

## PROPOSED ALTERNATIVE SOLUTION

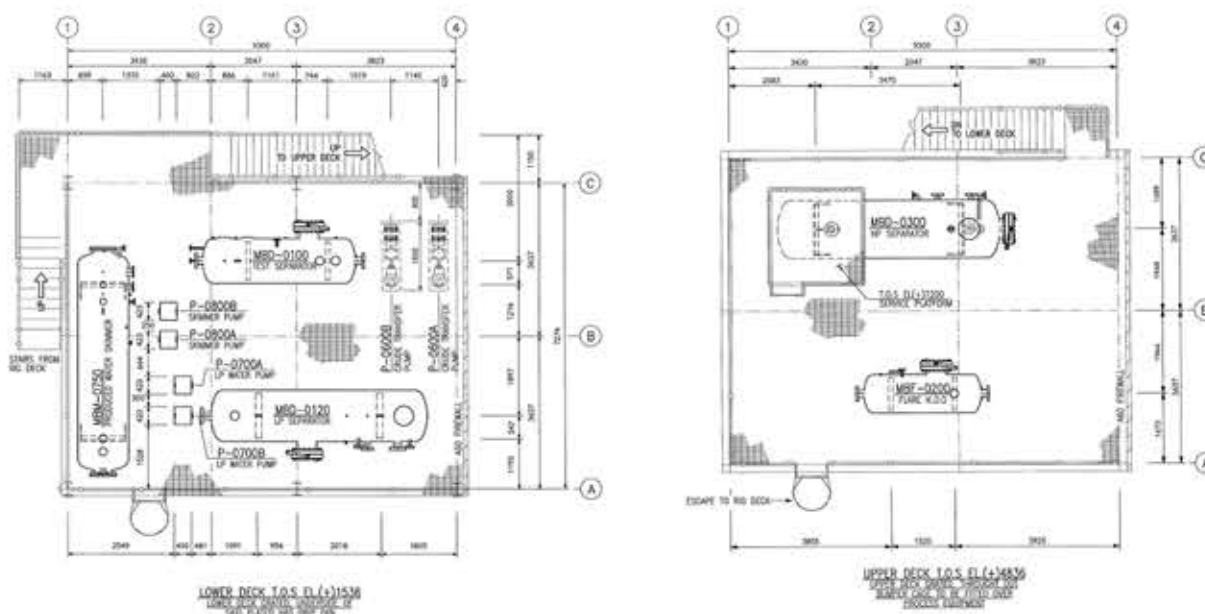
Our proposed alternative solution will involve the removal of one (1) Gas Engine Compressor Train from the MOPU to provide adequate space on process deck for the installation of an EPS module.

MOPU Production capacities:

Process description	Current Capacities	Alternative Capacities
Separation System	10,000 bpd total liquids	30,000 bpd total liquids
Crude Export System	2 x 6000 bopd	2 x 6000 + 10,000 bopd
Produce Water Treatment System	8000 bwpd	20000 bwpd
Gas Compression System	75 MMscfd	37.5 MMscfd
Gas Processing System	75 MMscfd	37.5 MMscfd
Gas Lift	20 MMscfd	20 MMscfd



EPS Module Photos



EPS Module General Arrangement





“The BOSS 1 has been converted into a MOPU and is currently operating in Indonesia on the West Madura Offshore field. It is currently running at 6000 bbl/day of oil production, 75 MMscfd of gas compression, 20 MMscfd of gas lift and 4000 bwpd. It has been operating since 2014.”

### Classification

Name	BOSS 1
Type	Bethlehem Steel Corp MS-250
Elevating System	Yoke and Pin system with 6 yoke pins and 6 fix pins at each leg
Registration Country	Indonesia
Current Location	West Madura, Indonesia
Availability	2017

### Helideck

Support a Bell 212 and Bell 412 w/ gross weight 5397 and 5080kgs w/ rotor diameter 14.02 and 14.63ft

### Storage Capacities

Salt Water	3480.20 bbls
Portable Water	885.40 bbls
Fuel Oil	1551.05 bbls

### Principal Dimensions

#### Hull

Hull Length (ft)	166
Hull Breadth (ft)	132
Hull Depth (ft)	16
Hull Transit Loadline Draft	2' - 6"

#### Mat

Mat Length (ft)	210
Mat Breadth (ft)	170
Mat Depth (ft)	12 (including 2 ft skirt)
Minimum Separation of Mat and Hull (afloat)	2' - 6"

