BOP Testing Best Practices

Ocean Endeavor and Ocean Baroness

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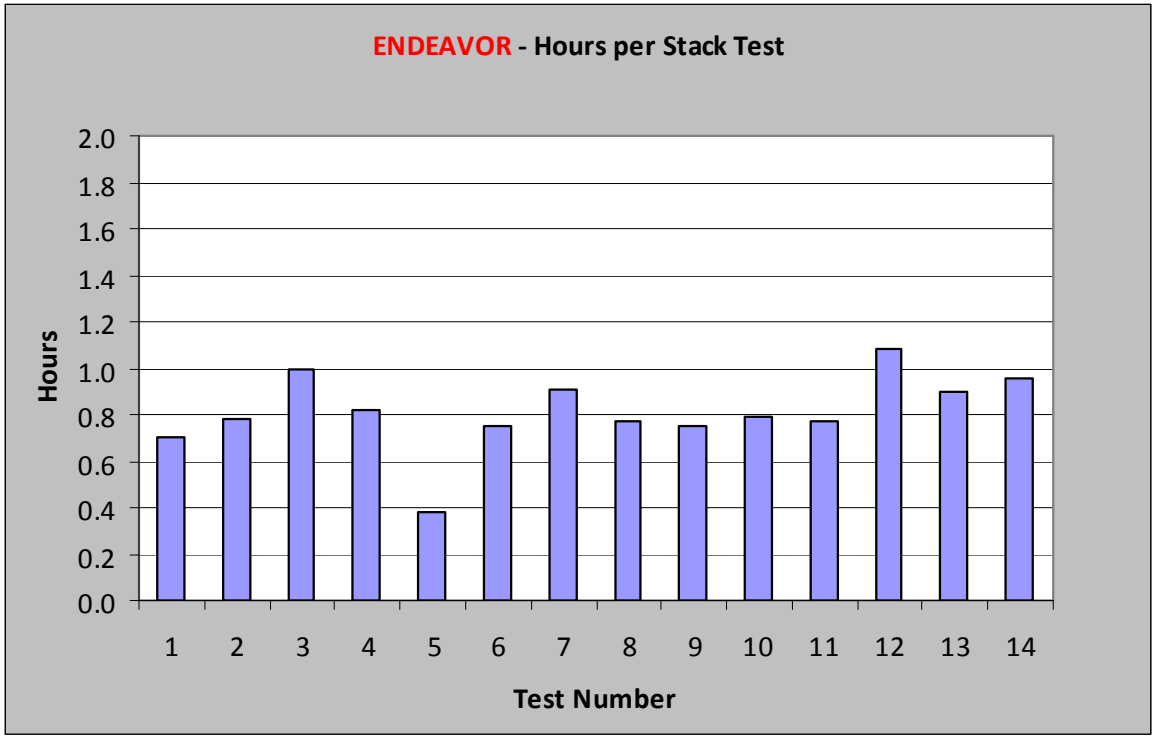
Background & Scope

- Excessive BOP testing times on Ocean Baroness
- Consistent performance on Ocean Endeavor
- What are we doing differently?

- Review, compare & analyze data
- Make recommendations & implement
- Identify Best Practices

