

MV VETERAN

AND

MV LEGIONNAIRE

Department of Transportation and Infrastructure

Independent Auditor's Report



**OFFICE OF THE AUDITOR GENERAL
NEWFOUNDLAND AND LABRADOR**

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TABLE OF CONTENTS

	Page
Audit at a Glance	i
Background	1
Findings	3
<u>Criteria 1</u>	
Project Management of Vessel Construction	4
Planning for Construction and Operationalization	6
Departmental Records	11
<u>Criteria 2</u>	
Contract Development	12
Commitments from the Shipbuilder	15
<u>Criteria 3</u>	
Oversight of Vessel Construction	18
Oversight of Vessel Operationalization	25
<u>Criteria 4</u>	
Initial Operations and Crew Training	28
Root Causes and Corrective Actions	32
Conclusions	39
Recommendations	41
Appendix I – About the Audit	42

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AUDIT AT A GLANCE

WHY WE DID THIS AUDIT

- In March 2018, the Public Accounts Committee requested our Office undertake a review of the process used to purchase two vessels (the *MV Veteran* and *MV Legionnaire*), including the mechanical issues experienced since entering service.
- Residents of the province rely on the daily services of government-owned and/or private vessels. Given the need to replace aging vessels, it is essential that the Department of Transportation and Infrastructure have effective project management processes in place to ensure the successful construction and operationalization of new vessels.

AUDIT OBJECTIVE

To determine whether the Department of Transportation and Infrastructure effectively managed the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*.

Audit Period

April 2009 – March 31, 2019

CONCLUSIONS

We concluded that the Department did not effectively manage the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*.

We found a number of concerns related to the Department's management of the project that may have contributed to the significant operational delays, service disruptions and unplanned costs.

RECOMMENDATIONS

- Establish and follow a project management process for the procurement of vessels which follows leading practice and gives particular attention to risk management, onsite supervision, document management and training.
- Ensure root causes for vessel mechanical issues are identified and addressed in a timely manner.
- With cooperation from other departments, ensure that all opportunities for potential industrial benefits are identified, pursued and documented.

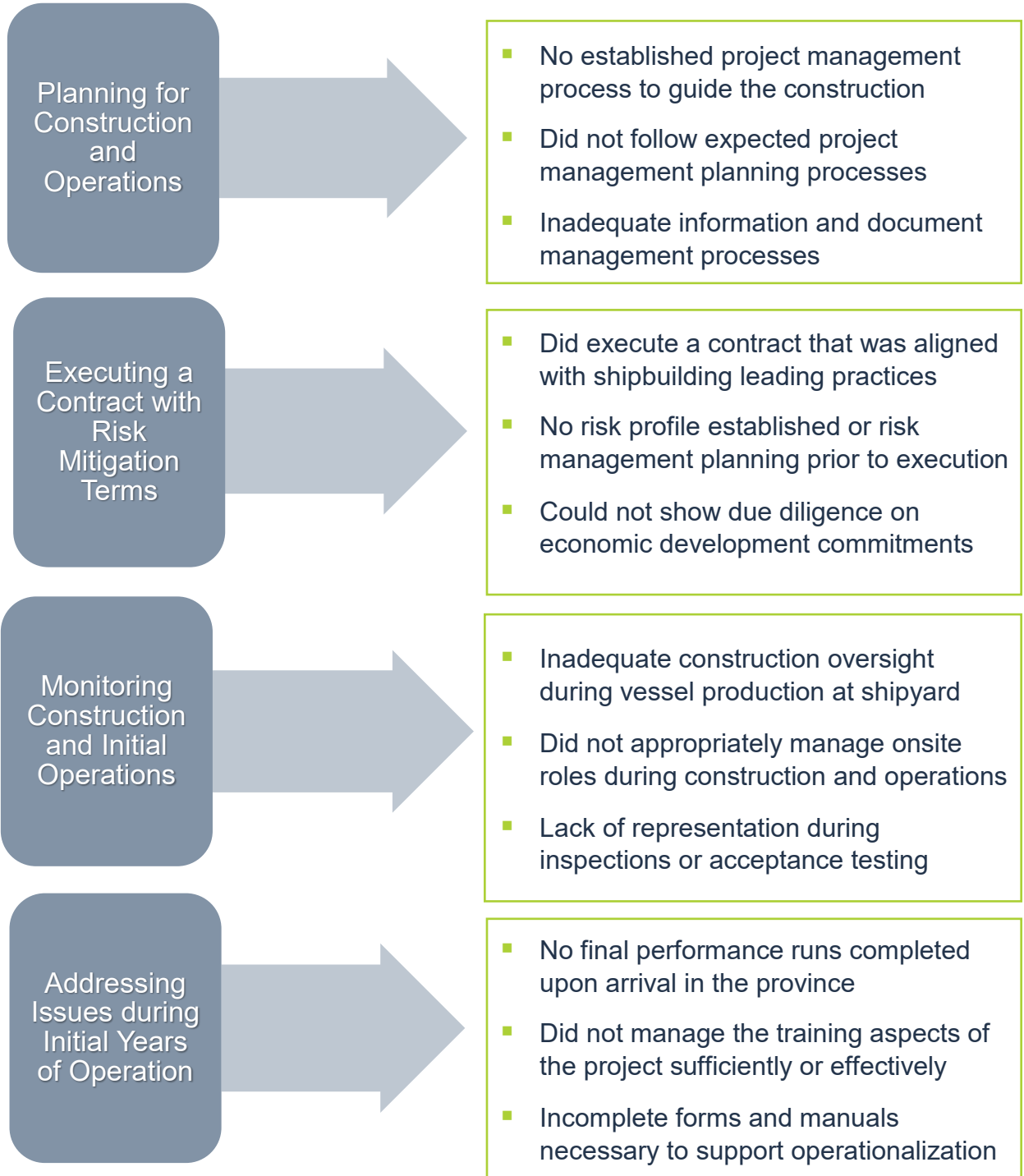


During the first three years of operation, the two vessels had a total of **607 out of service days**.



The total cost of adding two vessels, including wharves, was almost **\$120 million**.

WHAT WE FOUND



BACKGROUND

The Department of Transportation and Infrastructure (the Department), formerly the Department of Transportation and Works, is responsible for the administration, supervision, control, regulation, management and direction of all matters relating to transportation and public works. The Marine Services Division, of its Air and Marine Services Branch, is responsible for management of the Newfoundland and Labrador vessel transport system. The former Vessel Renewal Division of the Department was responsible for the management of the construction and operationalization of the *MV Veteran* and *MV Legionnaire*.

In April 2009, the Department began the process to replace the *MV Captain Earl Winsor* by issuing a request for expressions of interest for the design of a new vessel. The new vessel, an 80-metre ferry with an ice strengthened hull and roll-on roll-off features, would be a first of its design.

The Department issued a request for proposals for vessel construction in January 2013. The Department received proposals from nine shipbuilders worldwide. The Department executed a shipbuilding contract with the chosen shipbuilder on November 13, 2013 at a cost of \$51.1 million for the first vessel, known as the *MV Veteran*. It was later agreed that the shipbuilder would build a second 80-metre vessel, using the existing design, at a cost of \$49.6 million. An amended contract to allow for a second vessel, known as the *MV Legionnaire*, was executed on December 16, 2013. The shipbuilder selected their shipyard in Galati, Romania to be the construction site.

The *MV Veteran* was completed on schedule by the shipbuilder in August 2015. While the *MV Legionnaire* was completed on schedule by the shipbuilder in December 2015, two issues delayed delivery:

- Due to the ongoing investigation into thruster issues with the *MV Veteran*, the Department requested the *MV Legionnaire* remain at the shipbuilder's yard to allow modifications that were in line with those being made on the *MV Veteran*; and
- Wharf refits in Newfoundland and Labrador were not completed.

As a result, the *MV Legionnaire* was required to stay in the shipbuilder's yard until October 2016 and did not commence operations on its intended provincial route until August 1, 2017, when the wharf refits were completed.

The *MV Veteran* entered service on the Fogo Island – Change Islands – Farewell route on December 19, 2015. The *MV Legionnaire* entered service on the Bell Island – Portugal Cove route on August 1, 2017. Each vessel serves a population of approximately 2,500 people.

MV VETERAN AND MV LEGIONNAIRE

The costs related to the *MV Veteran* and the *MV Legionnaire* were as follows.

Total Costs for the <i>MV Veteran</i> and the <i>MV Legionnaire</i>		
Type	Cost	
Consultant for Vessel Design	\$ 2,072,000	
Classification Organization	208,000	
Payments to the Shipbuilder	Contract – <i>MV Veteran</i>	51,095,000
	Contract – <i>MV Legionnaire</i>	49,550,000
	Ship Delivery	391,000
	Change Orders	547,000
	Other Contract Costs	62,000
Onsite Representation	251,000	
Training Costs – Non-shipbuilder	108,000	
Total Costs¹	\$104,284,000	

Source: Prepared by the Office of the Auditor General based upon information from the Department of Transportation and Infrastructure (unaudited)

Note 1: Total costs do not include wharf refits totaling \$14.9 million (\$6.7 million for the *MV Veteran* route and \$8.2 million for the *MV Legionnaire* route).



Source: Department of Transportation and Infrastructure

FINDINGS

The objective of this audit was to determine whether the Department effectively managed the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*. Criteria were developed specifically for this audit to guide the audit work and conclude against the objective. Findings are organized in accordance with each of the four criteria established.

CRITERIA 1

The Department planned for the construction and operationalization of the vessels.

The Department had no established project management process in place to guide the construction of the *MV Veteran* and the *MV Legionnaire*.

