

Solvents

- Uses
- Types and Selection
- Application
- Handling
- Disposal

Solvent Types

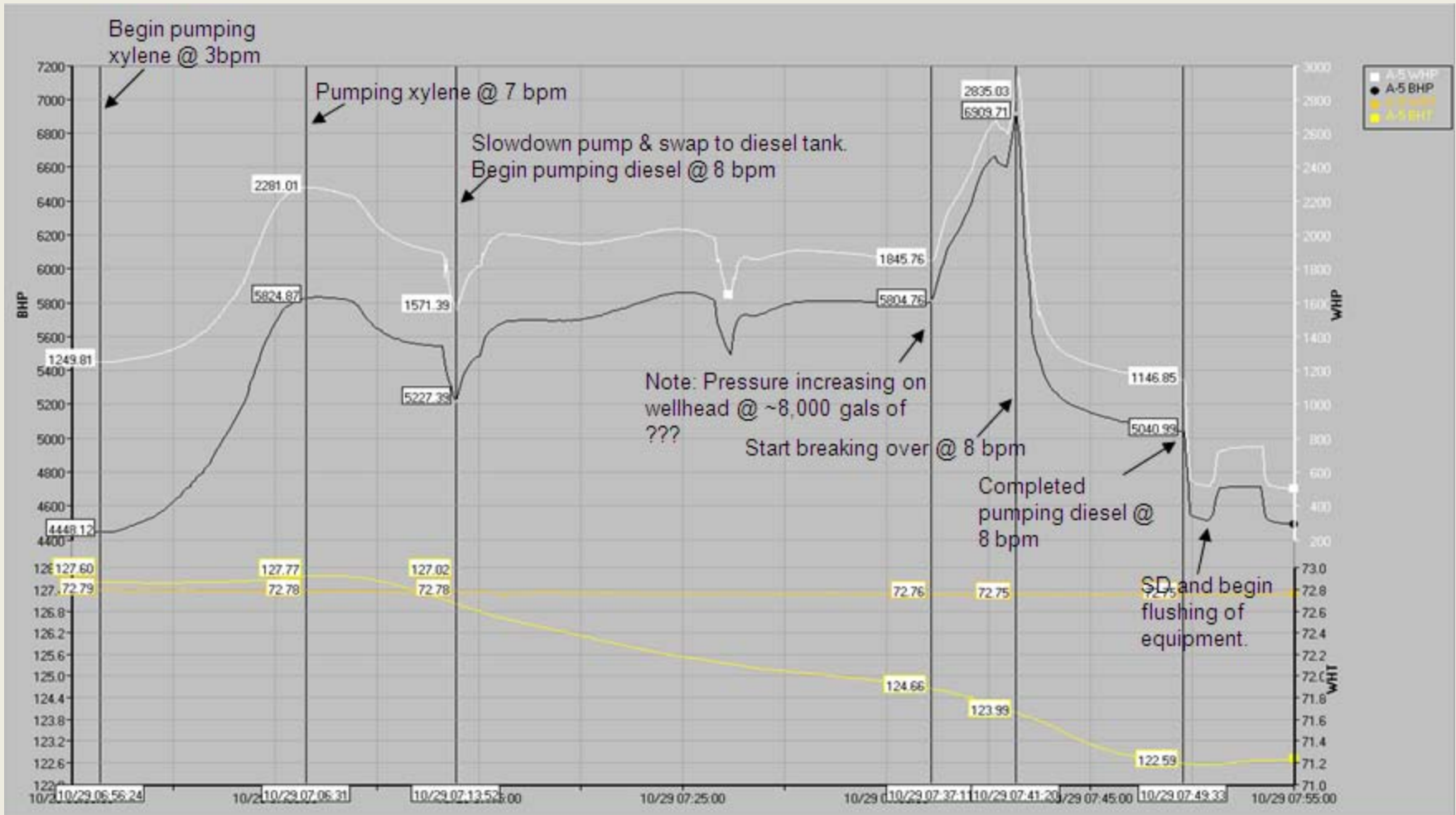
- Checks:
 - Flash point (safety issues for pumping)
 - Solubility of damage in solvent
 - Stability of solvent
 - Seal stability in solvent
 - Disposal ease

Solvent Types and Uses

- Xylene – removes most wax, asphaltene, sludges
- Toluene, same uses as xylene, but has lower flash point and harder on seals.
- Lemonol – may be a passable xylene substitute, safer, but test on the deposit at well conditions.
- Kerosene – removes wax, some sludges
- Crude oil – removes some wax, but generally poor response or very slow
- #2 diesel – not recommended unless filtered to 5 microns with beta of 1000.

