Decommissioning Process

Presented by

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Agenda – With some insights on

- Decommissioning Process- Steel Jacket Structures
- Decommissioning Process- Pipeline Systems
- Decommissioning Process- FPSO Systems
- Decommissioning Process- Deepwater

Decommissioning Process

(Steel Jacket Structures)

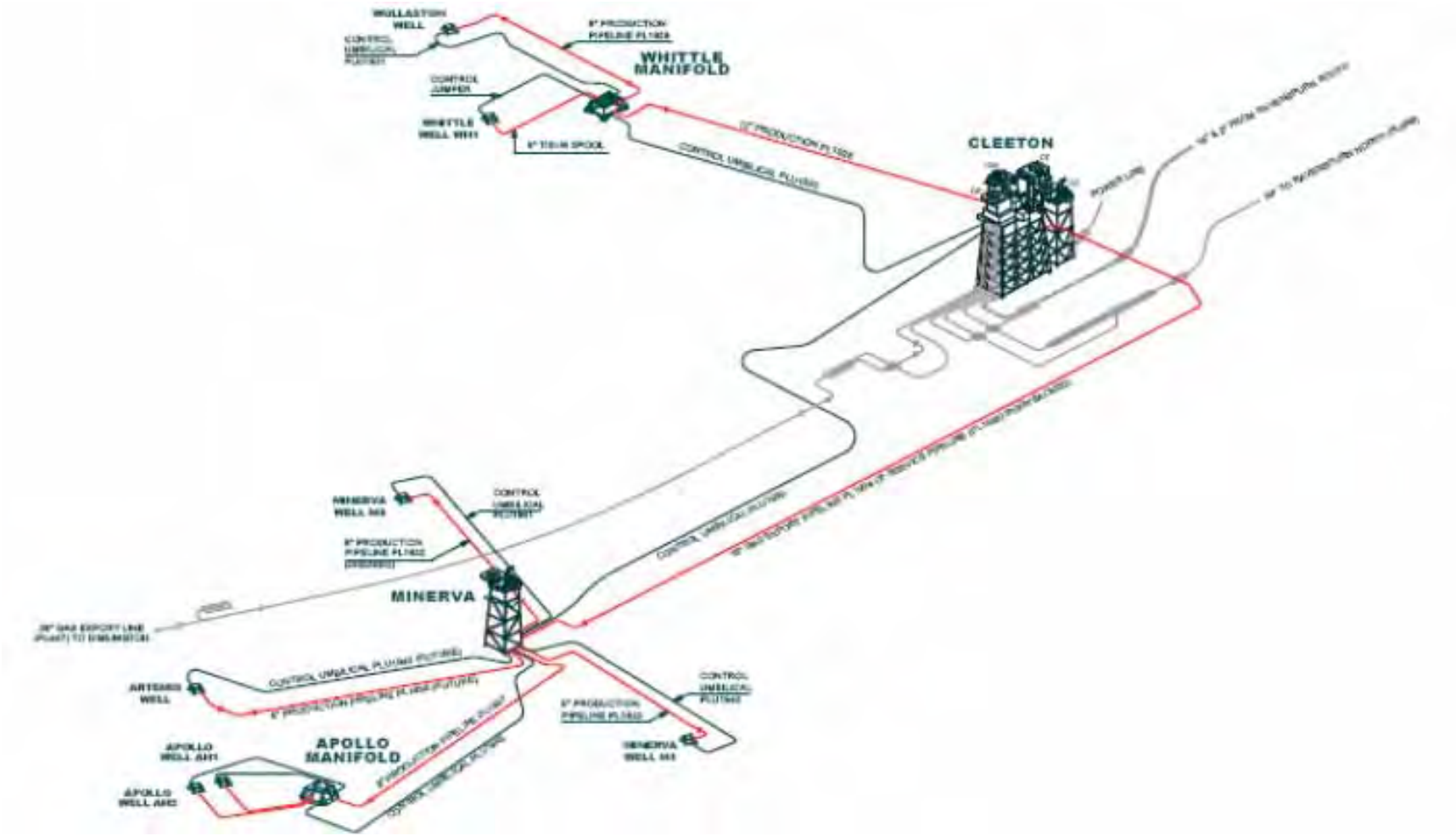
A Typical Decommissioning Process

- Surveying Topsides, Jacket & Subsea
- Engineering & planning
- Well P&A
- Conductor Removal
- Topsides Cleaning & Preparation
- Subsea Preparation
- Pipeline disconnection
- Topside Removal
- Jacket Removal
- Subsea Template Removal
- Pipeline etc. Removal (If Required)
- Seabed Clearance (500 m Zone)
- Post Decommissioning Survey

Decommissioning Process

(Subsea Pipelines)

Complexity of Pipeline Decommissioning 1



Pipeline Cover Weights

Clump Weights for the Thanet Wind Farm

REF: Pipeshield

What to do With Rock Dump - Regulations???

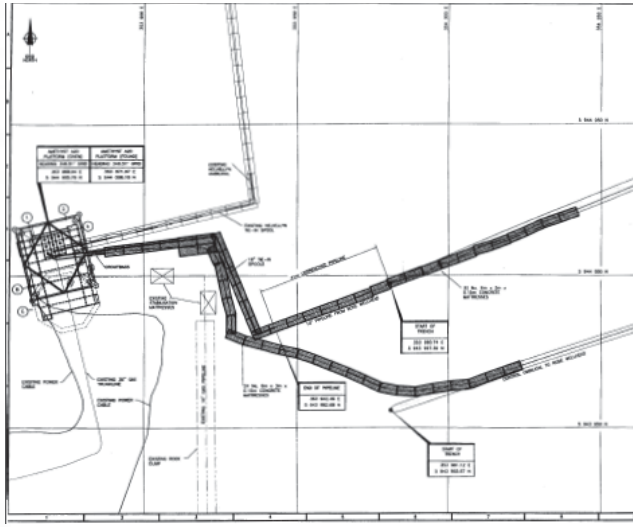
Description	Size	Quantity	Spec	Weight
Equipment				
Line pipe	OD 219.1 mm WT 12.7 mm	15 286 m	API-5L-X65	988.2 tonnes
Corrosion coating	0.3 mm thickness	15 286 m	Fusion bonded epoxy	4.1 tonnes
WN flange RTJ 2500#	OD 219.1 mm WT 15.9 mm	2	ASME B16.5 GR52	0.5 tonnes
Anodes		187		5.1 tonnes
Total weight				**997.9 tonnes**
Stabilisation				
Rockdump	169 m (KP 0.024) 60 m (KP 0.209) 79 m (KP 0.457) 62 m (KP 1.053) 42 m (KP 1.380) 54 m (KP 1.613) 29 m (KP 1.766) 30 m (KP 1.835) 96 m (KP 2.080) 58 m (KP 2.176) 23 m (KP 2.320) 39 m (KP 2.399) 53 m (KP 2.668) 60 m (KP 2.727) 93 m (KP 2.914) 35 m (KP 3.135) 24 m (KP 3.363) 26 m (KP 3.485) 36 m (KP 3.913) 22 m (KP 4.046) 32 m (KP 6.025) 14 m (KP 14.833) 28 m (KP 14.934) 56 m (KP 15.207)	1 220 m		17 080 tonnes
Total weight of stabilisation				**17 080 tonnes**

