# Practical Application of NEBA in the Decommissioning World

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## Introduction to Marathon Oil U.K.



#### **Brae Platforms**











# **Application of Net Environmental Benefit Analysis (NEBA)**



#### In the beginning.....

A few questions:

- Dimensions of the cuttings piles?
- Status of contamination?
- How do the contaminant levels compare to OSPAR thresholds?
- What is the best decommissioning option for the cuttings piles?
- What is the right thing to do?



### **3D Mapping Survey**

• 3D survey using equipment deployed from our supply vessel





#### **3D Mapping Survey**





Field	Height (m)	Seabed area (m²)	Estimated volume of cuttings (m <sup>3</sup> )
Brae Alpha	11.5	12,700	28,000
Brae Bravo	8	17,000	22,500
East Brae	9	6,900	12,300



#### **Brae Bravo Cuttings Pile Sampling**





#### Sampling Technique: Brae Bravo









#### Sampling Technique: Brae Alpha, East Brae











#### **Retrieval of Cores**





### **Drill Cuttings Samples**

- All platforms
  - Push cores (<1m) taken from edge of piles (by ROV)
  - Grab samples from pile surface
  - Brae Alpha:
    - 1 x 4.5m core
    - 1 x 8m core
  - Brae Bravo:
    - 3 x vibrocores, max depth 3.5m
  - East Brae:
    - 1 x 6m core
    - 1 x 8m core



#### **Drill Cuttings Core**





### **Drill Cuttings Analysis Results**

#### • All piles below the OSPAR thresholds

Analysis	Key Observations			
	Brae Alpha	Brae Bravo	East Brae	
Particle Size Distribution	Little variation throughout the pile. Classified as extremely poorly-sorted fine sands.			
Carbonates	Low			
Metals	Elevated levels of all metals when compared to central North Sea background seabed levels.			
Hydrocarbons	Elevated compared to central North Sea background seabed levels. Levels of a kerosene-like low toxicity oil based fluid (LTOBF) present at various stages of degradation.			
Polychlorinated Biphenols (PCBs)	Low with most below detection limits.			
Endocrine Disruptors	Octylphenol levels were lower than values quoted from OSPAR monitoring in the Baltic and Irish Seas. Elevated levels of nonylphenol present. Most results for organotins were below detection limits although detectable levels of tributyltin found in some surface grab samples.			
Naturally Occurring Radioactive Material (NORM)	Background level			
Benthic Macro-fauna	The number of macrofauna taxa identified across the piles were low and consistent with communities found on similar cuttings piles in the North Sea. Dominant taxa included polychaetes ( <i>Capitella</i> sp, <i>Paramphinome jeffreysii</i> and <i>Cirratulus cirratus</i> ) and the bivalve <i>Thyasira sasrsi</i> . Some survey stations contained anemones ( <i>Actinaria</i> spp) on dead <i>Mytilus</i> shells which had fallen from the jacket.			



#### **Then What**

- We had to decide what to do with all this data
- Piles all below the OSPAR hydrocarbon leach rate limits therefore can be left in situ to degrade naturally with no further study work required
- Marathon Oil wants to ensure we do the right thing for the environment
- What is the best drill cuttings management option?
  - Leave in-situ to degrade naturally within the marine environment
  - Redistribute the drill cuttings over a wider area, thus removing the pile
  - Recover the drill cuttings to the surface, treat them for any contamination and transport onshore for reuse or disposal



#### Drill Cuttings Net Environmental Benefit Analysis (NEBA)

- Comparative Assessment
  - Marathon Oil wanted a robust technique and one that could look at the influence of our actions in the future, not just at the time of the action
  - A comparative assessment was commissioned to evaluate the right thing to do with the drill cuttings
  - The technique adopted for the CA was NEBA

A NEBA is a comprehensive, objective, scientific, transparent and quantitative approach to compare between alternative actions and utilises ecosystem service valuation concepts



#### **NEBA**

A methodology for identifying and comparing the net environmental benefit of alternative management options that affect the environment (for example, site remediation)



Balance the risks, benefits, and trade-offs associated with a decision Compares over a period of time



#### **NEBA Data Inputs**





#### **NEBA Results**





#### Conclusion

- The application of NEBA allowed clear recognition of the impacts on safety, environment, socioeconomic aspects
- The methodology allows clarity of results for each aspect to be presented while also providing a holistic overview taking account of time factors
- Allows consistent comparisons
- Utilises all available data and doesn't leave valuable survey data sitting on a shelf!



#### **Thank you for Listening!**



Still photograph extracted from ROV footage of Brae Alpha drill cuttings pile surface - October 2015. **MarathonOil**