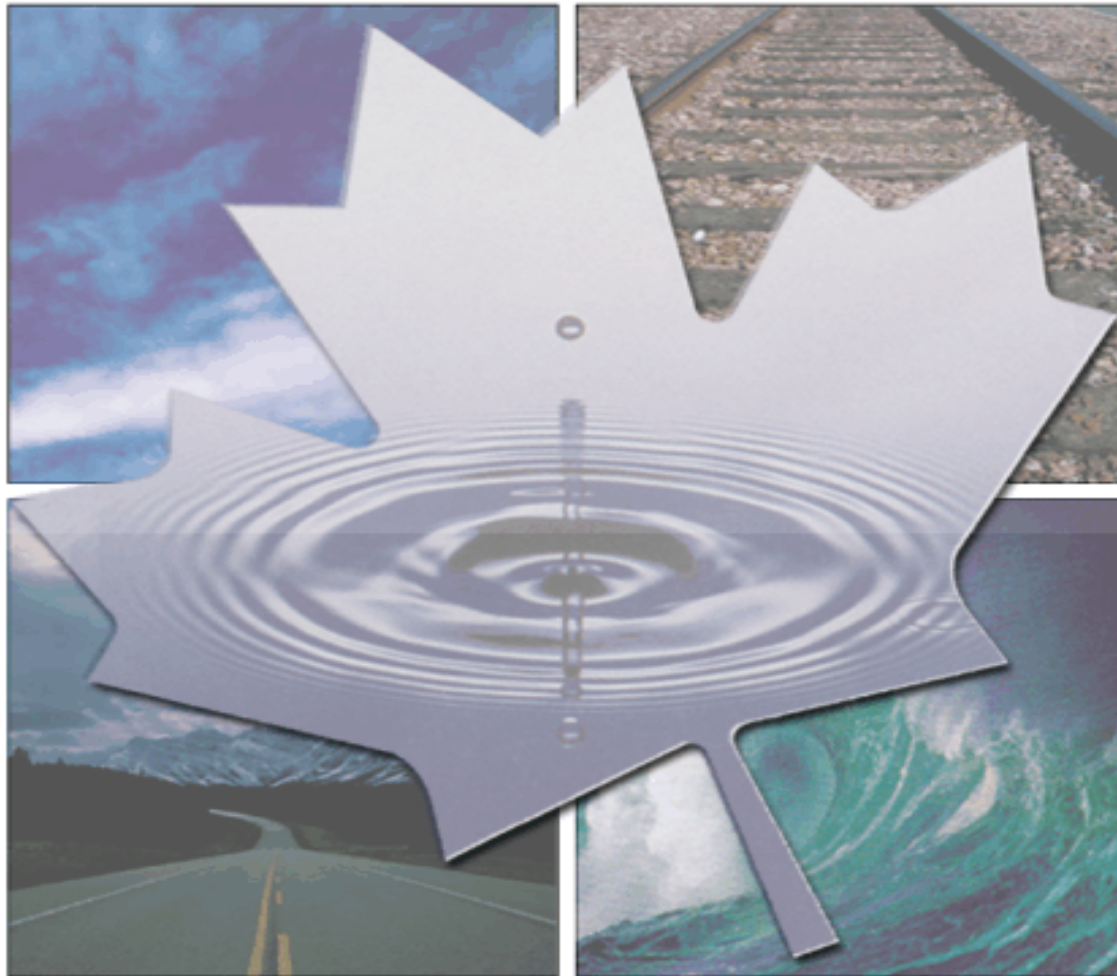


Audit and Advisory Services
Integrity, Innovation and Quality



**Audit of the Oversight Practices of Safety and Security Management
System**

February 2017

EXECUTIVE SUMMARY.....	I
1. BACKGROUND.....	1
1.1. What is SMS/SEMS?	1
1.2. Why SMS/SeMS regulations?	1
1.2.1. The Introduction of SMS/SeMS Regulations.....	1
1.2.2. Industry’s Role.....	2
1.2.3. Transport Canada’s Role	3
1.2.4. Potential Impact of SMS/SeMS Regulations	3
1.3. A multimodal SMS/SeMS strategic framework is currently under development.....	3
1.4. Audit objective, scope and reporting approach.....	4
2. AUDIT FINDINGS.....	5
2.1. SMS/SeMS objective, expected outcomes & performance measurement strategy.....	5
2.1.1. Rationale for SMS/SeMS Regulations	5
2.1.2. SMS/SeMS Specific Performance Indicators.....	6
2.1.3. Gathering and Analyzing Risk and Compliance Data	7
2.1.4. Good Practice – Aviation Security’s Approach to Performance Measurement.....	8
2.2. Implementation of SMS/SeMS regulatory oversight strategy.....	9
2.2.1. Oversight Strategy by Programs	9
2.2.2. Reporting of SMS/SeMS oversight activities.....	12
2.3. Quality control and assurance over SMS/SeMS inspection results	13
2.3.1. Quality Control.....	13
2.3.2. Quality Assurance	14
2.3.3. Good Practices Identified.....	15
3. CONCLUSION.....	16
4. SAFETY AND SECURITY GROUP MANAGEMENT RESPONSE.....	17
APPENDIX A – APPLICABILITY OF SMS/SEMS REQUIREMENTS BY PROGRAM..	22

EXECUTIVE SUMMARY

A safety/security management system (SMS/SeMS) is a set of management practices for systematically addressing safety/security risk within a transportation company.