While the Department did have a draft Marine Project Management Manual (March 2009), it did not consider it an established set of procedures. The Department staff used it at their discretion as a reference guide. The manual's mandatory use during the build of these two vessels would have resulted in the Department using an approach consistent with leading practice.

The Department did establish an appropriate project management team early in the process. However, the team only formally met five times between May 2009 and November 2009, four years prior to the award of the contract for the first vessel. There was also no evidence to indicate that the team met in a formal capacity for the remainder of the project.

The Department did not follow expected project management planning processes. Specifically, we found:

- No overarching project management plan;
- No risk management plan or other documentation to support formal risk assessment procedures, such as a risk scorecard;
- No overall project cost estimate, which would have been expected to include all project costs from contract award to operation;
- Inadequate planning for the human resources requirements of the vessels, including training specific to newly designed and technologically advanced vessels; and
- An untimely shore infrastructure feasibility study.

The Department did not maintain adequate information management and document management processes throughout the project.

PROJECT MANAGEMENT OF VESSEL CONSTRUCTION

A project is a temporary endeavour undertaken to achieve a unique product, service or result. Project management is the application of the knowledge, skills, tools and techniques to achieve the project.

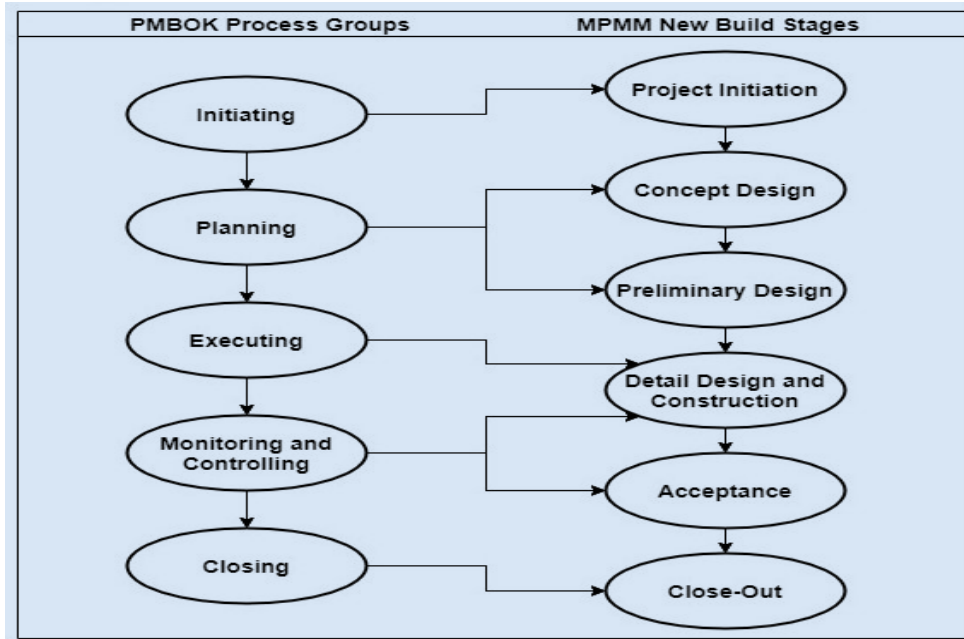
The Department had no established project management process in place to guide the construction of the *MV Veteran* and *MV Legionnaire*. While the Department had a draft project management manual that was drafted in 2009 and known as the Marine Project Management Manual (MPMM), it did not consider it an established set of procedures and department officials were not required to use it; instead they could use it as a reference guide at their discretion. The 2009 draft MPMM remained in draft form at the end of the audit period.

To determine the suitability of the draft MPMM for use by the Department, a comparison against a leading project management practices document, the Project Management Body of Knowledge (PMBOK) Guide, was conducted. The Project Management Institute is a leading authority on project management. The PMBOK Guide provides an internationally recognized set of standards to achieve effective project management in any industry.

The draft MPMM describes a project life cycle work process; it establishes a structured method for developing projects through distinct stages that progressively elaborate on the scope, cost, schedule and design. The draft manual notes that "...the project management process and techniques described in this manual embody project management best practices such as those listed in the PMBOK Guide...."

We found the draft MPMM contained the expected inputs and outputs as described by PMBOK standards. Further, it incorporated the five PMBOK Process Groups as illustrated in the following graphic.

PMBOK Process Groups vs. Draft MPMM Stages



Source: Prepared by the Office of the Auditor General based upon information from the Department of Transportation and Infrastructure and the Project Management Body of Knowledge¹

A formal requirement to use a finalized and approved version of the 2009 draft MPMM during the build of the vessels would have resulted in the Department using an approach comparable with project management leading practice.

¹ Project Management Institute. 2008. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. 4th ed. Newton Square, PA: Project Management Institute.

PLANNING FOR CONSTRUCTION AND OPERATIONALIZATION

A core principle of project management requires the development of an overarching project plan and significant detailed planning for a project. We would expect the completion of detailed planning for a project of this complexity and financial significance. We would also expect shore infrastructure planning to have occurred at an early stage of the project to ensure the infrastructure was suitable and ready for the date the vessels were scheduled to begin operating.

Detailed planning is normally addressed with a project management plan. A project management plan documents how the project is to be executed, monitored and controlled, and closed. The project management plan ensures the project is delivered on time and on budget while achieving the desired project quality. The development of the project plan, and overall management of the project, is the responsibility of a project management team.

The planning processes in the draft MPMM did include elements of planning for both the construction and the initial operations of a new vessel.

Project Management Team

A project management team is critical to the success of a large project. As per the draft MPMM, the project management team is responsible for executing the project and has a role to play from the design phase through to the final acceptance of the vessels. The team members are responsible for ensuring good quality from the design concept stage through to the completion of construction work.

We found the Department established a project management team in May 2009, early in the process, comprised of the appropriate representatives from the Vessel Renewal, Operations and Maintenance divisions of the former Marine Services branch. The establishment of the team was in accordance with the requirements of the draft MPMM. However, the established project management team did not formally meet beyond November 2009.

There is no evidence to indicate that the project management team met in a formal capacity for the remainder of the project, including up until the vessels were completed in December 2015. The Department indicated that officials completed the project management team's responsibilities, throughout the project via meetings and emails with the shipbuilder, the onsite supervisor hired by the Department to perform supervisory duties at the Shipyard on its behalf and senior departmental officials. However, they could not provide evidence to support that meetings and emails sufficiently achieved the critical responsibilities of the project management team.

Overarching Project Management Plan

The draft MPMM recommended the creation and use of an overarching project management plan, also known as a project execution plan. According to the draft MPMM, the project execution plan describes the overall approach the project would follow and is comprised of various sections that integrate subsidiary plans related to different aspects of the project. These subsidiary plans include, for example, a construction plan, a contracting plan, and a vessel operation plan. Topics such as how work will be executed in the shipyard, how contracts will be administered, and crew training are also defined.

The Department did not create and use a project execution plan to guide the execution of the project. The Department also could not provide any other evidence of overarching project management planning.

Risk Management Planning

A risk profile is an evaluation of an organization's willingness and ability to accept risks. Project risk management is fundamental to project management and project planning. The objective of project risk management is to minimize the likelihood and impact of negative events, while also increasing the likelihood and impact of positive events. Project risk management includes the processes of conducting risk management planning, identification analysis, response planning and monitoring and control. It involves the identification of risks, performance of a risk assessment to assess likelihood and impact of those risks, and the development of a plan to address the risks if they should occur. The draft MPMM recommended developing a risk management plan for a new build project.

Establishing a risk profile and performing project risk management allows an organization to verify that the risks present in a project are in line with the risks the organization is willing to accept. To be effective, we would expect the establishment of a risk profile and the completion of a project risk assessment before the execution of the contract.

The Department did not establish a risk profile nor did the Department complete a risk management plan for this vessel construction project. As a result, the Department did not ensure whether the risks associated with the project were aligned with the risk tolerance of the Department. The Department also did not complete any other documentation required to support formal risk assessment procedures, such as a risk scorecard. The Department was only able to provide meeting minutes that demonstrated discussion of risks happening as they occurred. This demonstrated a reactive approach to risk management as opposed to a proactive one, which is a fundamental concept of successful project management.

Cost Estimates

The draft MPMM recommended completing specific steps related to project costs planning and monitoring. Project cost management focuses on the cost to complete the project as well as the recurring, maintaining or supporting costs of the project once completed. The total cost of the project is a critical factor to consider when deciding to proceed with a project or to pursue alternatives.

The draft MPMM defines the purpose of a project cost estimate as a quantitative assessment of the likely amount of resources required to execute the project and should represent the total installed cost. The use of cost information is to inform other project management processes and to keep the overall project cost on track. While the draft MPMM does not provide guidance on what should be included in total installed cost estimates, we would have expected it to include costs such as vessel construction costs, delivery costs, necessary infrastructure improvement costs, onsite representation costs, and contingency allowances for unforeseen project costs.

We found the Department did not complete an overall project cost estimate, which should have included all significant costs required to bring the vessels into operation. The Department did provide us with a one-page document that listed cost estimates from shipbuilders in Newfoundland and Labrador, another part of Canada and other parts of the world. However, the estimates were outdated, the document did not present any details that supported the basis for the cost estimates and the information was not presented in a way that demonstrated rigor. The estimates also ranged over 135 per cent, with a low of \$37 million to a high of \$87 million.