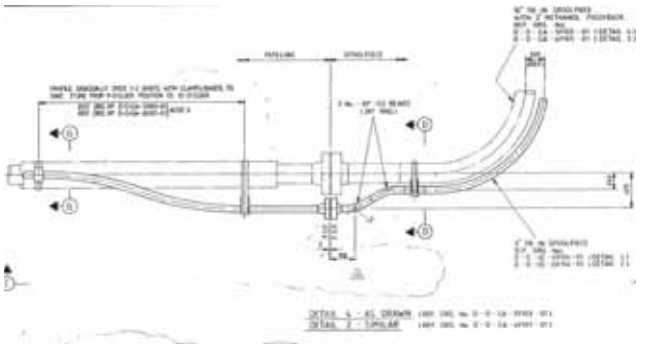
What to do With Mattresses & Grout Bags- Your Regulations???

Description	Size	Quantity	Spec	Weight
Equipment				
Line pipe	OD 219.1 mm WT 15.9 mm	48 m	API-5L-X52	4.3 tonnes
35° 5D pulled bend (1016 rad) c/w TE	OD 219.1 mm WT 18.3 mm	1		
64.6° 5D pulled bend (1016 rad) c/w TE		1		
86° 5D pulled bend (1016 rad) c/w TE		1		
Corrosion coating	0.3 mm thickness	48 m	Fusion bonded epoxy	
WN SR flange RTJ 2500#	OD 219.1 mm WT 15.9 mm	2	ASME B16.5 GR52	1.2 tonnes
WN flange RTJ 2500#		1		
WN SR flange RTJ 1500#		1		
Anodes		2		0.1 tonnes
Total weight				**5.6 tonnes**
Stabilisation				
Mattresses	6m x 3m x 0.15m	15		60 tonnes
	5m x 3m x 0.15m	36		144 tonnes
Grout bags	0.4m x 0.2m x 0.1m	100		2 tonnes
Total weight of stabilisation				**206 tonnes**

How Good Is Your Data - Your Regulations???

Ref	Drawing Number	Description
1	DO-DD-49100-01-E	Platform A1D Pipeline approach Details
2	DO-DD-49200-01-C	Platform A1D Infield Pipeline approach Details
3	DO-DD-59100-01-F	Platform A2D Pipeline approach Details
4	DO-DD-59200-01-C	Platform A2D Infield Pipeline approach Details
5	DO-DD-69100-01-C	Platform B1D Pipeline approach Details
6	DO-DD-29100-01-C	Platform C1D Pipeline approach Details
7	DO-GA-49101-01-E	A1D Tie-in Spoolpiece for 30" Trunkline and 3" Methanol General Arrangement
8	DO-GA-49102-01-D	A1D Tie-in Spoolpiece for 3" Methanol line Details
9	DO-GA-49104-01-C	A1D Tie-in Spoolpiece for 12" Gas Riser and 3" Methanol General Arrangement
10	DO-GA-59102-01-D	A2D Tie-in Spoolpiece for 3" Methanol line Details
11	DO-GA-59103-01-C	A2D Tie-in Spoolpiece for 10" Gas Riser and 3" Methanol General Arrangement
12	DO-GA-69101-01-C	B1D Tie-in Spoolpiece for 10" Gas Riser and 3" Methanol General Arrangement
13	DO-GA-69102-01-C	Platforms B1D and A1D Tie-in Spoolpiece for 3" Methanol line Details
14	DO-GA-29101-01-C	C1D Tie-in Spoolpiece for 12" Gas Riser and 3" Methanol General Arrangement
15	DO-GA-29102-01-C	Platforms C1D and A1D Tie-in Spoolpiece for 3" Methanol line Details
16	SK-ENG-054-025	Final Tee-piece dimensions
17	SK-ENG-054-027	Location of mattresses over A2D spools
18	SK-ENG-054-028	Location of mattresses over A1D and tee spools
19	SK-ENG-136-025	Mattress locations for A1D platform
20	SK-ENG-136-026	Mattress locations for A2D platform
21	SK-ENG-136-027	Mattress locations for B1D platform
22	SK-ENG-136-028	Mattress locations for C1D platform
23	DO-GA-49100-01-D	Platform A1D Riser General arrangement
24	DO-GA-59100-01-C	Platform A2D Riser General arrangement
25	DO-GA-69100-01-C	Platform B1D Riser General arrangement
26	DO-GA-29100-01-D	Platform C1D Riser General arrangement
27	DO-DD-09104-01-C	30"gas trunkline and methanol pipeline piggy-back attachment details
28	DO-DD-09204-01-B	Gas pipelines and methanol pipeline piggy-back attachment details





Rules & Methods To Monitor pipelines- Your Regulations???

General Imaging (GI)

General imaging is a general screening technique, used for identification of the following anomaly types:

- Exposures
- Upheaval or lateral buckling
- Pipeline movement
- Spanning
- Significant items of debris
- Incidents of pipeline disturbances due to third party interactions

General Visual Inspection (GVI)

General Visual Inspection refers to a sophisticated spread of equipment including visual inspection and a range of survey and positioning systems gathered using an ROV deployed from an inspection vessel. The system generally includes:

