

# STOCKING the DECOMMISSIONING TOOL KIT



A Subsea Decommissioning Joint Industry Project [JIP]

*Keith Caulfield, P.E.  
Expert Advisory Group  
Endeavor Management*

**Endeavor**

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# Stocking the Decommissioning Tool Kit

A Subsea Decommissioning Joint Industry Project [JIP]  
Member Companies in the Project

## OPERATORS

- EnVen Energy Ventures, LLC
- ExxonMobil Production Company
- Freeport-McMoRan Inc. (FMI)
- Marubeni O&G US (MOGUS)
- Shell Exploration & Production
- Stone Energy Corporation
- Total E&P Research & Technology USA, LLC

## SERVICE COMPANIES

- Baker Hughes International / Aker Solutions Subsea Production Alliance
- GE Oil & Gas UK
- Halliburton Energy Services, Inc.
- Oceaneering International, Inc.

# History and Ground Rules of the Subsea Decommissioning JIP

*This JIP is a result of prior work done for the industry.*

In early 2015, Endeavor performed a STUDY for DECOMMISSIONING BENCHMARKING. Six respected international operators took part in the study.

- 2 Majors
- 1 Large Independent
- 1 Small Independent
- 2 National Oil Companies

Petrobras was the primary sponsor of the study.

The study covered decommissioning worldwide. (next slide)

The study uncovered several common issues which were of concern to the participants moving forward.

**This JIP has addressed these common issues, plus others that have arisen as the JIP progressed.**

# **Stocking the Decommissioning Tool Kit: “Ground Rules: RESPONSE”**

The JIP Study Member Companies Achieved the Following:

- Enthusiastic collaboration was the rule – not the exception.
- The Member Companies gave the JIP some of their most qualified personnel as SMEs.
- Today’s audience – and the dais – is dotted with Subject Matter Experts who participated in this JIP.
- The SMEs were encouraged by their Companies to freely communicate with Endeavor Leads.
- There was some restraint due to IP concerns, but it was not a major factor.
- Outside companies were generally receptive to talking to Endeavor Leads about the state of the industry.
- Each SME has had an ample opportunity to review the draft Report for their Issue.

# Stocking the Decommissioning Tool Kit: “What Does BSEE Say?”

A very common question as we got started, in most issues, was “What does BSEE say about this Issue?”

- Generally, BSEE is willing to discuss overall issues with the industry – that’s why they usually are at these shows.
- However, there are limitations on how much and how often they can do this.
  - BSEE is very busy
  - BSEE, while very knowledgeable, depends on industry to advance the state of the art.
  - Many of BSEE’s written regulations are from different environments [e.g., the shelf] than deep water. Some adapt well; some do not.
  - It is simply not BSEE’s job to tell us what to do; they are a review / approval organization.

This results in a fact of life that we realized over and over:

- To make a change for the better, it is the Industry that must lead the way.
- BSEE will work with us, but we must convince them through effective arguments, safe field practices, and convincing documentation.

# **Stocking the Decommissioning Tool Kit: The Issues**

# Issue A / Economic Comparison: Intervention Vessel Cost Model

- The goal of this initiative was to assemble intervention vessel information into a usable format, enabling reasonable cost-benefit analysis of the options on the market. This will include performing selected intervention/P&A tasks using four options:
  - light well intervention vessel with no riser [RLWI]
  - a vessel with a small bore intervention riser
  - MODU with full subsea riser system including subsea BOP
  - “Hybrid” user-defined case in which:
    - Multiple vessels handle a single well



[blog.heartland.com](http://blog.heartland.com)



[subseaworldpress.com](http://subseaworldpress.com) / aker



# Issue A: Economic Comparison of Vessel Types

a DECISION ANALYSIS Model has been built which allows:

- Comparison of THREE Vessel Types performing the abandonment of a deepwater completion in two water depths
- A FLEXIBLE, USER-ADJUSTABLE Model allowing thorough customer malleability
- Ability to ASSESS RISK using multiple types of analysis
- The user to build a HYBRID CASE in which:
  - More than one vessel performs a single abandonment
  - The user can return the Model back to pre-set values at any time
  - The user to customize a grocery list of inputs:
    - Day Rates
    - Fixed Costs such as Mob / Demob
    - Daily Variable costs
    - Costs for any given job task
    - Weather, Operational, and Surprise Risks
    - ... and many other factors

The screenshot displays the 'JIP Decommissioning - Issue A' model interface. At the top, it shows the total cost as \$10.61 million. The interface includes a 'User Control Panel for Model' with dropdown menus for 'Vessel Selection' (set to 'Lucky Haddock') and 'Water Depth' (set to '1000'). Below this, there are sections for 'Job Task Breakdown' and 'Hybrid Specifications'. The main part of the screen is divided into several data tables:

- # of Tasks Breakdown:** A table showing the number of tasks for various job types across different vessel types.
- Abandonment Tasks:** A detailed table with columns for 'WBS Element', 'WBS or Risk', 'MOU', and 'Hybrid Task'. It lists tasks like '1.0000 - 1.0000 - 1.0000' through '1.0000 - 1.0000 - 1.0000'.
- 600m Depth:** A table showing cost breakdowns for 600m depth, including 'WBS Element', 'WBS or Risk', 'MOU', and 'Hybrid Task'.
- 2200m Depth:** A table showing cost breakdowns for 2200m depth, including 'WBS Element', 'WBS or Risk', 'MOU', and 'Hybrid Task'.
- Specify Risk Factors:** A section for defining risk parameters like 'Weather Risk', 'Operational Risk', and 'Surprise Risk'.
- Cost Selections:** A table for selecting specific cost components for the analysis.