Endeavor – Average Hours per Stack Test

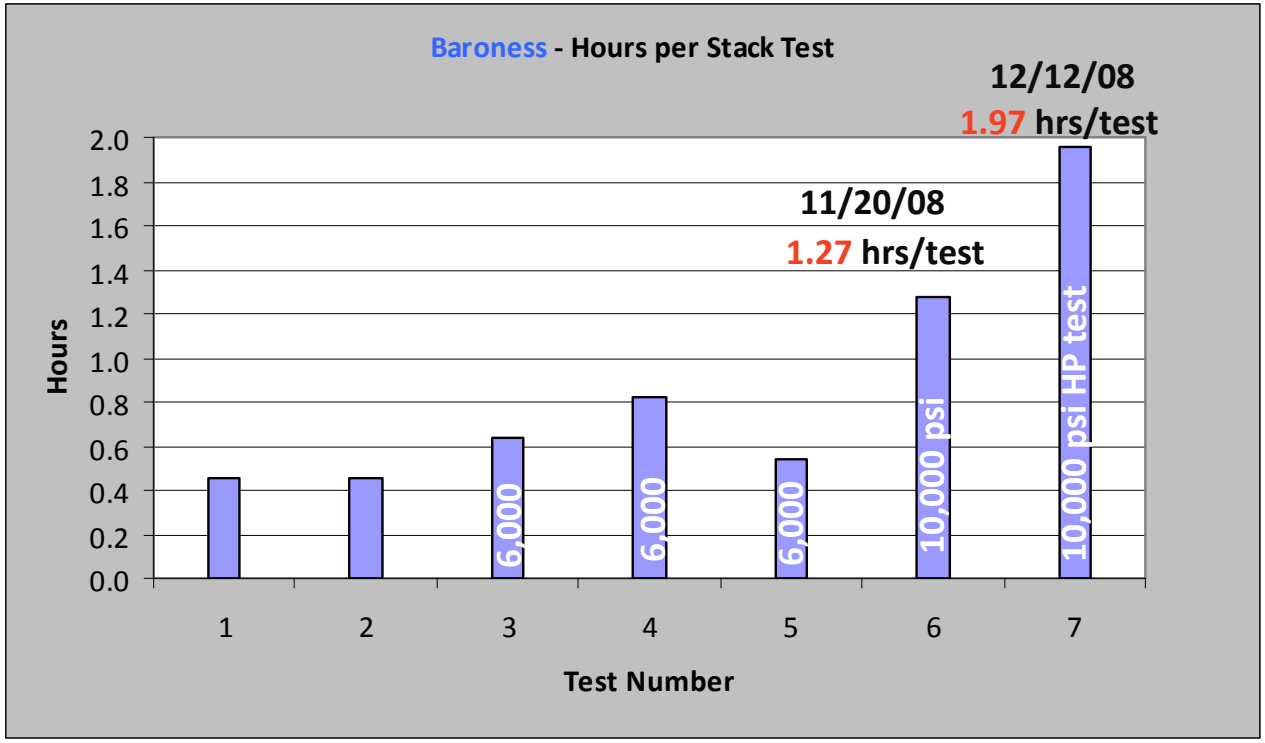
~ Entire Jack 3 Well



- Protected choke manifold; tests are performed off-line when possible
- Consistent performance – **(0.9 hrs/test)**

Baroness – Average Hours per Stack Test

~ Bass well to date



- High Pressure = 10,000 psi on Tests #6 and #7
- Excessive time on Test #6 and #7
- Why??

Preliminary Conclusions

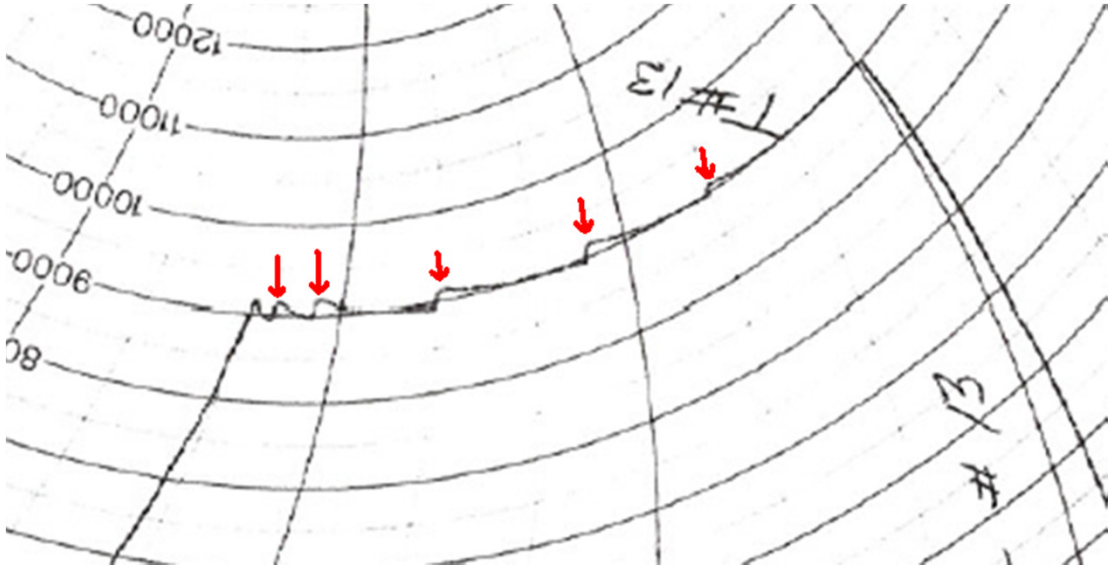
Causes of Excessive BOP Test Time on Baroness

