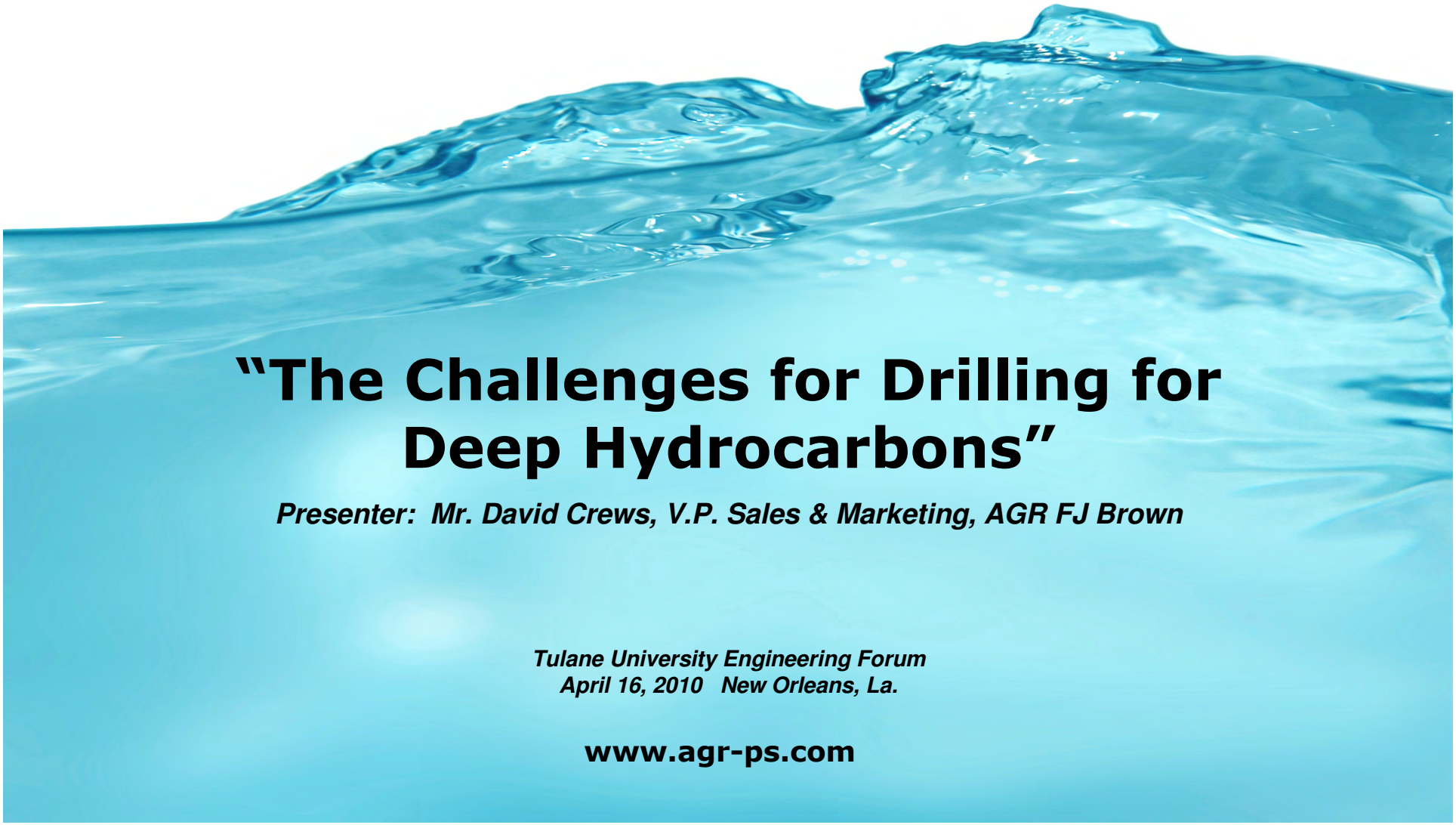


"The Challenges for Drilling for Deep Hydrocarbons"

Presenter: Mr. David Crews, V.P. Sales & Marketing, AGR FJ Brown

Tulane University Engineering Forum
April 16, 2010 New Orleans, La.

www.agr-ps.com

CREDITS

AGR FJ Brown would like to thank James R. Moffett and William R. Richey with McMoRan Exploration Company for their support on this presentation

CREDITS

The last true wildcatter……

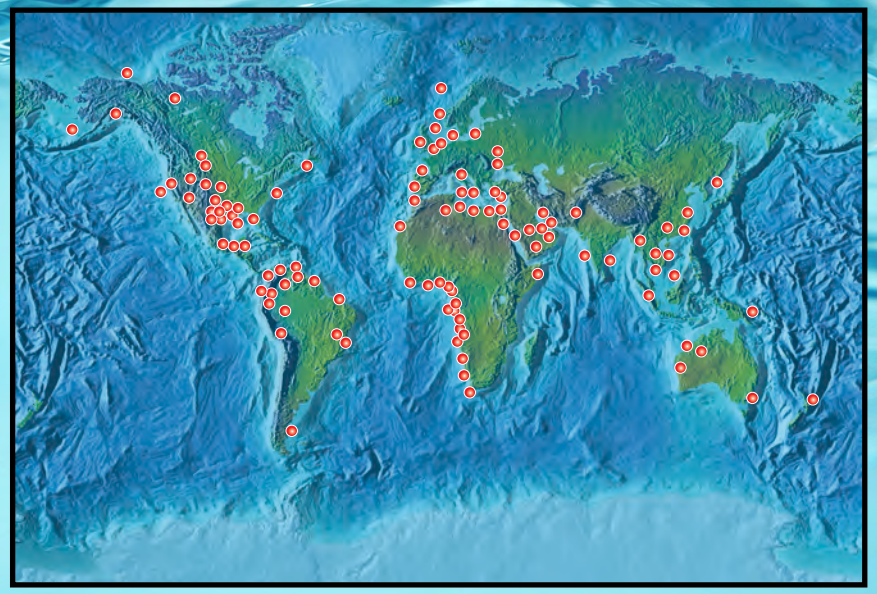
James R. "Jim Bob" Moffett

"Tex, we got it."

EXPERTISE

AGR FJ Brown, a member of the AGR Petroleum Services family of companies

Provided drilling and completion engineering support, complete drilling management teams and on-site drilling supervisors for nearly 25 years



