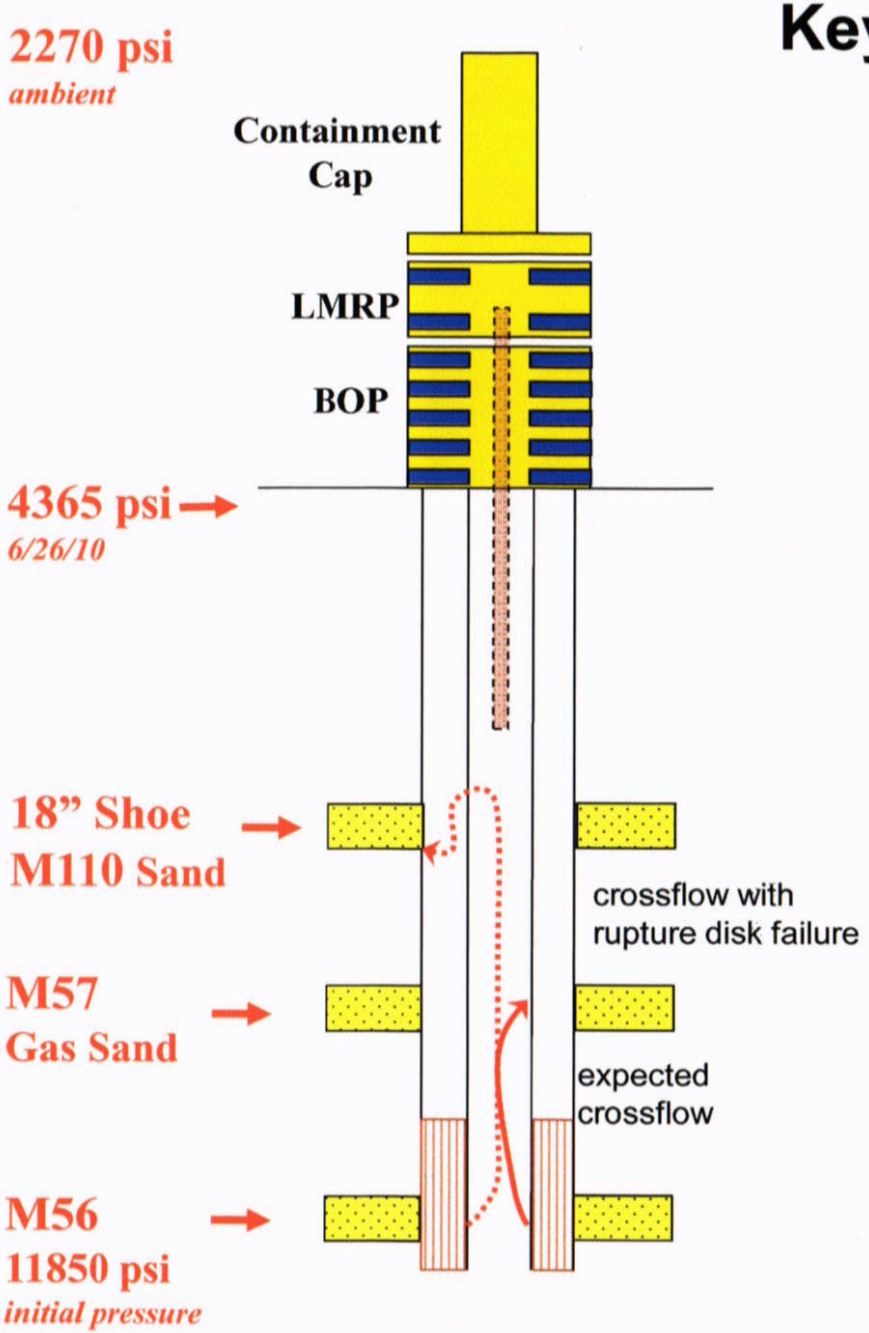

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