








Chesapeake ENERGY

FISH BYPASS UTILIZING SDI MAGTRAC RANGING

2013 AADE NATIONAL TECHNICAL CONFERENCE

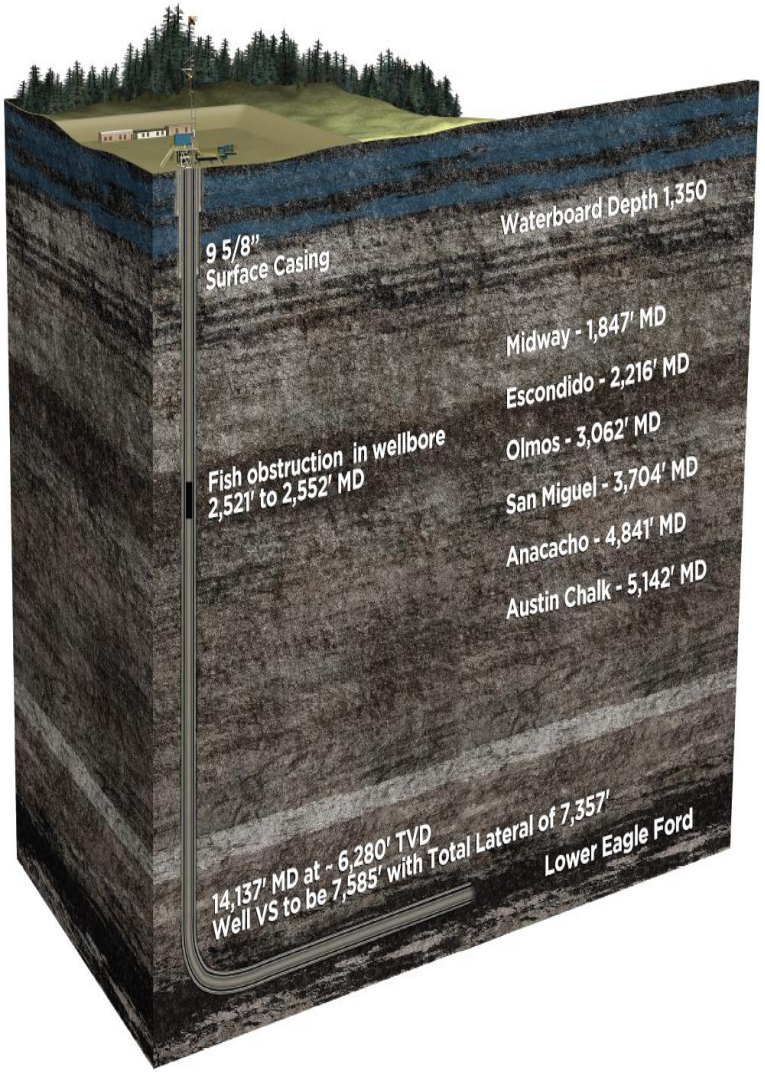
CHESAPEAKE ENERGY CORPORATION
JASON E. STIDHAM – SR DRILLING ENGINEER

PRESENTATION AGENDA



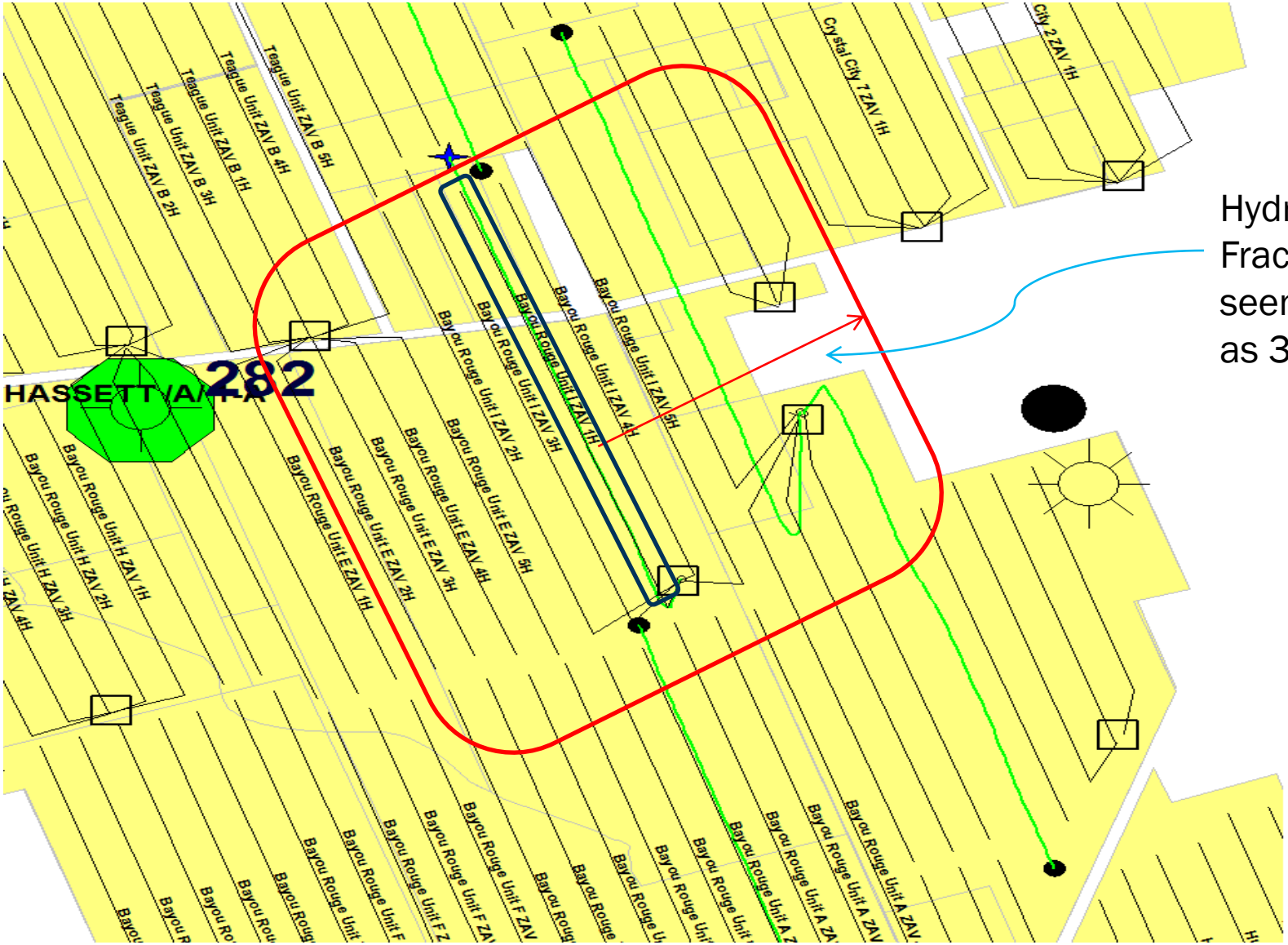
- **Discussion of Problem**
  - › Large Exposure Area
    - – Vertical and Horizontal
- **Severe Consequences for Failure**
  - › Huge Economic Impact
  - › Unknown Liability with TRRC
- **History of Well Operations and Fishing**
  - › Exhausted all Fishing Options
- **Description of SDI MagTraC Ranging**
  - › Tools
  - › Planning
  - › Execution of Plan
    - – Accuracy and Patience is Key
- **Questions**

BAYOU ROUGE UNIT I ZAV 1H



- **Well was TD'ed on 8/14/2012**
  - 9 5/8" Casing: 1,525' MD
  - TD: 14,177' MD
  - Total Lateral : 7,357'
  - Average TVD : ~6,250'
  - 16 Drilling Days to TD
  - Cost at TD $1,974 MM
  - Projected RR Cost $2.607 MM
- **Final Actual Results**
  - Rig Released on 9/18/2012
  - Cost at RR $5.924 MM
  - Cost at End of Fishing: $3.989MM
  - Cost at End of Mag Track Re-Entry $4.744MM
- **Well History after TD**
  - 8 ½ Hour CUC Performed
  - TOOH to 4,556'
  - Backream from 4,556' to 2,552'
  - Pulled Tight and Packed Hole off
- **Very Extreme Situation**
  - Open, Unprotected Hole
  - Multiple Exposed, Potentially Productive Reservoirs