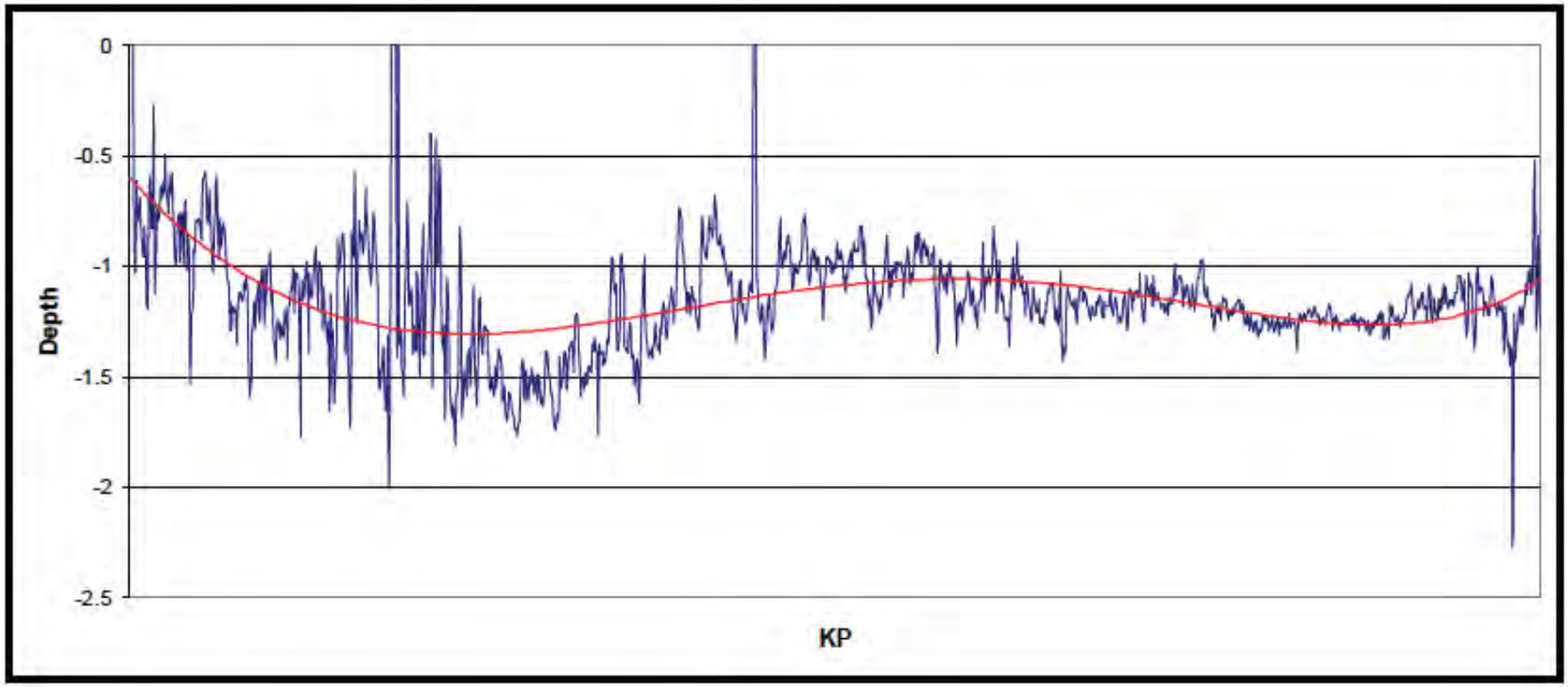
- Subsea positioning system
- Video cameras and recording equipment mounted on a 3 boom or pan and tilt frame to provide video images of the top and both sides of the pipeline
- Cross-profiling system
- Bathymetric system
- Pipe-tracking and depth of burial measurement system
- Cathodic protection survey system

The following aspects are considered when determining the stability of a pipeline:

- Spans
- Exposures
- Depth of burial

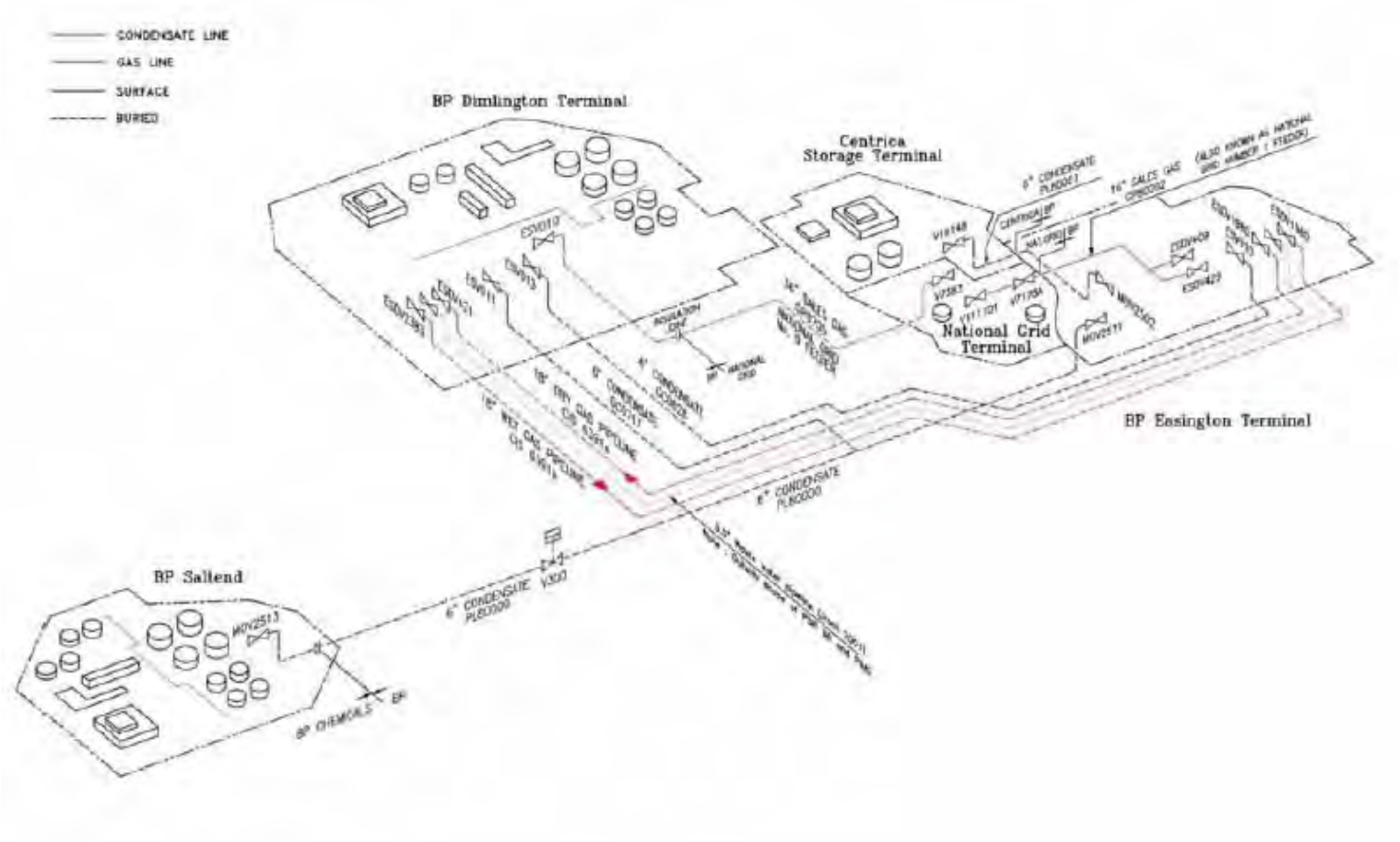
Areas of notable exposure

Complexity of Pipeline Decommissioning-What is the current status of your pipeline re decommissioning ???