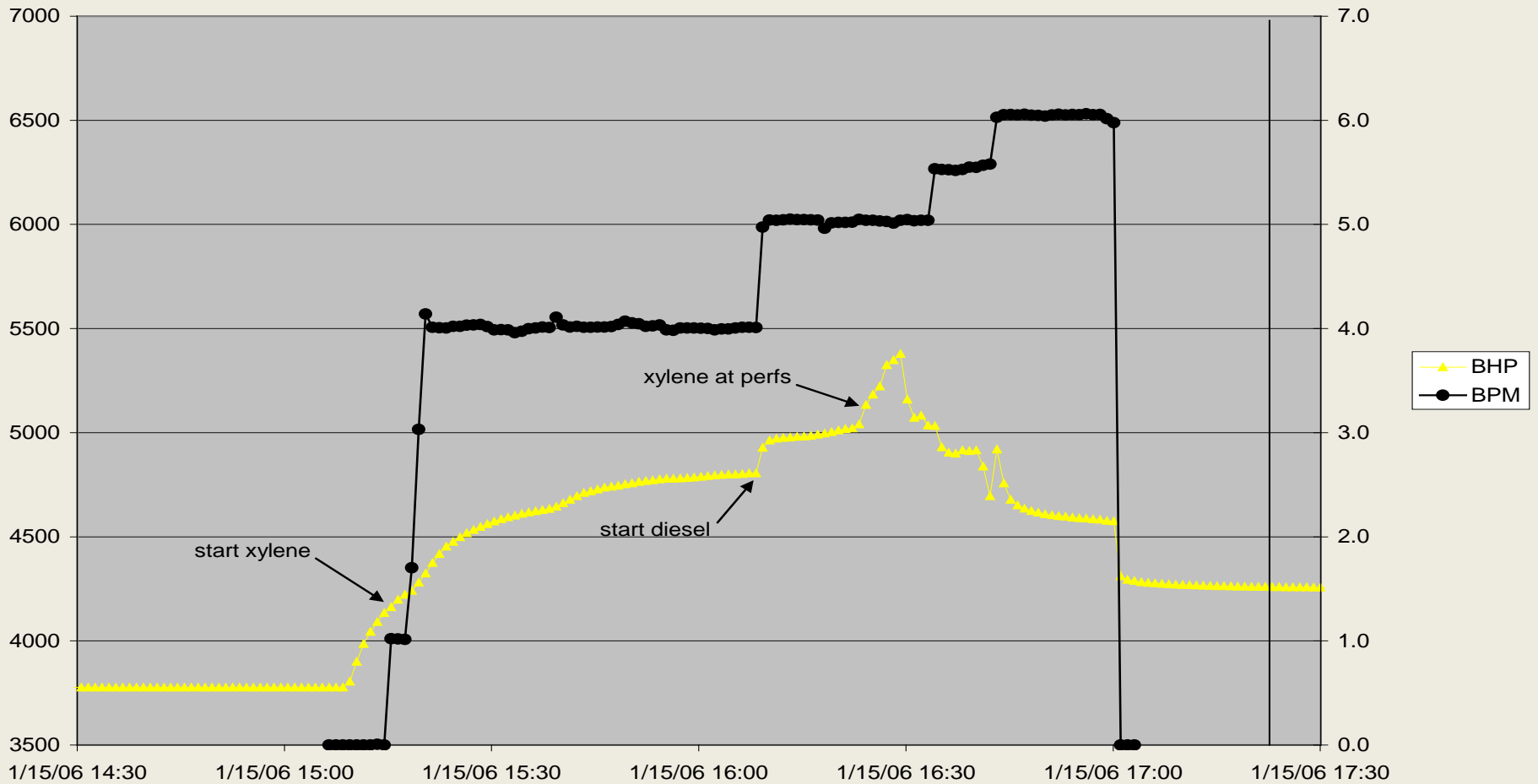
First Treatment

Begin pumping



Second Treatment

A-5



Solvents, Instead of Acids

- use for removal of:
 - Sludges – best solvent depends on composition
 - Emulsions – solvent depends on composition
 - Paraffins - xylene, kerosene, condensates, some oils
 - Asphaltenes – xylene, toluene, lemonol – dispersants
- Poorest solvents? - #2 diesel (loaded with wax) and dead crude oils (asphaltic growth issues and wax loadings)

Solvent Volumes

- paraffin removal
 - 10 to 15 gal/ft of affected zone.
- asphaltene removal
 - 10 to 25 gal/ft - and this won't dissolve much!
 - 100 grams of xylene dissolves 9 grams of asphaltenes

	Oil(bopd)	GOR(scf/bbl)	WHP(psi)	BHFP(psi)	WHT(°F)	H2S(ppm)	GAS(mmscfd)	APIGrav	SepPress(psi)
Before	2200	2080	770	3660	187	10	4.3	31.5	420
After	3200	1830	1050	5100	198	10	5,92	31.3	200