Over 130 clients in 56 countries

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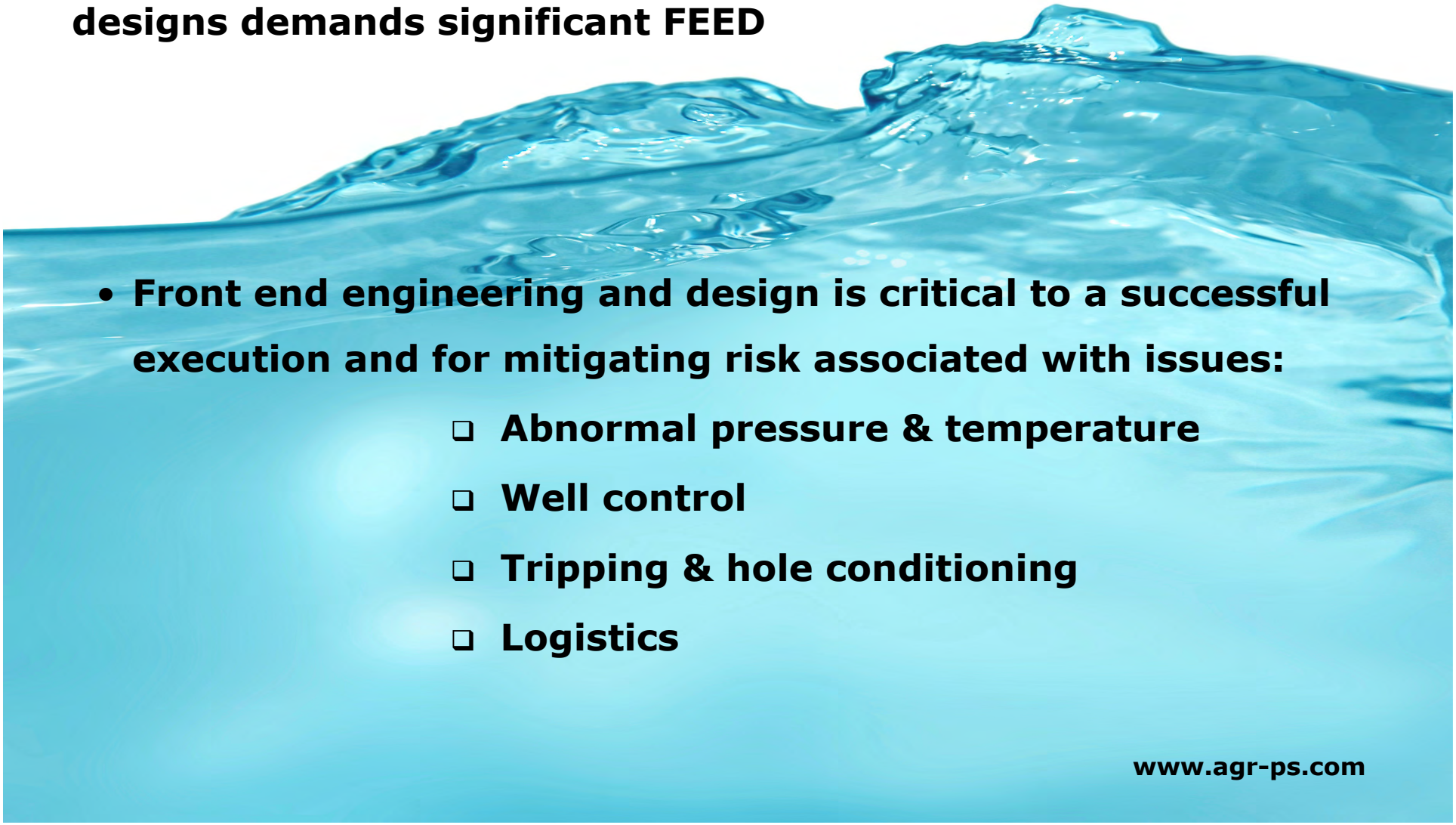
EXECUTION (FEED)

Successful execution of complex HPHT well designs demands significant FEED



- **Front end engineering and design is critical to a successful execution and for mitigating risk associated with issues:**
  - **Abnormal pressure & temperature**
  - **Well control**
  - **Tripping & hole conditioning**
  - **Logistics**

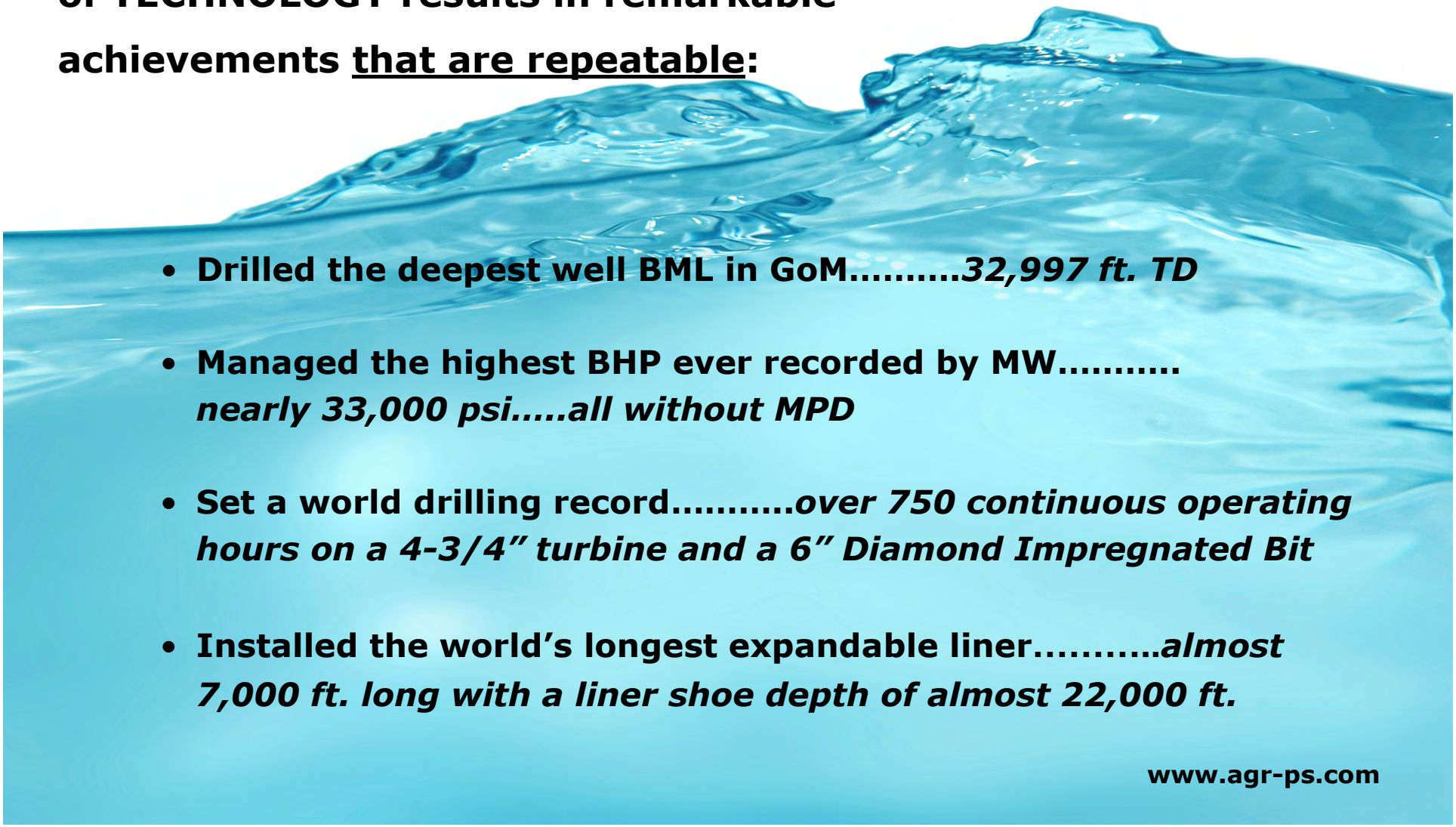
EXECUTION (TECHNOLOGY)

Successful execution of complex HPHT well designs demands unique combinations of COTS *and* enabling TECHNOLOGY

- **Combining commercial off the shelf technologies in unconventional ways and incorporating enabling technologies into well designs play critical roles in successful executions**

EXECUTION (Results)

