Brent Field Decommissioning Studies

3rd focused topic stakeholder engagement

Cell sampling, Drill cuttings, Reuse options

(Shell is operator of the Brent field for and on behalf of Shell U.K. Limited and Esso Exploration and Production UK Limited )
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Safety and arrangements for today

- Fire alarms
- Emergency exits
- Toilets
Aims for today

- Update participants on progress of the Brent Field Decommissioning Studies project and record any thoughts, issues or concerns about the project
- Present cell sampling alternative proposals and explore stakeholder views and issues on the ways forward
- Brief participants on current industry/DECC perspectives on drill cuttings and Shell’s work programme with respect to drill cuttings
- Reflect on work undertaken to date on re-use options
- Review future stakeholder dialogue and engagement activities up to development of the Decommissioning Plan
Agenda for today

10:00   Welcome and Getting Started
        Presentation & Q&A: Project and stakeholder dialogue update
        Presentation & Q&A: Cell Sampling – rationale, review of progress and alternative approach
        Plenary discussion: What issues does this alternative approach raise for you?

• Tea break

Breakout Groups & Feedback: What would you like to see in place to give you reassurance that the work on cell sampling will meet your expectations going forwards?

• Lunch

Presentation and discussion: Drill Cuttings – overview of current guidelines and Brent Delta drill cuttings programme
Presentation and discussion: Re-Use Options – overview of studies and conclusions

• Tea break

Plenary discussion: Future Engagement Topics/Issues
Next steps & Evaluation

16:00   Close
Project update

Austin Hand

Brent Decommissioning Project Director
Project status

• CoP dates- discussions continue with DECC

• Brent Delta Wells Plug and Abandonment status as at mid April ‘09: 7 wells abandoned, 2 wells suspended; further work temporarily suspended

• Topsides studies – concept selection studies for removals completed

• Tender documents for 2 major contracts for topsides removals being prepared
  o Decommissioning Services Contract (DSC)
  o Removals Front End Engineering Design (FEED)

• Esso and Shell management shortly to undertake assurance review of proposed options for topsides removals

• GBS studies – external technical studies completed. Derogation vs. removal evaluation in progress
Way Forward

28/30 April 2009
Stakeholder Engagement

- Feedback from September 2008 session:
  - Transcript report by facilitator on Brent website (November 2008) ([www.shell.co.uk/brentdecomm](http://www.shell.co.uk/brentdecomm))
  - Responses to Graffiti Board queries sent to all participants (December 2008)
  - Additional information and responses sent to participants (April 2008)
  - E-newsletter to be hosted on www and sent to all stakeholders via email (May 2009)

- Website routinely reviewed, responses made to public enquiries received via ‘Contact Us’ link

- Some initial engagement with parliamentarians

- Ongoing, routine one-to-one meetings with some stakeholders
Cell Sampling Strategy

Paul Smy

Brent Decommissioning Execution Manager
Brent Delta Animation
Cell Sampling: Evolution

- **Stakeholder input to date**
  - Minimum 10% sampling over all cells; or until representative analysis is achieved. > 3 cells per GBS
  - Industry learning: repeatability and consistency is difficult to achieve

- **Original aims**
  - Sonar map of the storage cell sediments
  - 6 litres of fluid collected in 250ml samples
  - On-Line profile of fluid column
  - Cone penetration test of sediments
  - 5 No. x 7m (max) core samples

- **Modified aims**
  - Sonar map of the storage cell sediments
  - On-Line profile of fluid column
  - Cone penetration test of sediments
  - 1 No. x 7m (max) core sample
FIND CENTRE OF THE PLUG

USE DRILL JIG TO FIND POSITION OF HOLES

COVERPLATE ROTATION JIG

GUIDE PINS ATTACHED TO PLUG TOP
Drill Trials

28/30 April 2009
COVERPLATE DETAIL (5.24m DIAMETER)

WASHING BASEFRAME IN POSITION ON CELL DOME

COVERPLATE MOUNTED ONTO PLUG

TOWER LEVELLING FRAME IN POSITION ON CELL DOME
Seal Trials
TOWER SECTION 1 WITH BRACING – IN POSITION

TOWER SECTION 2 – IN POSITION

DRILLING TOOL COMPLETE WITH WASHING SKID

ROV IN POSITION ON DOCKING STATION
Prototype testing
GEO COMBINED CPT AND SAMPLING TOOLS