SEVERE RESERVOIR IMPACTS – POTENTIAL EFFECT OF STIMULATION



FINANCIAL IMPLICATIONS FOR FAILURE

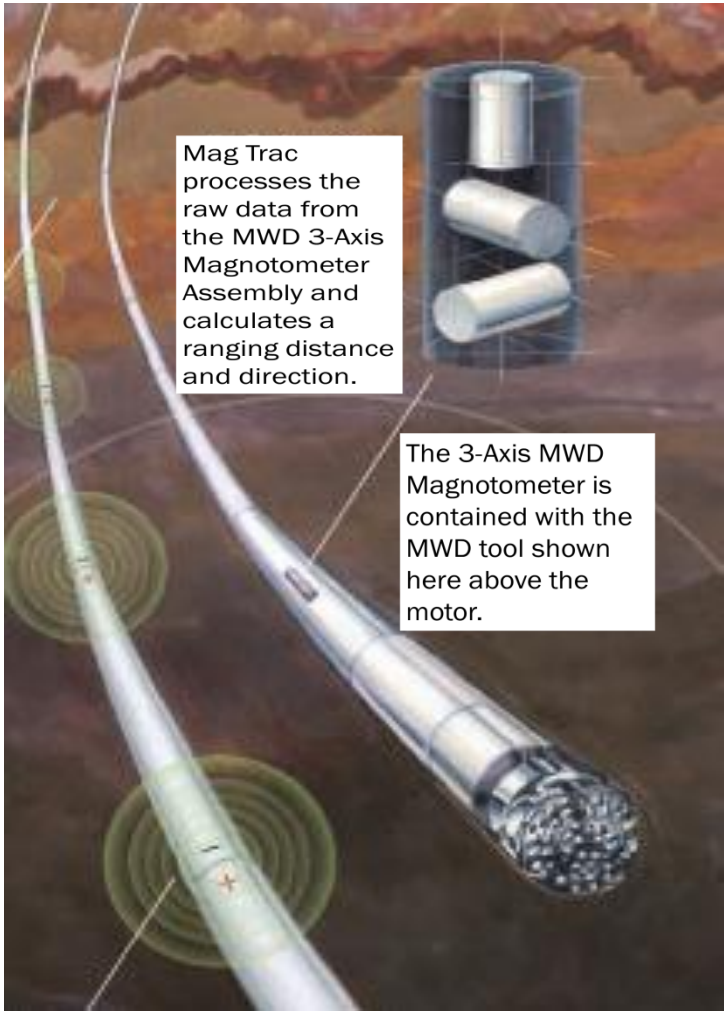
	GEUR Oil (MBO)	GEUR Gas (MMCF)	Present Undiscounted Value (M$)
Initial Wellbore	228	393	$5,532
Initial Wellbore & 2 Offsets	684	1,179	$16,596
Initial Wellbore & 11 Offsets	2,736	4,716	$66,383
*Assumes Shallow Oil Proforma Type Curve & Pricing 11/28/2012			

* This Information presented here accounts only for Eagle Ford Wells.
* Any potential uphole reserves/production was not taken into account.
* What would CHK need to accomplish to satisfy TRRC?
  - Huge Unknown

