CABLE SHIPS AND THE ENVIRONMENT: GREEN INITIATIVES TO MINIMIZE IMPACT ON THE MARINE ENVIRONMENT AND SPEED THE PERMIT PROCESS

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Abstract: To promote green initiatives and reduce the environmental impact of subsea communication systems, SubCom implemented a Shipboard Energy Efficiency Management Plan (SEEMP) several years ago. The initiative was created to provide a method for monitoring cable ship and fleet performance over time and identify which options optimize efficiency. The current program includes energy conservation training, hull and propeller cleaning, Green Weather Voyage Routing, economical speeds and operational directives, as well as economical loading conditions. Additionally, assessments of the acoustic signatures of ship and plowing operations is often required as part of an Environmental Impact Assessment (EIA) for permitting within national jurisdictions (EEZ) and may extend to the high seas in order to protect mammals. A responsible environmental program by system suppliers and ship operators has a positive effect on the permitting process for conducting marine operations. By preemptively addresses these concerns, such programs could help limit further regulations by the United Nations (UN), which is currently reviewing recommendations surrounding Biodiversity Beyond National Jurisdiction (BBNJ).

1. INTRODUCTION

SubOptic is all about connections and one of the most important connections all of us share is the relationship to our planet. The flow of information that results from connecting continents using subsea cable systems helps reduce the need for travel, facilitates telecommuting and may reduce overall energy use; but we can do more! It is our social responsibility to continuously look for ways to lessen our environmental impact.

Ten years ago, we made looking for ways to improve energy efficiency a priority. As a result of that effort the company developed a Ship Board Energy Efficiency Management Plan (SEEMP). The plan includes a method for tracking fuel use under a variety of operating conditions. This allows adjustments in equipment, speed, and other vessel parameters to be tested and evaluated for efficiency gains. Greater efficiency leads to a reduction in greenhouse gas emissions.

In addition to reducing greenhouse gas emission our ship operations can closely adhere to other environmental improvement efforts to continue to establish a track record of good environmental stewardship. Some of these efforts include the use of low sulfur fuel, adherence to regulations surrounding the reporting and reducing oil spills, rigorous predive checks of submersibles to prevent hydraulic failures and leaks, and the exclusive disposal of oily water at shoreside facilities. Reduction in the use of electricity when connected to shore-power is also offers an opportunity to decrease the carbon footprint of each vessel.

While there is more work to be done, this paper provides some insight into the efforts we have taken to continuously improve

operations and reduce environmental impact. Additional details are provided in the following sections and SEEMP results will be reported to the International Maritime Organization (IMO) starting this year.

2. ENVIRONMENTAL PERMITTING REQUIREMENTS AND EIAs FOR CABLE PROJECTS

Globally, there is an increasing requirement for marine operators to demonstrate their commitment to sustainable and green ocean stewardship. This requirement is manifested through various outlets including jurisdictional permit-in-principle requirements and operational permits. Many countries require project proponent parties to include detailed procedures designed to improve efficiency gains in vessel operations whilst simultaneously demonstrating due regard for the receiving environment. These requirements can be mandatory navigation requirements such as the speed restrictions off Cape Cod, USA in the areas of Northern Wright Whales habitat. Additionally, vessel operators are often required to demonstrate efficiencies in regulatory documents such as Environmental Impact Assessment (EIA) or Marine Mammal or Protected Species Impact Assessments. The level of detail needed to address the requirements of EIA's and protected species assessments have become increasingly more complex. Assessments commonly require consideration of cumulative impacts on nearby works and details regarding worst-case scenarios.

In addition to increased permitting requirements, the number of Marine Protected Areas (MPA designations) has also increased. Between 2013 and 2018 there has been an 87% increase in the designation of MPA's throughout the world [1]. Although it's commonly accepted that cable laying operations represent a low pollution risk, certain jurisdictions are also requiring detailed preemptive reporting information of incidents such as potential oil spills effects on Seabird Oil Sensitivity Index as well as oil spill indexes of the local species (UK). The adoption of the Ship Board Energy Efficiency Management Plan (SEEMP) has meant that many of these often onerous and detailed requests can be addressed swiftly, efficiently and with supporting empirical data that provides undeniable validity to the supporting data. Without the development of the SEEMP, this data would not be available.

3. SHIPBOARD ENERGY EFFICIENCY PLAN (SEEMP)

The Shipboard Energy Efficiency Management Plan (SEEMP) is SubCom's methodical approach to identifying areas for potential efficiency increases. It requires the consideration of both international regulation and our own corporate commitment to environmental stewardship. The project began in 2007 with a rigorous effort to track and develop baseline fuel consumption and determine the most strategic methods of conservation.

Initially, project leaders spent three years establishing benchmark data and developing energy-saving efforts that were implemented throughout our fleet starting in 2010.

The first part of the initiative identified seven key ship operations that could be tracked. These included basic ship operations such as transits, Remotely Operated Vehicles (ROV) work, plow operations, and cable loading. For three years, we collected fuel consumption and the ship operation data on a daily basis. Eventually we were able to develop a baseline for each operation by classifying the fuel consumption rates versus the ship operation. By the close of 2018 we identified a 15% overall reduction in fuel usage.

The conclusion of the initial SEEMP review highlighted our operational inefficiencies and revealed that the bulk of the savings could be captured through process changes;

not equipment upgrades. Ship schedules were adjusted to accommodate more fuel-efficient speeds, transit routes were re-calculated to take better advantage of ocean currents and weather routing. Closely managed hull and propeller cleaning resulted in less drag and hull resistance. Equipment benefits included extended engine lifetimes, and reduced overhaul periods and lube oil consumption.