Human Resource Planning

The draft MPMM recommends early planning for the human resources required to operate a new vessel. Early planning ensures identification of gaps in knowledge, experience or certifications that are required in the operations of a newly built vessel, and it also allows time to correct those gaps. The draft MPMM specifically recommended the identification of crew staffing levels, to define the knowledge requirements for the crew operating new vessels, develop a plan to address identified knowledge gaps, and complete an analysis of implications for existing collective agreements. We would expect the Department to have developed a plan to address these areas and others, such as new design implications or technological change.

The Department did address the human resource requirements of Transport Canada, including the completion of identification of roles required to operate the vessels, and the determination of the minimum crew complement required for vessel operations. However, this limited action did not demonstrate that the Department had planned for all aspects of the human resources required to operate the vessels. For example, the Department was unable to demonstrate it had completed the analysis to determine if the crew had the required skills to operate the new technology onboard the vessels. We would expect the analysis to have examined current crew skill sets, identified gaps, and proposed solutions through recruitment, reassignment or training. The Department also could not demonstrate it had assessed the impact the acquisition of the vessels would have on existing collective agreements. While the Department had attempted to develop a training plan, the document was never completed.

Shore Infrastructure Concept Studies

The new vessels, as compared to the existing route vessels, had differences that required adjustments to their respective shore infrastructure. The *MV Veteran* had wider ramps and a larger displacement than the *MV Earl Winsor*, while the *MV Legionnaire* was substantially larger than the *MV Beaumont Hamel*. Given these differences, we would expect the Department to have completed timely shore infrastructure concept studies for the intended routes to ensure that the vessels could begin operation when delivered by the shipbuilder and operationalized for service.

The draft MPMM recommends completing concept studies at an early stage of the project for a variety of reasons, including, but not limited to, determining suitability of existing shore infrastructure. Completing these studies early in the project timeline is important, as it allows sufficient time for any required changes to the vessel design to accommodate the intended route or to allow for existing terminals/shore infrastructure to be modified to enable operationalization of the new vessel.

An infrastructure study was completed for a new vessel on the Fogo Island route in March 2010, approximately three and half years before signing the shipbuilder contract in November 2013. This study examined the shore infrastructure on the Fogo Island route, determining its suitability to support the new vessel design, and gave recommendations of terminal changes required. Having the infrastructure study completed three and a half years before signing the contract allowed sufficient time to refit shore infrastructure, if and as required. This period also gave the Department opportunity to plan, contract, and execute the necessary changes to the shore infrastructure before the *MV Veteran* entered operation.

A feasibility study, which had similar elements to the infrastructure study noted above, had been completed for the Bell Island route in November 2013, three weeks before the signing of the amended contract to procure the *MV Legionnaire* in December 2013. The *MV Legionnaire* was unable to begin operations on its intended route for 20 months after it was constructed due to delayed shore infrastructure adjustments.

Our examination of the completed studies also noted 20 recommendations for the Department to facilitate the operationalization of the vessels. While these completed studies and the reasonableness of their recommendations were outside the scope of our audit, we did find the Department had not addressed eight of the recommendations, even though significant time passed between the study and the operationalization of the vessels.

DEPARTMENTAL RECORDS

Departmental processes to ensure completeness of department records is critical. There is risk of information loss and inefficiencies when staff turnover occurs or projects extend over significant periods of time. Written records are needed to ensure project continuity and clarity of purpose.

None of the senior department officials of the former Marine Services Division that were part of the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire* remain at the Department. We would have expected that the records generated by the former staff would be easily accessible and would clearly illustrate the work performed with respect to the various aspects of the project, any meetings conducted, and a general ability to follow the project from inception to completion.

As a result of incomplete corporate records and no access to individuals that were in key roles in the project, we encountered significant difficulties in obtaining information, which we required to complete our audit procedures. This situation significantly increased the amount of time and effort our audit team, and current staff of the Department, spent ensuring we had sufficient evidence to support our audit findings and conclude on our audit objective.

CRITERIA 2

The Department executed a contract with the selected contractor, the terms of which effectively mitigated the risks to the province to an appropriate level.

The Department executed a contract with the shipbuilder that was generally aligned with standard shipbuilding leading practices. The contract's scope was appropriate and included clauses to mitigate the risk to the government to an appropriate level. The contents of these clauses were generally complete and appropriate. Further, the contract had no omissions or deficiencies that appear to have directly contributed to the issues encountered by the vessels.

The Department did not establish a risk profile nor did department officials complete any risk management planning prior to executing the contract. As such, the Department did not ensure whether the commercial clauses of the contract were aligned with the risk tolerance of the Department. Further, we found there were three commercial clauses in the contract that could have been further negotiated and adjusted, depending on the risk tolerance of the Department and the need to mitigate additional associated risks.

The Department did not show sufficient evidence of due diligence with respect to the pursuit of commitments made by the shipbuilder regarding economic development initiatives.

CONTRACT DEVELOPMENT

As illustrated in the background section of this report, the total contracted price of the vessels was \$100.7 million. For a construction contract with a cost of this magnitude, we would expect the contract would sufficiently mitigate the risks to government during the execution of the contract. Also, the shipbuilder had extended multiple commitments at the time department officials signed the shipbuilding contracts, therefore, we would expect to see evidence of due diligence regarding those commitments.

A contract should seek to define and mitigate any potentially significant risks that may come about during the contractual relationship. We completed audit procedures to determine if the terms of the contract appropriately mitigated the risks to government to an appropriate level. These procedures included performing a comparison of the terms of the contract to other shipbuilding contracts that represent leading practice in the shipbuilding industry. We employed a procurement contract consultant to complete this work.

We found that the Department executed a contract with the shipbuilder that was generally aligned with standard shipbuilding leading practices. The contract's scope was appropriate, included clauses to mitigate the risk to government to an appropriate level, and the contents of these clauses were generally complete and appropriate. Further, the contract had no omissions or deficiencies that appear to have directly resulted in the issues encountered by the vessels.

However, there were three commercially sensitive clauses in the contract that were not as extensive as those in the benchmarked contracts nor did they fully align with leading practice. Also, the Department did not establish a risk profile nor did departmental officials complete any project risk management planning prior to executing the contract. As such, the Department did not ensure whether the commercial clauses of the contract were aligned with the risk tolerance of the Department. These three clauses were: the design check, liquidated damages and warranty clauses.

The purpose of a design check clause is for the shipbuilder to determine that the specifications and overall vessel design are in line with current design practices. The design check helps ensure the constructed vessels comply with the requirements of the contract and the specifications, including the requirements of the Classification Society and Transport Canada.

The design check clause did not effectively define the scope of the design check to align with leading practice. For example, the clause did not state if the shipbuilder was required to ensure the design would work with existing infrastructure, or if the design aligned the user interface to the crew's needs.

The purpose of a liquidated damages clause is to ensure that any damage to the Department as a result of underperformance of contractual obligations by the shipbuilder is compensated by an amount equivalent to the damages caused. The liquidated damages clause was less extensive than that of the benchmarked contracts, as it did not include provisions for fuel consumption and cargo capacity.

The purpose of the warranty clause was to guarantee the Department that the vessels would be free from certain defects for a specified period. The inclusion of a warranty clause was in line with industry standard. However, unlike the benchmarked contracts, it did not include any mechanism to extend the warranty period in the event of a prolonged out of service period. This kind of mechanism allows an extension of the warranty period to match the period of operation, rather than duration from date of delivery, and ensures the use of the full warranty period.

Commercial clauses take into account the desired level of risk that would be transferred from the owner to the shipbuilder and vice versa. When contracts are developed in conjunction with a risk profile and risk management processes, it allows for the contract and certain commercially sensitive clauses of the contract to respect the risk tolerance the organization is willing to accept. Each of these clauses in the contract could have been negotiated and adjusted, if preferred by the Department, to mitigate associated risk identified during a project risk assessment.

We also found that the Department did not have its own shipbuilding contract template. The use of a standardized contract template is a standard industry practice. The draft MPMM recommended the use of a pro forma shipbuilding contract template; however, we found the Department had not developed such a template. Instead, we found the template used for the ultimately-signed contract was a template provided by the shipbuilder. While the use of its own contract template would likely not have prevented the operational issues encountered by the vessels, it would have laid the foundation to ensure that clauses were in place to support the Department's risk tolerance for the construction project.

COMMITMENTS FROM THE SHIPBUILDER

At the time of signing the amendment to the contract in December 2013 to add the construction of the *MV Legionnaire*, the shipbuilder submitted a commitments letter, which outlined the business development initiatives that they would explore with the assistance of the Department of Industry, Energy and Technology (the former Department of Industry, Business and Rural Development).

These commitments were not formalized in a legal agreement. There were three commitments outlined as follows.

1. By January 1, 2016, the shipbuilder would either open a shipbuilder-certified support and service center or establish one through partnering with a local company whereby the shipbuilder would provide necessary technology transfers to build local capacity to service the vessels constructed by the shipbuilder, and would also possibly acquire space to stock locally needed support and service parts for the vessels.

The shipbuilder committed to spend \$0.4 million toward this initiative by December 31, 2016, and estimated the value of business and work that would accrue to Newfoundland and Labrador to be approximately \$2.5 million over five years.

Depending on various factors, such as their success in the oil and gas industry, and in the event they partnered with a local company versus establishing their own center in 2016, by January 1, 2018, the shipbuilder would establish a shipbuilder certified support and service center. This service center would employ six to eight people and result in business operations, including supply and other contracts, in Newfoundland and Labrador estimated to be worth \$2 million annually beginning in 2016.