Over the last decade, TC has been applying Safety/Security Management System regulations to segments of its regulated companies in the aviation, marine, and rail sectors. Although a direct link cannot currently be drawn between the introduction of SMS/SeMS and transportation accident and incident rates it is noteworthy that these rates have been declining despite continued growth in all transportation sectors. TC's Evaluation function will be carrying out an evaluation of SMS in Civil Aviation in 2017 to assess the specific impact of TC's SMS regulations on the Canadian aviation industry.

Internal Audit included the Audit of the Oversight Practices of Safety and Security Management System in its 2015-16 Risk-Based Audit Plan. The objectives of the audit were to determine if Safety and Security (S&S) programs:

- defined and communicated the objective and expected outcomes of their oversight of industry's SMS/SeMS to TC staff, the industry and external stakeholders;
- established a framework to guide the oversight of the industry's SMS/SeMS by TC staff; and
- implemented the framework as designed.

The audit found that Safety and Security programs are limited in their ability to assess the achievement of their SMS/SeMS objective and expected outcomes due to weaknesses in most of the performance measurement strategies and the quality of inspection data. As a result, S&S programs are not able to make fully informed decisions to improve the effectiveness of their SMS/SeMS oversight approaches and justify differences that exist between programs.

Internal Audit recommends Safety and Security should:

- Develop core SMS/SeMS objective(s) and expected outcomes for all programs.
- Develop performance indicators (including baselines and targets), taking into consideration unique modal requirements, to assess the impact of SMS/SeMS regulations and cost effectiveness of compliance monitoring approaches.
- Ensure programs improve their capabilities to gather and analyze risk data and SMS/SeMS compliance data.
- Ensure programs are able to distinguish SMS/SeMS oversight from other oversight activities in their National Oversight Plans to enable analysis of cost-effectiveness of the compliance monitoring approaches for SMS/SeMS regulations.
- Ensure programs fully implement controls that verify the completeness and accuracy of inspection data to enable performance measurement of SMS/SeMS regulations and related inspection activities.

In addition, Internal Audit identified some good practices related to performance measurement and quality control and assurance in a few programs that that could potentially be applied across all S&S programs.

The audit findings and recommendations will inform and help support work that the Safety and Security group currently has underway to develop a common framework to guide the development and implementation of SMS/SeMS regulations and oversight practices.

A number of the findings from this audit are consistent with the recently completed Risk-Based Business Planning (RBBP) Audit. This is not a surprise given that compliance monitoring activities for SMS/SeMS are managed under the RBBP process. While this audit focuses only on SMS/SeMS regulations, lessons learned from the audit could be applied to other risk interventions available to TC. By applying these lessons learned more broadly, TC’s Safety and Security programs would enhance their abilities to demonstrate the value of their work and facilitate more effective management of both their resources and risks in the transportation system. Planned transformation initiatives stemming from a recent departmental comprehensive review exercise provides the opportunity to improve and strengthen SMS/SeMS oversight.

STATEMENT OF CONFORMANCE

This Audit conforms to the Internal Auditing Standards for the Government of Canada, as supported by the results of an external assessment of Internal Audit’s *Quality Assurance and Improvement Program*.

Signatures

<hr/>	2017-02-01
Dave Leach (CIA, MPA) Director, Audit and Advisory Services	Date
<hr/>	2017-02-01
Martin Rubenstein (CPA, CIA, CFE) Chief Audit and Evaluation Executive	Date

1. BACKGROUND

1.1. WHAT IS SMS/SEMS?

A safety/security management system (SMS/SeMS) is a set of management practices for systematically addressing safety/security risk within a transportation company. It is a systematic, explicit, and comprehensive process for a company to manage safety/security with the same level of priority as other core business processes.

The concept of SMS was first used in the chemical and nuclear industries, following several major accidents in the 1990's, to bring improvements to their safety performance. Since then, the approach has been adopted by other industries (including transportation) on a voluntary basis and by regulators as an effective way to improve a company's safety practices. This report focuses on SMS/SeMS as a form of regulation.

While the specific contents vary by company, a SMS/SeMS normally consists of a common set of four interrelated components¹:

- 1) A clear **management commitment** to safety/security, often in the form of a written policy or policies, establishing the methods, processes, corporate structures and responsibilities that define the company's approach and commitment to safety/security.
- 2) A hazard/threat identification and **risk management process** whereby safety/security hazards/risks are regularly identified and assessed, risk mitigations are developed and implemented, and the performance of risk mitigations are monitored.
- 3) A **continual-improvement approach** to safety/security that actively monitors the company's overall safety/security performance, proactively seeks improvements, thoroughly investigates all accidents/incidents, and monitors the application of corrective actions.
- 4) **Safety/security-promotion activities** include providing of adequate training and establishing clear and open channels of communication related to safety/security issues.

1.2. WHY SMS/SEMS REGULATIONS?

1.2.1. The Introduction of SMS/SeMS Regulations

Transportation systems have grown exponentially both in size and complexity over the last several decades due to advances in technologies and the increase in international travel and trade. This changing environment creates new and evolving risks that need to be addressed with flexible and comprehensive regulatory approaches (table 1).