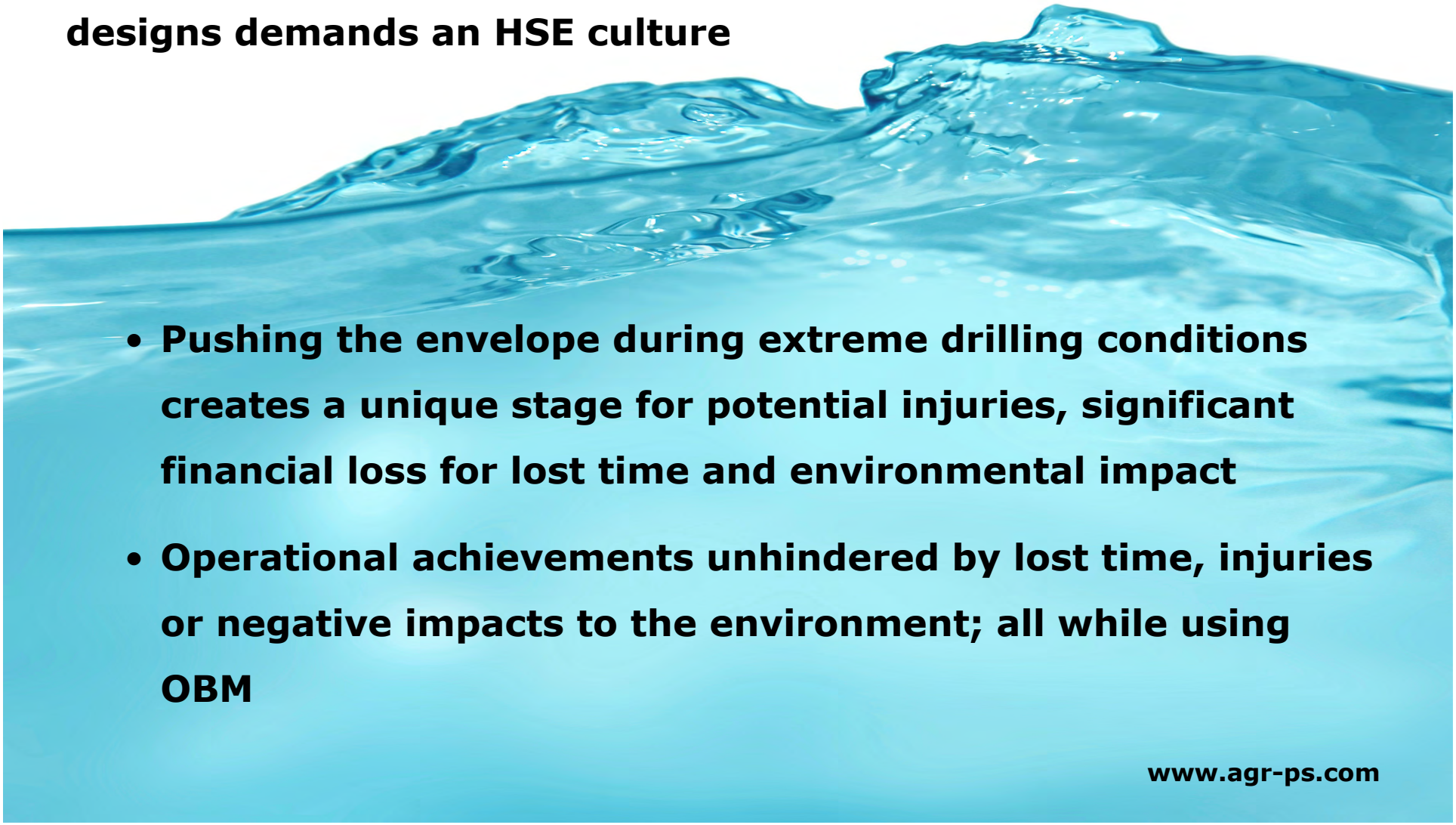
Proper execution of FEED work and the optimization of TECHNOLOGY results in remarkable achievements <u>that are repeatable</u>:



- **Drilled the deepest well BML in GoM……*32,997 ft. TD***
- **Managed the highest BHP ever recorded by MW…… *nearly 33,000 psi…..all without MPD***
- **Set a world drilling record……*over 750 continuous operating hours on a 4-3/4" turbine and a 6" Diamond Impregnated Bit***
- **Installed the world's longest expandable liner……*almost 7,000 ft. long with a liner shoe depth of almost 22,000 ft.***

EXECUTION (HSE)

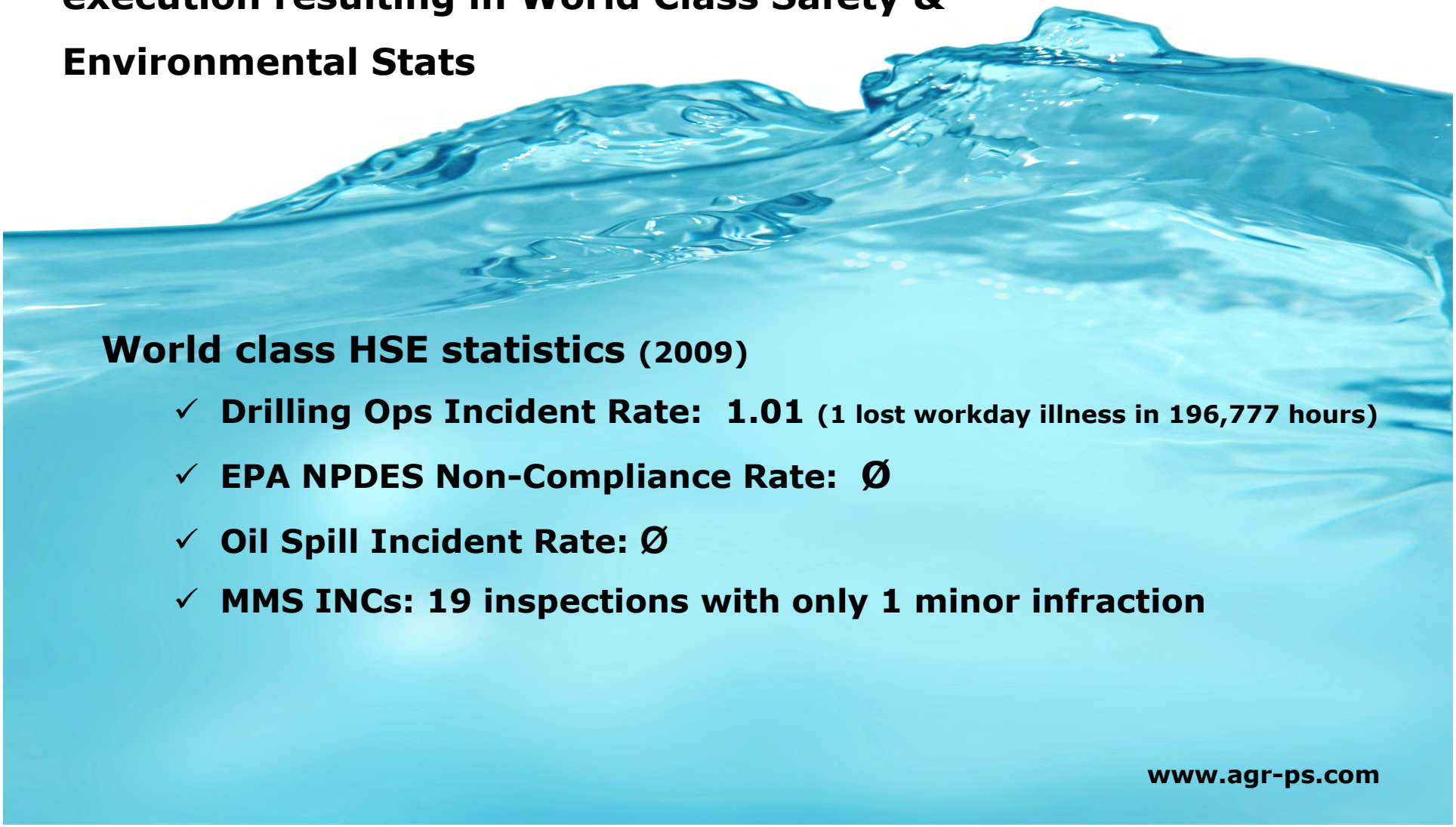
Successful execution of complex HPHT well designs demands an HSE culture