1. Unprotected choke manifold; all tests over 10,000 psi must be on-line

2. Inefficient pump operation (see following slides for examples)

Efficient Pump Operation on Endeavor

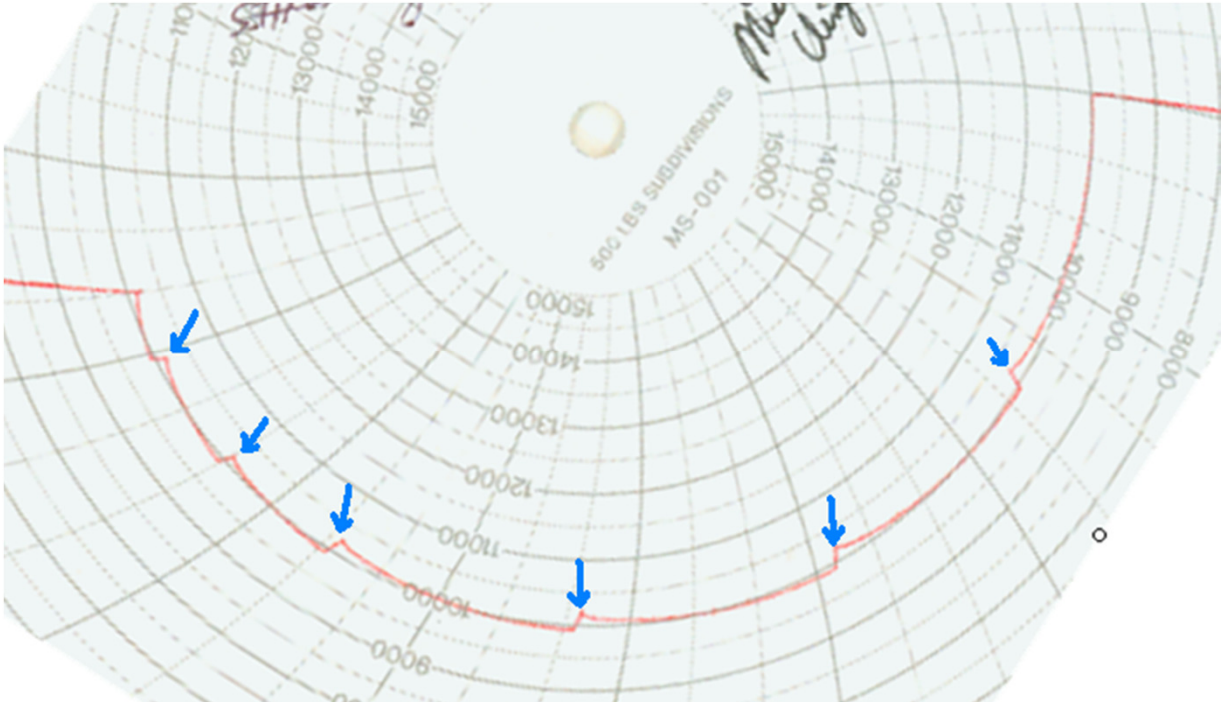
~ Test #13 to 9,000 psi on 10/28/08



- Endeavor operator bumps pressure 5 times in ± 25 min as soon as a rapid decline is noticed
- **More efficient method of compressing synthetic base mud**
- Good test in 35 min