2. Enter into a partnership to open an arctic research center in the province. As part of this commitment, the shipbuilder indicated they would invest a minimum of \$0.5 million to \$1 million over three years. They also indicated that if the commitment was successfully established, they estimated the creation of 30 to 50 person years of employment and would contribute approximately \$2.4 to \$4 million to the Newfoundland and Labrador economy per year beginning in 2016 and \$12 to \$20 million over the succeeding five years thereafter.
3. Work with the Department of Industry, Energy and Technology to identify locally based companies to become part of the shipbuilder products and services supply chain.

MV VETERAN AND MV LEGIONNAIRE

The shipbuilder committed to spend \$50,000 in furthering this initiative and they also indicated that if commercial plans came together, beginning in 2015, they would likely expend \$10 to \$11 million on various contracts creating domestic business opportunities for Newfoundland and Labrador and other Canadian companies.

The potential value of the direct spend committed by the shipbuilder was over \$1 million, with economic activity in the tens of millions in the next five years.

While the Department of Industry, Energy and Technology indicated they worked with the shipbuilder to explore these business development initiatives, we did not garner any evidence that the service center, a local partnership or the arctic research center were established. With regards to the supply chain initiative commitment, the Department of Industry, Energy and Technology indicated they helped facilitate supply chain opportunities for local businesses such as helping to organize meetings, presentations, site visits, and vendor days between local businesses and the shipbuilder as well as partnering to lead a trade mission in 2014. However, they were unaware of any business relationships established as a result.

As the department with the lead relationship with the shipbuilder, we would have expected to see evidence to show that the Department of Transportation and Infrastructure had worked with the Department of Industry, Energy and Technology to ensure the commitments from the shipbuilder were fully explored. We did not find this evidence.



Source: Department of Transportation and Infrastructure

CRITERIA 3

The Department monitored the construction and initial operationalization of the vessels, including compliance with contract terms, and ensured the identified issues were resolved.

The Department did not conduct adequate construction oversight during the construction and operationalization of *MV Veteran* and *MV Legionnaire*.

The Department did not appropriately evaluate, monitor and take corrective action regarding the contracted onsite supervisor role. When the selected proponent and the shipbuilder raised concerns, the response by the Department was insufficient. There was no onsite departmental representation present for 67 per cent of the construction period of the *MV Veteran*, and 63 per cent of the construction period of the *MV Legionnaire*.

The Department did not use progress reports sufficiently. The Department did not complete any internal project management reports and relied on shipbuilder or onsite supervisor reports, which were not comprehensive.

The Department did not have representation for more than half of the quality control inspections of both the *MV Veteran* and the *MV Legionnaire*.

The Department could not provide evidence that supported all progress payments to the shipbuilder.

The Department did not sign off on 27 per cent of the harbour acceptance tests of the *MV Veteran* and 93 per cent of the harbour acceptance tests of the *MV Legionnaire*. The Department did attend the sea trials for both vessels and did complete the acceptance process of the vessels.

The Department did not complete performance runs as a final evaluation of the *MV Veteran* and *MV Legionnaire* upon arrival in the province.

The Department had not finalized an operating manual before the *MV Veteran* entered service. They did not begin using a completed manual until April 2016, four months after the *MV Veteran* began operations.

The Department did not have its safety management system manual finalized for a period of at least five months after the *MV Veteran* began operations.

OVERSIGHT OF VESSEL CONSTRUCTION

Construction oversight includes various monitoring and control activities required to ensure the project meets the quality expectations defined in the contract and is completed on time and within budget. When an organization uses a contractor to complete design and construction work, one of the most critical activities is ensuring appropriate construction oversight.

Construction project monitoring is the process of keeping a close eye on the entire project management lifecycle and ensuring project activities are on track. Project monitoring is about comparing actual performance to the goals set. The draft MPMM recognized monitoring as one of the expected activities within a project.

Our audit work focused on the specific monitoring activities outlined in the draft MPMM and any activities outlined in the contract that allowed the Department to ensure the construction was proceeding on schedule and with the quality desired.

Onsite Supervision

While it is not feasible for a project management team to be always present during the construction of a project, the team can employ an owner's representative to fulfill that role. An owner's representative is responsible for the onsite supervision of the construction of a project including, but not limited to, monitoring the build, making decisions to ensure that construction remains on budget and on schedule and attending scheduled inspections.

Effective onsite representation facilitates timely decision-making and results in a quality product. While it is possible to build a vessel without the use of any onsite supervision, industry guidance advises that the cost to correct mistakes or make changes to such a vessel can be up to 15 per cent of the original contract price and these costs would be borne by the project owner.

The shipbuilder contract allowed the Department up to five individuals to act in the role of the owner's representative at the shipbuilder's dockyard during the construction of the vessels. In May 2014, the Department issued a request for proposals (RFP) for onsite supervision related to the construction of the vessels.

Only one proposal was received and the Department subsequently cancelled the RFP as the proposal did not meet the RFP requirements. It was also double the cost that the Department had budgeted for the onsite supervisor.

In June 2014, the Department contacted an individual who had been previously introduced to department officials by the shipbuilder. This individual said they had received the original RFP but had not submitted a proposal as they felt the scope of work “would need at least two if not three qualified persons over the period and [they did] not have the contacts to comply.” The Department engaged in further discussions with this individual after obtaining a proposal from the individual. In October 2014, the Department entered into an onsite supervision contract with the individual retroactive to August 18, 2014 at a budgeted cost of \$457,000.

The Department did not complete an evaluation of the selected onsite supervisor’s proposal, including an assessment of qualifications. We completed procedures to evaluate the onsite supervisor’s proposal against the requirements outlined in the original onsite supervision RFP. We found the onsite supervisor’s proposal had not adequately addressed at least seven critical RFP requirements relating to technical and managerial experience and skills. These technical and managerial skills are particularly important because they required the proponent to demonstrate how the onsite supervision work would be executed and to describe relevant experience in project management and vessel construction.

The amount of onsite representation required is subjective and depends on the risk tolerance of the owner of the vessel under construction. Early in the construction process, the onsite supervisor suggested to the Department the existing level of representation was insufficient in comparison to the size of the vessels.

Some of the comments made by the onsite supervisor through emails to department officials were as follows:

- Either vessel would typically have one engineer onsite early in construction, with an additional engineer joining after the vessel’s launch and an electrical engineer would join the onsite representation through the commissioning phase;
- The only project at the shipbuilder’s yard without three or more representatives was a 40-metre tugboat; and
- The supervision of the *MV Legionnaire* was a lot less than needed due to the ongoing demands of the *MV Veteran*.

Further, the shipbuilder had also raised concerns to the Department regarding insufficient onsite supervision. Details of the shipbuilder’s concerns were as follows.

- In a December 2014 meeting between the shipbuilder and the Department, the shipbuilder’s project manager noted it was “necessary for the [Department] to step up presence in Galati.” The action item remained on the meeting agendas for six months until June 2015. At that time, the minutes indicated that the Department responded on how representation would be increased.

- In January 2015, the shipbuilder sought to clarify whom they should invite to inspections. As the onsite supervisor was not always present at the yard, the shipbuilder wanted to know if they should continue to send inspection invitations to the onsite supervisor, or if the client inspection invitations should be sent elsewhere for response.
- In February 2015, the shipbuilder suggested the inspections would require the presence of the Department “24/7” and the Department should increase the presence of the onsite supervisor.

An issue that arose in March 2015 was evidence of the shipbuilder’s concern regarding insufficient onsite supervision. During the construction of the *MV Veteran*, the Department asked the shipbuilder to install a metal ladder covering as a safety measure. The shipbuilder indicated this was a change very late in the construction process, and that these sorts of changes were the reason the shipbuilder held as many inspections as they did.

The onsite supervisor’s proposal indicated there would be periods when they would not be available and that, beginning in May 2015, the supervision requirements for both vessels would intensify and would require two people to cope with the demands of the inspections.

We asked the Department if they had developed a plan to mitigate the risks associated with the deficiencies in the onsite supervision proposal. The Department provided us with the shipyard visitation schedules it had created. The visitation schedules did appear to cover the essential periods identified by the onsite supervisor for the vessels.

We completed audit procedures to determine if the Department completed the visitation in accordance with the schedules they had developed. The Department travelled to the shipyard for all of the days they had planned for the *MV Veteran*. The Department did not travel to the shipyard for 53 per cent of the days that they had planned for the *MV Legionnaire*.

As already indicated, beginning in May 2015, two or more individuals would be required onsite to keep up with the supervision and inspection requirements. This would include the *MV Veteran*’s commissioning activities in addition to the ongoing construction and inspections of the *MV Legionnaire*. The Department did not have two or more individuals on site for 63 days (56 per cent) between May 2015 and the completion of the *MV Veteran*’s commissioning in August 2015. Of those days, we found the Department did not have any onsite representation for 45 days (71 per cent).

Multiple documents indicated the need for an onsite presence during the whole of the vessels’ construction. Overall, we found that there was no onsite representation (either Department officials or the hired onsite supervisor) present for 67 per cent of the days the *MV Veteran* was under construction, and 63 per cent of the days for the *MV Legionnaire*.

MV VETERAN AND MV LEGIONNAIRE

As a result of the Department not having sufficient representation during the construction of the vessels, certain elements of the construction may not have been observed as they should have been. This gap increased the risk that issues could have gone undetected and the opportunity for correction may have been missed.

The onsite supervisor unexpectedly departed in April 2015. The Department did not hire a new onsite supervisor, and instead intended to rely on departmental staff to fulfill the role of onsite supervisor. This decision was in direct conflict with concerns raised by both the former onsite supervisor and the shipbuilder.