- **Pushing the envelope during extreme drilling conditions creates a unique stage for potential injuries, significant financial loss for lost time and environmental impact**
- **Operational achievements unhindered by lost time, injuries or negative impacts to the environment; all while using OBM**

EXECUTION (Results)

Embracing an HSE culture allows risk managed execution resulting in World Class Safety & Environmental Stats

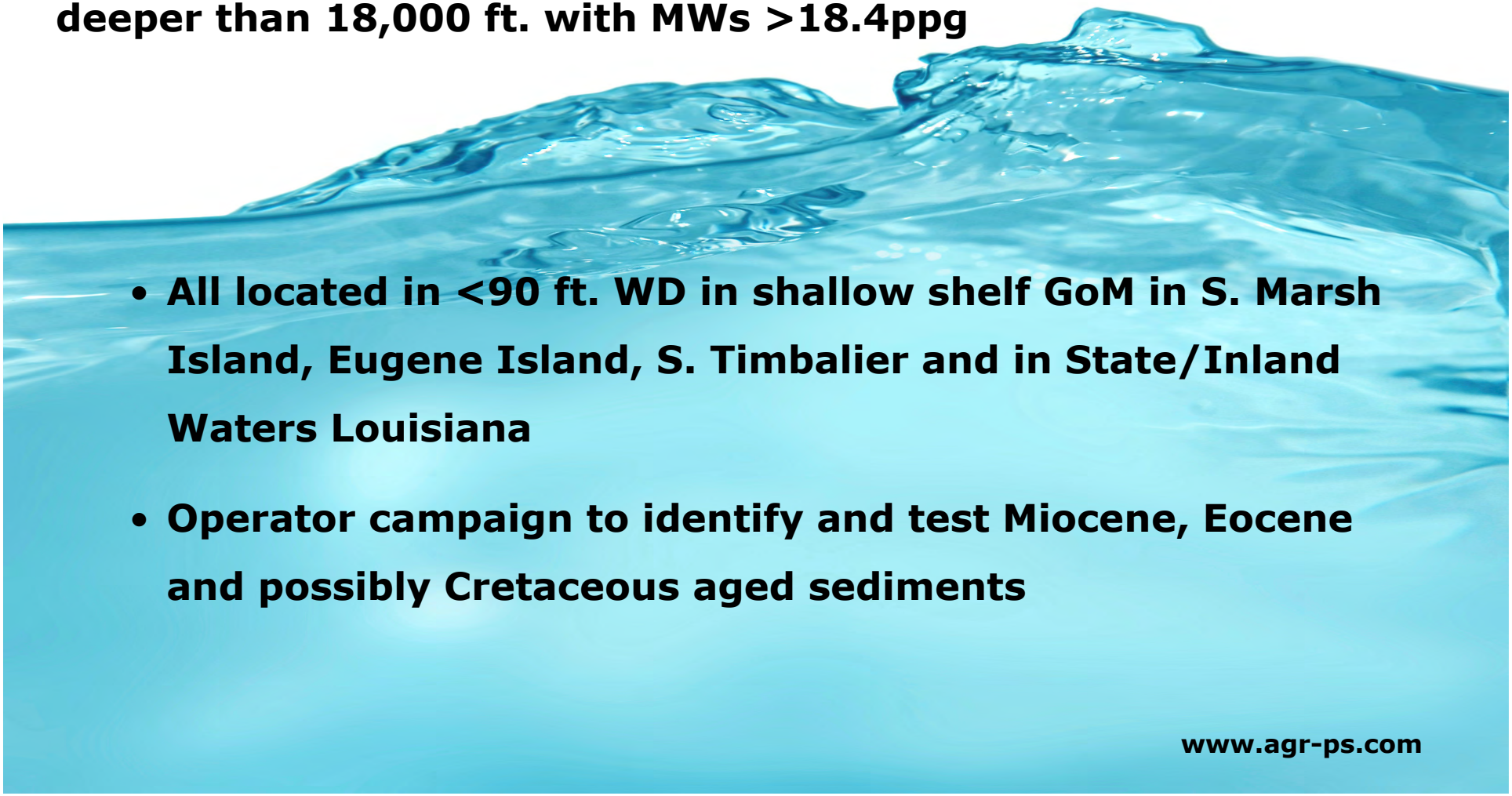


World class HSE statistics (2009)

- ✓ **Drilling Ops Incident Rate: 1.01 (1 lost workday illness in 196,777 hours)**
- ✓ **EPA NPDES Non-Compliance Rate: Ø**
- ✓ **Oil Spill Incident Rate: Ø**
- ✓ **MMS INCs: 19 inspections with only 1 minor infraction**

ULTRADEEP SUMMARY

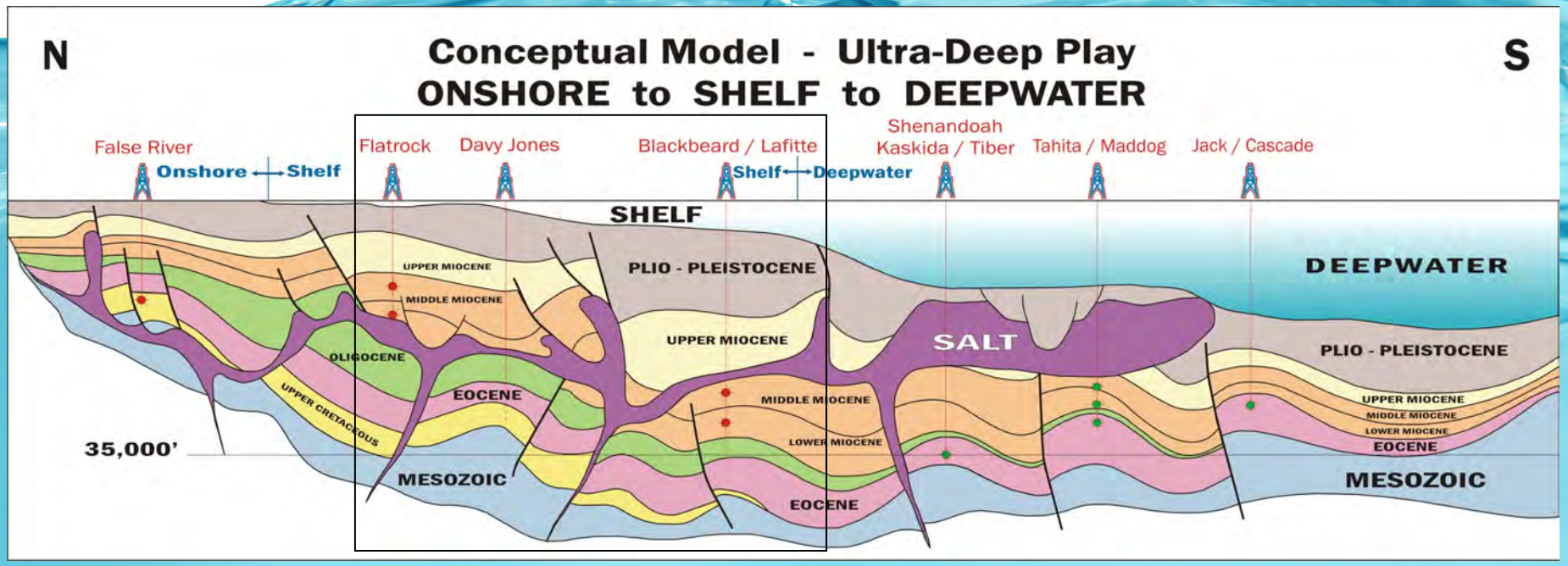
Since 2004, 12 wells drilled to TDs ranging from 20,046 ft. to 32,997 ft. BML……Over 35 wells deeper than 18,000 ft. with MWs >18.4ppg