# Issue B Economic Study: MODU Capability for Non-MODU Price?

The intervention industry has historically used MODUs for most deepwater interventions, for 2 reasons:

- MODUs offer the best “tool kit” to deal with well unknowns
  - Drill pipe and rotation / torque
  - Coil Tubing
  - Wireline
  - Full mud / circulation capabilities
- MODUs are in the field, under long term contract, interventions used to bridge schedule gaps
  - However, the high price of MODUs keeps the industry looking for “back of a boat” methods, even though they are not quite as capable as a MODU.
  - **What if a way can be found to obtain MODU or Near-MODU Capabilities at an affordable price?**
  - This study performed an unbiased feasibility and economic analysis to see if this is possible.

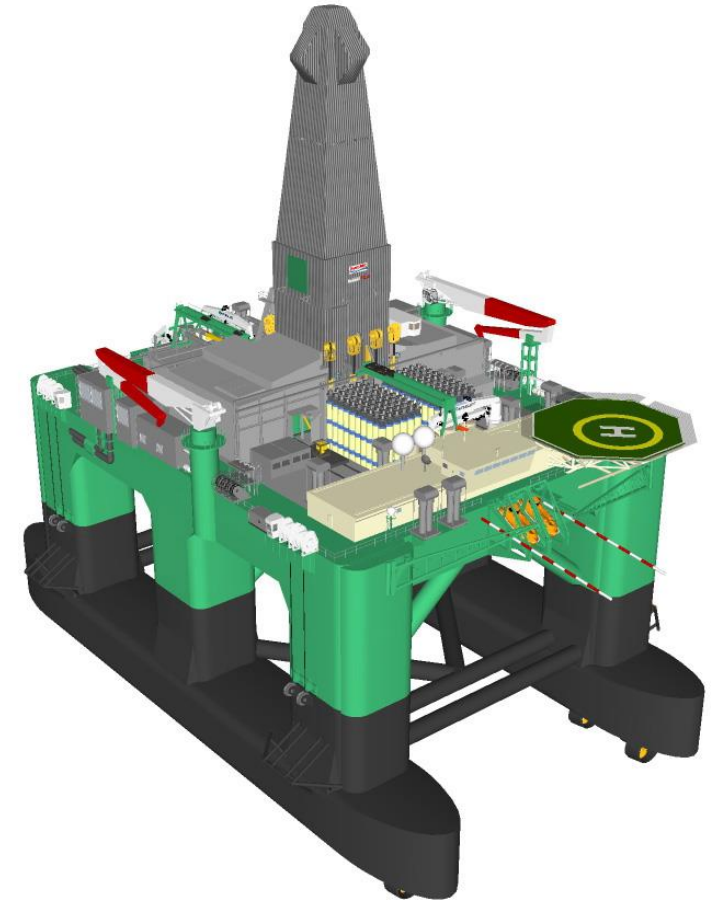


transocean

# Issue B: MODU Capability for Non-MODU Price?

The answer to the question is YES.

- A Re-Purposed MODU, converted to Intervention use, can earn a reasonable return in today's market, even at a depressed day rate.
- As a comparison, a new-build MODU would not pay its debt service today.
- The above applies to both re-purposed Drillships and Semi-Subs.
- The severe downturn has given much more choice and with more modern vessels than originally envisioned.
- Dramatic upside exists for such a vessel for those betting on a Recovery.
- An alternative view in the industry is not favorable to this idea. (Report)
- Would such a re-purposing be the right thing to do now?
- This is a question for the Market to decide.



# Issue C / Economic Study: Effective Cost and Performance Application of Resins

The intervention industry is thoroughly familiar with the use of cements in Plugging and Abandonment [P&A] work.

- There is an emerging school of thought that resins would work much better relative to certain common problems than cements.
- But Resins are EXPENSIVE! The cost per volume is much higher than cements.

Let's look at the 'all-in,' installed cost of Resins versus Cements. How expensive are they, really?