OPEN

CPT SAMPLE

CLOSED

FIRST SAMPLE TAKEN - OPEN

FIRST SAMPLE TAKEN - CLOSED
FINAL VALVE POSITION WITH DROPPED OBJECT COVER IN PLACE
An Alternative Way Ahead

• Development of cell remediation options requires an understanding of cell contents
  o But cell sampling is unlikely to give us consistent results; ref. industry experience

• If sample quality is critical for remediation design, then multiple samples will likely be required. One sample may not be enough!
  o Hence we may need to obtain multiple samples, ideally safely and cheaply

• Proposal is to:
  Postpone sampling to a time when it can be done more simply and safely
  o After the utility leg is flooded, possibly as part of a subsea attic oil removal campaign
  o And on an opportunistic basis from utility leg (more difficult for remote cells)
Mini ROV and PIG Trials
How does the Decommissioning Programme deal with this?

- **Key Factors**
  - Multiple samples will likely be required
  - Cell sampling is best done when the utility leg is flooded (no pressure difference to manage)
  - Experience suggests a process of evaluate, trial, execute, with more than one methodology in the tool box will be required.

- **Decommissioning Programme should**
  - Describe possible remediation options based on best available knowledge. (This may include opportunistic sampling results.)
  - Detail a future sampling strategy/schedule
  - Propose to continue the dialogue process with stakeholders on sampling results and the findings of any trials.
  - Propose to Update the Decommissioning Programme when an appropriate remediation methodology has been developed
Cell Sampling – Breakout Groups

What would you like to see in place to give you reassurance that the work on cell sampling will meet your expectations going forwards?
Drill Cuttings

Darrel Shaw
Brent Decommissioning Removals Lead
Drill Cuttings Management

- A component of the Decommissioning Programme
- OSPAR Recommendation 2006/5 sets out a 2 stage process for this assessment:
  - Stage 1 - screening to determine the persistence and rate of oil loss over the contaminated area
  - Stage 2 – assessment of the best available techniques (BAT) and/or the best environmental practice (BEP) for the cuttings pile
- Stage 2 required where either:
  - Oil loss > 10 tonnes / year, or
  - Persistence > 500 km$^2$years
- Where results are both below the threshold, the recommended action is for the piles to be left to degrade naturally
Drill Cuttings Survey (2007)

- Undertaken at the Brent platform sites

- Survey programme designed to conform with OLF* Guidelines to:
  - Establish footprint topography and volume
  - Ascertain the composition of the cuttings piles e.g. THC*, PAHs*, metals, PCBs* and Nonyl phenols (endocrine disrupters)
  - Identify the contaminated area i.e. the area containing THC level exceeding 50 mg/kg dry sediment
  - Ascertain the physical characteristics of the cuttings piles e.g. density, water quantity, particle size and shear strength

- Survey and sampling using variety of techniques:
  - Multibeam echo sounder
  - Piston / vibrocorer
  - Box corer
  - Grab samples
  - ROV corer – for use on cell tops
  - Surface profile imaging

- Environmental survey report still being finalised due to issues with original THC analyses

*OLF- Oljeindustriens Lanaforeing (Norway); THC-Total Hydrocarbon Content; PAH-Poly Aromatic Hydrocarbons; PCB-Polychlorinated Biphenyls

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Drill Cuttings Mapping at Brent Delta

- Cell top cuttings
  - Volume: 798 m$^3$
  - Max Ht: 6.8 m

- Seabed cuttings
  - Volume: 1,575 m$^3$
  - Max Ht: 10.3 m

Note:
1. Above reference elevation, 2.3 m above cell tops
2. DTM surface relative to reference datum level of –143.4 m.
Drill Cuttings Study Work

- Original modelling showed all Brent piles to fall below OSPAR thresholds
- Challenge over initial analysis method used to measure Total Hydrocarbon Content (THC)
- Samples have been re-analysed and verified by independent experts
- Long Term Modelling (LTM) results being re-validated using new THC data
  - Results expected to be within recommended thresholds
- Short Term Disturbance Modelling (STM) ongoing
  - To assess the environmental impact caused by human disturbances of the pile
Drill Cuttings Study Work