Depth of burial profile

Decommissioning of land-falls to onshore Gas Receiving Facility – Your Decom Regulations??



Regulations versus Decommissioning Costs

As the example of pipelines demonstrates, decommissioning is a very complex and specialised area.

Decommissioning needs to be regulated carefully as the regulations applied will DIRECTLY effect your final decommissioning costs.

QUESTIONS TO THINK ABOUT?

Do you understand the implications of each regulation on the decommissioning work scope and costs?

What is the true benefit to Society of the each regulation and does the regulation achieve the required balanced outcome?

The balance of common sense versus the perfect environment ?

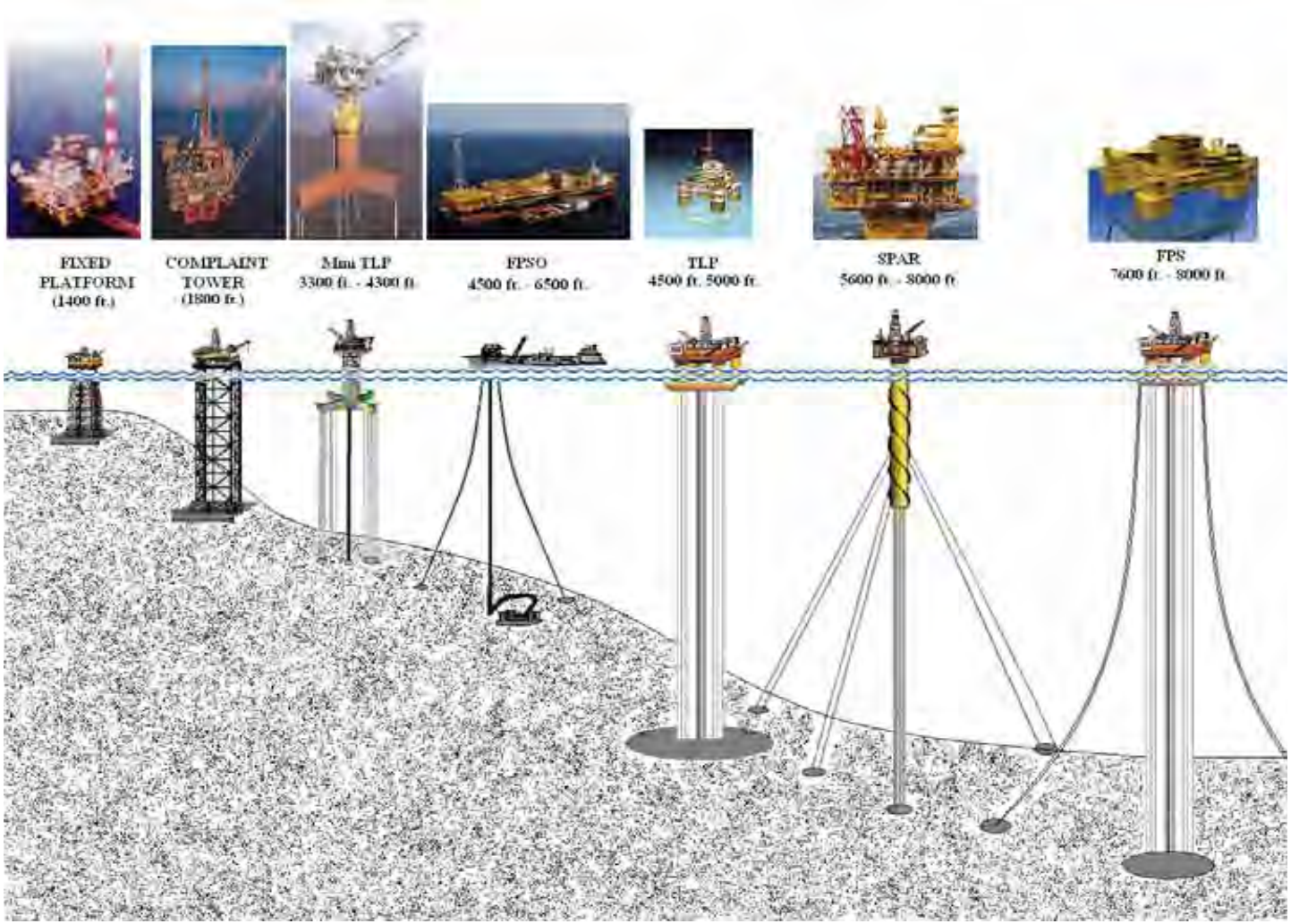
Cab the money be used better- schools, hospitals etc. ?

Can the resultant decommissioning regulations should create work for the local workforce and still achieve the goals?

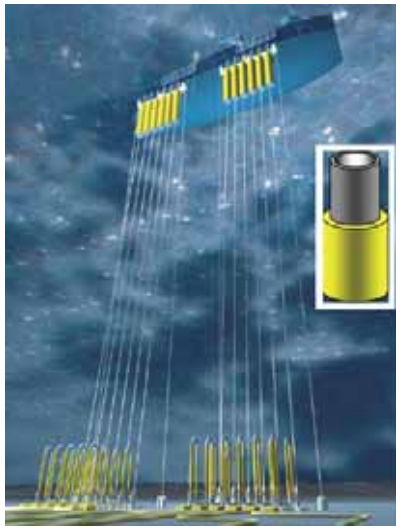
Decommissioning Process

(FPSO Production Systems)