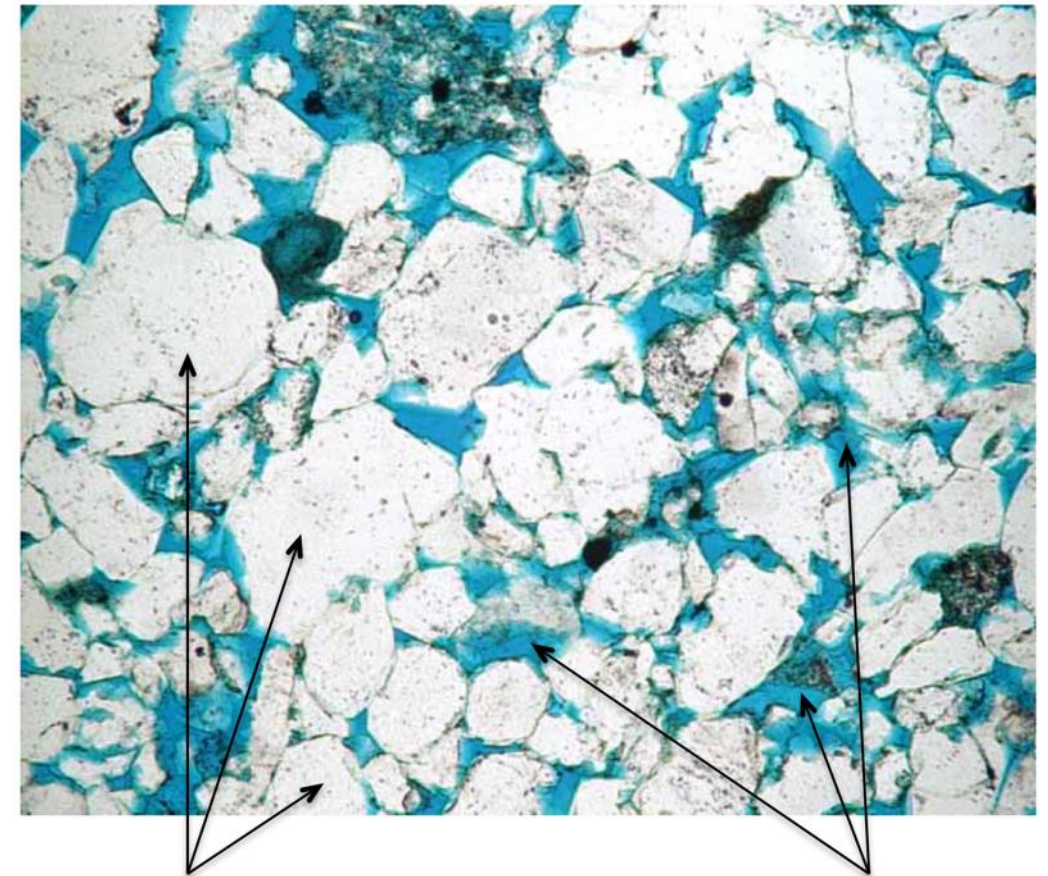
nca-group.com



# Issue C : “Cost and Effective Application of Resins”

The answer to the question is NO, but with a HUGE CAVEAT.

- Resins are 25 to 30 X more expensive than cements.
- When used as simply a “CEMENT SUBSTITUTE,” WOC times can be better but even taking operation savings into account, this will not even out the costs.
- CAVEAT: When the UNIQUE Properties of Resins are fully exploited, there are several means of saving money while still increasing sealing performance.
- These advantages MUST be designed-in to the well or to the Decommissioning program; then cost advantages will occur and lifetime seal performance is increased.
- Let’s look at the Pros and Cons of Resins vs. Cements



Formation Rock Matrix

Hardened Resin (Dyed Blue) Injected Into Formation Pore Spaces

# Issue C: Resins vs. Cements

## RESINS

### PROS

- Sealing Mechanism completely different from cement
  - Liquid penetrates where solids cannot. 'Glue analogy'
  - Resins actually change the properties of the sealed spaces
- Flows readily into tight spaces, then sets
  - Much tighter pores than cements (better squeezes)
  - Eccentric pipes and casing
  - Control lines
- Can be custom-made to handle any well situation
  - Can set the WOC time as needed
  - Set up the blend to fit well fluids / conditions etc.
- Resins can actually convert well fluids (even problem fluids) to sealing material
- Easier to place correctly due to different placement techniques

### CONS

- Expensive
- Un-set resins may require special cleanup procedures
- Resins can be custom formulated, but industry 'knowledge gap'
- Resins need testing to prove durability over geologic time frames

## CEMENTS

### PROS

- Thoroughly known by industry
- Cheap
- Traditional and familiar
- Easy cleanup unless it has set.

### CONS

- Solids are the sealant.
    - Mechanism similar to a cork in a bottle. 'Clamp analogy'
    - Solids bridge gaps they cannot penetrate
    - Cannot penetrate as well as liquids can
  - Adjustability of formula limited; not many choices
  - Limited means to adjust WOC time
  - Contamination by wellbore fluids
  - Poor seal in any tight space
- 
- Cements need to prove durability over geologic time frames

## Issue C: Open Letter to the Industry

- Properly formulated resins reduce the **two most common causes of barrier failure:**  
    Poor Placement and Contamination of the Sealant
- MOST IMPORTANTLY -- the industry does not get these 3 VITALLY important and different things about resins:
  - 1. Don't understand the significant advantages of geo-synthetic composite barriers....
  - 2. Don't understand the significant advantages of a solids free liquid sealant -- specifically about placement
  - 3. We must change the way we think about designing and installing (placement techniques/procedures) barriers to use these advantages.
- 'Cement thinking' and 'cementing process approaches' will undermine the cost-effective application of these materials.

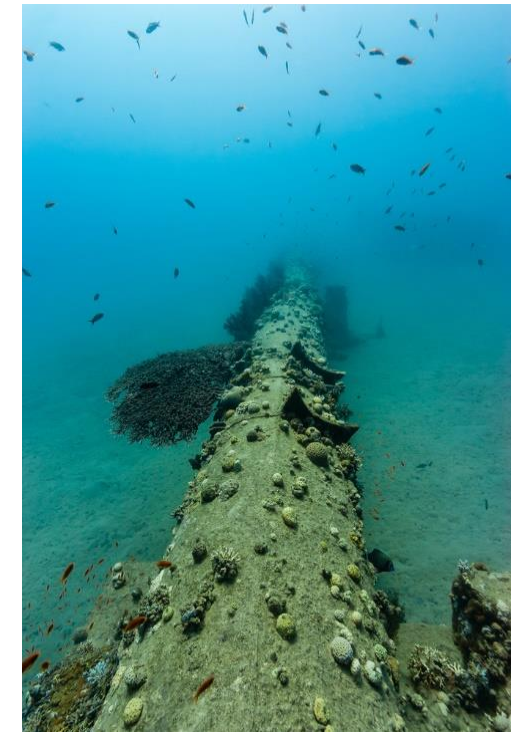
# Issues D (existing wells) and H1 (future wells) Decommissioning Subsea Pipelines & Flowlines