- **All located in <90 ft. WD in shallow shelf GoM in S. Marsh Island, Eugene Island, S. Timbalier and in State/Inland Waters Louisiana**
- **Operator campaign to identify and test Miocene, Eocene and possibly Cretaceous aged sediments**

MISSING LINK

Data points on GoM shelf provide the missing links between the onshore and DW discoveries



BARGE RIGS

"Shallow" ultradeep wells drilled with barge rigs

- **Deepest TD 24,600 ft.**
- **Preferred specs**
  - ✓ **Minimum Hookload: 1,500,000 lbs.**
  - ✓ **Pumps: 3x 1700hp**
  - ✓ **Top Drive**

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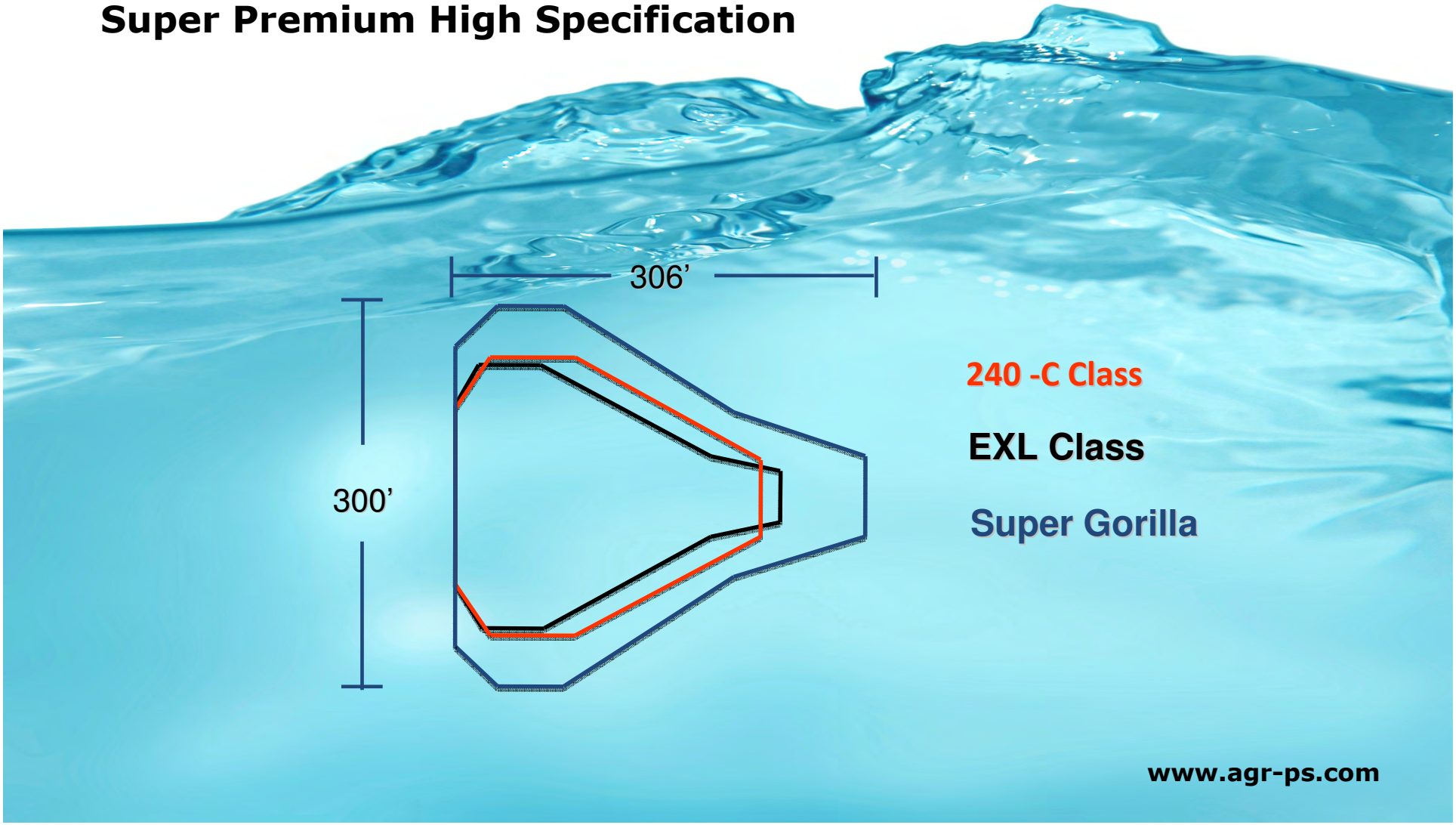
JACKUP RIGS

240-C Workhorse Class

Super Premium High Specification



JACKUP RIGS

Ultradeep wells drilled with

Super Premium High Specification Rig

- **Average 26,505 ft. TD**
- **Deepest 32,997 ft. TD**

	240-C Workhorse Class	Super Gorilla Class
Hookload	2.5M lbs.	2.5M lbs.
Cantilever Reach	80 ft.	100 ft.
#Mud Pumps/HP	3/3,000 HP ea.	3/3,000 HP ea.

