

SMART ABOUT SALT COUNCIL

ESTABLISHMENT OF A TRAINING, CERTIFICATION AND ACCREDITATION VERIFICATION PROGRAM TASK 3 – VERIFICATION FRAMEWORK

SEPTEMBER 11, 2018

DRAFT





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TRAINING, CERTIFICATION
AND ACCREDITATION
VERIFICATION PROGRAM
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SMART ABOUT SALT COUNCIL

DRAFT
PROJECT NO.: 18M-00698-00
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1 INTRODUCTION

1.1 OVERALL PROJECT

The objective of the Assignment is to develop a verification program that authenticates chloride application processes during winter maintenance operations in line with SASC programs and practices. The verification program will consider available resources, leading practices, and stakeholder capacities' to support continued reductions of chloride levels. There will be a particular focus on implementation in the Lake Simcoe Watershed.

The list of tasks is as follows:

1. **JURISDICTIONAL SCAN:** WSP will complete a jurisdictional scan to understand how anti-icing and de-icing products such as salt are managed and application rates and practices monitored and/or verified.
2. **INTERVIEWS:** As we understand it, the purpose of this task is to ascertain stakeholder's perspective on implementing a salt audit program in the Lake Simcoe Watershed.
3. **DRAFT VERIFICATION FRAMEWORK:** Using the information gathered through the scan, a verification framework to validate the use of leading practices in winter maintenance with particular emphasis on the SASC's training, certification and accreditation programs.
4. **SOLICIT FEEDBACK:** stakeholders will be asked their opinions on the draft verification framework.
5. **TEST VERIFICATION FRAMEWORK:** winter maintenance professionals, facility operators, and other key stakeholders will test the verification framework.
6. **PILOT VERIFICATION FRAMEWORK:** the verification framework will be tried on facilities and/or contractors over a winter season with at least one pilot being done in a priority sub-watershed in the Lake Simcoe watershed.
7. **FINALIZE VERIFICATION FRAMEWORK:** the feedback obtained by the pilot program will be used to finalize the verification framework.
8. **ASSIST IN OUTREACH:** outreach and marketing materials will be developed for the verification program.

This report covers the following tasks:

1. **DRAFT VERIFICATION FRAMEWORK**

1.2 TASK 3 - DRAFT VERIFICATION FRAMEWORK

1.2.1 Purpose

From our proposal, dated March 22, 2018, WSP will collaborate with SASC to design, test and implement a chloride audit/verification framework to validate the use of leading practices in winter maintenance with emphasis on the SASC's training, certification and accreditation programs. There are three components for this Task:



- 1 Develop Draft Verification Framework
- 2 Hold an Internal Workshop with SASC to review Draft Verification Framework
- 3 Revise Draft Verification Framework based on workshop feedback and provide the second draft of the verification framework.

2 CONSIDERATIONS FOR A VERIFICATION FRAMEWORK

As specified by SASC, considerations for developing the verification framework include:

- 1 Meeting existing SASC training, certification and accreditation requirements
- 2 Complementing supporting leading practices in salt management
- 3 Building upon / apply the findings from the jurisdictional scan
- 4 Recognizing resource limitations of industry applicators
- 5 Considering safety requirements of industry and the public, and
- 6 Representing the leading practices to address liability concerns and issues in other jurisdictions

The following sections break down the above considerations into specific review criteria for the various options for verification frameworks.

2.1 MEET EXISTING SASC TRAINING, CERTIFICATION AND ACCREDITATION REQUIREMENTS

The following are the documents providing requirements and guidance to Faculty Owners and Managers Requirements for Certified Sites and for Certified Contractors. These will form the basis of the verification.

2.1.1 Faculty Owners and Managers Requirements

Documents:

1. Self-Assessment – Site Worksheet
2. Application for Certification and Annual Renewal Smart About Salt Certified Site
3. Guide to Smart About Salt Designation – Site

Appendix A has more details on requirements from the above documents.