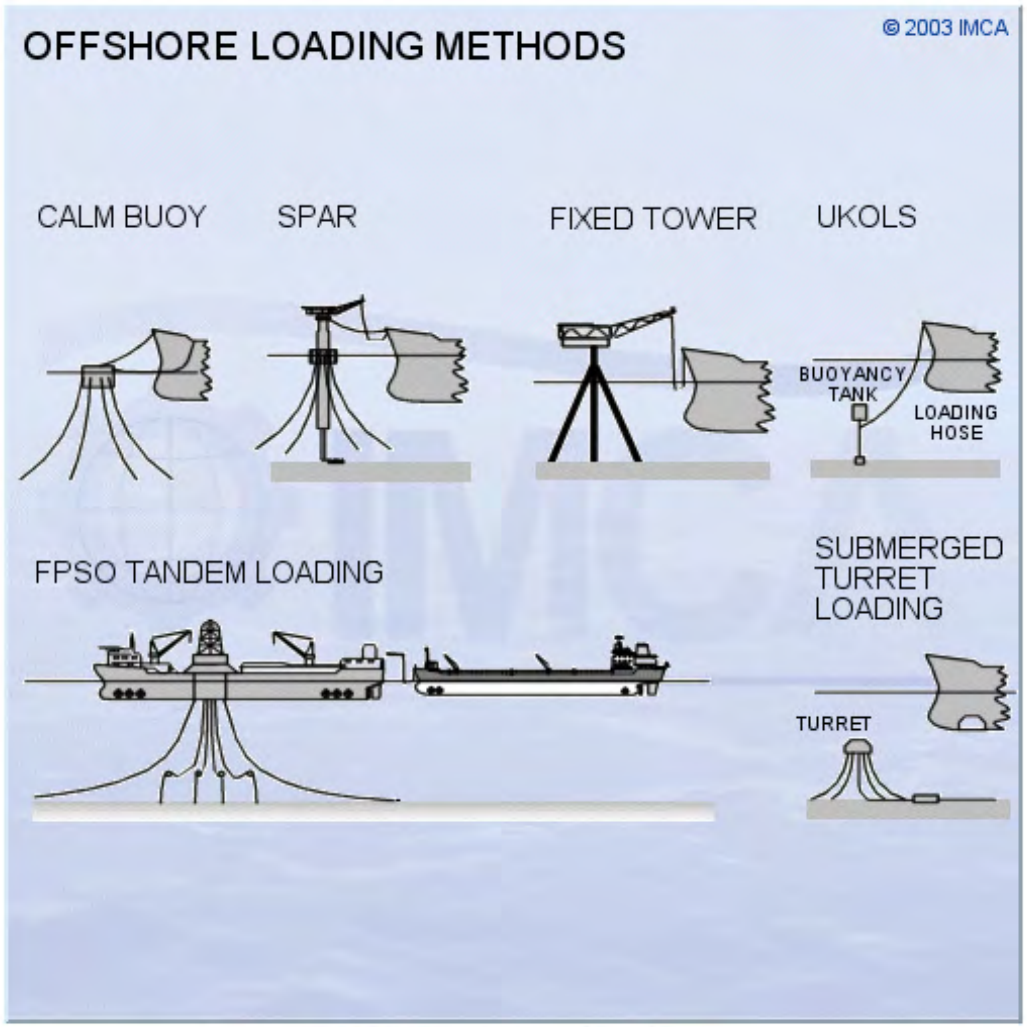
Types of Facilities Covered in Workshop



Types of Facilities Covered in Workshop



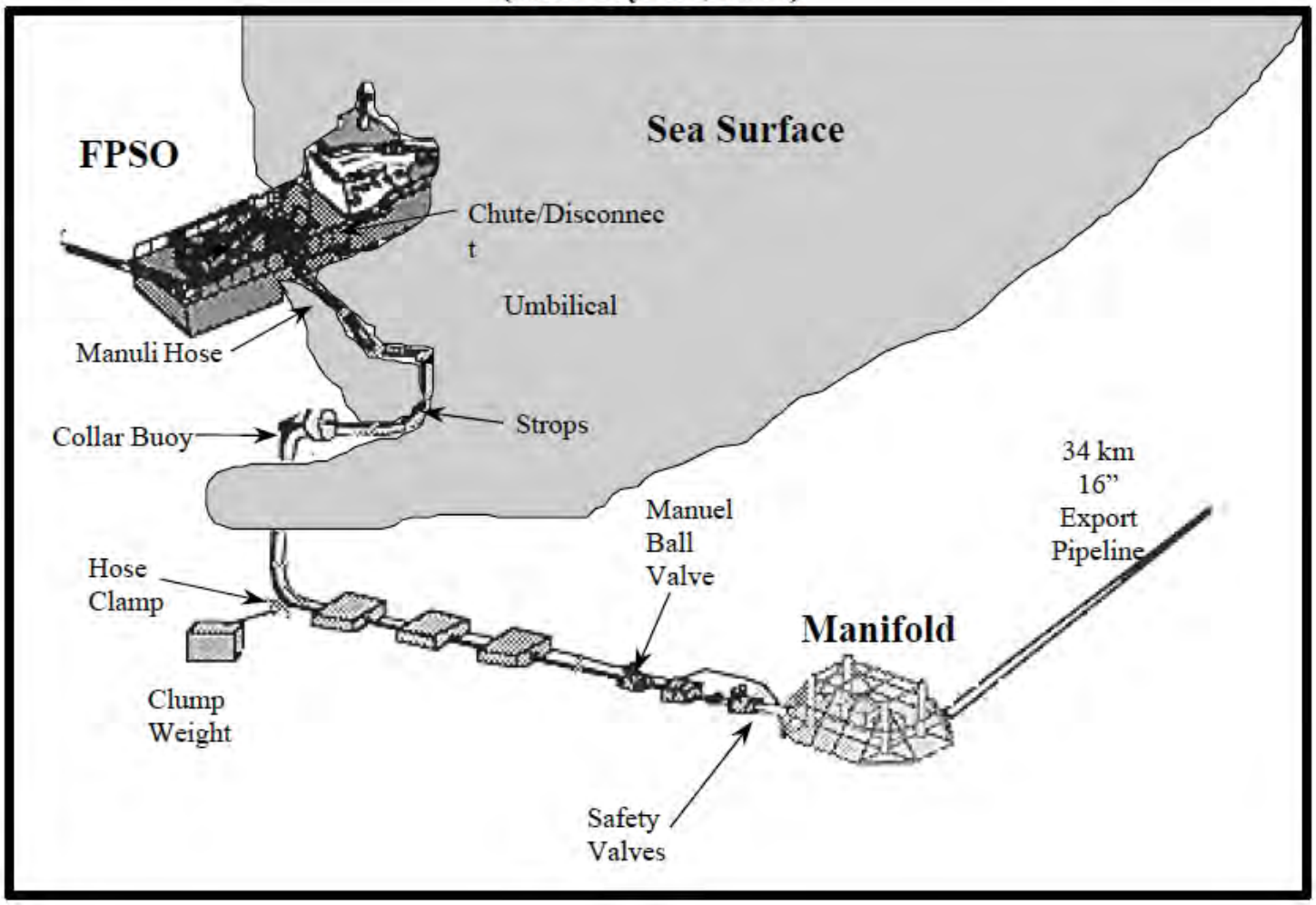
Offshore Loading Methods



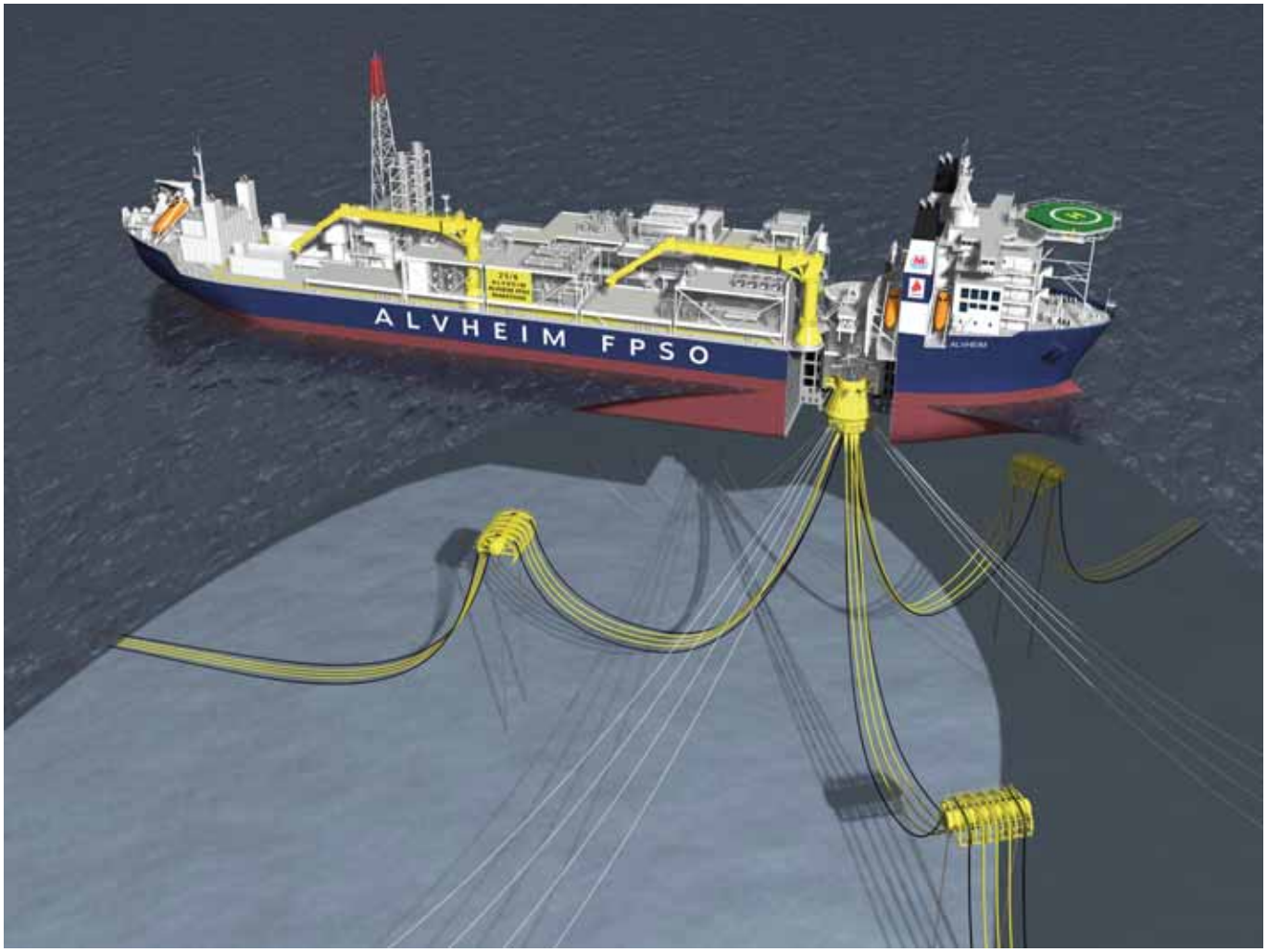