The secondary findings identified elements that would require equipment upgrades in order to realize savings. Based on these findings, we began our efforts towards revising lighting circuits, cooling water systems and ventilation systems. Lighting changes to include more efficient LED lights and motion detectors in unoccupied spaces became priority accomplishments for the onboard electricians. Port Engineering tackled some higher end process changes to integrate variable frequency drives into our cooling water systems and engine room ventilation fans. The pilot programs for these changes are operational and currently being evaluated for implementation on all our ships.

Because of our proactive approach we realize phenomenal benefits from constantly reviewing the SEEMP and encouraging open conversation and brainstorming events to ensure new ideas and areas of focus are implemented. Overall the program has helped us capture a tremendous operating advantage in many areas of business. Permitting, Marketing, Project Managers, Engineering and Fleet Operations all share a benefit from the successful application of our Energy Efficiency Plan.

4. KEY INITIATIVES AND ELEMENTS OF THE SEEMP

Primary features of the SEEMP are broken down in to four main categories which include planning, implementation, monitoring and self-evaluation for Improvement. Because of the lifecycle of a ship and the rapidly changing technology we've created a continuous process that can be reviewed at any time.

When one considers the volatility of fuel price, increased efficiency regulations and fuel sulfur content; items that were not cost effective a few years ago are reemerging as candidates for future implementation. But high-profile equipment changes are not the real benefit of the SEEMP. Training and awareness have been the real success of the program because we have managed to reevaluate our standard operating procedures across the company. Key terms like "economical transit", "power plant alignment" and "hull cleaning" have become part of SubCom's vernacular.

The planning stage of the SEEMP includes a broad area which includes basic training for the crew on everyday conservation habits. It's a positive way for the Master to promote shipboard energy conservation to encourage ship personnel to actively conserve. Routine inspections are made to identify processes and equipment that are wasting energy. Deficiencies such as water leaks, lights being left on, unnecessary running of ventilation fans, A/C boundary doors being left open are actively sought out. Several Maintenance System Work Orders have also been tailored to aid in optimizing propeller and hull efficiency. Both the Chief Engineer and Captain now check the hull to determine if hull growth may be affecting the vessels efficiency. A rigorous planned maintenance program for main engines and main propulsion equipment now encourages a predictive and condition-based maintenance plan. The benefits of this is that equipment which is running efficiently can be identified and left alone. The savings over more conventional periodic servicing can amount to a significant cost reduction.

In implementing these plans we've reevaluated some of our basic thoughts on

ship operation and created new policies and new procedures for the ships to utilize while planning activities. By issuing Operational Directives that identifies transit speeds and having a policy which clearly identifies the ships most economical speed we can make considerations while planning ship operations. The vessel voyage plans are also developed with weather and ocean current routing. The Master, in conjunction with Fleet Operations, then decides if transit durations would benefit using a Green Voyage Report.

To prevent tasking, the vessel's crew with additional record keeping the data is transferred using a combination of the vessel's Master's Daily Report and Chief Engineers Energy Consumption Report for vessel operation, fuel, lube oil and shore power consumption. Port Engineering then monitors the ship's consumptions to evaluate the overall efficiency. The Energy Consumption Report is a combination of various individual forms which were consolidated into one document. By consolidating what was existing we didn't have to create additional forms and we streamlined capturing the entire fleets data in a standardized format.

Self-evaluation is performed on a continuous basis. Reviewing shipboard data, setting goals and looking towards new technology for savings is an integral part of the programs self-improvement. Case studies for motion detector light switches, LED lighting, water conservation, potable water production, variable frequency drives, and shore power have formed the backbone of the SEEMP. Case studies are typically created before we implement any equipment or process change, and then reviewed again after a pilot program to determine if the realized cost benefit is favorable for implementation across the fleet.

5. ACOUSTIC IMPACTS AND MITIGATION

A common component of installation permit applications throughout global jurisdictions is the identification of the potential acoustic impacts of submarine fiber-optic cable installation operations on the environment and local fauna. In the USA; this is required through the US Army Corps of Engineers permit process. In Europe, it is through the EIA and European Protected Species legislation and in Australia, it is required through various wildlife acts. In several African countries, it is through the EIA process. In all cases, the requirement for disclosure of details surrounding potential acoustic impacts are always accompanied by the requirement of a plan to address mitigation.

One significant facet of the SEEMP is the examination of the individual acoustic footprints of our installation vessels, their vessel mounted equipment and subsea equipment. Constant review and recording of the acoustic footprint of our equipment coupled with demonstrable details of vessel operations efficiencies through green routeing and operations enables SubCom to address potential acoustic impacts and mitigations in a swift and effective manner. In cases, it has also resulted in the removal of previously applied PSO or MMO requirements for installation operations.

Knowledge of the current acoustic footprint of all our installation equipment has led to a, company- wide, increase in awareness of the potential impacts of our subsea equipment. This knowledge has not only led to an increase in awareness of the impacts of acoustics during our installation operations, but it has fed into equipment procurement whereby the impacts of the equipment's acoustic signatures are considered during the procurement process.

6. CONCLUSION

These green initiatives address new requirements and address the greater focus by governments, the United Nations (UN) and other agencies and commissions have placed on ocean and global environmental protection. The Shipboard Energy Efficiency Management Plan (SEEMP) initiated in 2007 is our methodical approach to identifying areas for potential efficiency increases. SubCom's improvements in cable ship fuel efficiency, pollution reduction and optimizing ship operations that consider protection of mammals and other sea life that address these concerns are not only good for the planet, they facilitate project permits and lower the risk to new telecom projects overall. These programs may also preemptively address the on-going evaluation of regulations in the deep-sea by the UN that are considering Bio Diversity Beyond National Jurisdictions (BBNJ) thus could help to limit further regulation.

7. REFERENCES

[1] protectplanetocean.org