Source: Department of Transportation and Infrastructure

We completed procedures to determine if the Department fulfilled the planned onsite visits scheduled by the onsite supervisor for the vessels. We found the Department was not onsite at all for 43 per cent of the remaining days the onsite supervisor had planned for the *MV Veteran* and for 64 per cent of remaining days the onsite supervisor had planned for the *MV Legionnaire*. Portions of these periods included times when there should have been at least two representatives onsite to keep up with the supervision and inspection demands.

Progress Reporting

Progress reporting is an important part of project management, as it documents the monitoring function of the project. It serves to inform senior management and other stakeholders on progress and issues and helps maintain control of the project schedules and costs. The draft MPMM recommends documenting this reporting in monthly project management status reports, and identifies information types to include in each report, such as overall progress against milestones, costs and changes to the project, and critical issues encountered during the reporting period.

The Department did not develop and use a formal departmental monitoring process for the construction of the vessels. Instead, the Department relied on the progress reports provided by the shipbuilder and the onsite supervisor.

Across the approximately 20-month construction period for the vessels, the Department did not complete any internal project management reports. The Department was only able to provide us with reports received from the shipbuilder and onsite supervisor. Meeting minutes indicate department officials discussed progress reports with the shipbuilder.

We found the progress reports completed by both the shipbuilder and onsite supervisor were insufficient as a replacement for overall departmental monitoring processes for the vessel construction as recommended by the draft MPMM. For example, none of the progress reports from the shipbuilder discussed project changes or cost information as recommended by the draft MPMM and only four of the 44 reports received contained verbiage – the remainder contained only pictures of the vessels during the stages of construction.

Quality Control Inspections

A quality control process in a project is fundamental to ensuring a quality product. The shipbuilder's quality control processes included a detailed inspection program. While attendance at these inspections was not always mandatory for the Department, attendance was quite critical. From a project owner perspective, it presented the best opportunity to make corrections without incurring additional costs and to ensure the eventual product matched the needs of the Department.

The Department could not determine if they had complete records of quality control inspection dates. Of the quality control inspection dates the Department was able to provide us, we determined that the Department or the onsite supervisor did not attend 56 per cent of the inspections for the *MV Veteran*, and did not attend 61 per cent of the inspections for the *MV Legionnaire*. In total, the Department did not have representation at 58 per cent of all the inspections, missing the opportunity to make final corrections without incurring additional costs.

Consistent with industry practice, the Department enrolled the vessels in the Delegated Statutory Inspection Program, which allowed a recognized organization to attend and monitor inspections and trials and ensure regulatory requirements were being met. As the owner of the vessels, the Department should also be physically present during the vessel construction to oversee the project and to have their own representation at the inspections.

Construction Design Activities

The contract required the completion of a design check by the shipbuilder and a review of the shipbuilder's detailed design development by the Department. A design check required the shipbuilder to perform a check of the contract specifications to identify any errors, anomalies, or other items needing clarification before work on the detailed design development of the vessels began. The detailed design review required the Department to review shipbuilder-prepared engineering drawings for use in constructing the vessels.

The inclusion of a design check and detailed design review in the shipbuilding represents a shipbuilding best practice and is one recommended by the draft MPMM. We found the design check had been completed by the shipbuilder. We also found the Department reviewed the detailed design drawings developed by the shipbuilder.

Milestone Payments

The contract required the Department to make construction progress payments in regular installments as the construction reached specified milestones. Each milestone, after the initial contract signing, required a certification by the Classification Society that the vessels had reached that stage of completion; these certifications were an important control in contractual payments.

The Department was unable to provide us, from their own records, four of the certificates from the Classification Society that would have been required before the issuance of payment, two related to the *MV Veteran* and two related to the *MV Legionnaire*.

While this may be a situation where the Department has misplaced these certificates, there is a risk these certificates were not obtained as required. Without these certificates, the Department could not demonstrate that the appropriate stage of completion was achieved before issuing the payments.

MV VETERAN AND MV LEGIONNAIRE

Milestone	Contractual Payments			
	MV Veteran		MV Legionnaire	
	Amount	Required documents	Amount	Required documents
Contract Signing	\$15,300,000	✓	\$14,900,000	✓
Start of Steel Cutting	15,300,000	✓	14,900,000	X
Placement of Engines Onboard	10,200,000	X	9,900,000	✓
Vessel Launch	5,100,000	✓	5,000,000	✓
Shipbuilder's Yard Delivery	3,600,000	X	3,400,000	X
Delivery to the Province	1,600,000	✓	1,500,000	✓

Source: Prepared by the Office of the Auditor General based upon information from the Department of Transportation and Infrastructure

OVERSIGHT OF VESSEL OPERATIONALIZATION

The oversight of vessel operationalization should include various monitoring and control activities required to ensure operationalization of the project meets the quality expectations defined in the contract and is completed on time and within budget.

Testing and Acceptance

The contract and the draft MPMM both refer to the completion of tests, known as trials, on the vessels; completion of these tests aligns with leading shipbuilding practice. The purpose of completing trials includes ensuring proper functioning of machinery and systems, proper sea operations and confirmation of contract requirements, such as speed or maneuverability.

The trials for the vessels were completed in two phases. The first, called harbour acceptance tests, occurred throughout the final stage of vessel construction and were primarily focused on testing equipment to ensure operability. The other phase of the trials were sea trials, which occurred over two days and tested the vessels sea operations while verifying the main vessel requirements such as speed.

The Department was not required to attend the trials, however not attending a trial meant the Department missed the opportunity to ensure the accuracy of the trial, and accepting the results as completed by the shipbuilder.

The Department did not sign off on 29 of 109 (27 per cent) of the harbour acceptance tests for the *MV Veteran* and 101 of 109 (93 per cent) of the harbour acceptance tests for the *MV Legionnaire*.

Department representatives did attend the sea trials of both vessels at the shipyard in Romania. The number of representatives who attended the sea trials varied between the vessels; while the Department had four representatives onsite for the sea trials of the *MV Veteran*, only two representatives were onsite for the sea trials of the *MV Legionnaire*.

The draft MPMM and the contract required the Department to submit items requiring corrective action to the shipbuilder at certain points throughout the trials process. We did find the Department submitted items requiring corrective action to the shipbuilder for the vessels; however, greater attendance at the trials may have resulted in the identification of additional corrective items.

Following the completion of the trials, while the vessels were still in Romania, the Department was required to technically accept the vessel. Technical acceptance included identifying items to correct as part of the acceptance; this step is critical, as this acceptance was final and binding. The Department completed the acceptance process of the vessels, and included a list of outstanding items to be addressed by the shipbuilder.

Final Evaluation

Consistent with the terms of the contract, the shipbuilder is responsible for delivery of the vessels to the province. This delivery by the shipbuilder's crew ensured the crew completing the trans-Atlantic voyage was sufficiently experienced to do so. When each vessel arrived in the province, the Department was entitled to complete a performance run to evaluate the condition of the vessels upon arrival. The performance run gave the Department the opportunity to identify any deficiencies that may have arose after technical acceptance.

We found that the Department did not complete performance runs for either the *MV Veteran* or the *MV Legionnaire* as a final evaluation upon their arrival in Newfoundland and Labrador.

Operating Manuals

Operating manuals are a beneficial resource to ensure the consistent and correct operation of vessels. We would expect these manuals to be fully completed prior to the *MV Veteran* entering service.

The shipbuilder developed an operating manual, which detailed the operating instructions and requirements for the vessel systems. However, we determined the Department had not finalized the operating manual with the shipbuilder before the *MV Veteran* entered service. The Department did not begin using a completed manual until April 2016, four months after the *MV Veteran* began operations. During that time, they used a draft manual.

We found the Department did not have its safety management system manual, which included policies and standard operating procedures, finalized for a period of at least five months after the *MV Veteran* began operations.

CRITERIA 4

The Department had processes to address issues that impacted the delivery of vessel services during the initial years of operations.

The Department did not manage the training requirements sufficiently and could not demonstrate they responded appropriately to shipbuilder concerns.

The Department did not fully utilize the shipbuilder-provided pre-delivery training for the *MV Veteran* and did not utilize any for the *MV Legionnaire*. The Department decided to reallocate the *MV Legionnaire* training budget to cover outstanding change order costs.

The Department did use shipbuilder-provided training based in Newfoundland and Labrador. However, they negotiated with the shipbuilder to cut the training time in half from the shipbuilder's initial proposal to accommodate double the number of crewmembers trained. This negotiation resulted in reduced sailing days, and eliminated a significant number of topics, such as engine maintenance and propulsion systems. Some key crew positions did not attend any training or attended after the vessel was in service.

The Department was unable to provide 54 per cent of the initial familiarization forms and 83 per cent of the forms for crew requiring familiarization after an absence in our audit sample.

During the first three years of operations, the *MV Veteran* and *MV Legionnaire* had combined out of service periods totaling 607 days. Equipment failures and vessel damages resulted in unplanned costs to the Department totaling \$4.2 million. Several examples were noted, including the delay in identifying the root cause of the *MV Veteran* thruster failures until October 2017 - the third thruster failure and more than two and a half years after the initial thruster failure had occurred.

The Department had access to and used technical support from the shipbuilder for the *MV Veteran*. While the Department maintains that they had this support for the *MV Legionnaire*, they were unable to provide evidence to support this.

The Department did not plan for any potential out of service periods prior to initial operationalization nor did they always identify or address root causes that resulted in these out of service periods and unplanned costs.

INITIAL OPERATIONS AND CREW TRAINING

While the Department considered the initial operating period of the vessels to be two years after entering service, for the purposes of our audit, we considered the initial operations of the vessels to be from when the vessels were ready to enter operations to the end of our examination period. This resulted in the audit of an initial operations period from December 19, 2015 to March 31, 2019 for the *MV Veteran* and from December 7, 2016 to March 31, 2019 for the *MV Legionnaire*.