Effectively flushing subsea pipelines can be a challenge. This study:

- Evaluates flushing methods used today
- Examines alternative flushing fluids and additives
- Suggests alternative, improved methods for flushing
- Equipment improvements and alternatives for effective processing of flushing fluids



marinetechologynews.com



theonltd.com



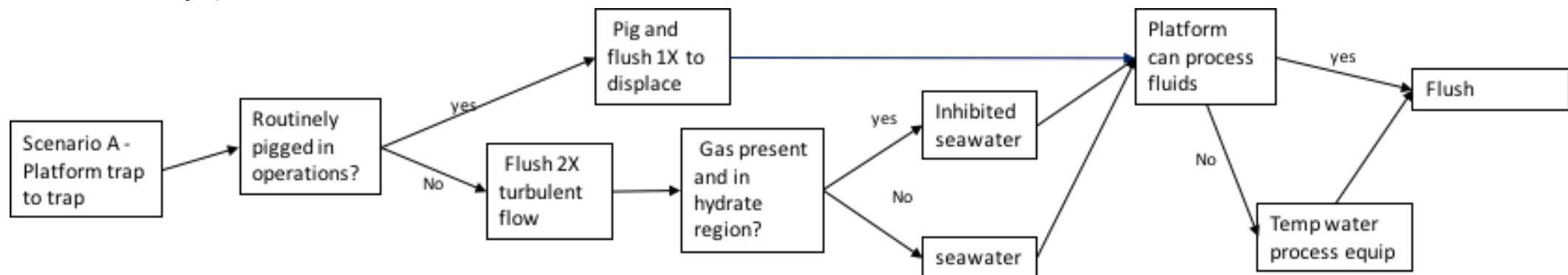
# Issues D & H1

## Final Product / Deliverables

- A Pipeline Flushing Toolbox
  - Common scenarios
  - Potential methods and equipment
  - To pig or not to pig
  - Possible flushing fluids, mixes, and additives
  - How to dispose of fluid contents
  - Primary pros and cons of each



azom.com



## Issues D and H1: Conclusions (cont'd)

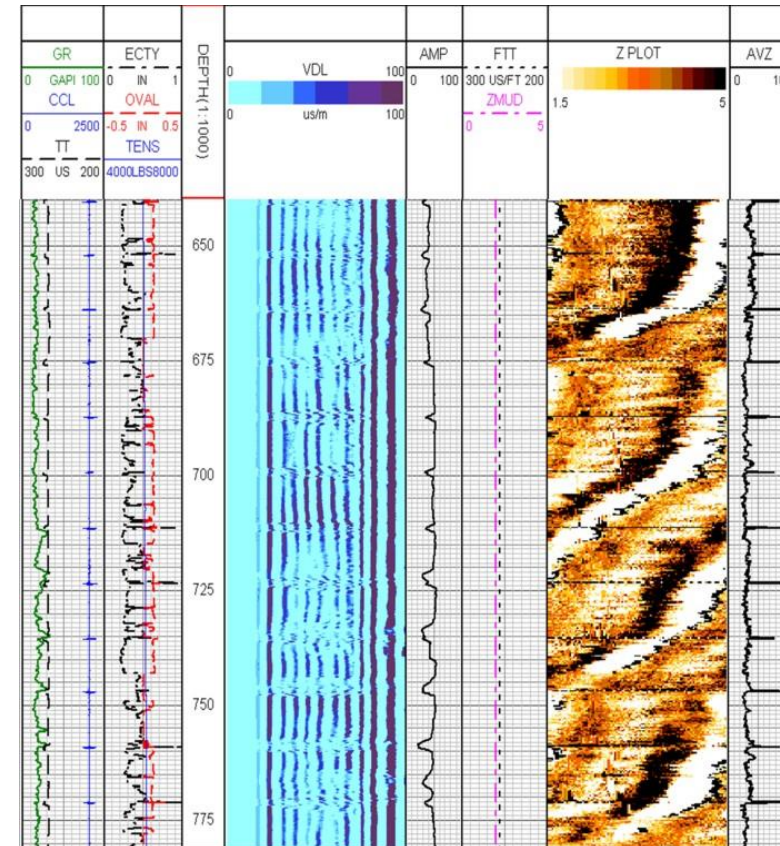
- Addition of intervention points
  - Of interest for blockage detection and remediation purposes,
  - Not required for reaching the required flushing flowrates.
  - Cost and extra risk: more leak points, more difficult installation
- Main items that lead to a higher cost for flushing operations
  - blockages,
  - unexpected interface issues, and
  - requiring a multi-service vessel for the operations.

# Issues D and H1: Recommendations

- Further work on:
  - Best practices for flowline blockage remediation
  - PLET redesign for a lower profile
  - PLET lifting / handling redesign for easier recovery: long term survival of appurtenances
  - PLET coatings to encourage marine life
- Promising new technologies for pipelines for the future:
  - “Neetcoat:” Coating for pipelines that allows heating of line to remediate blockages
  - TracerCo: CAT scan imaging allows cross-section of pipe in place
  - Astro Technologies: Fiber Optic sensors for assessment of multi pipeline data points

# Issue E: Cement Bond Logging Through Multiple Casing Strings

- This issue is simple: Is there any technology available that would allow us to “see” the CBL past one casing wall?
- This study will seek out any possibilities and show the industry how far we are from achieving this.
- The ultimate goal of this initiative is to determine whether we can eventually obtain accurate CBLs in all annuli.