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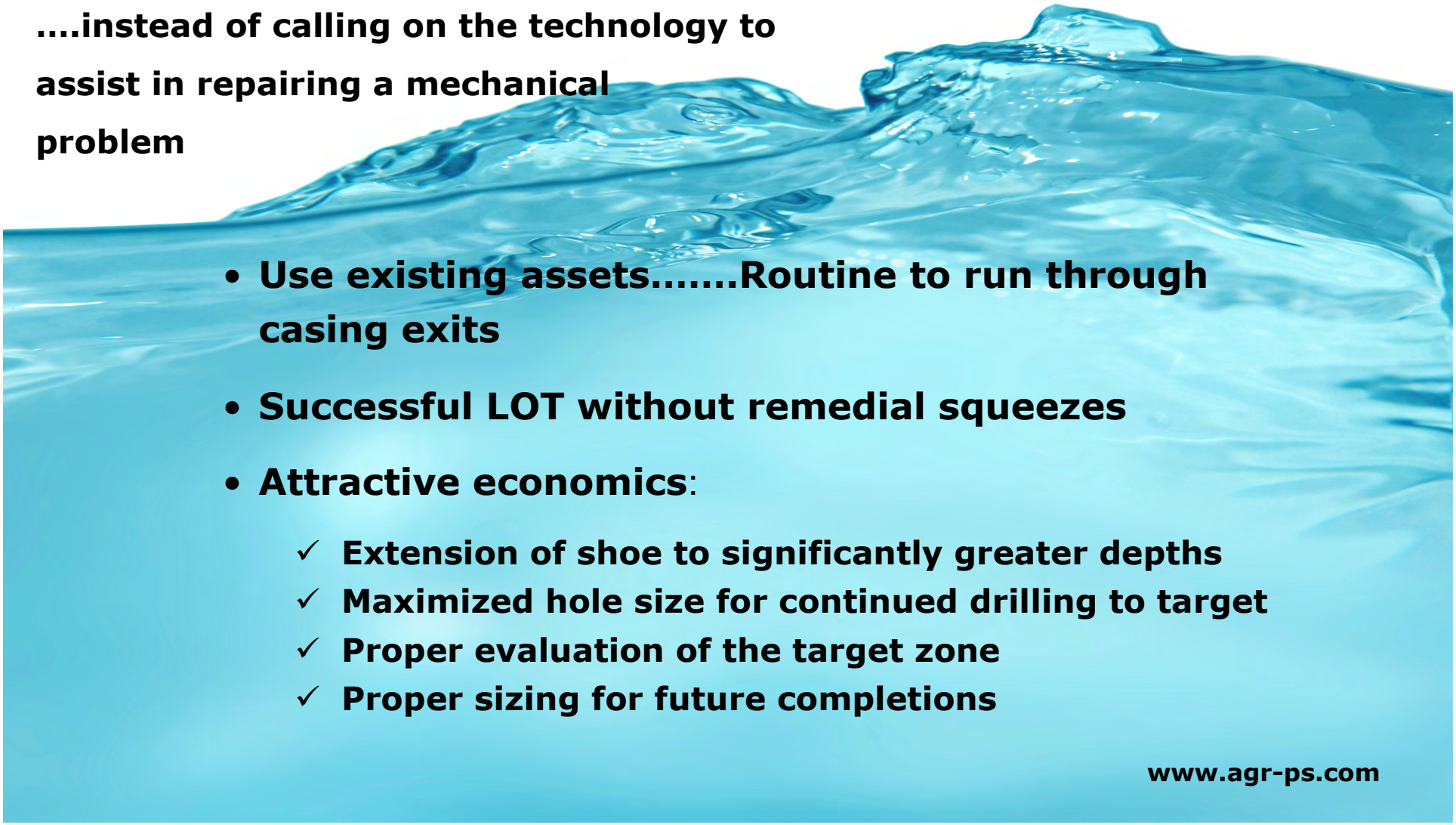
EXPANDABLES

The use of expandable technology is being incorporated into future well designs as an enabling technology……

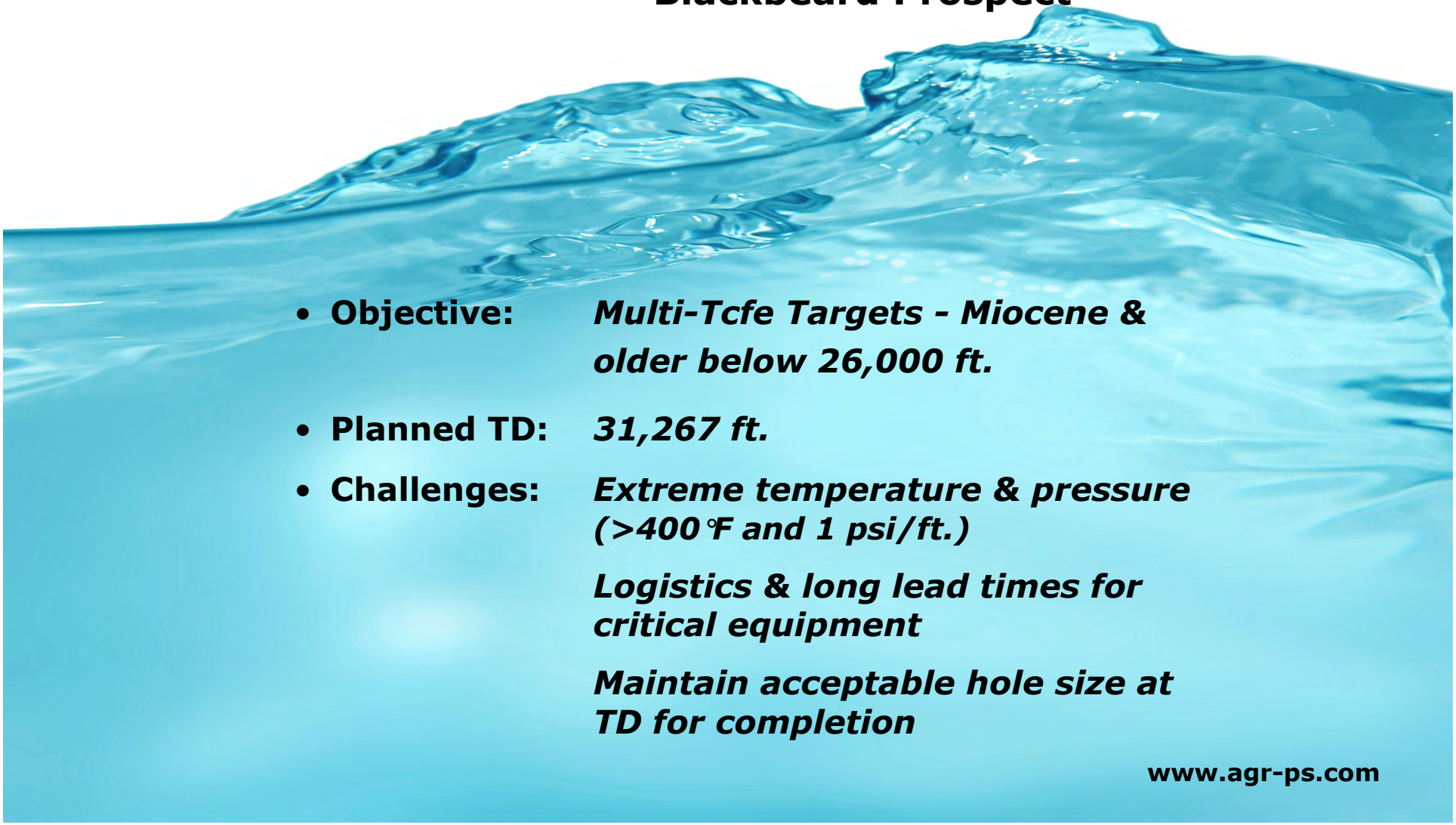
….instead of calling on the technology to assist in repairing a mechanical problem



- **Use existing assets…….Routine to run through casing exits**
- **Successful LOT without remedial squeezes**
- **Attractive economics**:
  - ✓ **Extension of shoe to significantly greater depths**
  - ✓ **Maximized hole size for continued drilling to target**
  - ✓ **Proper evaluation of the target zone**
  - ✓ **Proper sizing for future completions**

WELL DESIGN

Well Summary: S. Timbalier 168
Blackbeard Prospect



- **Objective:** ***Multi-Tcfe Targets - Miocene & older below 26,000 ft.***
- **Planned TD:** ***31,267 ft.***
- **Challenges:** ***Extreme temperature & pressure (>400°F and 1 psi/ft.)***