Sketch 5.11 - OLT configurations

Simple View of Early Subsea Facilities Linked to FPSO

Figure 68 - Complete FPSO/Manifold Interface
(From Lynch, 1996)



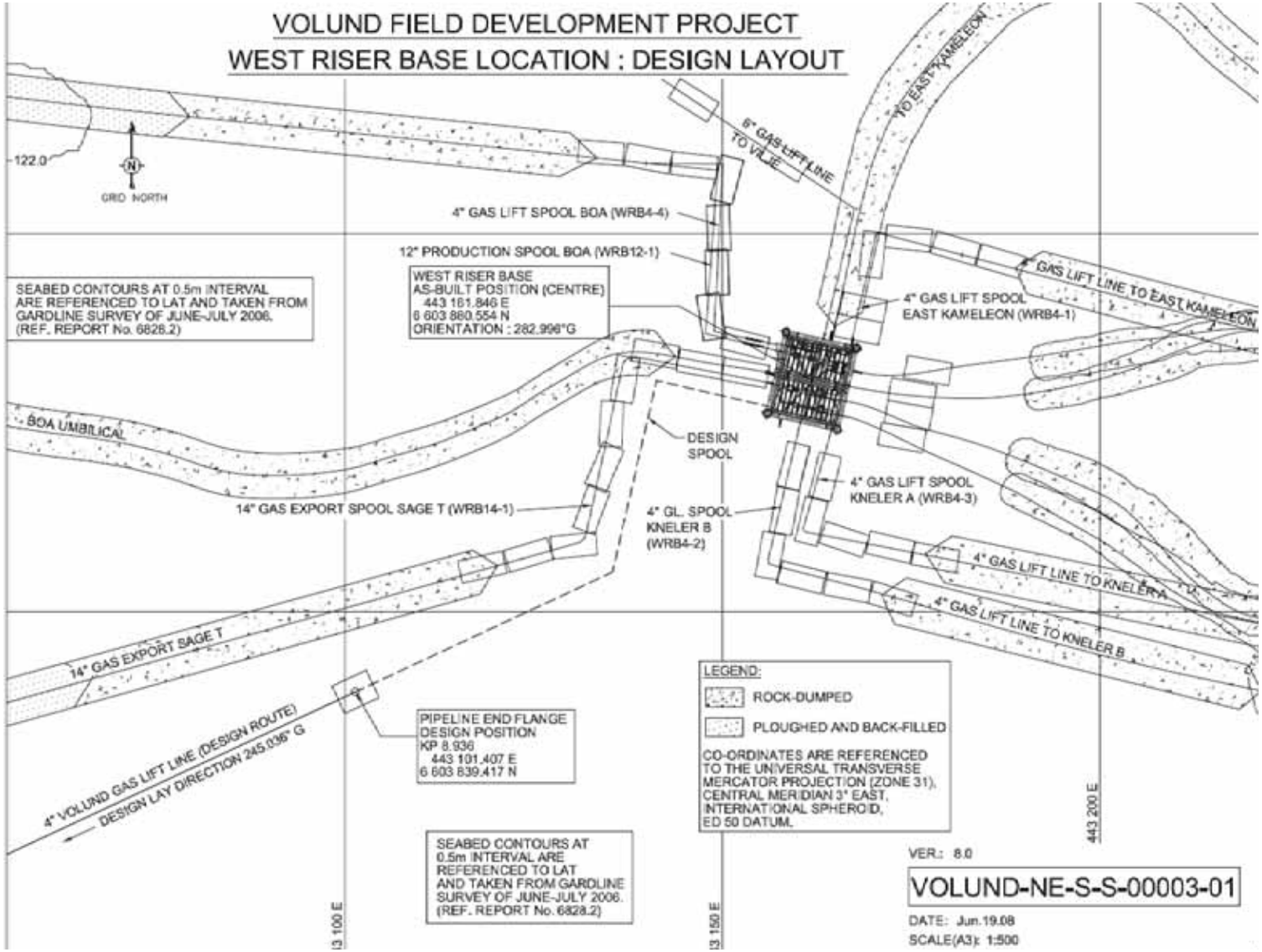
FPSO Surface Facilities Supporting Subsea Facilities



