First “Jones-Act” purpose-built shuttle-tanker: an innovative procurement approach for US GoM Cascade & Chinook fields

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**Ship-based Crude Oil Production Chain**

- **Production + Storage + Offloading**
- **FPSOs**
- **Transportation**
- **Terminals & Refineries**
- **Products**
Outline

- A Rear View Mirror
- A Jones Act Market – Bumps on the Road
- A Design Competition
- A Conversion of a New Build
- A New Old Procedure
- Looking Ahead
Once upon a time: back to 70s

1977 – 1st Offloading in Campos Basin, Brazil
1979 – 1st cargo to a dedicated shuttle-Tanker, North Sea
1980 – 1st purpose build DP Shuttle-Tanker – North Sea
2010 – 1st purpose build Shuttle-Tanker in US
Rear Mirror View
Petrobras’ Offloading in Numbers

- From 1999 - more than 4500 oil off taking operations
- 3 near misses (2 with regular tankers and 1 with DP)
- 3.8 billion barrels exported by ST

![Pic from the Web](image)

**Offloading Operations in Brazilian Waters 1999 - 2006**

- Regular Tankers 56%
- DP Tankers 44%

Enough to fill it up 320 times the Reliant Stadium
2006: planning the future.
1998    99    00    01    02    03    04    05    06    07

Timeline for a Jones Act Shuttle-Tanker

MMS
Starts
evaluation
of FPSOs
in GoM

EIS starts
USCG
involved
5 worldwide
Regulatory
Agencies
involved

Use of FPSO in the
GoM was approved

FPSO can be a
Foreign Flag
Vessel

Shuttle-Vessel
shall comply the
Jones Act

Petrobras
started a study
to use a
Shuttle-Vessel

Contracted
the 1st
Jones Act
Shuttle-
Tanker
The Shuttle-Tanker in US shall fully comply with the Jones Act *

* The Merchant Marine Act of 1920 (The “Jones Act”)

Senator Wesley Livsey Jones (1863-1932), Republican from the state of Washington, Author of the Jones Act, intended to protect his state’s trade with Alaska.
Back to 2006
Is the Jones Act Shuttle-Vessel the critical path?

Artistic View
Tandem Offloading Operation
Marketing Evaluation
Conclusion in 2006

- Limits on Americans’ shipyard schedule/availability
- Restrictions on existing tankers for conversion
- Aging of the existing tanker fleet
- Lack of interest due to risks regarding re-use (no foreign Jones Act ST market)

2006 – Conclusion: the Shuttle Vessel will be the critical path of the Project
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1st Step

Identify possible types of vessels

Objective: define which type of vessel could participate
ITBs
ATBs
Conventional Tanker
DP Tanker
New build or conversion
Design Competition

2\textsuperscript{nd} Step

Comparative Risk Analysis

Objective: define requirements to keep options with the same level of safety
Hardware Mitigations

- International rules & Conventions (IMO), OCIMF, OPA90, USCG, CS
- PLT, CCTV, IG, F&G, EG, Vent, etc
- DP System, Thrusters, CPP
- Green Line (Telemetry)
- Limit on vessel aging
- Retrievable Hawser & Hose
- BLS & SDS
Humanware Mitigations

Restricted Area for Navigation

Theoretical & Practical Training

Operation Experience & procedures

Offloading Performance

Tests and Real Simulations

SIMOPS

Assist Tug
Design Competition

3rd Step

Comparative Efficiency Evaluation

Objective: to set criteria to compare different proposals
Engineering Studies
Prior to start Design Competition

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Comparative Efficiency Analysis

Example of a Comparative Downtime result

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<td>%</td>
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<td>Ballasted ST</td>
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Hawser Tension (tonf) - max = 105.1tonf min = 0.0tonf mean = 39.4tonf
Terms & Conditions & Technical Specification