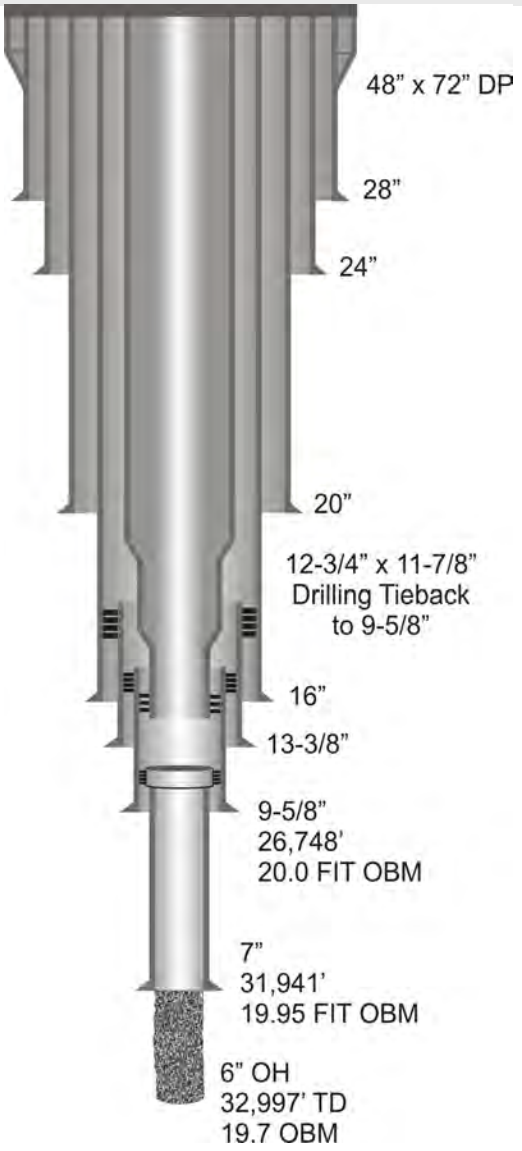
  Logistics & long lead times for critical equipment

  Maintain acceptable hole size at TD for completion

MEETING THE CHALLENGE

Well Summary: S. Timbalier 168
Blackbeard Prospect

- ✓ **Logged 4 potential hydrocarbon bearing zones….*all below 30,000 ft.***
- ✓ **Deepest well BML in GoM….*32,997 ft. TD***
- ✓ **Highest BHP ever recorded by MW…….. *nearly 33,000 psi…..all without MPD***
- ✓ **Set a world drilling record…….*over 750 continuous operating hours on a 4-3/4" turbine and a 6" Diamond Impreg Bit***



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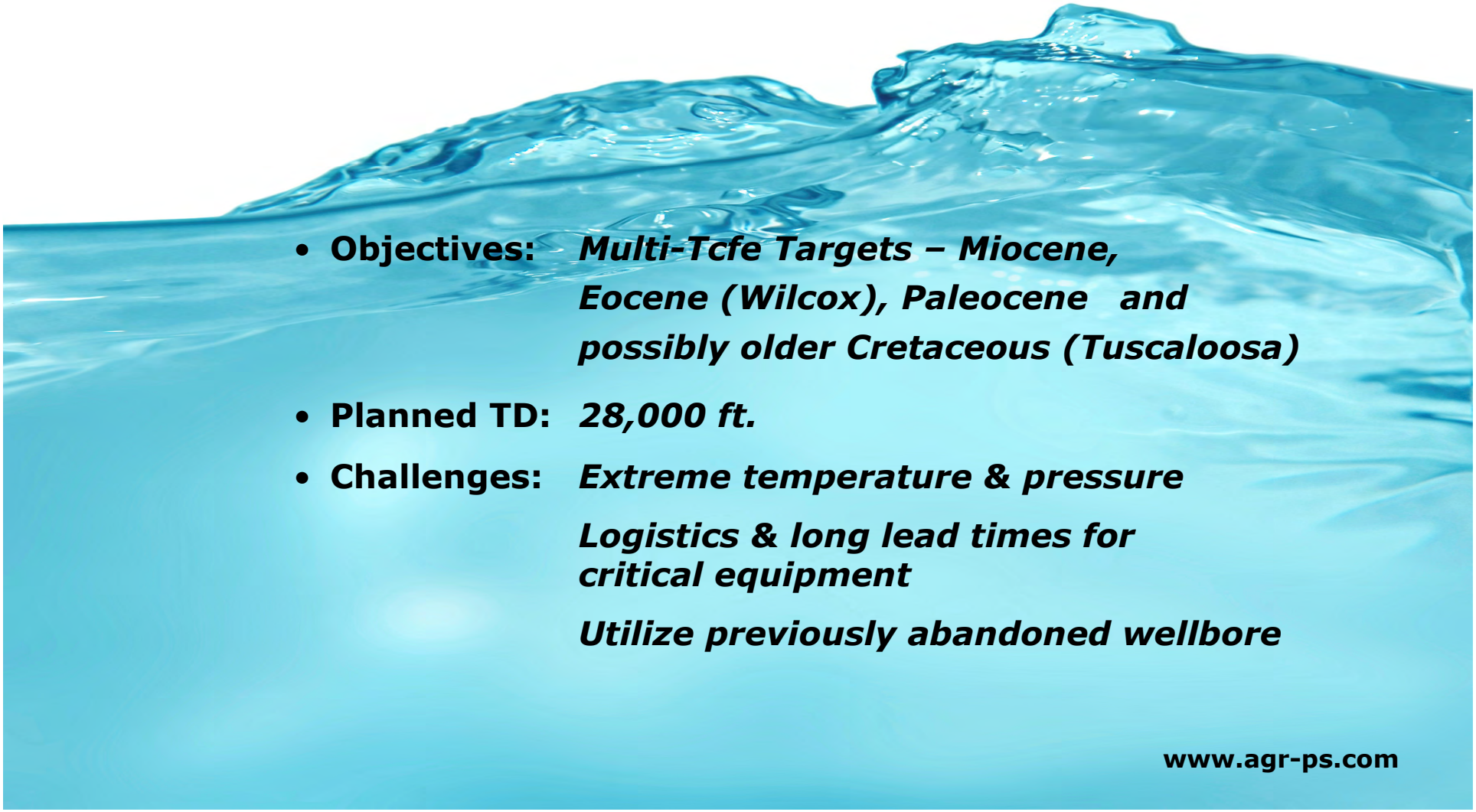
WELL DESIGN

Well Summary: **S. Marsh Island 230**
Davy Jones Prospect



- **Objectives:** ***Multi-Tcfe Targets – Miocene, Eocene (Wilcox), Paleocene and possibly older Cretaceous (Tuscaloosa)***
- **Planned TD:** ***28,000 ft.***
- **Challenges:** ***Extreme temperature & pressure***

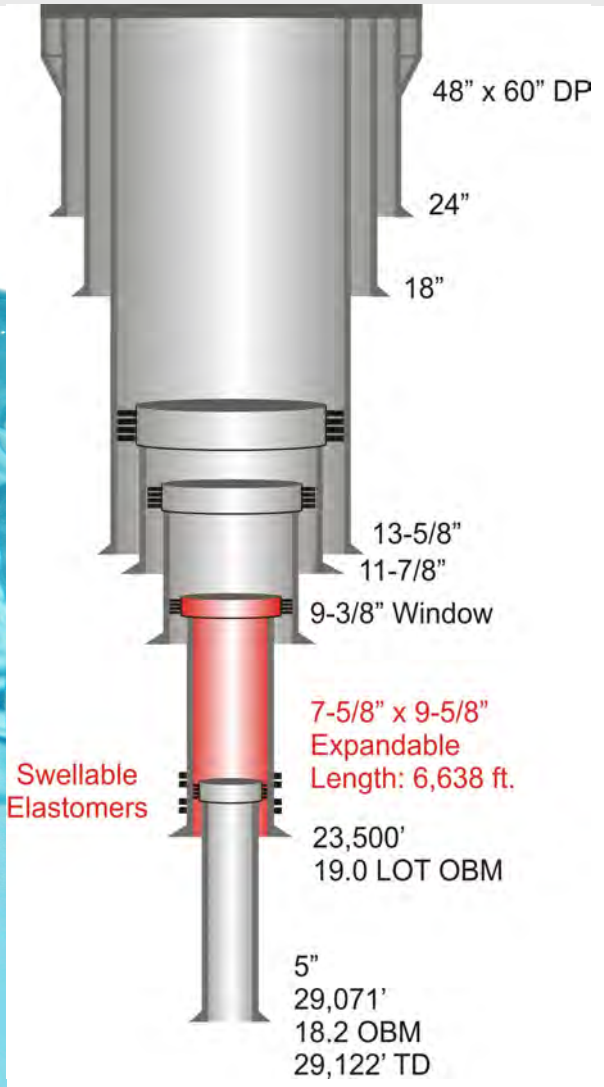
  Logistics & long lead times for critical equipment