Typical Subsea Facilities Connected to FPSO

Components of a Typical FPSO Production Facility

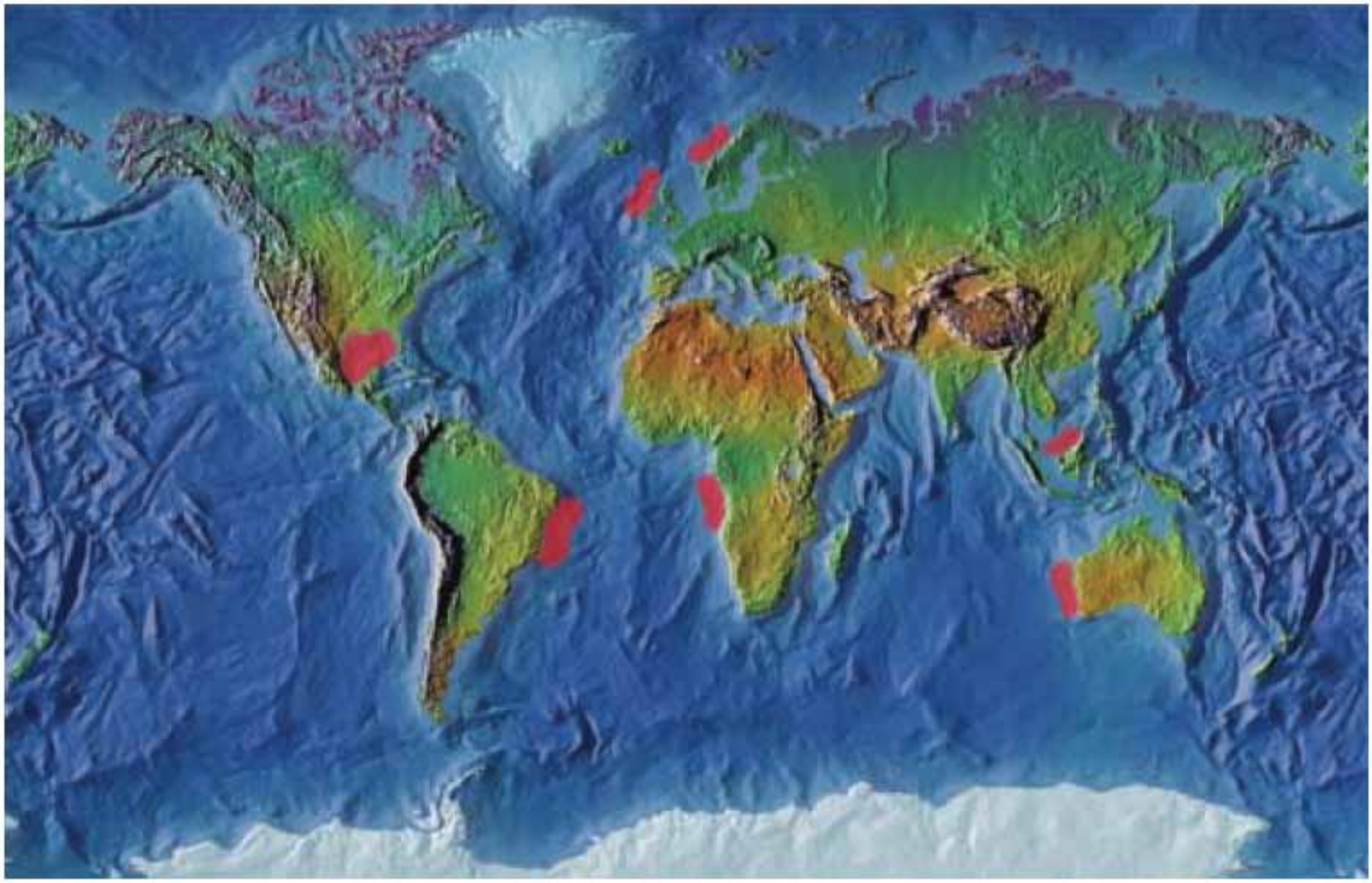
- Trees with or without over-trawlable structure
- Subsea manifolds with or without an over-trawlable structure
- Riser bases
- Flowlines, gas lift-lines
- Control and chemical supply umbilicals
- Flexible risers and buoyancy system (mid water arches)
- Gas Export and Gas Lift Subsea Isolation Valves (SSIVs)
- FPSO Mooring system
- Export pipeline tie-in structure
- Water disposal wells