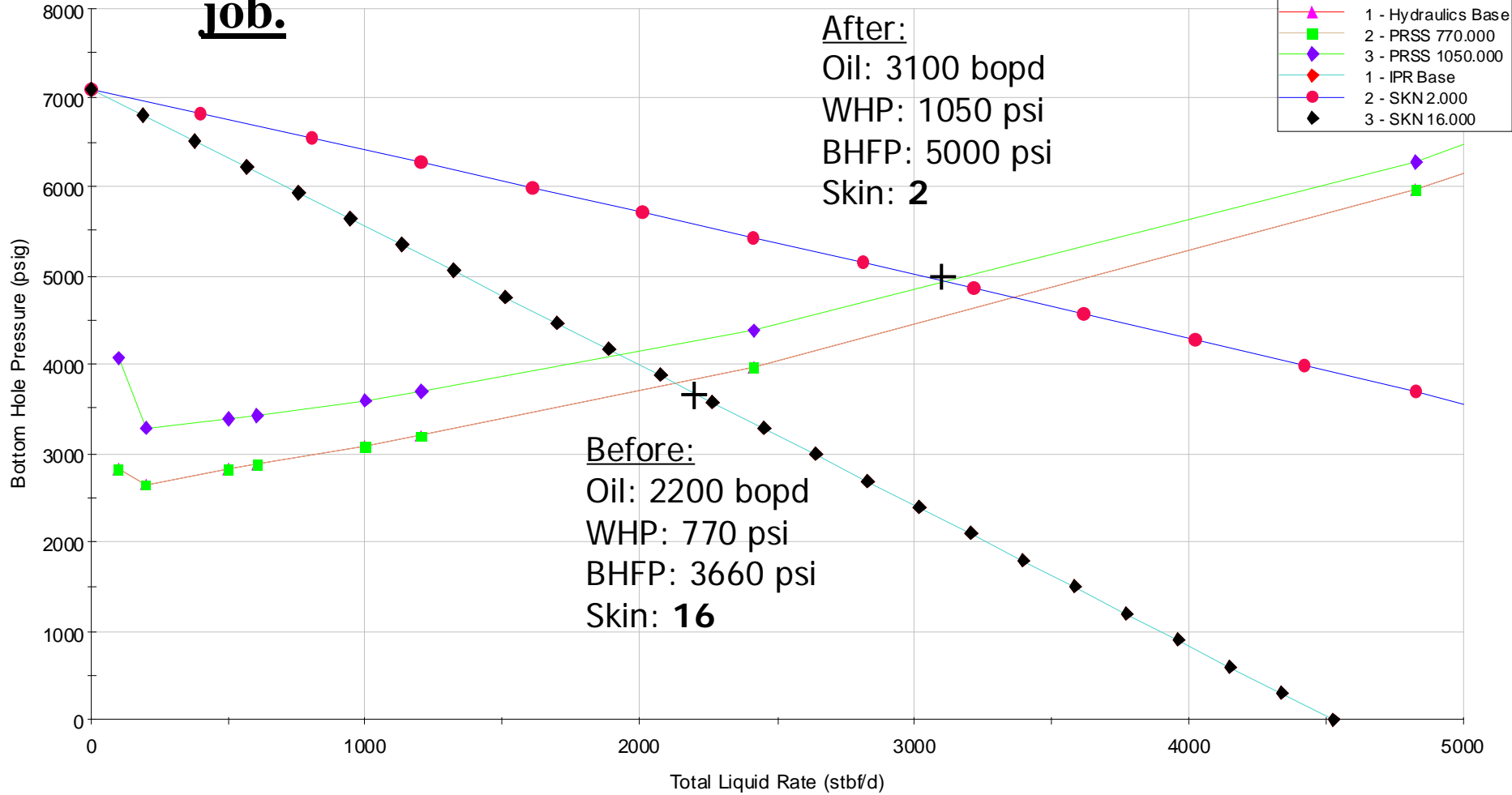
Example of a solvent job.



Boqueron 02
Reservoir Data
Pressure = 7100
kh = 1092.0
Skin = 16.00

Boqueron 02 (13march01)
Density = 4.000
Perf Diam = 0.50
Penetration = 8.00

Rate vs. Pressure
27-Mar-01 11:42:54
Depth (MD) = 17276
WHPres (psia) = 770
Tubing I.D. = 2.750 (s1)



With correction of Separator pressure, the data becomes:

Event	Oil(bopd)	GOR(scf/bbl)	WHP(psi)	BHFP(psi)	WHT(°F)	H2S(ppm)	GAS(mmscfd)	APIGrav	SepPress(psi)
Before	2200	1950	770	3660	195	10	4.3	31.4	420
After	3100	1950	1050	5000	195	10	5.92	31.4	420

Treatment Summary

100 gal per foot perforated of 100% Xylene -> Total:
21,000 gals Soak time: 6 hours

Injection rate: 1,1 bpm w/ CT annulus pressure:
2000 psi.

Calculated Xylene penetration with 10% porosity @
6,5 ft.

Estimated Cost

\$ 255,000

Real Cost

\$ 191,500

Problems with Solvents

- rubber/elastomer seal deterioration
- density problems (hard to get to and hold on bottom)
- getting reasonably pure solvents
 - ie., xylene b.p. is 138-144 C
 - naphta not nearly as good
 - just what is a xylene bottom? – no real definition

Solvent migration through a standing brine column

- Xylene will come back to surface fast (fast or faster than gas?)
- Migrates at 5 - 10,000 feet per hour in seawater.
- If you're soaking a pill on bottom, it won't stay there long.

Disposal

- Most solvents are sold with crude.
- Some aromatics may affect oil price, but may not be a factor in large oil volumes.
- Care must be taken not to expose personnel or the environment to returning solvent.