SELF-ASSESSMENT – SITE WORKSHEET

The site owner / manager is asked to complete the worksheet that includes a site map with identified problem areas, solutions and action plans, as well as areas of low traffic

APPLICATION FOR CERTIFICATION AND ANNUAL RENEWAL SMART ABOUT SALT CERTIFIED SITE

The document focuses on the following:

- Salt Use summary: contractor reports on average application rate



- Training compliance: yes/no questions related to training of site staff and contractors.
- Awareness compliance: yes/no question about employee and client awareness
- Record Keeping compliance: yes/no questions about records kept

GUIDE TO SMART ABOUT SALT DESIGNATION – SITE

The guide assists owners and property managers in the completion of the Application for Certification and Annual Renewal for Smart About Salt Certified Site and the Self-Assessment – Site Worksheet.

2.1.2 Contracting Company

Documents:

1. Self-Assessment –Worksheet
2. Application for Certification and Annual Renewal Smart About Salt Certified Site
3. Guide to Smart About Salt Designation – Contractor

Appendix A has more details on requirements from the above documents.

SELF-ASSESSMENT – CONTRACTORS' WORKSHEET

The contractor is asked to rate their performance against specific criteria for key practices including: equipment calibration, material application and tracking, use of liquid materials, and training.

APPLICATION FOR CERTIFICATION AND ANNUAL RENEWAL (SMART ABOUT SALT COUNCIL , UNDATED B)

The document is the report of total salt use for the year by the contractor. It includes an update of the self-assessment, which appears to be only required for the first 3 years.

CONTRACTOR DESIGNATION GUIDE (SMART ABOUT SALT COUNCIL, 2011)

The guide assists contractors in the completion of the Application for Certification and Annual Renewal for Smart About

2.2 COMPLEMENT / SUPPORT LEADING PRACTICES IN SALT MANAGEMENT WHILE ADDRESSING LIABILITY CONCERNS

The verification framework should support the knowledge and use of leading practices in winter maintenance to optimize the use of road salt (i.e., minimizing road salt use without reducing performance or increasing liability concerns). There are many documents available that provide guidance on leading practices. Such practices, unless identified as a requirement in SASC documents, are not viable verification criteria as the verifiee would not be aware of the criteria to which they are being held.

The following are the documents, as provided by SASC, include leading practices. These practices are not requirements. As such, they are not the basis for verification criteria, but they can be used to provide guidance with respect to Opportunities for Improvements.



TRAINING WORKBOOK (SMART ABOUT SALT COUNCIL, 2018)

The Training Workbook is an overview of the SASC training and is useful in evaluating the competence of people trained in salt management. Topics include:

- Understanding weather
- Mechanical snow removal
- The 5 R's of salt management
- Use of liquids
- Calibration of equipment
- Application rates
- Materials storage and handling
- Risk management and record keeping
- Site assessment

Appendix A has more details on requirements from the above documents.

ESSENTIALS OF SALT MANAGEMENT TRAINING OVERVIEW

The Overview is the syllabus to the SASC training and is not expected to be useful in the verification program.

SNOW OPERATIONS RISK MANAGEMENT GUIDE (MARSH, 2011)

The above guide includes detailed leading practices / risk management for salt management from other sources. Those topics that are directly related to winter maintenance operations are included below:

- Site Preparation / Inspection and Snow Maintenance On-site
- De-Icer / Salt Application Rates
- Equipment Calibration / Verification
- Material Usage Tracking (Smart About Salt)
- On-Site Snow Storage / Dumping Areas
- Off-Site Snow Storage Disposal Sites
- Property Damage or Slip, Trip, Fall / Incident management
- Bulk Salt Loading / Storage / Transport
- Vehicle Inspection
- Vehicle / Equipment Maintenance
- Operator Selection Criteria
- Driver / Operator / Employee Manual
- Driver / Operator Training
- Record Keeping & Legal Review
- Complaint Handling

Appendix A has more details on requirements from the above documents.

2.3 BUILD UPON / APPLY THE FINDINGS FROM REPORT FOR TASK #1 - JURISDICTIONAL SCAN

The Task #1 Jurisdictional Scan examined both road salt application certification programs as well as other certification programs to best understand their current application, monitoring, and verification processes, as well as the opportunities and weaknesses inherent in individual programs and the system in general. It has selected the programs which are most similar to the SASC in terms of goals, resources, and operations and whose verification and auditing programs could be most transferable. Table 1 is a summary of the key components of road salt and other certification programs.