#### Legs

Number of Legs	3
Type	Tubular
Length (ft)	312
Size (ft)	12 (OD)
Pinholes	6 pinholes spaced 6 ft

### Firewater System

Two (2) electric driven submersible pump Pumpworks 610 PWV 16FXH-3 stage, 2770 GPM each

### Crane

Two (2) Link-Belt ABS-218A cranes w/ 100ft boom rated at 26T capacity @ 40ft radius

### Power Generation

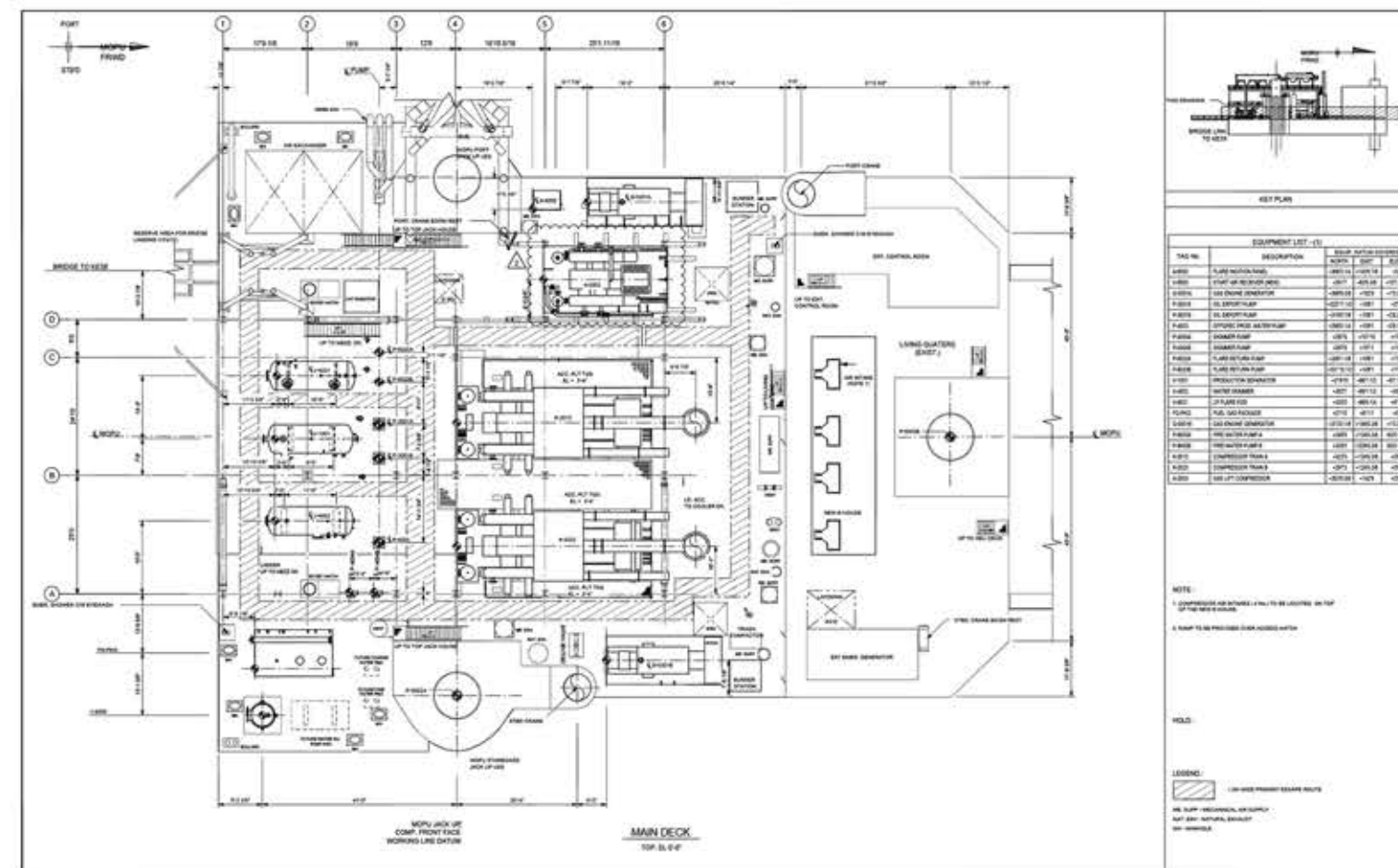
Main Hull Generator	Two (2) 2100 KW Generator Motors EMD MD12E8 diesel engines
Topsides Generator	Two (2) Waukesha Gas Engine 12VHP L5794GSI
Emergency Generator	One (1) 400 KW Cat D-397-TA diesel engine
Firewater Generator	One (1) 1250KW Cat 3512B diesel engine