¹ Draft Multimodal Policy on the Regulation of Management Systems

Table 1 – Distinctions between SMS/SeMS and other forms of regulations

<p>If we know the problem...</p> <p><i>Ice on airplane wings reduces lift</i></p>	<p>...and we know the solution...</p> <p><i>De-icing fluid removes ice</i></p>	<p>...we can use a Prescriptive Regulation</p> <p><i>De-icing fluid must be used in icy conditions</i></p>
<p>If we know the problem...</p> <p><i>Automobile rollovers cause fatalities</i></p>	<p>...but there are many possible ways to achieve the solution...</p> <p><i>There are many ways to design an automobile roll cage</i></p>	<p>...we can use a Performance-Based Regulation</p> <p><i>Roll cages must withstand collisions of at least 35km/h</i></p>
<p>If we don't know the problem, or only know the root cause...</p> <p><i>Poor safety culture leads to accidents</i></p>	<p>...and there are many possible solutions...</p> <p><i>Numerous ways to focus staff and management attention on safety</i></p>	<p>...we can use a Management System-Based Regulation</p> <p><i>Companies must implement a Safety/Security Management System to assess and mitigate their own unique risks</i></p>

At the international level, many countries have agreed through organizations such as the International Civil Aviation Organization (ICAO) and International Maritime Organization (IMO) to augment traditional regulatory approaches by adding management system-based regulations to further improve the performance of safety and security measures in the aviation and marine industries. Transport Canada (TC) has introduced SMS/SeMS regulations to specific parts of the aviation, marine and rail transportation sectors it regulates (Appendix A).

1.2.2. Industry's Role

With the introduction of SMS/SeMS regulations, companies have to design and operate a management system to help improve the level of safety or security within its own operations. This approach leverages the intimate knowledge that a company has of its own operational environment to identify and proactively manage risk. Because individual companies must constantly monitor the performance of their SMS/SeMS and make necessary adjustments, management-based regulations are expected to lead to continuous safety and security improvements in the overall transportation system.

SMS/SeMS regulations are used by TC with other forms of regulations such as prescriptive and performance regulations. Putting in place SMS/SeMS regulations does not mean that a company self-regulates. On the contrary, they are an additional level of measures that require companies to address potential safety/security gaps that cannot be adequately targeted by other forms of regulations.

1.2.3. Transport Canada's Role

TC is responsible for developing and implementing SMS/SeMS regulations as well as overseeing and enforcing industry's compliance to them. Through its oversight of SMS/SeMS regulations, TC is able to gain knowledge of a company's safety/security management practices and its unique operating environment. This may also help to identify not only trends in individual companies but potentially systemic issues across an industry.

1.2.4. Potential Impact of SMS/SeMS Regulations

There are some indications that SMS/SeMS is adding another layer of protection against accidents and incidents by making operators accountable for having in place systems that proactively identify and mitigate safety/security risks.

Despite growth in the decade since the implementation of TC's SMS/SeMS regulations, Canada's transportation system has been experiencing a steady decrease in accident and incident rates. In the ultra-safe aviation industry where accidents are measured in 100,000 flying hours, for example, the total number of accidents declined to the lowest recorded figure in modern aviation history in 2012. In 2015, Canada saw a further 6% decrease in aviation accident rates in 2015 compared to the 2010-2014 five-year average. Meanwhile, most industry stakeholders identify SMS as an important component in continuous improvement in aviation safety².

TC's Evaluation function will be carrying out an evaluation of SMS in Civil Aviation in 2017 to assess the specific impact of TC's SMS regulations on the Canadian aviation industry.

1.3. A MULTIMODAL SMS/SEMS STRATEGIC FRAMEWORK IS CURRENTLY UNDER DEVELOPMENT

As a result of the different evolution in safety/security thinking in the aviation, marine and rail industries, TC's Safety and Security programs have developed different regulatory and oversight approaches to SMS/SeMS over the years. Recognizing the need to increase consistency within and across programs and to provide greater clarity for regulated entities, stakeholders, employees, and the public, a project is underway within TC's Safety and Security group to define a multimodal policy for regulating SMS/SeMS. This project includes the following three components:

- **Policy³:** Setting common policy objectives for SMS/SeMS, common principles for regulatory or voluntary approaches for various industry sectors, and considerations for applying SMS/SeMS to smaller, less complex regulated entities.

² [Review of the Canadian Transportation Safety Regime: Transportation of Dangerous Goods and Safety Management Systems, March 2015.](#)

³ DRAFT MULTIMODAL POLICY ON THE REGULATION OF MANAGEMENT SYSTEMS

- **Directive⁴:** Identifying and developing requirements and best practices for consistent oversight, enforcement, and staff and industry training.
- **Performance assessment:** Establishing a Performance Assessment Framework, including indicators for the core multimodal objective and expected outcomes, to be adapted by Programs to their unique circumstances.

The development of a policy was identified as a departmental priority in TC's 2015/16 Report on Plans and Priorities as well as a strategic initiative under Safety and Security Transformation 2020.

1.4. AUDIT OBJECTIVE, SCOPE AND REPORTING APPROACH

The audit objectives were to determine if Safety and Security (S&S) programs:

- defined and communicated the objective and expected outcomes of their oversight of industry's SMS/SeMS to TC staff, the industry and external stakeholders;
- established a framework to guide the oversight of the industry's SMS/SeMS by TC staff; and
- implemented the framework as designed.

The audit reviewed the activities carried out in Aviation Safety, Aviation Security, Marine Safety and Security, and Rail Safety programs between 2014-04-01 and 2015-12-31 in accordance with their respective SMS/SeMS regulations in place.

Internal Audit assessed each program using a common set of audit criteria. The audit findings and recommendations are summarized under three themes:

- 1) SMS/SeMS objective, expected outcomes & performance measurement strategy;
- 2) Implementation of oversight strategy; and
- 3) Quality control and assurance over SMS/SeMS inspection results.

The audit report highlights similarities and differences in SMS/SeMS oversight practices across programs. The audit findings will inform and support the work currently underway in Safety and Security to develop a multimodal policy framework to guide the development and implementation of SMS/SeMS regulations and oversight practices.

