

Exh. MM-69
Docket TP-220513
Witness: Michael Moore

**BEFORE THE STATE OF WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,

Complainant,

v.

PUGET SOUND PILOTS,

Respondent.

Docket No. TP-220513

**EXHIBIT TO CROSS-ANSWERING TESTIMONY OF
Captain Michael Moore
ON BEHALF OF
PACIFIC MERCHANT SHIPPING ASSOCIATION**

US pioneer moves ahead with milestone LNG conversion (Jan. 2020)

MARCH 3, 2023

<https://www.rivieramm.com/news-content-hub/news-content-hub/us-pioneer-moves-ahead-with-a-milestone-lng-conversion-57639>



North Star was fitted with two 1,100 m3 LNG tanks for its conversion

US pioneer moves ahead with milestone LNG conversion

24 Jan 2020 by John Snyder

US-based Tote Maritime Alaska is undertaking a multi-year milestone conversion of two coastal roll-on-roll-off vessels, refitting the ships' four diesel engines to burn LNG

Tote Maritime Alaska is currently engaged in the refit of two coastal roro vessels, transforming them into LNG-powered ships. Making the conversion unique in North America is that the two Orca-class sister ships, *Midnight Sun* and *North Star*, will undergo much of the required work while they remain in operation.

“There was a desire and a need to keep these ships in operation as much as possible while we are doing this,” says Tote Services Orca LNG conversion project director Lee Peterson. Specifically built for service to Alaska, the two trailerships conduct twice weekly service between Anchorage and Tacoma, Washington, transporting everything from groceries and TVs to autos and military vehicles. Tote has been operating the Jones Act cargo service between Tacoma and Anchorage since 1975.

Mr Peterson calls the two vessels ‘vital lifelines’ to Alaska, making it important that Tote Maritime Alaska keeps the ships running. “That’s the reason we are doing this over such a long period of time,” he says.

Conversions to take four years

Multi-phase conversions of *Midnight Sun* and *North Star* will take about four years to complete, allowing much of the conversion work to be done dockside and at sea to minimise the vessels’ out of service time.

Each vessel will undergo two phases of conversion, with each phase including work while in service, concluding with a nine-week shipyard stay. In the first phase, each vessel will undergo most of the required structural enhancements while in the shipyard, including the addition of a deck to the aft end of the ship, installation of two 1,100 m³ LNG tanks and supporting infrastructure.

During phase 2, mechanical modifications will be completed on two of the vessel’s four engines while the ship is in service. During the final shipyard phase the remaining two engines will be converted, with all systems converted, completed and tested. The LNG tanks will be fuelled to power the newly converted engines.

Orca-class vessels were custom designed by San Diego-based shipbuilder NASSCO and delivered in 2003 for Alaska service. *Midnight Sun* and *North Star* each have an overall length of 255.7 m, beam of 36 m, draught of 9 m, with

a trailer capacity of 600 40 ft-equivalent units (FEUs) and a cargo deck area of 33,445 m², with specialised ramps that allow cargo to be quickly discharged.

North Star completed the conversion of its number two main engine in August 2019 during phase 2 of its in-service work. The final shipyard phase is scheduled for completion in Q1 2021. The first phase shipyard work on *Midnight Sun* was conducted in December. Plans call for the vessel to be powered by LNG in 2022.



Grace Greene (Tote): Far exceeding current and future regulations

Adopting a pre-fabricating strategy

To accomplish the conversions while the vessels are in service, Tote Services conversion port engineer Kelly Scott says the company had to pre-fabricate as much as possible. For each vessel conversion, Mr Scott says, Tote had to figure out what could be done while the vessel was in operation sailing to Alaska “to allow space and scope for the big things we can’t do in service.”

The complexities of planning out and executing the conversions extended well beyond Tote personnel.

“It has required tens of thousands of manhours of planning, not only on the Tote side, but from all our project partners in six different time zones on four different continents,” says Mr Scott.

Project partners include NASSCO, engine manufacturer MAN Energy Solutions and control systems designer General Electric. Part of Seaspan Shipyards, Victoria Shipyards in Victoria, British Columbia, Canada was selected by Tote Maritime Alaska to carry out the yard production work and docking necessary for the conversion of the Orca-class vessels to dual-fuel operation.

A part of the planning process, MAN Energy Solutions successfully converted a prototype engine at its test facility in Germany, ensuring that any unseen issues could be ironed out ahead of time before retrofitting the older prime movers.

Each of the diesel-electric vessels is equipped with four MAN B&W 9L 58/64 main engines and two MAN B&W 9L 27/38 medium-speed auxiliary diesel engines, which are designed to operate on both heavy fuel oil (HFO) or marine diesel oil (MDO). Each ship has an Alstom electric propulsion plant, with frequency converters and two synchronous, variable-speed, reversible, brushless, double-wound main propulsion motors.

The conversions are expected to virtually eliminate sulphur oxide (SO_x) emissions and particulate matter, while reducing nitrogen oxide (NO_x) emissions by 90% and CO₂ emissions by 35% from the two Orca-class vessels.

Tote settled on converting the two diesel-electric ships to burn LNG in 2012. In August 2012, Tote received a permit from the US Coast Guard providing a conditional waiver from the Emission Control Area (ECA) fuel sulphur content requirements of MARPOL Annex VI regulation 14.4 while the vessels are being converted.

“Converting to LNG makes so much sense for us,” says Tote Maritime Alaska president Grace Greene. “It is us leading; it is us doing things that no one else is doing,” she says. “When we made the decision (to convert), we realised that we

would not only meet current or future regulations, but we would far exceed them, and that is absolutely the right decision to make.”

LNG bunkering of the vessels will be handled once a week at the Port of Tacoma. An Arctic series triple swivel assembly fuel marine loading arm from SVT will be used to refuel the vessels. From the tanks, LNG will be sent to the gasification room, where waste heat will be used to convert the cryogenic liquid to a natural gas, which will fuel the ship’s 52.2 MW of engine power.

Tote leads by example

When it comes to investing in environmental solutions and advancing the use of LNG as a fuel, there are few companies that can surpass the credentials of Tote Maritime Alaska’s parent company, Tote. In December 2012, Tote signed a US\$350M contract with NASSCO for the construction of the world’s first LNG-fuelled containerships for operation between Jacksonville, Florida and San Juan, Puerto Rico. Those two 3,100-teu vessels, *Perla del Caribe* and *Isla Bella*, were designed by DSEC, part of South Korea’s Daewoo Shipbuilding and Marine Engineering, and were the first to have MAN ME-GI series dual-fuel engines.

Those ships are refuelled by Tote’s *Clean Jacksonville*, the first LNG bunker barge built in the US. LNG is supplied by Pivotal LNG and WesPac Midstream to the barge, which is operated by tug and barge operator Foss Maritime. Like Tote Maritime Puerto Rico’s sister company, Foss Maritime is a member of the privately held Saltchuk Resources.

“We led the way with LNG in the Puerto Rico service with the two Marlin-class dual-fuel vessels and now we are doing the same here in Alaska,” says Tote president and chief executive Tim Nolan. “It’s in our DNA to be a leader, not only in the Saltchuk family of companies, but also in the maritime industry as a whole.”