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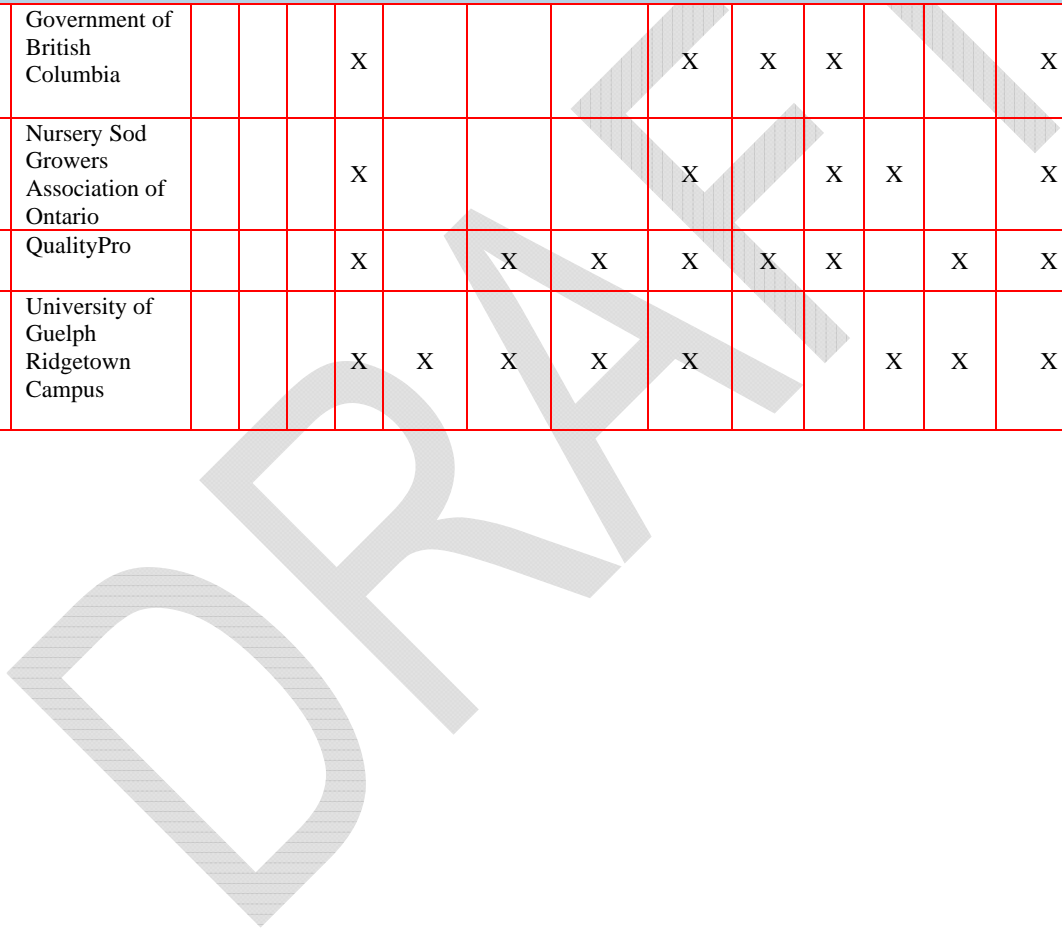


Table 1. Summary of Findings for Task #1 - Jurisdictional Scan of Road Salt and Other Certification and Verification Programs

PROGRAM NAME	ORGANIZATION	APPLICABLE AREAS				TRAINING REQUIRED		EXAM REQUIREMENT	THIRD PARTY AUDITING	SELF-REPORTING	LEVEL		APPLICANT		COMMENT
		Roads	Sidewalks	Parking	Other	In class	Online				Organizational	Individual	Applicators	Applicator supervisors/managers	
Road Salt Programs															
Smart Salting Level 1 Certification	Minnesota Pollution Control Agency	X	X	X		X					X	X			Education program
Smart Salting Level 2 Certification		X	X	X		X	X			X	X			X	Online self-assessment program
Green SnowPro	New Hampshire Department of Environmental Services	X	X	X		X		X		X	X		X		Education, exam, and reporting program. Upon completion participants may receive a certification of liability protection for operators and owners provided by the government of New Hampshire.
Winter Salt Certification	City of Madison	X	X	X		X		X		X		X	X		Education, exam and reporting program
Salt Application Verified Equipment Program (SAVE)	Toronto and Region Conservation Authority	X	X	X					X		X	X	X		Equipment (spreader) calibration