There are many activities that affect the success of the initial operations of a vessel. These include training the crew, evaluating and correcting mechanical issues, using support provided by the shipbuilder, and planning for potential service disruptions. Furthermore, since these were newly designed vessels, we would expect additional contingency planning.

Sufficient crew training is critical to initial operations success as it provides the opportunity for crew to learn the required skills to operate the vessels. Types of training available to the crew related to vessel operations included:

- Shipbuilder training - training provided by the shipbuilder that represents a transfer of knowledge to the crew that would operate the vessels during the initial operations period. It included training at the shipyard in Romania and in the province.
- Other operational training - training provided to the crews of the vessels from sources other than the shipbuilder.
- Familiarization training - ongoing training of new and returning crew provided by the Department as required by Transport Canada Regulations.

Due to the lack of a training plan, the Department was also unable to demonstrate that the training that occurred was sufficient.

Shipyard Training in Romania

The contract provided for shipbuilder training based out of the construction shipyard in Romania. The contract allowed the Department the opportunity to have up to three engineering staff per vessel attend three weeks of training at the shipyard during the final stages of construction. The training was to focus on propulsion systems, electrical systems, auxiliary systems, and deck equipment. The goal of this training was to teach the engineering crew about the working principles and basic maintenance procedures of the vessel. This training was to occur during the completion of the trials, providing the opportunity for participating crew to gain operational experience by also participating in the trials, and was extremely important for the vessel crew to attend.

We determined that the Department only sent one chief engineer to the shipyard training for the *MV Veteran*. The Department thus lost the opportunity to have trained two other engineers. The Department was unable to demonstrate the reasoning behind this decision.

We found the shipyard training for the *MV Legionnaire* did not occur at all. In November 2015, a department official contacted the shipbuilder and informed the shipbuilder that the Department did not intend to avail of the shipyard training and decided instead to reallocate the budget for this training to outstanding change order costs.

Shipbuilder Training in Newfoundland and Labrador

The shipbuilder offered the Department a 15-day technical and familiarization training session based in the province for six attendees. The Department requested the shipbuilder also provide maneuvering training for nautical crew in addition to the 15-day technical and familiarization training. The Department negotiated with the shipbuilder to create a 15-day training session that combined the agendas and topics of the technical and familiarization training as well as the maneuvering training.

The training agendas and topics were reduced to accommodate two crews during the 15-day training. While this change doubled the number of crew trained to 28, significant training topics were dropped from the agenda. Examples of training topics reduced or eliminated from the revised training agendas were engine maintenance, propulsion systems, and unmooring exercises. In addition, the number of sailing days was reduced from 14 to six.

During the course of the training and the subsequent operational support period, we found several instances of emails where the shipbuilder raised concerns regarding crew training. These were as follows:

- The shipbuilder's onsite trainer noted a number of observations about the technical crew. Some of the observations included: "have no interest whatsoever," "just sitting gabbing on the bridge wing," "hints of going to familiarize themselves have been ignored," and "no way these guys are going to manage these vessels currently."
- Shipbuilder officials expressed a concern to the Department that the crew did not have sufficient sailing training. As a result of this concern, the shipbuilder offered to provide additional training.
- Shipbuilder officials noted the crew needed to be more proactive in investigating and solving issues because they would have to do this on their own in the future when the shipbuilder was done.

The Department was unable to demonstrate how they had addressed these concerns. Department officials maintained that management quite likely addressed these concerns through informal communication with departmental officials at the time the shipbuilder raised them; however, they were unable to provide evidence to support this.

Further, we found three members of the initial crew (one captain and two engineers) of the *MV Veteran* and two members of the initial crew (one captain and one chief mate) of the *MV Legionnaire* did not attend the shipbuilder-provided training that took place in Newfoundland and Labrador.

Other Operational Training

The Department arranged for two other operational training sessions.

The first training session was a ship maneuvering simulation offered locally. This session was intended for nautical crew to provide them with experience in how the vessels would operate. This training took place in September 2015. While the crew of the *MV Veteran* completed the maneuvering training, the crew of the *MV Legionnaire* did not.

The second training session was propulsion system training, provided by the manufacturer of the propulsion system and was intended for vessel engineering staff. This training took place between January 29 and February 3, 2017.

We found the propulsion system training occurred for the engineering staff of the *MV Legionnaire* at an appropriate time that lined up with the initial operations of the vessel. This training was not timely for the engineering staff of the *MV Veteran*, as it occurred more than a year after the vessel went into operation.

Familiarization Training

Familiarization training is required for any incoming crewmember who has not worked on the vessel before, or has not worked on the vessel within the prior six months. Typically, it is a one-day training for all incoming crew, with the designation of the familiarizing crewmember determined by the position of the incoming crewmember. For example, a captain would require training with another already familiarized captain. A familiarization form outlines the required familiarization processes, and completion of the form is required as evidence that the familiarization had been performed appropriately.

We completed procedures to determine if appropriate familiarization training had occurred during the initial operating period of both vessels. We excluded deck crew, cooks and students in our analysis, due to the nature of these positions. We selected a sample of 35 crewmembers requiring initial familiarization and a sample of 30 operational crewmembers requiring returning familiarization during our audit period.

The Department was unable to provide 19 of the 35 (54 per cent) familiarization forms we requested related to crew requiring initial familiarization, and was also unable to provide 25 of the 30 (83 per cent) familiarization forms we requested related to crew requiring familiarization after a six month absence. Further, for two returning crewmembers requiring the familiarization training as a result of an extended absence, the Department could not demonstrate that an initial familiarization had been completed.

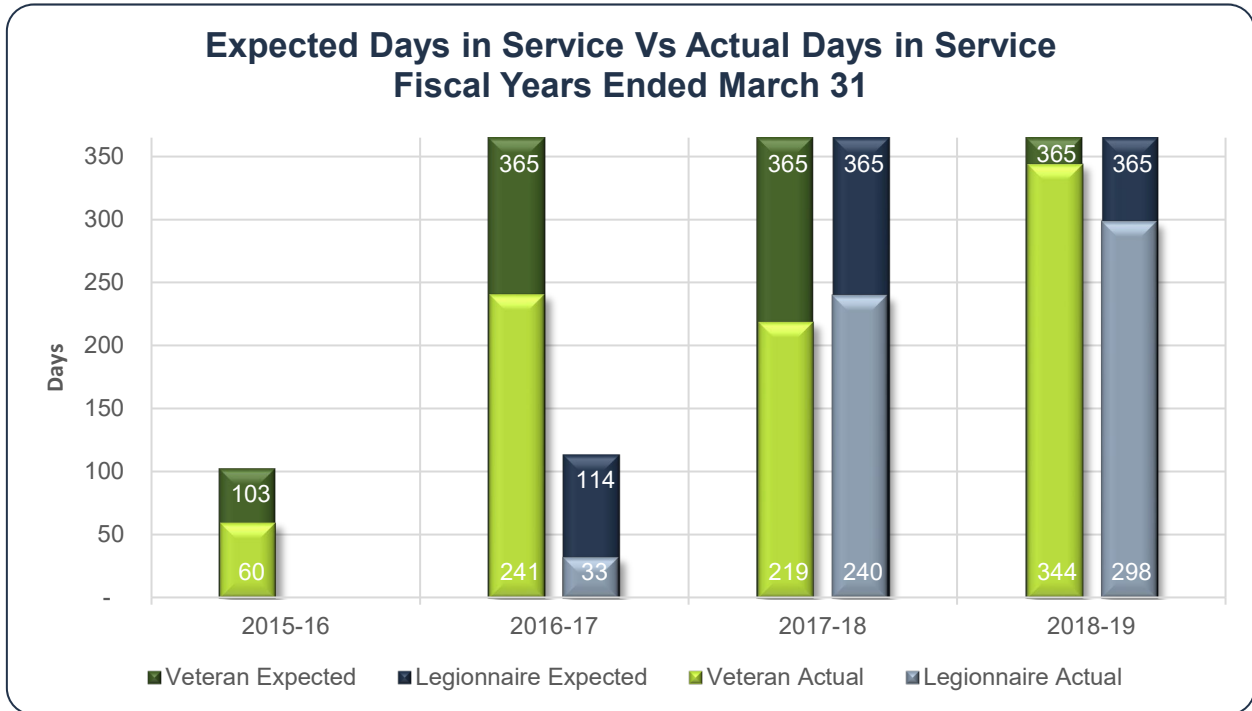
ROOT CAUSES AND CORRECTIVE ACTIONS

To ensure a successful initial operations period, we would have expected the Department to identify and address root causes, within a reasonable timeframe, for any substantial or recurring issues that affected service availability. This would help minimize the potential for service delivery issues and reduce additional costs in the future.

The *MV Veteran* and *MV Legionnaire* have had a number of out of service periods since they went into operation. These out of service periods have been a result of significant equipment failures and vessel damage. The *MV Veteran* had an equipment failure before it went into operation.

We found the *MV Veteran* and *MV Legionnaire* had a combined 607 out of service days during their first approximately three years of operations.

During the operating period of December 19, 2015 to March 31, 2019, the *MV Veteran* had been out of service for 334 days, 28 per cent of the total operating period.



Source: Prepared by the Office of the Auditor General based upon information from the Department of Transportation and Infrastructure (unaudited)

Meanwhile, during the operating period of December 7, 2016 to March 31, 2019, the *MV Legionnaire* had been out of service for 273 days, 32 per cent of the total operating period. The out of service period of the *MV Legionnaire* included a period of 184 days that the vessel was docked after arriving in the province because the Department did not yet have the wharves refitted to properly accommodate the vessel. This represented 22 per cent of the operating period.