# Issue E: Cement Bond Logging Through Multiple Casing Strings

## Current State of the Industry

- Promising Current technologies
  - Halliburton “Behind Pipe Evaluation Technology” system can:
    - In proven fashion, evaluate CBL across 2 annuli. Emerging technology w/ advanced waveform analysis.
    - Has possibilities to ‘see’ 4 annuli, work in progress
  - Baker Hughes has tool that gives us more info within 1 annulus
    - Works better in multiple fluids and gas environments
    - Can give us shear and flexural strength data on cement
- Possible new technologies for the future [long term]:
  - Use of LWD equipment to generate CBL data
  - Nuclear sensing of CBLs

# Issue F: Subsurface Cutting and Milling Options

This study will discover the possible options to be made available in more effective casing cutting and section milling, including:

- Cutting and milling from alternative vessels
- Dealing with the problem of cutting control & electrical lines
- Efficient cutting of multiple casing wall sections



Eaton oil tools

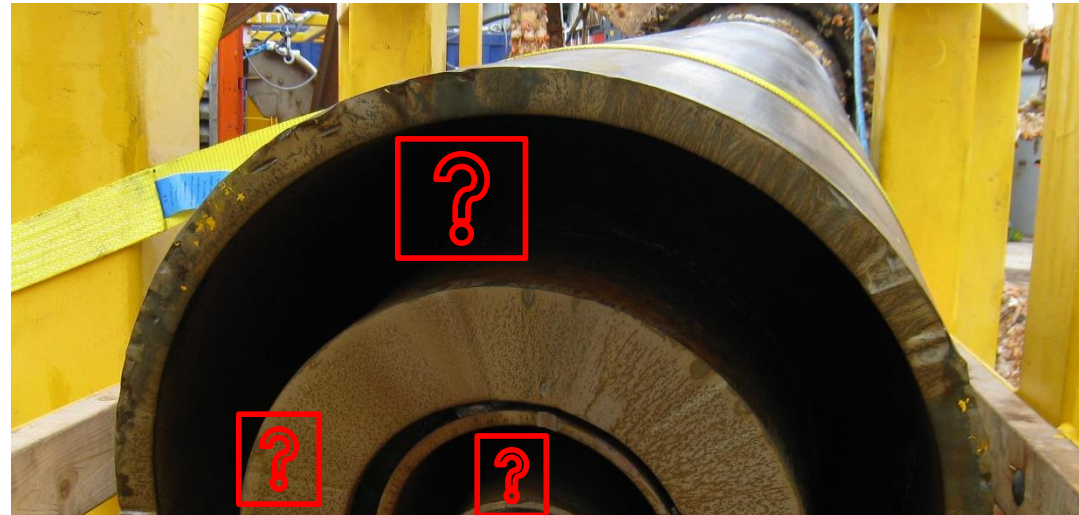
# Issue F: Subsurface Cutting and Milling Options

1. Current technology is adequate for decommissioning needs. Much evolutionary work is ongoing:
  - Advanced cutting structures (one example is BHI's AMT)
  - A true one trip multi-string section by section mill, by Deltide
  - A perforating and circulating system that can isolate multiple annuli [SapuraKencana, OIS, and Wild Well]
2. New abandonment technologies are on the horizon.
  - Laser (by Foro Energy, SLB, and UCS and possibly others)
    - Multi strings possible
    - Projected availability 2017
    - Limited depth [Fiber Optic Transmission]
  - Exothermic (by Interwell)
    - Creates not only a cut but a barrier in one action
    - Wireline deploy
    - Available 2017 – 2018
  - Plasma (by GA Drilling)
    - Radial plasma cut
    - Commercial by 2020



## Issues G and H2: What's Up in Those Outer Annuli?

- Is there any technology available that would allow us to know annulus conditions without perforating casing?
- This study searched for any possibilities and show the industry if there is any realistic chance of non-destructive monitoring of outer annuli.
- The ultimate goal of this initiative is to determine whether we can eventually obtain accurate monitoring in all annuli.



oceanengineering.com



# Issues G and H2: What's Up in Those Outer Annuli?

## NOW:

### Existing Wells

- Multi-function tools (perf, assess, circulate) – Wild Well, other companies
- Hot Tap style tool – Oceaneering – not true hot tap but could be modified. External to Subsea Wellhead.

## NOW:

### Drilling New Wells

- Sensors on pipe OD – FMC, Metrol, Expro – using batteries
- Same w/o batteries – Roxar, Halliburton. Power from wellbore
- Fiber Optic Sensors – Metrol, poss. Ziebel, others for wellbore

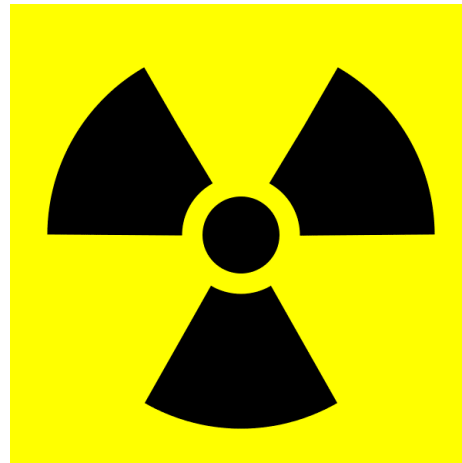
## FUTURE:

### Wells P&A in Future

- Power-efficient sensors
- Longer life batteries
- Fiber Optics shows much promise
- “Tech pieces” all exist at various companies, if put together in one system.