PROGRAM NAME	ORGANIZATION	APPLICABLE AREAS				TRAINING REQUIRED		EXAM REQUIREMENT	THIRD PARTY AUDITING	SELF-REPORTING	LEVEL		APPLICANT		COMMENT
		Roads	Sidewalks	Parking	Other	In class	Online				Organizational	Individual	Applicators	Applicator supervisors/managers	
Other Programs															
Industrial Greenhouse Gas Verification Process	Government of British Columbia				X				X	X	X			X	Industrial Greenhouse Gas Emission Monitoring
Green Certification Program	Nursery Sod Growers Association of Ontario				X				X		X	X		X	Agriculture and Sod Production
GreenPro	QualityPro				X		X	X	X	X	X		X	X	Pest Management
Integrated Pest Management Certification for Corn and Soybeans	University of Guelph Ridgetown Campus				X	X	X	X	X		X	X	X	X	Class 12 Pesticide regulation





Criteria for considering verification framework for SASC:

- 1) Education / Training is a key component of almost all road salt and other certification and verification programs, and as such should be part of the verification.
 - 2) Self-Reporting / Record Submission is a common component of road salt management programs but it is unclear the frequency and depth of review undertaken by a program on these records. The people contacted from the programs noted that 1) companies involved in the programs have expressed difficulty in completing submission documents, and 2) documentation and/or data is incomplete or inaccurate.
 - 3) Third-party verification includes records as submitted and on-site. Two approaches were found:
 - a. Records and on-site reviews occur once every three years, and
 - b. Ten percent (10%) of members audited per year (assuming both records and on-site component).
-

2.4 RECOGNIZE RESOURCE LIMITATIONS OF INDUSTRY APPLICATORS

Limitations of industry applicators were considered to include:

- 1) Literacy / language proficiency of staff to participate in verification
- 2) Time constraints during winter season for verification
- 3) Financial burden of verification (wages, equipment, etc.)

These have been included into the consideration of audit process by providing minimal information requests and scheduling of on-site visits.

2.5 CONSIDER SAFETY REQUIREMENTS OF INDUSTRY AND THE GENERAL PUBLIC

It is recognized that any verification framework should not interfere or in any way diminish worker safety or the safety of the public. This consideration has been included into the evaluation criteria.

2.6 CONSIDER THE PERFORMANCE CRITERIA PROVIDED BY SASC

SASC identified the following potential performance metrics for the verification policies and practices in the Request for Proposals:



Table 1. SASC Performance Criteria and Current Requirements

FACILITY OWNERS AND MANAGERS			CONTRACTING COMPANIES		
Performance Criteria	Current Requirements	Verification	Performance Criteria	Current Requirements	Verification
			1. Calibration	Yes	
			2. Pre-wetting	No	Can be asked during verification,
			3. Percentage of automatic controllers	No	Can be asked during verification,
			4. Percentage use of advanced equipment such as snow plow blades	No	Can be asked during verification,
			5. Percentage use of sweepers and blowers	No	Can be asked during verification,
			6. Percentage use in operations of temperature sensing equipment	No	Can be asked during verification,
1. Percentage of employees that are trained in leading practices in winter maintenance	No Only yes/no on Annual Certification Report	Can be readily determined, add to verification	7. Percentage of employees that are trained in leading practices in winter maintenance	Yes 100% are required as part of self-evaluation rating over 2.	Can be determined during verification
2. Percentage of supervisors that are trained in leading practices in winter maintenance	No Only yes/no on Annual Certification Report	Can be readily determined, add to verification	8. Percentage of supervisors that are trained in leading practices in winter maintenance	Yes 100% are required as part of self-evaluation rating of 2.	Part of verification
3. Use of sand or other grits	No Use may be on Self Assessment, but not a requirement	Can be readily determined, add to verification	9. Use of sand or other grits	Yes Daily Winter Log Sheets	
4. Percentage use of direct liquid application	No Maybe on Self Assessment, but not a requirement	Can be asked, may not know, add to verification	10. Percentage use of direct liquid application	Yes May be calculated from Daily Winter Log Sheet	Verification can confirm if Daily Winter Log Sheet are completed fully including DLA
5. Percentage use of low or non-salt products	No Maybe on Self Assessment, but not a requirement	Can be asked, may not know, add to verification	11. Percentage use of low or non-salt products	No May be calculated from Daily Winter Log Sheet	Verification can confirm if Daily Winter Log Sheet are completed for DLA. Recommend: Include reporting of all anti-icing/de-icing products