Inefficient Pump Operation on Baroness

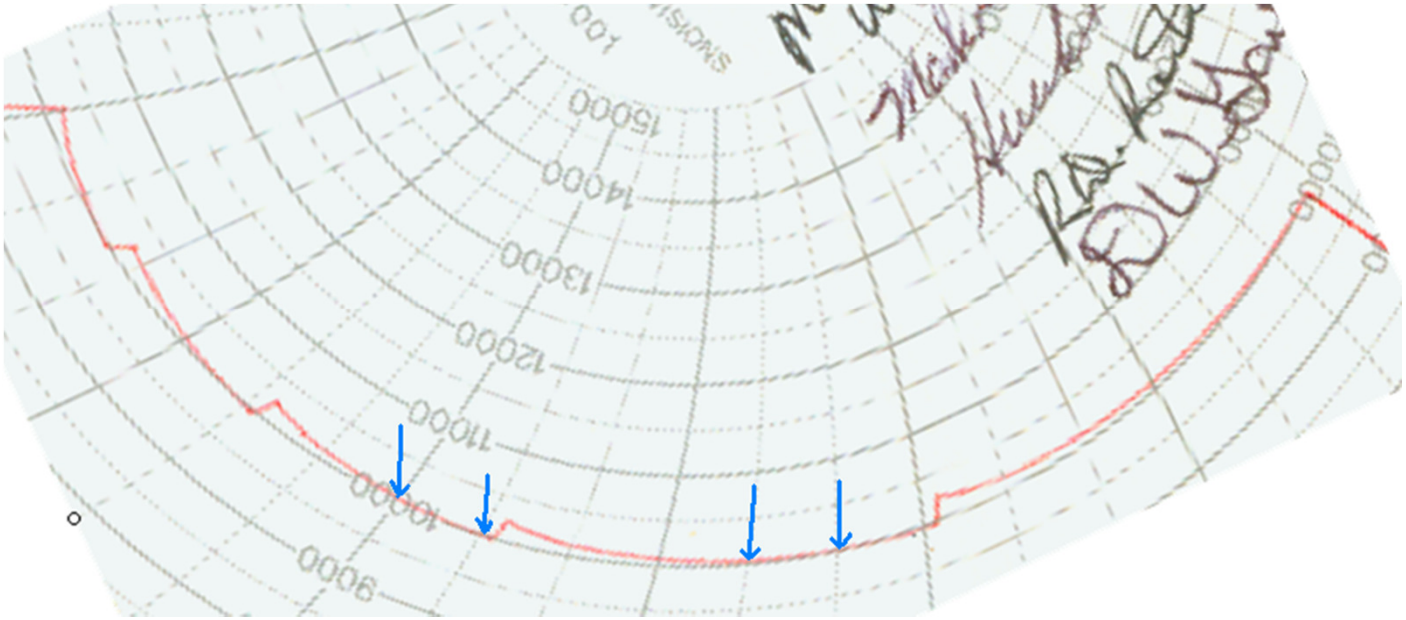
~ Test #6 to 10,000 psi on 12/13/08 (1.97 hrs/test)



- Operator bumps pressure 5 times in ± 65 min (half the frequency of Endeavor)
- Baroness operator waiting too long to bump up pressure
- Good test in 125 min (over twice as long as Endeavor)
- Same pattern seen when comparing most high-pressure tests