# Issues I: Dealing with Hazardous Material

- Identify how the industry is handling the following contaminants:
  - NORM [Naturally-Occurring Radioactive Materials]
  - Mercury
  - Arsenic




wikipedia

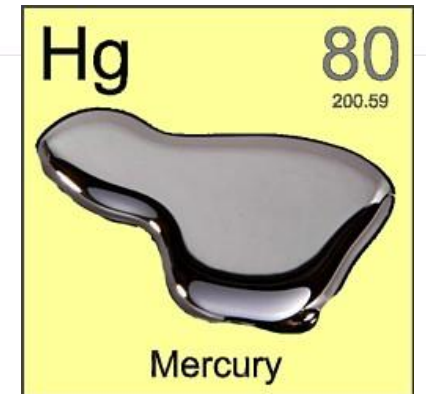
## Arsenic

- ▶ What is Arsenic ???
- ▶ Ubiquitous element in the nature.
- ▶ Widely distributed in
  - Atmosphere (air)
  - Geosphere (Soil, Rock)
  - Biosphere (Plants, Animals)

slideshare.net



A small, white, rectangular card with a purple border, tilted slightly. It features a small glass vial with a stopper on top. Below the vial is a black-bordered box containing the number '33', the symbol 'As', and the word 'Arsenic'.



A yellow-bordered card for the element Mercury. It features a large, dark, metallic, liquid-like puddle of mercury. In the top left corner is the symbol 'Hg', and in the top right corner is the atomic number '80' and the atomic weight '200.59'. Below the puddle, the word 'Mercury' is written in a bold, black font.

emaze.com

# Issues I: Dealing with Hazardous Material

- KNOWLEDGE IS POWER. FOREKNOWLEDGE SAVES MONEY.
  - Assess your decontaminants during facility lifespan.
- Accurate assessment is difficult to obtain:
  - Typical Well Testing nearly always UNDER-REPORTS the presence of contaminants.
  - Over the life of the field, the level of contaminants can be predicted with only limited accuracy.
- To mitigate these problems:
  - Retain a knowledgeable environmental expert who can adjust for the factors causing under-representation of the DST samples.
  - Build sampling ability into the system.
  - Regular and systematic testing program to assess levels of contaminants. (Build sampling ability into equipment.)
  - With these steps taken, you will be **prepared [saves \$]** – not **surprised [costs \$]** – by the work needed to decontaminate.
- Here are your decommissioning options:
  - Current technology – and lack of assessment - produces **“test, cap, and transfer” methodology** – a very expensive option.
  - Advanced technology would perform the decontamination with **specifically designed chemical batches**.
  - Optimal future applications would provide **in-situ chemical decontamination**, with final disposition downhole.
  - Maybe the best solution is **prevention – consistent scale inhibitors** applied throughout equipment life.

## Issue J: Coil Tubing Operations in Open Water

CT in open water has been pursued for years by several companies. This is mainly as a step up in capability for RLWI systems.

- Open water experience has been in pump-down lines so far. This has allowed work on fatigue and alternative materials to occur.
- SLB has successfully used OWCT for top well plugging after wellhead removed.
- Island and BHI have successfully drilled non-hydrocarbon formations in Norway with OWCT.
- Island is preparing an OWCT system for intervention operations in 2017.
- Blue Ocean is readying an OWCT system for well intervention. Sub-system tests and construction are underway. System is slated for field operations late '16 / early '17.

# Issue K: Benefits of Leaving Seafloor Hardware In-Situ as Part of Decommissioning

- Proposed Regulations – and Common Sense –tend to lead us to believe that pulling equipment [PLETs, PLEMs, SUTAs, etc.] off of the sea floor is the ‘Right Thing To Do.’
- After all, our Dads told us “Leave it Better than You Found It.’

**Well, now, is it Really the Right Thing To Do?**

We asked the environmental experts at **Coastal Environments** (La Jolla, CA) to examine this issue and study the effects of Decommissioning in Deep Water (Greater than 3000 feet).



**Coastal**Environments

# Issue K: Benefits of Leaving Seafloor Hardware In-Situ as Part of Decommissioning

The surprising answer is, “Quite possibly, NO.”

The reason is **DEEP WATER IS VERY DIFFERENT**, enough to defy Common Sense.

Properties of Deep Water:

- Deep Water is VERY STILL. There is no movement, no current of any sort. It is UNCHANGING.
- Deep Water has very little OXYGEN; so life is sparse there.
- Surprisingly, even though population numbers are low, DIVERSITY is VERY HIGH.
- Deep Seawater absorbs Calcium Carbonate (tiny sea bones that form CORAL). So no Coral exists.
- So, very little natural “housing” [habitat] for these species exists.
- The sum of the above four bullets: Deep Water Sea life can thrive but it is very DELICATE.
- The scarcity of local “housing” means that species have little CONNECTIVITY (ability to travel).

# Issue K: Benefits of Leaving Seafloor Hardware In-Situ as Part of Decommissioning

DEEP WATER IS VERY DIFFERENT, enough to defy Common Sense.