- Drill cuttings on Brent piles expected to fall below OSPAR recommended thresholds
- Review of management options - complete
  - In depth review of management options:
    - Natural degradation
    - Covering
    - Dispersal
    - Recovery and re-injection or return to shore
  - Enabler for any future BAT/BEP assessment
Drill Cuttings Position

- Complete re-validation of LTM and STM study work

- If pile falls below OSPAR thresholds then leave in place, unless other project activities require drill cuttings removal (e.g. for cell access or GBS refloat)

- If pile exceeds OSPAR thresholds then undertake BAT / BEP assessment to determine preferred management option
Drill Cuttings - Discussion

Considering the content of the pre-reading material and what you have heard in the presentation today, what questions does this raise for you?
Reuse Options

Darrel Shaw
Brent Decommissioning Removals Lead
Reuse

- Potential for reuse requires assessment in the Decommissioning Programme
  - Under the waste management hierarchy, the general principle of reuse is preferred over recycling and disposal
- Shell has internal guidance policies when considering potential reuse options taking into account:
  - Shell’s business requirements
  - The characteristics of Shell’s assets
  - The diversity of suggested alternative uses
  - Their probability of success
Reuse Options on Brent

- Carbon Projects
  - Carbon Capture and Storage (CCS)
  - Enhanced Oil Recovery (EOR)
- Research Schemes
- Tidal / Wave power
- Artificial Reefs

(Wind power was ruled out during early consideration)
Carbon Projects

• Brent reservoir offers potential for future carbon projects, but
  o Facilities not designed for CO₂ service – material compatibility, utility support for Enhanced Oil Recovery (EOR)
  o Facilities are at the end of their design life – obsolescence, upgrades required
  o High maintenance and operating costs
  o Hazards introduced by CO₂ would have a major effect on the Safety Case

• Carbon Capture and Storage (CCS) could be achieved using lower cost solutions, e.g. subsea wells

• EOR requires massive capital investment
  o 100+ new wells required
  o £700 million plus facility modifications

• Brent is not in the proximity of any major sources of CO₂

• No transportation infrastructure in place

Conclusion:
• Facilities not suitable, would need to build new ones
• Decommissioning does not prevent future CCS or CO₂ considerations
Research Use & Tidal / Wave Power

• Tidal / Wave Power
  o Maintenance and operating costs are high - approx. £25million per year per platform (fully manned)
  o Availability of resource – higher yield sites exist closer to shore
  o Lack of nearby consumers – requires significant investment to bring the power to market

• Research Use
  o Facility would need to be maintained to comply with statutory and Shell standards to ultimately ensure safe removal
  o Operating costs are high – same as noted above
  o No known demand from stakeholders

Conclusion: No economic re-use options identified that meet Shell business criteria
Artificial Reefs

- Brent facilities are not attractive candidates for re-use as artificial reefs
- UK Oil and Gas industry has studied this issue for the North Sea
- No UK legal basis/precedent for artificial reefs (removal of structures is required under OSPAR)
- Little/no experience of artificial reefs in North Sea
- Solid concrete structures do not make good reefs. Open lattice steel structures are better
- OSPAR requires that structures must be totally clean
- Little evidence that artificial reefs on UKCS would make big benefit to fish stocks or biodiversity
- Useful for recreational purposes (diving, sport fishing etc)
- Better in shallower (<50m) and near shore waters
- No movement by key interest groups (eg fishing industry) to establish artificial reefs in the North Sea

**Conclusion:** Brent facilities are not attractive candidates for re-use as artificial reefs
Reuse Conclusions

- Based on work to date, reuse of Brent facilities is not considered a viable option:
  - High maintenance and operating costs
  - Incompatibility of existing facilities for carbon projects
  - Inferior location for power generation projects
  - Unattractive as an artificial reef

- While the Brent reservoir may be suitable for future carbon projects, this should be done on a Greenfield basis
Re-use options – Discussion

What are your views on the apparent lack of practical and economic re-use scope for Brent facilities?