Inefficient Pump Operation on Baroness

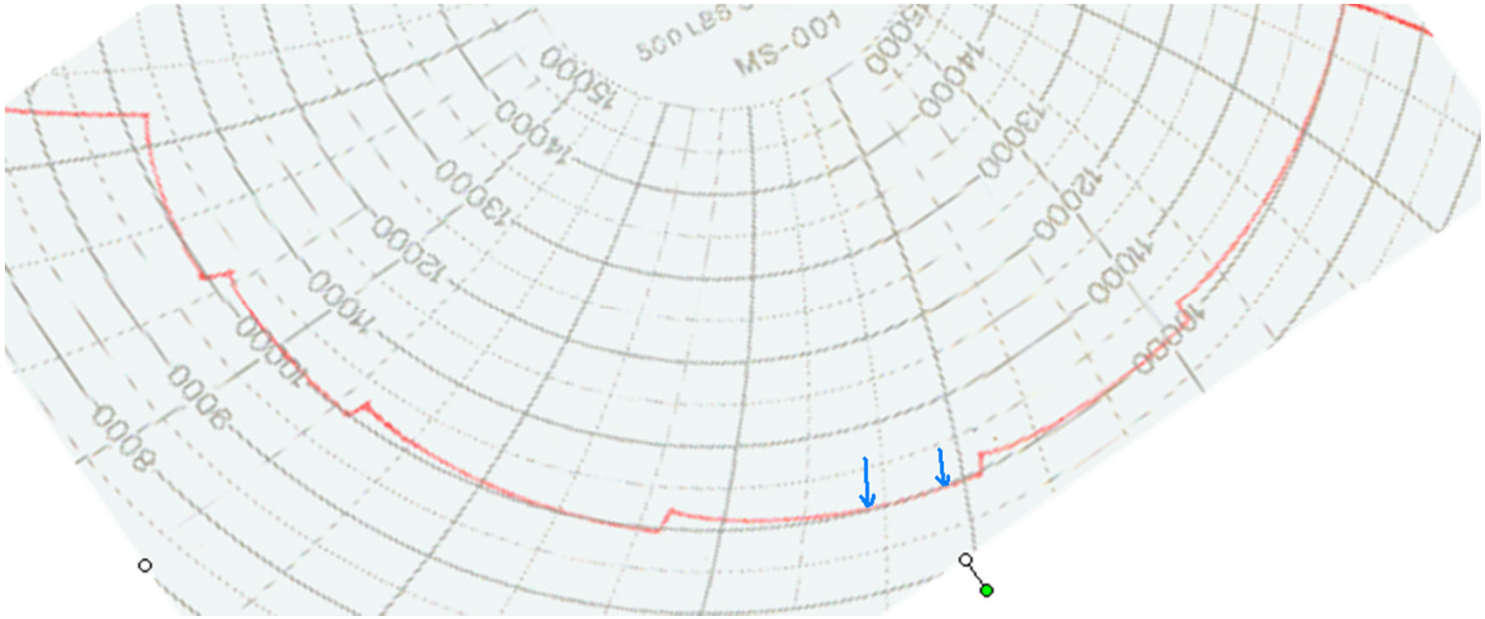
~ Test #8 to 10,000 psi on 12/14/08 (1.97 hrs / test)



- As per SLB operator on Endeavor, the 5 min high pressure test could have ended at either noted interval
- Baroness operator unnecessarily spent ± 55 min