⁴ DRAFT MULTIMODAL DIRECTIVE ON THE REGULATION OF MANAGEMENT SYSTEMS

2. AUDIT FINDINGS

2.1. SMS/SEMS OBJECTIVE, EXPECTED OUTCOMES & PERFORMANCE MEASUREMENT STRATEGY

Context:

Regulation is one of the most powerful risk interventions available to TC. It is one of the primary means for TC to communicate safety and security priorities to industry. A clearly defined objective and expected outcome of a regulation helps align expectations from industry, the traveling public, and TC's inspectors. This in turn sets up the foundation for a coordinated approach to manage safety and security in the transportation system by all stakeholders and facilitates informed resource allocation decisions.

Internal Audit reviewed the SMS/SeMS objectives and expected outcomes described in each program's "*Regulatory Impact Analyses*" document and examined the processes/structures in place to measure their achievement. Internal Audit expected to see clear and measurable objectives and expected outcomes defined. In addition, since programs have a number of common requirements in their SMS/SeMS regulations, Internal Audit expected to see similarities in how programs describe their SMS/SeMS objectives and expected outcomes.

Findings:

The objectives and expected outcomes and performance measurement strategies for SMS/SeMS are not well defined, nor are they consistent across programs. This makes it difficult to assess the effectiveness of SMS/SeMS as a unique intervention to improve safety and security in transportation.

2.1.1. Rationale for SMS/SeMS Regulations

Internal Audit found limited documented risk analysis and rationale describing why programs selected SMS/SeMS regulations as an intervention as opposed to alternative intervention strategies. For Aviation and Marine Safety and Security programs, the decision to adopt SMS/SeMS regulations was driven by TC's commitments to an internationally accepted approach. This finding is consistent with the recent Risk Based Business Planning Audit as SMS/SeMS is one of the interventions covered in that audit.

With the multimodal SMS/SeMS policy currently being developed, Safety and Security will be defining principles to better support future decisions on when to use SMS/SeMS or expand SMS/SeMS requirements to other segments of the transportation system.

SMS/SeMS objectives and expected outcomes

Programs' SMS/SeMS objectives are described in one or a combination of the following three themes (listed in the order of commonality):

- to strengthen the management of safety or security (Aviation Safety, Aviation Security, Marine Security, and Rail Safety).
- to align with international practices (Marine Safety and Marine Security).
- to ensure unimpeded flow of trade (Marine Security).

The expected outcomes of SMS/SeMS are also described differently across programs. Some expected outcomes are well defined and can be more easily associated with SMS/SeMS such as “increased sharing of aviation security information among security partners at airports”. While others cannot be easily distinguished from other types of interventions (e.g. “reduced occurrence of incidents and accidents” or “greater safety”).

These different descriptions of SMS/SeMS objectives and expected outcomes contribute to confusion and misaligned expectations about what SMS/SeMS is intended to achieve. This confusion exists among TC inspectors and TC managers who are required to oversee and enforce the regulations, the regulated companies who are required to abide by them, and decision makers who approve the use of and allocate funding to TC for overseeing them⁵. This situation leads to varying expectations, making it difficult to assess the overall effectiveness of SMS/SeMS as an intervention strategy.

Recommendation 1

Safety and Security should develop core SMS/SeMS objectives and expected outcomes for all programs.

2.1.2. SMS/SeMS Specific Performance Indicators

In addition to the different descriptions of SMS/SeMS expected outcomes, the audit also found that programs are limited in their ability to measure the achievement against the existing expected outcomes.

Performance indicators are often not established or are under development for outcomes that would be more specific to SMS/SeMS regulations and better measures of its performance.

Examples of SMS/SeMS outcomes without performance indicators include:

- Companies have a stronger safety culture; and
- Companies spend fewer resources / have higher efficiency and flexibility in managing safety/security.

⁵ As stated in the 2015 Report of the Standing Committee on Transport, Infrastructure and Communities <http://www.parl.gc.ca/HousePublications/Publication.aspx?Language=e&Mode=1&Parl=41&Ses=2&DocId=78349>
53

Programs engage in the annual risk-based business planning process to allocate resources for different compliance monitoring activities (including SMS/SeMS) based on risks observed in their respective industries. The process is informed by a combination of risk and compliance performance indicators collected by inspectors from each program during the year. However, the performance indicators currently collected are not specific to SMS/SeMS. As a result, programs would not be able to use them to assess the overall impact of SMS/SeMS or to confirm whether an optimal cycle of SMS/SeMS compliance monitoring activities and resource levels has been established.

Recommendation 2

Safety and Security should develop performance indicators (including baselines and targets), taking into consideration unique modal requirements, to assess the impact of SMS/SeMS regulations and effectiveness of compliance monitoring approaches.

2.1.3. Gathering and Analyzing Risk and Compliance Data

Internal Audit found that programs are sometimes limited in their ability to gather and/or analyze risk and compliance data that they currently collect through their oversight of SMS/SeMS regulated companies.

For example, Aviation Safety and Marine Safety cannot systematically integrate the risk and compliance data they have collected. These programs have to manually collate the required data from different information systems to perform trend analysis. This situation significantly restricts both the frequency and the scale of the trend analysis that they could conduct.

Marine Security does not currently analyze data it collected through its SeMS oversight activities. Rail Safety is still developing its approach to analyze data and measure the performance of its SMS oversight activities.

Recommendation 3

Safety and Security should ensure programs have the capabilities to gather and analyze risk data and SMS/SeMS compliance data.