Properties of Deep Water:

- Deep Water Sea Life is DESPERATE for HABITAT [no coral present]
- In Deep Water, any DISTURBANCE can last for:
  - DAYS          MONTHS          YEARS          DECADES          CENTURIES
- Pulling sea floor equipment can create a “mud cloud” that lasts DECADES.
- This can kill many of the species that live in the area.
- They survive by filtering the water and gleaning nutrients. Muddy water chokes them.

# Issue K: Benefits of Leaving Seafloor Hardware In-Situ as Part of Decommissioning

## PULLING EQUIPMENT from SEA FLOOR in DEEP WATER

### PROS

- Satisfies Common Sense
- Get to do what Dad Told Us – follow our teaching
- Possibly fits into pending regulators' intent
- “Easy” to let happen with little study or controversy

### CONS

- Can create a decades-long disturbance that kills local life
- Removes steel Habitat from an area desperate for it
- Takes away the species' connectivity to some degree
- Can kill local life in 2 ways: habitat removal and disturbance

## LEAVING EQUIPMENT “*in situ*” in DEEP WATER

### PROS

- Appears to be better for the actual life in the area
- Provides substantial Habitat for variety of sea life
- Allows Connectivity between local Habitats
- Once DW sea life understood, seems to be better fit for the situation in many cases

### CONS

- Seems contrary to Common Sense
- Industry needs much education on “The Deep Water Difference” before attitudes can change widely
- Must convince regulators on this Difference effectively
- Will likely take more study before change can occur



# Issue K: Benefits of Leaving Seafloor Hardware In-Situ as Part of Decommissioning

- Proposed Regulations – and Common Sense –tend to lead us to believe that pulling equipment [PLETs, PLEMs, SUTAs, etc.] off of the sea floor is the ‘Right Thing To Do.’
- After all, our Dads told us “Leave it Better than You Found It.’

**Well, now, is it Really the Right Thing To Do?**

After examining the surprising nature of the Deep Water Sea Floor, emerging evidence tells us

**THIS COULD WELL BE THE WRONG THING TO DO.**

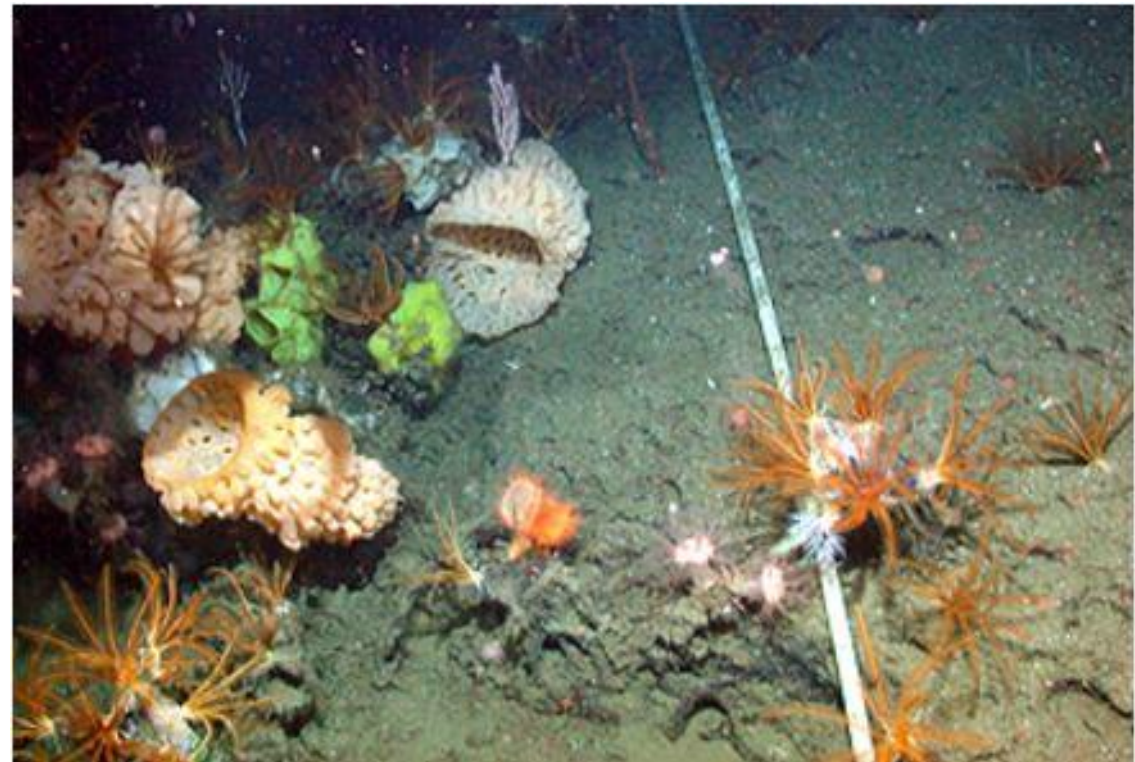
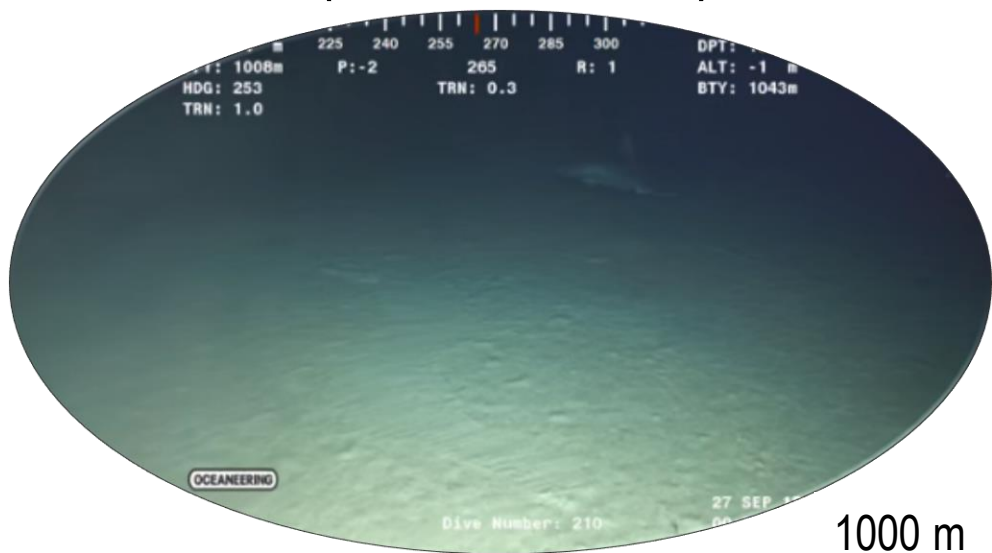
**(Sorry, Dad.)**