- Mandatory Equipment
- Mandatory Performance
- Recommended Requirement

Design Competition Package

Petrobras Offloading Guidelines

Constant iteration with USCG

Engineering Studies

Functional Spec

Regulatory Framework
- Administration
- IMO & OCIMF
- USCG
- CS
BLS connection

Thanks APL & Pusnes
Requirements on the ST side

- Flushing requirement
- Amidships Manifold
- CPP
- Thruster
- IG, F&G, EG
- Telemetry / Greenline
- OPA 90
- Max 15 years aging
- COW, Vent System
- Automation & Control
- Cargo Heating, Cranes, etc

AT with minimum 65 t bollard pull
Requirements on the FPSO side

- Pneumatic Line Thrower
- Retrievable Messenger Line
- Retrievable Mooring Hawser
- Retrievable Offloading Hose
- Hose flushing facilities
- Alternate offloading hose
- Telemetry

Thanks to BWO
Telemetry System
Green Line

- Chain Stopper Closed
- Hose in Position
- Coupler Claws Closed
- Inboard Valve Open
- Crude Pressure Normal
- Coupler Valve Open
- Cargo Valve
- OESD 1 and 2 not activated
- Hawser tension normal
- Hose reel band brake engaged
- Export Valve open

- DARPS

Green Line = Permit to Load
Breaking Green Line = Shutdown = OESD1
Award the winner
Design Competition evaluation

Open Technical Proposal & Qualification
Commercial Proposal is sealed

Comply with Mandatory Equipment & Performance?

Yes → Qualification Acceptable?

Yes → Apply Equalization Factor as previously defined

Yes → Open commercial proposal. Weight proposal

No → Proposal rejected

No → Qualification Acceptable?

No → Award the winner
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Design Competition Winner: OSG

Conversion of a new build

Construction: Aker Shipyard, Philadelphia

OSG had already ordered 12 product tankers at APSI, 2 of them booked to convert into Shuttle Tankers.
Conversion: Detyens, in Charleston, South Carolina

- Remove the Fixed Propeller
- Install a CPP
- Install a tunnel in the bow and a Bow Thruster
- Install a 2250KW Generator
- Install a BLS Aker-Pusnes
- Install the telemetry system
Shuttle Tanker Overseas Cascade

Constructed in Philadelphia
Converted in South Carolina

Shuttle-Tanker in Philadelphia

Shuttle-Tanker Launching
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Safety in Operation  Safety Zone – Notice to Mariners

Turret Location:
26° 41’ 46.25” N
90° 30’ 30.16” W

Overlaid with Tandem Offloading

728 m Radius

206.5 m
150 m
185 m
228 m

50 m each

500 m from Stern
Operational Sectors
## Set of Training

- Simulators
- Manufacture training
- Specific offloading equip training
- Hands-on training in Brazil

Thanks to MITAGS
Offloading Manual

- Offloading Guideline (Petrobras Doc)
- Hazids, Hazops, Engineering Studies
- International Regulation, CFR (USCG)
- M/T OVERSEAS CASCADE OIL TRANSFER MANUAL (OSG DOCUMENT)
- Oil Transfer Manual (BWO DOCUMENT)
- Assistant Tug (CHOUEST DOCUMENT)
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OSG Overseas Cascade
Delivered April 1st 2010

Contractual delivery window: April 1st to 30th 2010
Actual delivery: April 1st 2010

Thanks to OSG
After Delivery

April 30th 2010 the vessel was handed over to BP to work on the Macondo Response.

Aug 20th 2010 the vessel was handed over to Petrobras/Brazil, to operate in Campos Basin as a ST.

Thanks to OSG.
ST in operation in US and in Brazil
Conclusion

Despite challenges and marketing uncertainties, delivery of the 1st Jones Act ST was made on time, in budget, as contracted, mainly due to a strong collaboration and commitment among Petrobras America, Petrobras Headquarters, OSG and partner, putting this part of the project out of the critical path.

STs can be an economically feasible and flexible option for oil export in US.

Petrobras Offloading Committee, under Petrobras America’s coordination, defined a procurement strategy that was the key of this result.

This approach starts a new oil export mode for E&P development in the US GoM.

Acknowledges: Devon, Total, OSG & USCG

Thanks to Marine Technology Society
First “Jones-Act” purpose-built shuttle-tanker: an innovative procurement approach for US GoM