2.1.4. Good Practice – Aviation Security’s Approach to Performance Measurement

Aviation Security

Although Aviation Security’s SeMS requirements do not fully come into force until March 2017, Internal Audit identified the following positive features in the design of Aviation Security’s performance measurement approach for SeMS that other programs could consider adopting:

- The program ties each SeMS requirement to one of the SeMS-specific expected outcomes it establishes. SeMS inspection results therefore would serve as a source of performance indicators towards each SeMS specific outcome.
- The program distinguishes the importance of different SeMS requirements and assesses each requirement progressively against one, two, or all three levels of performance below:
 1. The requirement exists in an operator’s plan - e.g. Aerodrome-related security roles and responsibilities for employees are documented, current, and complete.
 2. The requirement is implemented by operators - e.g. The aerodrome operator communicates aerodrome-related security roles and responsibilities to all of its employee groups.
 3. The requirement implemented is effective in achieving TC’s expected outcomes - e.g. Based on a sample, employee groups understand their aerodrome-related roles and responsibilities and are carrying them out.

This performance measurement approach will allow the program to clearly differentiate the significance of the types of non-compliances found in its SeMS inspections. As a result, the program would be able to quickly and effectively identify and address important issues/trends related to its regulations or oversight activities, which will allow it to effectively assess the impact of its regulations and compliance monitoring activities.

2.2. IMPLEMENTATION OF SMS/SEMS REGULATORY OVERSIGHT STRATEGY

Context:

To realize the benefits envisioned for the SMS/SeMS regulations, programs need to implement an oversight strategy that will verify compliance by the regulated companies. A strategy would include the following aspects:

- The type of oversight monitoring activity that will lead to the best compliance results from regulated companies;
- Timing and frequency of the oversight activities (i.e. risk-based, cyclical, or hybrid);
- The level of integration between the monitoring of SMS/SeMS regulations and other regulations; and
- The type (e.g. SMS/SeMS specialist or generalist) and number of inspector resources required to carry out the SMS/SeMS compliance monitoring plan.

Internal Audit reviewed the SMS/SeMS oversight strategies programs applied, and identified similarities and differences in each of the aspects described above.

Findings:

Programs apply different strategies to help verify that regulated companies comply with their respective SMS/SeMS regulations. However, it is not clear whether the different strategies programs use are based on risk or solely on available resources given the limitations in performance measurement as described in the previous section. This finding is consistent with Internal Audit's recently completed Risk-Based Business Planning Audit.

The following section describes the SMS/SeMS oversight strategies each program applies, highlighting their similarities and differences.

2.2.1. Oversight Strategy by Programs

Marine Security

The choice and timing of Marine Security's oversight activities are mandated by the International Maritime Organizations' (IMO) International Ship and Port Facility Security (ISPS) Code.

Marine Security requires its SeMS regulated ports, marine facilities and vessels to go through a certification process every five years to continue to operate. To issue or renew an operating certificate, Marine Security inspectors need to carry out a comprehensive inspection on certificate holders to verify that they develop and implement the applicable SeMS requirements.

In addition, inspectors also carry out a smaller scale inspection between the second and third year of the five year interval to ensure these certificate holders continue to comply with its SeMS requirements. Marine Security is able to adjust the effective date of the certificate if they identify significant non-compliances by the certificate holder at either of these inspections.

As virtually all of Marine Security's regulations are SeMS-based, all of its inspectors are trained to carry out SeMS oversight activities. It has very little flexibility in resourcing for its annual oversight plan given the IMO mandated certification cycle.

Marine Safety

The choice and timing of Marine Safety's oversight activities are mandated by the International Maritime Organizations' International Safety Management (ISM) Code. The ISM Code requires the following three types of vessels that operate on international waters to adopt a SMS:

- Passenger ships including passenger high-speed craft;
- Oil tankers, chemical tankers, gas carriers, bulk carriers and cargo high-speed craft of 500 gross tonnage and upwards; and
- Other cargo ships and mobile offshore drilling units of 500 gross tonnage and upwards.

Marine Safety requires each of the applicable vessels to be certified every five years and be audited against the code between the second and third year of the five year interval. In addition, the companies which own these vessels are also required to go through an annual certification process to continue to operate. These SMS certification activities are currently carried out by third party delegates⁶ on TC's behalf. This approach is allowed under the ISM Code and, according to Marine Safety, adopted by most countries' marine safety authorities.

Under the third party delivery model, Marine Safety inspectors are not directly involved in the certification of companies and vessels. Instead, a small group of SMS specialists from Marine Safety observe an ad-hoc sample of SMS audits carried out by third party delegates to assess whether they meet TC's terms and conditions of delegation. The results from these "observations" are compiled by a senior SMS inspector at headquarters who provides the information to inspectors responsible for selecting and renewing qualified delegates.

⁶ Transport Canada has authorized specific marine classification societies to issue Canadian maritime documents to certain vessels on behalf of the Minister of Transport. Some of these vessels are required to have SMS according to the ISM Code.

Aviation Safety

Unlike the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO) does not specify the minimum frequency a country needs to carry out its SMS oversight activities. Nonetheless, Aviation Safety has adopted a five-year cycle as the basis of its compliance monitoring approach.

Inspectors are required to carry out a combination of comprehensive and focused inspections on each SMS regulated company. These inspections are supposed to take place in a predetermined interval within the five-year cycle. Using the National Aviation Safety Information Management System (NASIMS), the program's risk assessment and planning tool, inspectors further refine the inspection interval for each company based on risk information they gathered during the year. This approach is meant to prioritize inspector resources to companies that are considered higher risk.

The audit's review of NASIMS' data identified some inconsistencies including cases of incorrectly identifying which companies require a SMS. The program is currently taking steps to address the data quality issues and to improve NASIMS' ability to risk prioritize companies.