Inefficient Pump Operation on Baroness

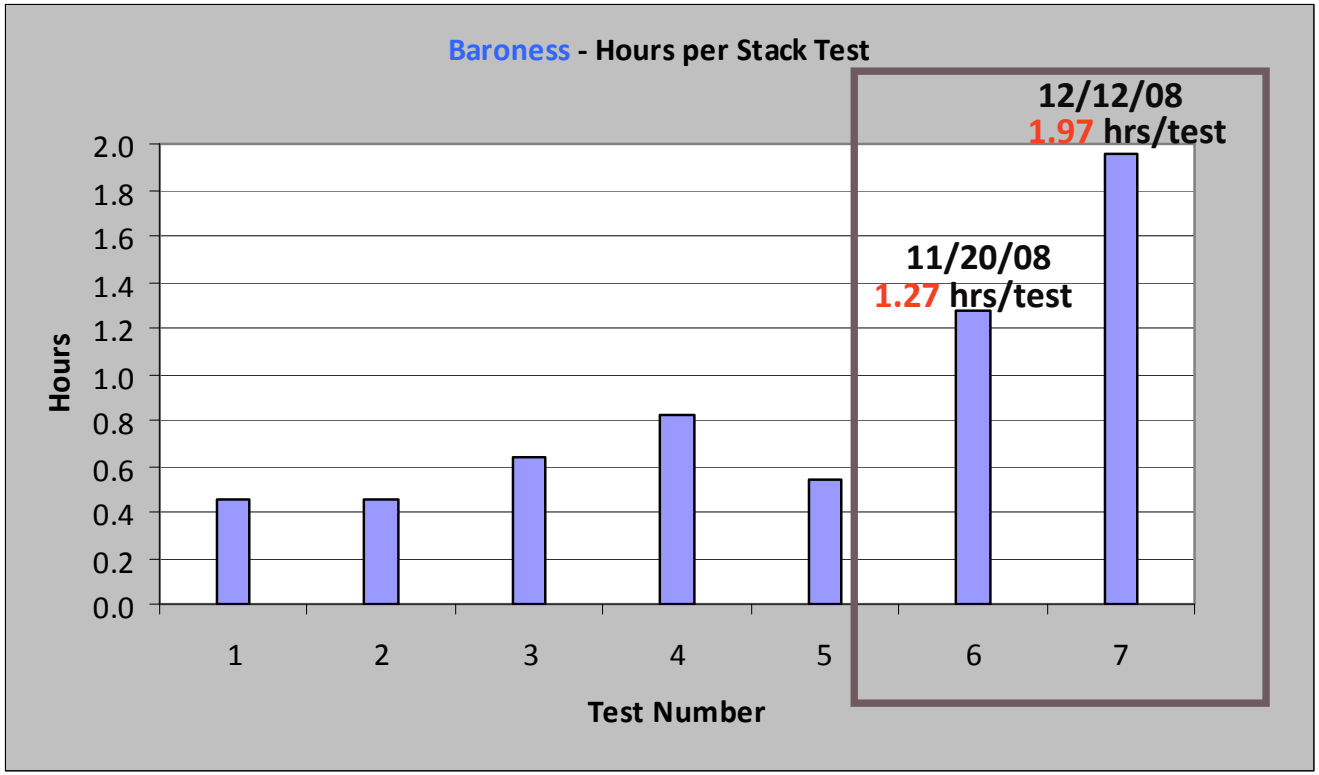
~ Re-test #9 to 10,000 psi on 12/14/08



- As per SLB operator on Endeavor, the 5 min high pressure test could have ended at the noted interval
- Baroness operator unnecessarily spent ± 40 min

On-line Test Optimization

Comparison of Baroness' tests #6 & #7



- Both tests to 10,000 psi using 14.9 ppg SBM
- At first glance test #6 looks much better than test #7
- However, test #7 total time was ~10 hours less than test #6
- This was done by combining component testing which reduced the total number of on-line tests performed from 19 to 11.

Team Recommendations

1. Review each rig's test charts with Baroness Halliburton pump operator & company men

2. Identify unacceptable decline more quickly and bump pressure (± 100 psi) more frequently (not an exact science)

3. HES to review test charts with MMS to better understand what makes a "good test"
   Note: MMS inspectors are invited to SLB quarterly safety meetings to review test requirements

4. Use water in surface lines and cement unit to minimize compression time

5. Optimize on-line testing.
   - Maximize number of tests performed off-line
   - Combine on-line tests to test multiple components at once
   - Post-job evaluation: Evaluate number of tests performed and time per test to find optimal testing procedure

6. Investigate modifications that would allow for off-line high pressure testing on Baroness

7. Review performance of next BOP test on Baroness (due 12/28/08)

8. Identify Best Practices

Contact Information

Safety tip of the day:
BE SURE TO OPEN RAMS BEFORE POOH

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