### Survival Capsule

Two (2) Lifeboat w/ capacity 54 persons each

### Process Design Condition

Separation	One (1) Production separator rated 6000bopd/4000 bwpd/5MMscfd
	One (1) Production scrubber rated 75MMscfd
Compression	Two (2) Caterpillar Gas Engines with Ariel Compressors rated 37.5 MMscfd each
Gas Lift	One (1) Waukesha Gas Engine with Ariel Gas Lift Compressor rated 20MMscfd
Produced Water	Two (2) Hydrocyclones rated 4000 bwpd each
Treatment System	One (1) Skimmer rated 8000 bwpd



**MOPU BOSS 1 TOPSIDE EQUIPMENT LIST**

Equipment Description	Rated Capacity	Quantity	Operating Pres. (psig)	Operating Temp. (F)	Des Pres. (psig)	Des Temp. (F)
<b>PROCESS SEPARATION SYSTEM</b>						
Production Separator	5 MMscfd/ 6000 bopd/ 4000 bwpd	1	150-200	120	350	150
Production Scrubber	75 MMscfd	1	150-200	120	350	150
<b>CONDENSATE TRANSFER SYSTEM</b>						
Oil Export Pump	6300 bpd (each)	2	150/480 or 200/630	121	1285	150
<b>GAS COMPRESSION SYSTEM</b>						
Caterpillar Gas Engine Compressor (single stage compressor w/ 4 cylinders)	44.26 MMscfd (each)	2	150/480 or 200/630	118/280	815	350
<b>FLARE SYSTEM</b>						
HP Flare KOD	85 MMscfd	1	65	8.6 to 120	125	(-)20 to 150
LP Flare KOD / Closed Drain Vessel	16 MMscfd	1	1.45	120	50	(-)20 to 130
LP Flare Return Pump	2000 bpd (each)	2	1.45/250	120	310	150
HP Flare Tip	85 MMscfd	1	-	-	240	200
LP Flare Tip	16 MMscfd	1	-	-	240	200
Flare Tip/Flare Ignition Control Panel	-	1	-	-	-	-
<b>PRODUCED WATER TREATMENT SYSTEM</b>						
Hydrocyclone	4124 bwpd (each)	2	150-200	120	350	150
Water Skimmer	4000 bwpd	1	1.45	120	50	150
Offspec Water Pump	4000 bwpd	1	ATM/250	120	740	150
Skimmer Pump	4456 bopd (each)	2	ATM/74	120	120	212
<b>OPEN DRAIN SYSTEM</b>						
Open Drain Tank	2200 bwpd/ 3800 bopd	1	ATM	Ambient	Liquid Full + 1 psig	150
Open Drain Pump	1411 bpd	1	ATM/23	Ambient	120	212
<b>FUEL GAS SYSTEM</b>						
Fuel Gas Scrubber	2.9 MMscfd	1	115	116	150	150
Fuel Gas Coalescer Filter	3 MMscfd	2	100	115	150	150
Fuel Gas Superheater	-	1	85	114/132	250	150
<b>POWER GENERATION SYSTEM</b>						
Waukesha Gas Engine Generator	1450 hp (each)	2	-	-	-	-
<b>BLACK AIR START UP SYSTEM</b>						
Start Air Compressor Package	177.6 scfm (each)	2	0/250	85	380	-
Start Air Receiver	242 cuft	1	250	100	380	200
<b>INSTRUMENT/UTILITY AIR SYSTEM</b>						
Air Compressor Package	231 scfm (each)	2	0/125	85	160	-
Air Dryer 1 Package	1000 scfm	1	125	100	50 to 150	120
Air Dryer 2 Package	261 scfm	1	120	100	160	150
<b>GAS LIFT COMPRESSION SYSTEM</b>						
Waukesha Gas Engine Gas Lift Compressor (Dual stage compressor w/ 2 cylinders each stage)	20 MMscfd	1	400/1350	120	1900	350