All Aviation Safety's inspectors are trained to monitor companies' compliance to both SMS and other non-SMS requirements in each inspection⁷.

Aviation Security

Aviation Security has adopted a three-year inspection cycle for its SeMS oversight activities. Using its risk assessment and planning tool called Security Operations Risk Assessment Model (SORAM), the program is able to adjust the frequency of its SeMS inspections based on the most current view of risk.

Similar to Aviation Safety, all of its inspectors are responsible for monitoring operators' compliance to both SeMS and other non-SeMS regulatory requirements. Initially, Aviation Security monitored compliance to SeMS and other non-SeMS requirements through separate inspections. It has recently modified its inspection approach to monitor compliance to both SMS and non-SMS requirements at the same time.

⁷ Three types of inspections -- Assessments, Program Validation Inspections (PVI) and Process Inspections (PI) are used to monitor regulatory compliance by SMS regulated companies; two of which (PVI and PI) are also used to monitor compliance by companies not required to have a SMS.

Rail Safety

There is no international organization in the rail industry that provides guidance on SMS. When first introduced, Canada was a leader in using SMS to regulate the rail industry.

To monitor companies' compliance to all of its SMS requirements, Rail Safety has chosen to carry out SMS audits in a five-year cycle. It is currently developing company profiles to risk rank companies based on common criteria and prioritize higher risk companies to be inspected earlier in the five-year cycle.

Rail Safety monitors rail industry's compliance to its SMS regulations and other regulations separately. Rail Safety's SMS audits are carried out by a separate group of SMS auditors located in headquarters and in each region.

2.2.2. Reporting of SMS/SeMS oversight activities

TC's Safety and Security Management Board requires programs to plan the number of inspections that they will carry out by quarter and report the progress against the plan on a quarterly basis. The primary purpose of this exercise is to monitor whether programs are able to complete their National Oversight Plans on time and on budget.

During the course of this audit, auditors encountered difficulties in confirming the number of SMS/SeMS oversight activities planned and carried out by Aviation Safety, Aviation Security, and Marine Safety. The reporting on progress against SMS/SeMS oversight activities in these programs is either incorporated under other inspection categories or is not consistently included in a program's National Oversight Plan.

Having the ability to distinguish SMS/SeMS oversight activities from other activities is important not only for ensuring the completion of the plan, but also for supporting programs' performance measurement. Without it, programs would have difficulty in identifying improvement opportunities that are specific for its SMS/SeMS oversight activities (e.g. change in inspection/audit cycle, resource requirements).

Recommendation 4

Safety and Security should ensure programs are able to distinguish SMS/SeMS oversight from other oversight activities in their National Oversight Plans to enable analysis of the effectiveness of the compliance monitoring approaches for SMS/SeMS regulations.

2.3. QUALITY CONTROL AND ASSURANCE OVER SMS/SEMS INSPECTION RESULTS

Context:

We have broadly defined the terms quality control and quality assurance as follows:

- Quality control (QC) – Activity carried out by managers/quality reviewers before an inspection is concluded to ensure the quality of that single inspection.
- Quality assurance (QA) – Activity that takes place after an inspection is concluded. This kind of review is usually carried out on multiple inspection files by functional authorities at national headquarters to identify quality issues that need to be addressed systemically. It is more forward looking in nature compared to quality control.

Quality data is fundamental for performance measurement. Inspectors need to accurately record the results of their inspection activities. Without accurate and complete information there is no solid basis for measuring the performance of programs' SMS/SeMS oversight activities and their impact on the transportation system.

Internal Audit reviewed a randomly selected sample of SMS/SeMS inspection files from Aviation Safety, Aviation Security, and Marine Safety and Security to look at the QC and QA processes in place to ensure the quality of inspection files. The sample covered approximately 5% of SMS/SeMS inspection files completed between 2014-04-01 and 2015-12-31 (a 21 month period). Rail Safety was not included since their new SMS regulations had come into force in April 2015 and there had been no SMS audits conducted over the period of our sample.

Findings:

Programs' QC/QA processes are still in an early stage of development and do not yet provide sufficient assurance on the quality of inspection files. This in turn impacts programs' ability to effectively measure and manage the performance of their SMS/SeMS regulations and the related oversight approach.

2.3.1. Quality Control

Despite standard operating procedures describing what should be collected in an inspection file, inspectors do not always provide sufficient details to support their analysis and conclusions. There are generally three factors contributing to this situation:

1. QC reviewers do not always identify non-conformance to a program's standard operating procedures.
2. QC reviewers do not always require inspectors to address non-conformance to standard operating procedures before the inspection is concluded.
3. The level of QC carried out may not be sufficient for some programs based on the overall state of the quality of their inspection files.

Most programs have only started their national QC regimes within the past two years and are still in the process of fully developing them. Programs have been made aware of the issues Internal Audit identified and are working with their QC reviewers to address them.

2.3.2. Quality Assurance

All programs are either carrying out QA activities or planning to do so in the near future to systematically identify and address quality issues on inspection files. In addition, they are all required to plan and track the number of QC/QA activities completed and report to the Safety and Security Management Board on a quarterly basis.

QA reviewers often interview staff and review inspection files to explore quality issues rather than assessing and measuring quality against pre-established criteria. As a result, they are limited in their ability to demonstrate the extent that quality improvement progress is made over time. Aviation Safety is the only program that has established a clear quality target which would allow it to clearly demonstrate the extent that its QC/QA activities improve the quality of inspection files (see 2.3.3. for more details).

Recommendation 5

Safety and Security should ensure programs fully implement controls that verify the completeness and accuracy of inspection data which will also support performance measurement of SMS/SeMS regulations and related inspection activities.