The out of service period for the *MV Legionnaire* was in addition to the 264 days it had been docked in Romania before sailing to Newfoundland and Labrador. The Department had requested the shipbuilder keep the *MV Legionnaire*, as the Department was attempting to complete wharf refitting before vessel acceptance. The Department had also requested the shipbuilder address any issues on the *MV Legionnaire* that had been previously investigated and corrected on the *MV Veteran*.

The most substantial issues affecting the operations of the *MV Veteran* are outlined in the following table.

Major Service Interruptions of the <i>MV Veteran</i> In Service Date: December 19, 2015		
Issue	Period of Service Interruption	Days Out Of Service
Thruster Failure #1 (Starboard)	February 1, 2016 - March 12, 2016	41
Thruster Failure #2 (Port)	April 4, 2016 - July 5, 2016	93
Hull Damage from Ice	June 18, 2017 - July 16, 2017	29
Thruster Failure #3 (Port)	October 26, 2017 - February 18, 2018	116
Engine Failure	March 10, 2019 - April 10, 2019	32

Source: Prepared by the Office of the Auditor General based upon information from the Department of Transportation and Infrastructure (unaudited)

While the *MV Legionnaire* did not have the same magnitude of service interruptions that the *MV Veteran* did, it did encounter a number of issues resulting in out of service periods. Following the *MV Veteran*'s second thruster failure, the Department required the shipbuilder to make the same modifications to the *MV Legionnaire* that were being completed on the *MV Veteran*; this may have helped reduce the number of out of service periods for the *MV Legionnaire*.

We also found there had been recurring vessel ramp issues during the period August 2016 through July 2017. While these ramp issues did not result in significant out of service periods, they did affect service delivery for the vessels.

We found the equipment failures and vessel damages resulted in unplanned costs.

Vessel Equipment Failures and Damage Costs					
Vessel	Fiscal Year Ended March 31				
	2016	2017	2018	2019	Total
<i>MV Veteran</i>	\$ 98,000	\$ 443,000	\$ 1,472,000	\$ 1,256,000	\$ 3,269,000
<i>MV Legionnaire</i>	-	17,000	403,000	482,000	902,000
	\$ 98,000	\$ 460,000	\$ 1,875,000	\$ 1,738,000	\$ 4,171,000

Source: Prepared by the Office of the Auditor General based upon information from the Department of Transportation and Infrastructure (unaudited)

Some of these costs were covered by insurance. The insurance policy covered the hull damage (\$0.5 million), the third thruster failure (\$1.4 million) and the engine failure (\$1.1 million). The Department did incur costs to provide emergency replacement services to the affected communities during the out of service periods, which included the use of swing vessels and air services.

The Department did not always identify or address root causes for issues that resulted in significant out of service periods, or for recurring issues that resulted in less extensive out of service periods within a reasonable timeframe.

MV Veteran Thruster Failures

The Department did not identify a root cause of the *MV Veteran* thruster failures until October 2017, after the third thruster failure had occurred, and more than one and a half years after the first thruster failure occurred. It was ultimately determined that each thruster failure had been caused by the same lack of lubrication to the thruster bearings.

The first thruster failure occurred in February 2016 and resulted in a 41-day out of service period. The shipbuilder determined the cause of the failure to be overheating of the bearings within the thruster due to lack of lubrication, however, no root cause was determined.

The second thruster failure, occurring 24 days after the completion of repairs from the first failure, resulted in a 93-day out of service period and was nearly identical to the first. The shipbuilder completed an investigation and concluded the mechanical reason for the failure was insufficient lubrication to the bearings, but they were unable to determine the root cause. In response, the shipbuilder completed a number of modifications to the thrusters to prevent future damage.

The third thruster failure occurred in October 2017, which resulted in a 116-day out of service period, and the issue was again due to a lack of lubrication to the bearings. With the aid of the modifications completed after the second failure, the Department was able to conclude human error was likely the root cause of the third failure. During a layover period, the temporarily-assigned crewmember turned off the lubrication system while the thruster was placed into a power saving mode. At the end of the layover period, the crewmember did not restart the lubrication system when they restarted the thruster.

An investigation completed by the Department at the time noted a lack of compliance with standard operating procedures by more than one captain. It indicated that standard operating procedures for shutdown and start-up were not being followed diligently, and certain captains had practices for shutting down various equipment during lunch breaks or rest periods that did not comply with established protocol. Further, it indicated the crew seniority system allowed for crewmembers with experience on these more mechanically sophisticated vessels to be bumped by crewmembers with more overall seniority, but with less experience on these particular types of vessels.

The investigation resulted in a number of recommendations aimed at the human resource issues. Recommendations included requiring chief engineers and captains to have “notation” experience, enhanced “type” qualifications or endorsements, stringent adherence to standard operating procedures, and increased shore support personnel to facilitate crew training. The investigation also resulted in a recommendation to implement a control to prevent the thrusters from operating without lubrication in the future.

The Department implemented the recommended control that prevented the thrusters from operating without lubrication on the vessels. However, they did not address any of the recommendations related to human resources.

Another investigation completed by the Human Resource Secretariat, the branch of government responsible for the human resources management of departments, indicated that human error was the likely root cause.

MV Veteran Engine Failure

The *MV Veteran* engine failure occurred in April 2018, and resulted in a 32-day out of service period. Department officials advised us that at the outset, it was obvious that human error was the root cause - a crewmember working at the time of the incident used the incorrect filter and attempted to start the engine. When the engine did not start, another crewmember also attempted to start the engine, resulting in damage to the engine. An investigation completed by the Human Resource Secretariat confirmed this and highlighted a significant deficiency in the crewmembers' basic engineering knowledge. While the Department maintains that discussions were held with the crewmembers to address the technical deficiencies noted, they were unable to demonstrate that this discussion had occurred.

The two crewmembers involved in the engine failure had participated in shipbuilder training in Newfoundland and Labrador; however, the Department was unable to provide us with their completed initial familiarization forms.

Recurring Vessel Ramp Issues

As noted earlier, recurring issues with vessel ramps resulted in numerous out of service periods during the initial operations of the vessels.

The Department provided four reports, one from the shipbuilder and three from the vessel ramp manufacturer, all dated between August 2016 and July 2017. These reports indicated concerns with the operational procedures used by the vessels' crews to load and unload vehicles and passengers. The reports identified 24 instances of the incorrect positioning of alarm sensors and issues with proximity sensors. Further, in one of the four reports, the ramp manufacturer noted if the proximity sensors were not repositioned on the *MV Legionnaire*, similar damage could occur to that vessel as well.

In addition, the shipbuilder and the ramp manufacturer noted improper ballasting during loading/unloading operations. Ramp alarms are vessel controls signaling improper ballasting. Some of the reports indicated that the vessel's crews allowed loading/unloading operations to occur while the alarms were sounding. This alarm is for the protection of the ramps and traffic must not cross the ramp in this condition.

Other observations reported by the shipbuilder and the ramp manufacturer included unsuitable infrastructure in some ports and improper mooring procedures, during which crew used the vessel ramps as an anchoring mechanism.

Observations from these reports included:

- Since it is annoying, the crew is eliminating the proximity alarm by lifting the magnet arm away from the sensor;
- The *MV Legionnaire* was ballasted completely wrong;

- Bow door had mechanical damage from contact with the concrete shore ramp;
- The *MV Legionnaire* was observed to be repositioned with the vessel ramp down on the concrete shore ramp and the vessel ramps were subsequently being dragged across the concrete surface;
- The southern shore ramp in Change Islands, in the opinion of the shipbuilder, was a major contributing factor to the ramp damage. All other shore ramps were upgraded except the southern shore ramp, which was extended;
- During a final discharge, improper unloading was observed. The shipbuilder's representative told the crew on deck to stop and ballast the vessel properly, but was ignored; and
- The shipbuilder's representative noted no maximum angle alarm was sounding; upon investigation, a white silicone had been applied on the sensor track that prevented the alarm from sounding. The shipbuilder's representative directed the removal of the silicone; however, this had not been completed by the time the representative had left on the following day.

The reports also highlighted numerous instances of damage occurring to the vessels ramps. For example, in addition to the above noted damages, the shipbuilder and the ramp manufacturer noted the hinge assemblies of the *MV Legionnaire* had bending and/or twisting due to external forces, and that the related hinge pin had snapped.

We found that even though the Department had been aware of these ramp issues since receiving these reports back in 2016 and 2017, they could not provide evidence that the issues had been addressed. We observed the alarm sounding during a site visit of the *MV Legionnaire* in both February and September 2019.

Support from the Shipbuilder

The contract provided two mechanisms to support the initial operations of the vessels: a warranty and technical support.

The warranty provided coverage for bad workmanship or material defects discovered within the first 12 months of operating a vessel. The warranty for the *MV Veteran* began on October 17, 2015 and the warranty for the *MV Legionnaire* began on February 1, 2016.

As a result of the significant out of service periods experienced by the *MV Veteran*, the Department requested, and received from the shipbuilder, an extension of the warranties for both the *MV Veteran* and *MV Legionnaire*. The warranty for the *MV Veteran* expired on October 16, 2017, two years after the vessel's arrival in the province, and the warranty for the *MV Legionnaire* expired on October 15, 2017, one year after its departure from the Romanian shipyard.

The Department used the warranty during the period in which it was available. During the warranty period, the Department submitted 261 warranty claims, 147 for the *MV Veteran* and 114 for the *MV Legionnaire*. The shipbuilder approved 243 (93 per cent) of these claims, with 137 (93 per cent) approved for the *MV Veteran*, and 106 (93 per cent) approved for the *MV Legionnaire*.