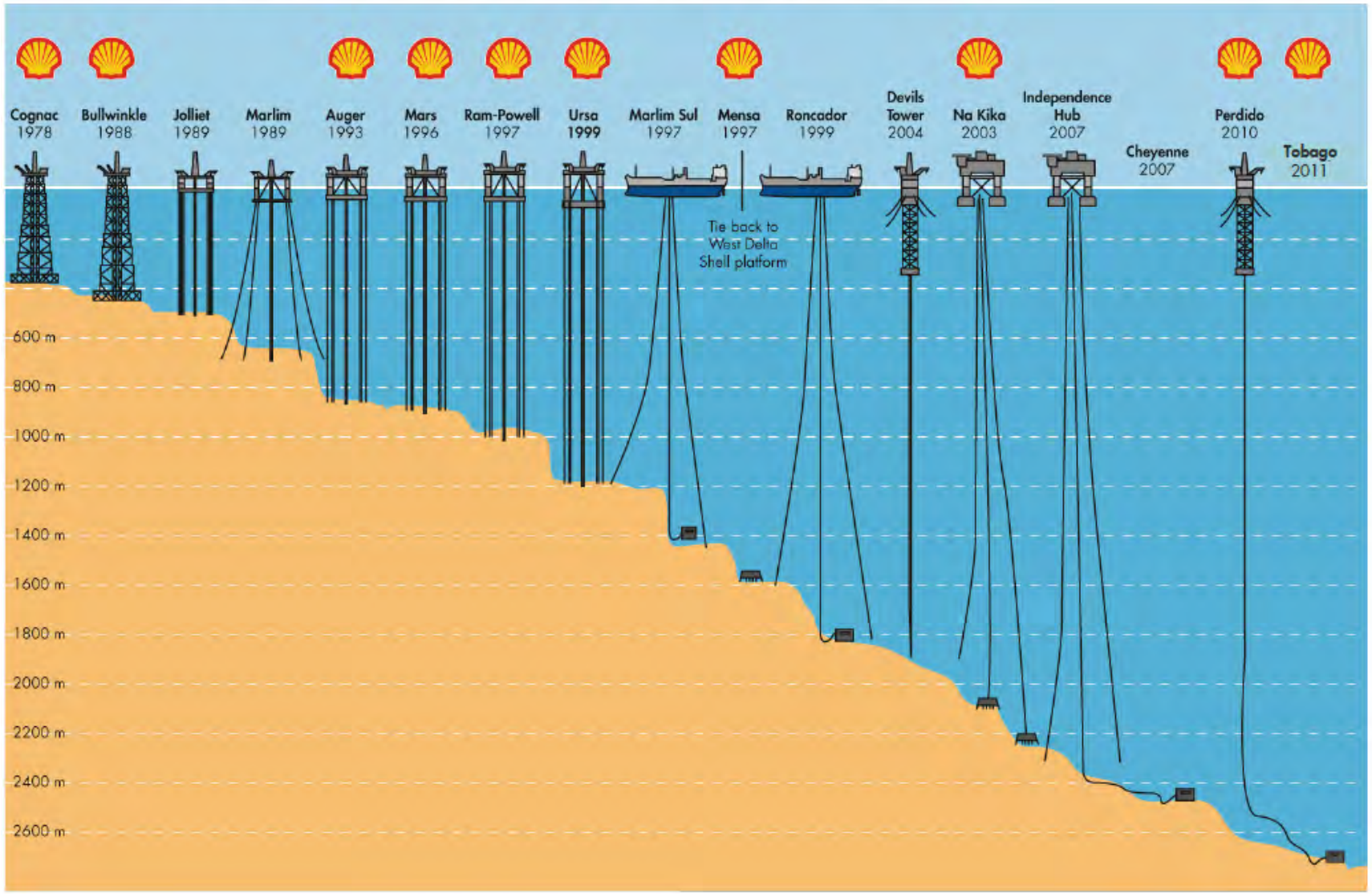
Decommissioning Process

(Deepwater Production Systems)

Major Deepwater Provinces



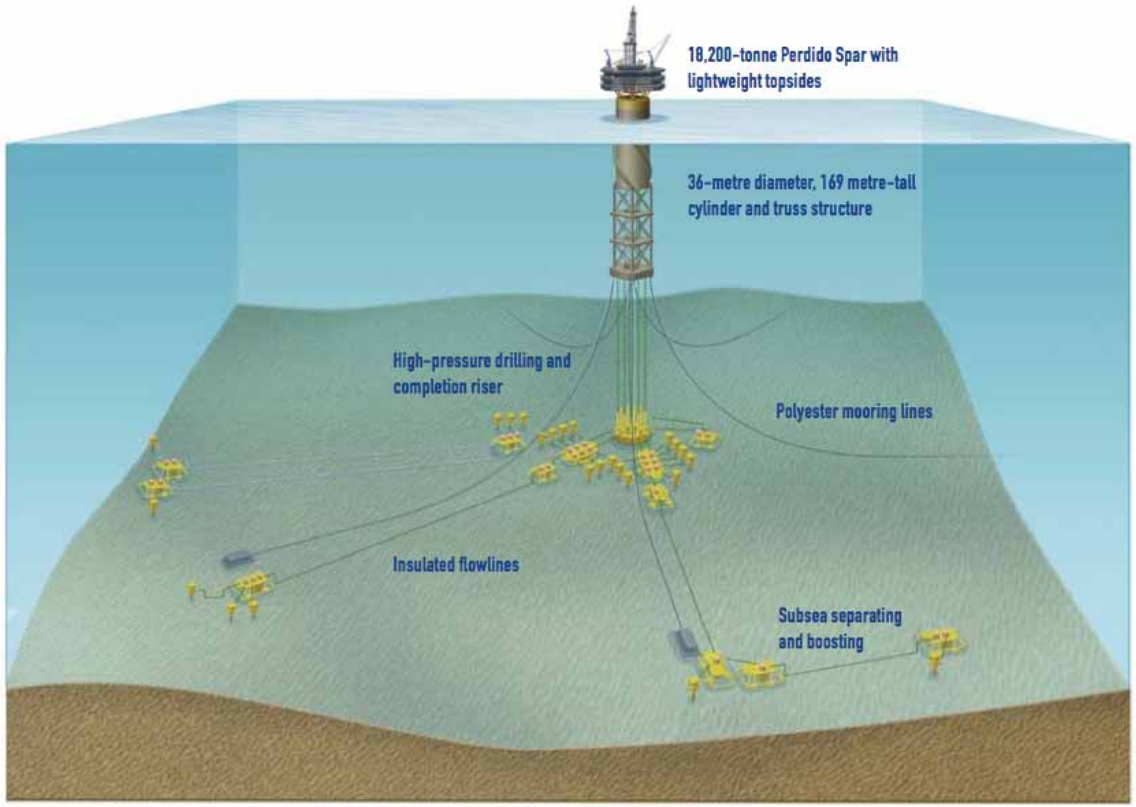
DEEPWATER DEVELOPMENT HISTORY



PETRAD

REVERSE ENGINEERING SERVICES

Perdido Spar: The Current GOM Deepwater King



Ref: Shell EP Technology No.3, 2008

- First commercial production from the lower tertiary in the Gulf of Mexico
- Hydrocarbon storage tanks for flow assurance
- Full host scale subsea separating and boosting
- First application of wet-tree direct vertical access (DVA) wells from a spar
- Lightweight topsides to enable quick, single lift mounting to lower risk
- Drilling rig for anticipated well-works due to highly fractured low pressure reservoirs
- Innovative solutions for HSE, including a blast-rated firewall spanning the production and cellar decks
- World's deepest (4,500-feet/1,370-metre) cutting of an operating oil pipeline and splicing in a Y-connection

Thank you for your attention

Any Questions ?