2.3.3. Good Practices Identified

Aviation Safety and Aviation Security

While their QC/QA activities are still under development, the two aviation programs share the following good practices to help ensure the quality of their SMS/SeMS inspection files.

Process Control

Both programs require their inspectors to verify the completeness of their own inspection files, either using a process control checklist or prompts from inspection database systems, before passing them on to their manager/QC reviewers. This approach reinforces the fact that inspectors have the primary responsibility for the quality of their own inspection files. It also allows managers/QC reviewers to focus their efforts on the accuracy of the information on file and the appropriateness of inspectors' conclusions rather than simply ensuring that inspectors include all required information on file.

Phased QC approach

Both programs are currently conducting QC reviews on a higher proportion of completed SMS/SeMS inspection files until the level of quality across their programs improves to an acceptable level.

In Aviation Safety's case, it has decided to maintain the higher QC level until inspectors' conformance to all key requirements reaches its target level. This type of clear target allows management to easily assess the effectiveness of the program's QC/QA activities. As a result, managers will be able to make the necessary adjustments to achieve their quality objectives in a more cost-effective manner.

3. CONCLUSION

TC applies Safety/Security Management System regulations to segments of its regulated companies in the aviation, marine, and rail sectors. Currently S&S programs are limited in their ability to assess the impact of their SMS/SeMS regulations and oversight activities due to weaknesses in most of the performance measurement strategies and the quality of inspection data. As a result, S&S programs are not able to make fully informed decisions to improve the effectiveness of their SMS/SeMS oversight approaches and justify differences that exist across programs.

Given that compliance monitoring activities for SMS/SeMS are managed under the RBBP process, a number of findings from this audit are consistent with the recently completed Risk-Based Business Planning (RBBP) Audit. The findings and the recommendations from this audit will inform and support the work currently underway in Safety and Security to develop a common framework to guide the development and implementation of SMS/SeMS regulations and oversight practices across the Safety and Security group. The good practices we identified in a few programs related to performance measurement, quality control and assurance could also potentially be applied across all programs within Safety and Security. Moreover, lessons learned from the audit could be applied to other risk interventions available to Transport Canada and, in doing so, the programs would be better positioned to demonstrate the value of their work and facilitate more effective management of both resources and risks in the transportation system. Finally, planned transformation initiatives stemming from a recent departmental comprehensive review exercise provide another opportunity to improve and strengthen SMS/SeMS oversight.

4. SAFETY AND SECURITY GROUP MANAGEMENT RESPONSE

Transport Canada's Safety and Security Group agrees with the recommendations of the Internal Audit of the Oversight Practices of Safety and Security Management Systems.

Background

SMS/SeMS regulations have been introduced by Transport Canada (TC) in marine, air and rail transport modes to make industry more accountable for systematically and proactively managing risks and threats within their transportation activities. SMS/SeMS regulations have been implemented and adjusted periodically over the last ten years to refine them and improve their effectiveness. Transport Canada is now focused on improving its internal management of oversight of SMS/SeMS regulations by addressing management challenges.

One challenge stems from SMS/SeMS requirements that have been established based on different pieces of legislation that were developed at different times resulting in uneven authorities for regulating SMS/SeMS. This has contributed in part to variations in the way SMS/SeMS oversight has been planned and managed. TC will address uneven authorities for SMS/SeMS through legislative modernization and a defined departmental approach to achieve greater consistency across Programs' SMS/SeMS oversight.

Implementation of oversight, including SMS/SeMS, is planned and monitored through risk-based National Oversight Plans (NOPs). There have been continuing efforts at TC to improve the effectiveness of risk-based planning as well as strive to achieve greater consistency across modes, to help senior managers oversee their programs and make risk-informed decisions.

With ongoing improvement to oversight and the evolving implementation of SMS/SeMS, monitoring the effectiveness of oversight will continue to be important. The Transport Canada Directive on Safety and Security Oversight (DOSSO) is the basis for Program monitoring of oversight performance. The DOSSO, which came into force in April 2014, mandates every S&S Program to implement internal quality assurance (IQA) to monitor performance and continuously improve oversight activities.

In 2015, S&S looked at progress on IQA through a gap analysis. The gap analysis indicated that Programs had for the most part developed the elements of an IQA required by the DOSSO however, ongoing implementation of IQA is in various states of maturity across S&S programs. The improvements sought through oversight modernization such as enhanced risk intelligence, improved risk analysis and better information on the impact of TC's actions, will better support IQA and performance management.

Path Forward

A legislative modernization proposal in Comprehensive Review, if supported, would bring greater consistency and a range of more flexible instruments to TC's safety and security legislation. This presents an opportunity to develop comprehensive legislative authorities for SMS/SeMS regulation. In addition, a consistent departmental approach to SMS/SeMS will be developed through a Policy and a Directive.

The Policy will communicate TC's ultimate objective for SMS/SeMS, a set of principles for developing SMS/SeMS regulations, as well as expected outcomes for industry's implementation of SMS/SeMS. The Directive will contain program requirements and advice for S&S Programs to develop appropriate SMS/SeMS regulations and implement oversight consistent with desired objectives and outcomes. S&S will also develop a Performance Assessment Framework with indicators for performance measurement.

As part of ongoing improvements to NOPs, SMS/SeMS will be highlighted in existing oversight reporting tools. This will require more information, including SMS/SeMS compliance data, to determine how successful oversight activities have been. Building on these ongoing improvements, S&S will launch modernization initiatives, if supported under Comprehensive Review, that are designed to improve risk-based oversight and include:

- increased use of evidence and intelligence to better identify issues, trends and emerging risks to transportation safety and security;
- common risk assessment approaches that allow comparison of risks across Programs and their relative potential impacts;
- analysis of the actions TC takes to control, reduce or manage risks; and,
- better evaluation of the effectiveness and efficiency of TC actions to inform future decision making.