The contract required the shipbuilder to provide a technical support engineer who would work on the vessels with the crews for a four-week period following the three-week training period of each vessel. The purpose of this support was to provide technical support during the initial operations. The Department used the four-week technical support for the *MV Veteran*. While the Department maintains they used this support for the *MV Legionnaire*, they were unable to provide evidence to support this.

Out of Service Planning

We would expect the Department to plan for potential out of service periods to minimize the impact on service delivery. We would consider this especially important when operating a new vessel design.

The Department did not plan for potential out of service periods related to the initial operations of these two new vessels. Further, the email of a department official, shortly after the second thruster failure, highlighted the lack of a coordinated Department response to a vessel suddenly going out of service. The email noted the Department had to, instead, engage in crisis management for that event.

While the Department has general plans for foreseen and unforeseen service interruptions, the introduction of newly-designed vessels and modified shore infrastructure to service the vessels would have increased the risk of potentially significant out of service periods. This risk would necessitate vessel redundancy plans to ensure critical services were able to be maintained in a timely and cost effective manner.

CONCLUSIONS

The Department of Transportation and Infrastructure did not effectively manage the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*.

During the first three years of operation, the *MV Veteran* and the *MV Legionnaire* had a combined total of 607 out of service days. Equipment failures and vessel damages also resulted in unplanned costs of approximately \$4.2 million.

It is critical to use effective project management processes to reduce the likelihood of significant issues in a large construction project like the *MV Veteran* and *MV Legionnaire*. However, we found a number of concerns related to the Department's management of the project that may have contributed to the significant operational delays, service disruptions and substantial unplanned costs during the construction, operationalization and initial operations of the vessels.

Some of those concerns are:

- The Department did not have an established project management process in place to guide the construction of the vessels.
- The Department did not perform sufficiently detailed planning for the project. For example, the Department did not sufficiently plan for crew training needs, which may have led to human errors that caused three thruster failures, resulting in 250 out of service days in total. Also, the lack of a timely shore infrastructure study for the *MV Legionnaire* route may have resulted in a delay in wharf restructuring, which caused an eight-month delay in the initial operations of the *MV Legionnaire*.
- The Department did not maintain adequate information management and document management processes throughout the project.
- Department monitoring of the construction and initial operationalization of the vessels was also insufficient. For example, the Department did not maintain adequate representation at the shipbuilder's yard to facilitate proper monitoring throughout the construction phase of the vessels. This inadequate representation resulted in significant concerns from the shipbuilder and increased the risk that contract terms were not being met, issues may have gone undetected and the opportunity for correction may have been missed. The Department also did not properly monitor the initial operationalization of the vessels, such as ensuring sufficient training and that operating manuals were finalized before initial operations.
- The Department did not plan for potential out of service periods related to the initial operations of the vessels. When the vessels encountered mechanical issues during initial operations, the Department did not always identify or determine root causes of the mechanical issues in a timely manner.

- The Department did appear to have executed a contract with the shipbuilder, the terms of which effectively mitigated the risks to the province to an appropriate level. However, the Department did not establish its contract risk tolerance prior to executing the contract; we were unable to determine whether the clauses of the contract were aligned with the risk tolerance of the Department.
- As the department with the lead relationship with the shipbuilder, we would have expected to see evidence to indicate that the Department of Transportation and Infrastructure would work with Department of Industry, Energy and Technology to ensure that the commitments from the shipbuilder were fully explored. We did not find this evidence.

RECOMMENDATIONS

1. The Department should establish and follow a project management process for the procurement of vessels that follows leading practice, with particular attention paid to risk management, onsite supervision, document management and training.

DEPARTMENT'S RESPONSE

The Department acknowledges that project management processes could have been stronger for the procurement of the vessels. It further acknowledges that improved document management would aid in demonstrating the project management processes that were employed on the project.

The Department notes that since the procurement of these vessels, the province has adopted a new public procurement framework, which includes a new act and regulations for public procurement. In concert with these changes, the Department has developed additional procurement and project management approaches for major projects which reflects improved risk transfer, risk management and life-cycle costs considerations. The Department is committed to continuous improvement in this area.

2. The Department should ensure root causes for significant mechanical issues and recurring mechanical issues of vessels are identified and addressed in a timely manner.

DEPARTMENT'S RESPONSE

The Department concurs that identifying and addressing root causes for significant and recurring mechanical issues should be completed in a timely manner. The Department works with equipment manufacturers and industry experts on an ongoing basis to achieve this end. The Department notes that root cause determination for mechanical equipment is often complex and conclusive results are not always available.

3. The Department, with cooperation from other departments, should ensure that all opportunities for potential industrial benefits are identified, pursued and documented.

DEPARTMENT'S RESPONSE

The Department concurs with the recommendation.

APPENDIX I – ABOUT THE AUDIT

OBJECTIVE

The objective of our audit was to determine whether the Department of Transportation and Infrastructure effectively managed the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*.

CRITERIA

Criteria were developed specifically for this audit based upon relevant legislation, the Department's policies and procedures, reviews of literature including reports of other legislative auditors, and consultations with management. The criteria were accepted as suitable by the senior management of the Department.

We assessed whether the Department effectively managed the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire* against the following criteria:

1. The Department planned for the construction and operationalization of the vessels.
2. The Department executed a contract with the selected contractor, the terms of which effectively mitigated the risks to the province to an appropriate level.
3. The Department monitored the construction and initial operationalization of the vessels, including compliance with contract terms, and ensured the identified issues were resolved.
4. The Department had processes to address issues that impacted the delivery of vessel services during the initial years of operations.

TERMS OF ENGAGEMENT

In March 2018, the Public Accounts Committee requested our Office undertake a review of the process used to purchase the *MV Veteran* and the *MV Legionnaire* and the mechanical issues experienced since entering service. As a result, this performance audit focuses on the management by the Department of the construction, operationalization and initial operations of the *MV Veteran* and the *MV Legionnaire*.

SCOPE AND APPROACH

Our audit covered the period from April 2009 to March 31, 2019. Our audit included examining whether the Department effectively managed the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*, including the terms of the shipbuilding contract.

Our audit did not include an assessment of the quality of the design of the vessels, the quality of the contractor selection process, or the suitability of scope or content of the training offered. Our audit also did not examine management of the construction of shore infrastructure, such as wharves.

Our audit included conducting interviews with department officials and the use of an email search tool (multi-mailbox). It also included a detailed inspection of documentation related to the procurement and initial operations of the vessels, including an examination of contracts, policies and procedures, planning documents, monitoring reports from the onsite consultant, and training records. We considered industry practice where applicable. We analyzed and used data from the shipbuilder's warranty portal through access provided to us by the Department. We also used departmental information, including departmental attendance records and statistical information. We obtained confirmation from the Department that their officials had provided all known information requested by the auditors, or information that could affect the findings or audit conclusions. Sample selections were non-statistical and selected judgmentally.

AUDIT STANDARDS

This independent assurance report was prepared by the Office of the Auditor General of Newfoundland and Labrador on the management of the construction, operationalization and initial operations of the *MV Veteran* and *MV Legionnaire*. Our responsibility was to independently audit the Department's processes to provide objective information and recommendations. Management at the Department acknowledged their responsibility for the audit subject matter.

Our audit was performed to a reasonable level of assurance in accordance with the Canadian Standard on Assurance Engagements (CSAE) 3001 – Direct Engagements as set out by the Chartered Professional Accountants of Canada and under the authority of the *Auditor General Act*.

The Office applies Canadian Standard on Quality Control 1 and, accordingly, maintains a comprehensive system of quality control, including documented policies and procedures regarding ethical requirements, professional standards, and applicable legal and regulatory requirements.

In conducting the audit work, we have complied with the independence and other ethical requirements of the Rules of Professional Conduct of the Association of Chartered Professional Accountants of Newfoundland and Labrador.

USE OF EXPERT

During our audit, we used the services of a procurement contract consultant to provide advice, including during the development of audit criteria, and to perform certain audit procedures in response to our assessed risks on various aspects of this engagement.

WHY THIS AUDIT IS IMPORTANT

Residents of the province rely on the daily services of 10 Government-owned vessels and eight privately-owned vessels servicing routes throughout Newfoundland and Labrador. These vessels transport approximately 850,000 passengers, 400,000 vehicles and 10,000 tonnes of freight annually.

Government's newest vessels, the *MV Veteran* and *MV Legionnaire*, cost Government more than \$100 million. Government's current fleet of vessels are aging and will need to be replaced in the future. As such, it is essential for the Department to have effective project management processes in place to ensure the successful construction and operationalization of new vessels.

DATE CONCLUSION REACHED

We obtained sufficient and appropriate audit evidence on which to base our conclusions on August 4, 2021, in St. John's, Newfoundland and Labrador.



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ABOUT US

VISION

Promoting positive change and accountability in the public sector through impactful audits.

MISSION

To promote accountability in Government's management and use of public resources and encourage positive change in its delivery of programs and services.

VALUES

Above all else, the Office of the Auditor General must have independence, credibility and integrity. These are essential to everything we do; critical to our success. The Office of the Auditor General complies with professional and office standards to produce relevant and reliable audit reports. The Office of the Auditor General's independence of government, in fact and in appearance, provides objective conclusions, opinions and recommendations on the operations of government and crown agencies. Our staff work in a professional and ethical manner, ensuring respect, objectivity, trust, honesty and fairness.

AUDIT TEAM

The Auditor General wishes to thank the diligent audit team who performed their work with independence, credibility and integrity:

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