FACILITY OWNERS AND MANAGERS			CONTRACTING COMPANIES		
Performance Criteria	Current Requirements	Verification	Performance Criteria	Current Requirements	Verification
					used into the Annual Certification Report then it can be checked.
6. Number of winter storm events	No	May be able to be determined from verification review, labour intensive process, not recommended	12. Number of winter storm events	No	Not verifiable. Recommend: Include reporting of all anti-icing/de-icing products used into the Annual Certification Report then it can be checked.
7. Number of winter storm events where de-icing products are utilized	Yes Annual Certification Report	Verification will confirm if process for determining events for Annual Certification Report is correct Verification can confirm number of winter events, labour intensive process, not recommended	13. Number of winter storm events where de-icing products are utilized	Yes Annual Certification Report	Verification will confirm if process for determining events for Annual Certification Report is correct Verification can confirm number of winter events for one or more sites, labour intensive process, not recommended
			14. Actual amounts of anti-icing/de-icing products used with emphasis on chloride products	No Annual Certification Report requires reporting of total solid salt, not liquids or sand blends	Not verifiable. Recommend: Include requiring reporting of all anti-icing/de-icing products used into the Annual Certification Report. Once required, verification can confirm if Daily Winter Log Sheet totals match reporting in Annual Certification Report and match records of purchases. This is labour intensive.
8. Use of shared liability contracts	No	Can be readily determined, add to verification	15. Use of shared liability contracts	No	Can be readily determined, add to verification
9. Percentage of sites that have been assessed	No Internal SASC calculation	N/A			
10. Percentage of sites that have a salt management plan and/or winter maintenance plans	No Salt management plan and/or winter maintenance plans not required	Can be determined from verification as a yes/no. City of Guelph or other standard would need to be selected to verify			



FACILITY OWNERS AND MANAGERS			CONTRACTING COMPANIES		
Performance Criteria	Current Requirements	Verification	Performance Criteria	Current Requirements	Verification
		against SASC can combine results. Not recommended			
11. Reporting and record keeping for a) number and frequency of complaints, b) the number and frequency of audits / program verifications, and, c) the findings against leading practices and teachings of the SASC.	a) No Compliant procedure is not required b) N/A c) No	a) Not verifiable. How complaints are handled can be asked. Recommend: Include requiring sites to have a complaints protocol (SASC can provide template) and require reporting in the Annual Certification Report. b) SASC calculation c) Sites have lack of practices. Recommend: Include requiring standard practices. To start, sites should be required to monitor conditions and salt use on their properties (using a standard areas / photo log) and include in Annual Certification Report.	16. Reporting and record keeping for a) number and frequency of complaints, b) the number and frequency of audits / program verifications, and, c) the findings against leading practices and teachings of the SASC.	a) No No complaint protocol requirements b) N/A c) Yes Include in verification of the self-assessment ratings	a) Not verifiable. How complaints are handled can be asked but not a requirement. Recommend: Include requiring contractors to have a complaints protocol (SASC can provide template) and require reporting in the Annual Certification Report. b) SASC calculation c) Include as verification, but if the use of a leading practices is not required, then not enforceable.