  Utilize previously abandoned wellbore

MEETING THE CHALLENGE

Well Summary: S. Marsh Island 230
Davy Jones Prospect

- ✓ **Exceeded planned TD….*29,122 ft. TD***
- ✓ **Existence of Wilcox-aged sediments and geologic model confirmed. Logged high quality, hydrocarbon bearing sands**
- ✓ **3rd longest expandable liner in the world…..2nd longest through a window…… 1st through a whipstock using an expandable openhole anchor with swellable elastomers……*almost 6,700 ft. long with a liner shoe depth of almost 24,000 ft.***



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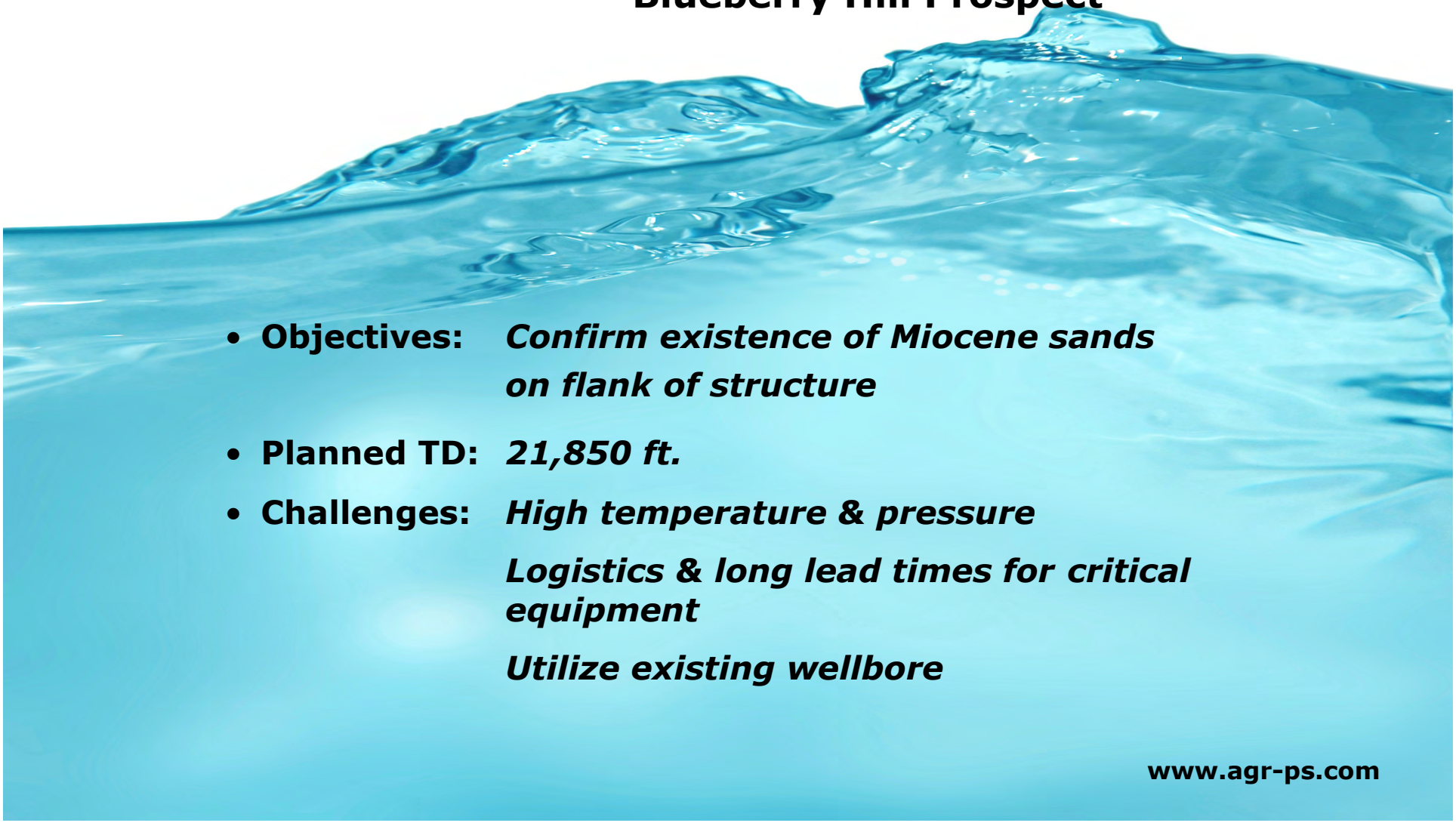
WELL DESIGN

Well Summary: **S. Marsh Island**
Blueberry Hill Prospect



- **Objectives:** ***Confirm existence of Miocene sands on flank of structure***
- **Planned TD:** ***21,850 ft.***
- **Challenges:** ***High temperature & pressure***

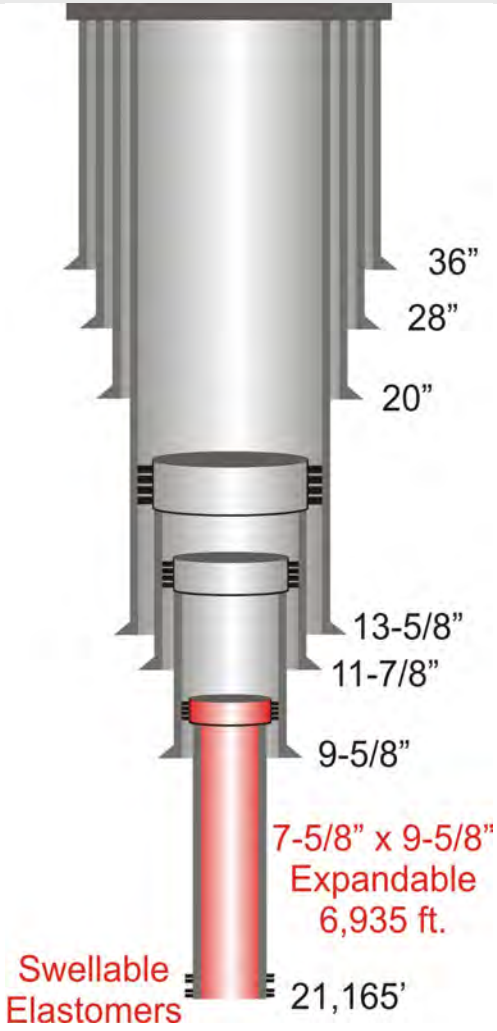
  Logistics & long lead times for critical equipment

  Utilize existing wellbore

MEETING THE CHALLENGE

Well Summary: S. Marsh Island
Blueberry Hill Prospect

- ✓ **Reached geologic TD….*23,208 ft. TD***
- ✓ **Existence of Miocene-aged sediments verified and confirmed thickening on flank of structure. Identified three hydrocarbon bearing sands**
- ✓ **Longest expandable liner in the world….. *almost 7,000 ft. long with a liner shoe depth of almost 22,000 ft.***

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Questions?
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