To improve monitoring of SMS/SeMS effectiveness, each S&S Program with SMS/SeMS regulations will adjust their IQA plans to incorporate an explicit element focusing on SMS/SeMS inspections or audits.

Recommendation	Management Response	Timeframe	OPI(s)
SMS/SeMS objective, expected outcomes & performance measurement strategy			
1: S&S should develop core SMS/SeMS objectives and expected outcomes for all programs.	S&S will develop and maintain an SMS/SeMS Policy that will establish a core multimodal objective and expected outcomes for regulated parties' SMS/SeMS.	March 2017	DG MSPI, Safety & Security
2: S&S should develop performance indicators (including baselines and targets), taking into consideration unique modal requirements, to assess the impact of SMS/SeMS regulations and effectiveness of compliance monitoring approaches.	S&S will, in concert with an SMS/SeMS Directive, develop a Performance Assessment Framework, including indicators for the core multimodal objective and expected outcomes, to be adapted by Programs to their unique circumstances.	March 2017	DG MSPI, Safety & Security
	As part its response to the Audit of Risk Based Business Planning, S&S will enhance existing reporting tools to provide more information on ongoing changes to safety and security risks, and whether the chosen oversight actions, including SMS/SeMS oversight, are successfully addressing these risks.	March 2018	DG MSPI, Safety & Security

<p>3: S&S should ensure programs have the capabilities to gather and analyze risk and SMS/SeMS compliance data.</p>	<p>S&S programs will develop approaches to gather and analyze SMS/SeMS compliance data to support performance measurement and risk analysis.</p>	<p>March 2018</p>	<p>DGs of Civil Aviation, Aviation Security, Marine Safety and Security, Rail Safety, Safety & Security</p>
	<p>As part of the response to the Audit of Risk Based Business Planning, S&S risk intelligence and analysis functions will adopt a common risk assessment model that supports the ranking of safety and security risks with a more proactive approach to identifying risks.</p>	<p>Starting in 2017-2018 until 2021-2022</p>	<p>Oversight transformation team</p>

Implementation of an Oversight Strategy			
<p>4: S&S should ensure programs are able to distinguish SMS/SeMS oversight from other oversight activities in their National Oversight Plans to enable analysis of the effectiveness of the compliance monitoring approaches for SMS/SeMS regulations.</p>	<p>As part of ongoing improvements to the NOPs, SMS/SeMS will be highlighted in existing reporting tools. This will require more information on effectiveness and costs as part of assessing how successful oversight activities have been. The Policy, Directive and Performance Assessment Framework on SMS/SeMS will also enable better analysis of the effectiveness of SMS/SeMS oversight in relation to other oversight approaches.</p>	<p>March 2018</p>	<p>DG MSPI, Safety & Security</p>
Quality Control and Assurance Over SMS/SeMS Inspection Results			
<p>5: S&S should ensure programs fully implement controls that verify the completeness and accuracy of inspection data which will also support performance measurement of SMS/SeMS regulations and related inspection activities.</p>	<p>Under the Directive on Safety and Security Oversight (DOSSO), and its Integrated Standard for Internal Quality Assurance and Program Performance, each Safety and Security Program must develop and maintain a risk-based IQA plan outlining the objectives of the quality assurance work. Programs will adjust their plan to incorporate an explicit element focusing on SMS/SeMS inspections or audits.</p>	<p>December 2017</p>	<p>DGs of Civil Aviation, Aviation Security, Marine Safety and Security, Rail Safety, Safety & Security</p>

APPENDIX A – APPLICABILITY OF SMS/SEMS REQUIREMENTS BY PROGRAM

AVIATION SAFETY

Type of Regulated Entities	Population	SMS required
Air Carriers	2,324	40 (1.7%)
Certified aerodromes	567	325 (57.3%)
Air navigation services providers	2	2 (100%)
Approved maintenance organizations	1,001	40 (4%)
Canadian registered aircraft fleet	35,355	0

AVIATION SECURITY

Type of Regulated Entities	Population	SeMS required
Aerodromes	89	89 (100%)
Air Carriers	330	0
Air Cargo Supply Chain ⁸	960	0
Air Cargo Air Carriers	244	0
Primary Security Line Partners ⁹	361 approx.	361 (100%)
CATSA	89	0

MARINE SAFETY

Type of Regulated Entities	Population	SMS required
Canadian Vessels	30,000	100 (0.3%)
Companies	35	35 (100%)

MARINE SECURITY

Type of Regulated Entities	Population	SeMS required
Ports and marine facilities	301	301 (100%)
Occasional used marine facilities	138	0
Canadian flagged vessels	176	176 (100%)
Domestic ferries facilities	29	29 (100%)
Domestic ferries	40	40 (100%)
Foreign SOLAS vessels	3,835 approx.	0

RAIL SAFETY

Type of Regulated Entities	Population	SMS required
Federal railway companies	26	26 (100%)
Provincial railway companies	10	10 (100%)
Local railway companies	41	41 (100%)

⁸ Air Cargo Supply Chain includes shipper/originators of cargo and cargo operators such as ground transportation companies and warehousing facilities.

⁹ Primary security line partners are defined as including a business, organizations or non-profit group that occupies an area that is on an aerodrome's primary security line and that includes a restricted area access point. Their number is approximate as they change constantly.