2.7 VERIFICATION APPROACH

The international standard for auditing management systems is ISO 19011: 2011. It lays out some basic elements for a successful audit. This standard was used to provide the following structure to this section:

- Definition of key terms
- Principles of verifications
- Verification Program Objectives
- SAS Verification Program Structure

2.7.1 Terms

- **Conformity / Compliance:** verification finding that reflects the fulfilment of a requirement
- **Opportunity for Improvement (OFI):** verification suggestion to improve the program
- **Nonconformity / Non-compliance:** verification finding for the non-fulfilment of a requirement. Some systems differentiate between minor and major to indicate level of concern and/or to prioritize actions.
- **Verification:** A verification is a disciplined approach to evaluate and improve the effectiveness of a system; to authenticate that the individual elements within the system are effective and suitable in achieving the stated objectives.
- **Verification evidence:** records, statements of fact or other information which are relevant to the verification criteria (see below) and verifiable NOTE Audit evidence can be qualitative or quantitative.
- **Verification findings:** results of the evaluation of the collected verification evidence against verification criteria. Verification findings indicate conformity or nonconformity. Verification findings can lead to the identification of opportunities for improvement or recording good practices. If the verification criteria are selected from legal or other requirements, the audit finding is termed compliance or non-compliance.
- Verifier: organization undergoing verification
- Verifier: person who conducts a verification

2.7.2 Principles of Verifications

Verifying is characterized by reliance on a number of principles. These principles should help to make the verification an effective and reliable tool by providing information on which SASC can evaluate an organization and for an organization to can act in order to improve its performance. Adherence to these principles is a prerequisite for providing verification conclusions that are relevant and sufficient and for enabling verifiers working independently from one another, to reach similar conclusions in similar circumstances.

Six principles are outlined below.

- 1 **Integrity:** the foundation of professionalism, Verifiers and the person managing an verification programme should:
 - Perform their work with honesty, diligence, and responsibility;
 - Observe and comply with any applicable legal requirements;

- Demonstrate their competence while performing their work;
 - Perform their work in an impartial manner, i.e. remain fair and unbiased in all their dealings;
 - Be sensitive to any influences that may be exerted that may be exerted on their judgement while carrying out an audit.
- 2 Fair presentation:** the obligation to report truthfully and accurately. Verification findings, verification conclusions and verification reports should reflect truthfully and accurately the verification activities. Significant obstacles encountered during the verification and unresolved diverging opinions between the verification team and the verifiee should be reported. The communication should be truthful, accurate, objective, timely, clear and complete.
 - 3 Due professional care:** the application of diligence and judgement in verifying. Verifiers should exercise due care in accordance with the importance of the task they perform and the confidence placed in them by the verification client and other interested parties. An important factor in carrying out their work with due professional care is having the ability to make reasoned judgements in all verification situations.
 - 4 Confidentiality:** security of information. Verifiers should exercise discretion in the use and protection of information acquired in the course of their duties. Verification information should not be used inappropriately for personal gain by the verifiers or the verification client, or in a manner detrimental to the legitimate interests of the verifiee. This concept includes the proper handling of sensitive or confidential information.
 - 5 Independence:** the basis for the impartiality of the verification and objectivity of the verification conclusions. Verifiers should be independent of the activity being verified wherever practicable, and should in all cases act in a manner that is free from bias and conflict of interest. Verifiers should maintain objectivity throughout the verification process to ensure that the verification findings and conclusions are based only on the verification evidence.
 - 6 Evidence-based approach:** the rational method for reaching reliable and reproducible verification conclusions in a systematic verification process. Verification evidence should be verifiable. It will in general be based on samples of the information available, since a verification is conducted during a finite period of time and with finite resources. An appropriate use of sampling should be applied, since this is closely related to the confidence that can be placed in the verification conclusions.

2.7.3 SAS Verification Program Objectives

Program objectives are established to direct the planning and conduct of verifications and should ensure the verification program is implemented effectively. Verification program objectives should be consistent with and support SASC policy and objectives. These objectives should be based on consideration of the following:

- SASC management priorities
- SAS program requirements
- Reinforce leading practices in road salt management
- Needs and expectations of interested parties, including customers
- Verifiee's level of performance, as reflected in the occurrence of failures or incidents or customer complaints
- Risks to the verifiee
- Results of previous verifications
- Level of maturity of the system being verified
- Resource limitations of industry applicators
- Safety requirements of industry and expectations of the general public

Given the above, the verification program objectives are as follows:

- To verify compliance with SASC program requirements
- To obtain and maintain confidence in the capability of SAS-designated operators
- To obtain and maintain confidence in SAS-designated sites
- To determine the effectiveness of the SAS program
- To educate certified parties on leading practices

3 FRAMEWORK

The purpose of a SASC verification is to authenticate that the SAS recommend practices are being effectively implemented to the extent that is suitable for the organization to achieve SASC stated objectives of reducing salt loss and optimizing salt use.