HISTORY OF FISHING OPERATIONS

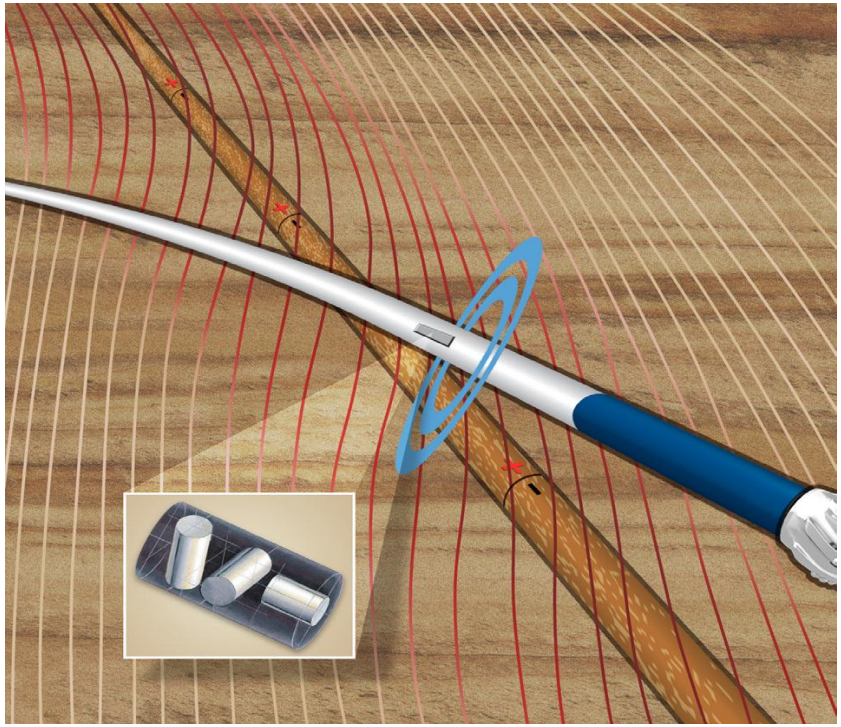
- Freepoint showed free pipe at 1,600’ MD
- Back off at 1,442’ MD, TIH Fishing Assembly and Jar
  - Jar for approximately 24 Hrs – Unsuccessful
- Wash over Fish from 1,478’ to 2,171’ and began to free up
- Freepoint showed pipe stuck at 2,386’ MD (Top of Monel Collar)
- TIH with Fishing Assembly and Jar with no success
- Back off DP leaving 1 Jt of DP and Directional BHA in hole
- Wash over Fish from 2,474’ MD to 2,519’MD, which is top of IBS on Motor
- Attempt to mill off blades off of IBS, which resulted in leaving Burn Shoe in Hole
- Back off Monels and UBHO Sub leaving IBS looking up with Burn Shoe
- Milled up IBS blade section and burn shoe
- Attempted to wash down around bottom section of IBS and Motor, lost second burn shoe
- TIH with Fishing Assembly and attempted to Jar; no success gripping fish.
- Only options left –
  - Mill up the entire motor $$ (Possibly have a blind sidetrack occur anyway)
  - Sidetrack around and re-enter wellbore directly below fish.

SDI – MAG TRAC SERVICE



- **Mag TraC Service**
  - No Special Tools Required
  - Any Raw MWD Data will work
  - Patent on Computer Algorithm
    - Magnetic Interference
    - Distance and Bearing Output
- **Detailed Directional Plan**
  - Sidetrack and Projected Re-Entry Point
    - Exit Wellbore with whipstock
    - Enter Wellbore directly at Bottom of fish
  - Use Anti Collision to track Fish
  - Re-Adjust Plan as needed with Ranging Service
- **Unique CHK Process for Re-Entry**
  - Drill in 5 Foot Intervals at Specific Toolface
  - 2 Separate Survey Runs between drilling intervals
    - MWD for Magnetic Interference
    - Gyroscopic for Wellbore Position
  - Process Raw MWD Data to confirm Fish Position
  - Re-Adjust Directional Plan as needed