**WHAT’S BEST FOR THE INDUSTRY?**

While emerging science implies that leaving equipment in-situ can be good, the best course for the Industry would be to study each site and allow companies to pursue “in-situ” or not based on the science of the local seafloor environment.

# Issue K: Benefits of Leaving Seafloor Hardware In-Situ as Part of Decommissioning

Bottom with NO SUBSTRATE  
(W. Africa location)



**DEEP WATER SEA BOTTOM with CABLE SUBSTRATE**  
flytrap anemone, mushroom corals, various porifera: 1580 m

# Areas for Further Study: Recommendations

## Overall: Stocking the Decommissioning Toolkit

- Dealing with issue of “MODU Rating” for boats taking well returns.

## Overall: Stocking the Decommissioning Toolkit

- Set up a method / organization by which BSEE and Industry can dialog “strategically”

## Issue A: Intervention Vessel Cost Model

- Refinement of Model, education on how to best custom-fit to individual company needs

## Issue C: Effective Cost and Performance Application of Resins

- Long-Term Testing of Resins for Durability: Define and Budget a Test Plan
- Develop guidelines for how much Resin needed to replace given amount of Cement

## Issues D / H1: Decommissioning Subsea Pipelines & Flowlines

- (if needed) Design of PLETS for long term confidence in Lifting / Handling
- Study to assess prospects for advancements in detecting Pipeline Blockage

# Areas for Further Study: Recommendations

## Issue F: Subsurface Cutting and Milling Options

- Risk analysis of Thermite cutting scenario

## Issue G: What's Up in Those Outer Annuli

- System Reliability Analysis of “ported wellhead” that allows access to annuli.
- Work with annulus sensor manufacturers to extend sensing life

## Issue I: Dealing with Hazardous Materials

- Develop lifetime plan for Contaminant Assessment on a typical well / field

## Issue K: Ecological Benefits of In-situ Decommissioning of Subsea Hardware

- Industry collaboration in actual ROV deep water facilities surveys

# QUESTIONS?

**Keith Caulfield, P.E.**

**Endeavor Management, Operations Advisor**

**[kcaulfield@endeavormgmt.com](mailto:kcaulfield@endeavormgmt.com)**

**(832) 670-4635**

During our +40 years of continuous service to the oil and gas industry, we have worked with our clients to address emerging strategic challenges and achieve greater business success. While the strategic challenges have changed over time, our services are now focused on three areas critical to accelerating and achieving our clients' strategic goals:

**Marketing Research and Insights** – Endeavor provides the ability for our client to deeply understand their target markets, customers, and even their internal organization with relevant, fact-based knowledge by fielding highly targeted, relevant, global quantitative market or organizational studies. Coupling this insight with our digital dashboards provides your organization with the ability to monitor the effectiveness of your strategic marketing and branding efforts, manage the customer experience and to better operationally align your organization to execute on these strategic imperatives.

**Expert Advisory Services** – Endeavor has built a team of experts who are recognized as being at the top-of-their field in terms of experience, strategic problem solving and operational expertise. This Expert Advisory Group includes extensive experience in all phases of exploration and production with a specific emphasis on offshore facilities, drilling, well completions, subsurface evaluation, and offshore construction and installation activities. Our team members have worked and been leaders in the international oil and gas markets for operators and service companies throughout their extensive careers. We have alliance partnerships with other firms in multiple locations around the world and can work with these firms when our clients need additional support.

**Strategy, Organizational Transformation, and Executive Coaching** – Endeavor combines its deep industry expertise and extensive market research capabilities to help our clients craft pragmatic solutions to their strategic challenges and then to ensure that the leadership is fully aligned with how to execute the strategy for maximum effectiveness. Often these activities include working with the leadership to create enterprise-wide alignment with the strategic initiative, providing executive coaching for the leadership team and individuals so that they are enabled to perform more effectively as individuals and as teams, and to build the organizational competencies and capabilities to be an industry leader.

Endeavor has worked for many of the major integrated oil companies, independents, and major product/service companies in the US and around the world. Our Oil and Gas Practice is headquartered in Houston, Texas with satellite operations in Rio de Janeiro, London, San Ramon and Cairo.

For more information, visit [www.endeavormgmt.com](http://www.endeavormgmt.com)

Endeavor Management  
2700 Post Oak Boulevard  
Galleria Tower 1 , Suite 1400  
Houston, TX 77056

**Endeavor**