CHALLENGES TO OVERCOME



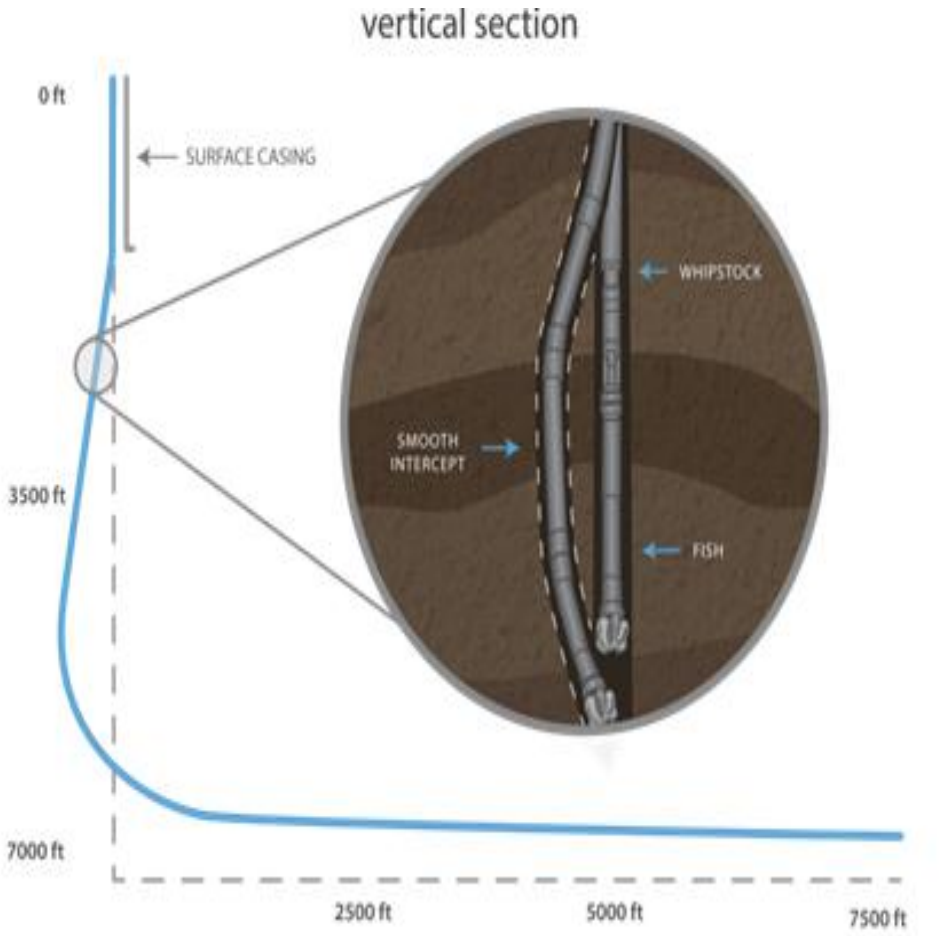
- **Length of Fish**
  - Exit and Re-Enter Wellbore in ~30'
  - No room for error
  - Fish is the antenna
- **Whipstock Composition**
  - Too much Interference
  - Good Ranging 3' to 4' below whipstock
- **Accuracy of the Algorithm**
  - +/- 10% Distance to the Target
  - +/- 5 Degrees of Toolface Direction
- **Survey Inaccuracies/Differences**
  - Gyro vs.MWD readings
  - Significant Digits
    - 3" Difference in 1 vs. 2 Sig. Digits in Gyro

Difference of 8.25' @ same TVD or 4" per 100' Drilled

Gyro	2,512' MD	7.40 Inc	189.77 Az	2,507.92' TVD	-90.25 N/S	-27.21 E/W
MWD	2,512.5' MD	7.57 Inc	190.55 Az	2,507.92' TVD	-98.20 N/S	-29.40 E/W

JOB EXECUTION

1. Gyro Survey to Top of Fish
2. Set Whipstock Oriented HS
3. Directional Plan devised with Re-Entry Point based on Walk Tendency
4. Sidetrack Process
    1. Drill in 5 Foot Intervals
    2. 2 Survey BHAs in Derrick
    3. All Surveys within 5 Foot of Bottom
5. Intercepted Fish 4’ High
    1. Algorithm Limitations
    2. Predicting what is Ahead
    3. Plan for Center not Wall
6. Chattered down Motor to PDC Bit
7. Drilled Toolface 90 Degrees Right of Fish past PDC Bit
8. Turrned Toolface Back and Re-Entered Existing Wellbore
9. Clean-out run was made to Bottom
10. Casing was ran and cemented with no issues.



QUESTIONS