The above purpose statement contains three elements that require further clarification.

- Recommend practices: practice upon which SASC provides training and other guidance
- Effectively implemented: the practices are being properly performed
- Extent suitable for the organization: a recognition of the organization's constraints in implementing practices.

The verification is not to authenticate compliance. Compliance verification is a comprehensive review of an organization's adherence to standards and requirements. Currently, SASC has some requirements but few clear standards. This may be developed in the future. In the meantime, the verification is, by necessity, more subjective. The verifier will need to use judgement to determine if an organization is reducing salt loss and optimizing salt use by effectively implementing enough leading practices.

There are two aspects of the verification program: Facility Owners and Managers (sites) and Contracting Companies (contractors). For each, the following is established:

- Extent of the verification
- Objectives of the verification
- Procedures and verification methods
- Audit criteria
- Resources and qualifications, and
- Communicating result of verification

This section will end with a discussion of the verification program review for both Facility Owners and Managers and Contracting Companies. Figure 2 shows the general verification framework.

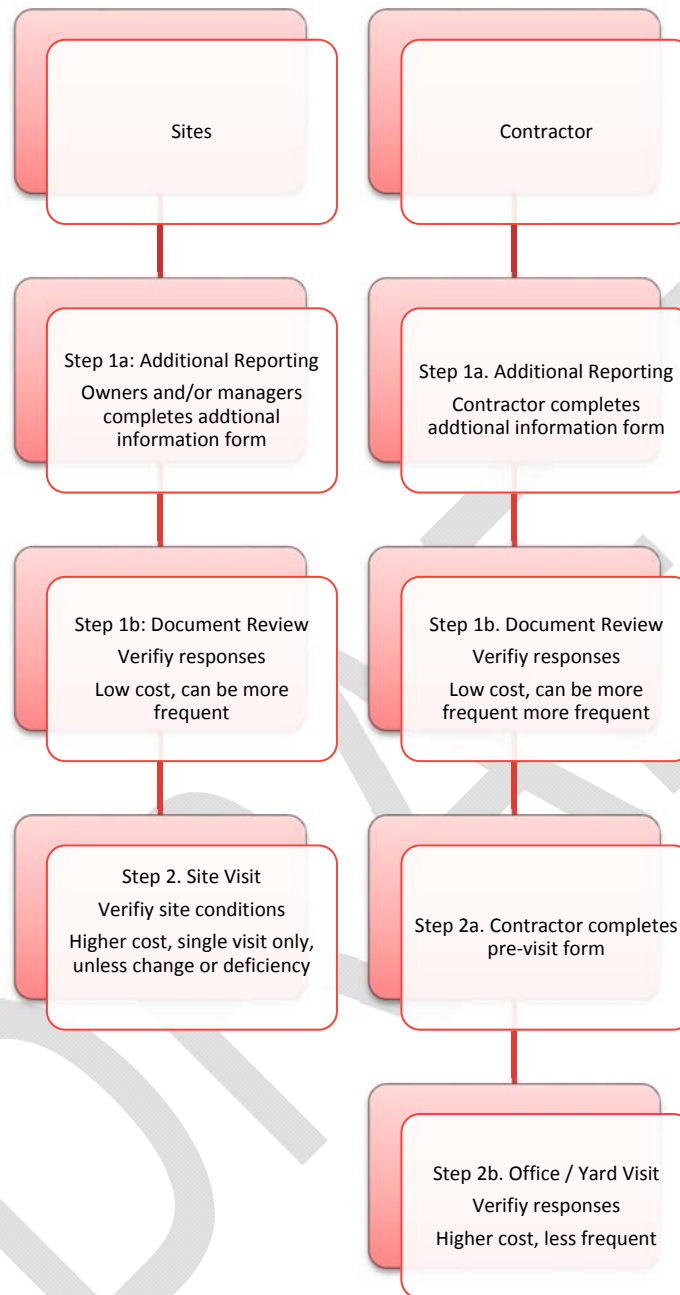


Figure 1. Verification Framework

3.1 SITES

3.1.1 Extent of the Verification

SAS certification is on a property (site) basis. A Certified Site is a property that meets the Smart About Salt criteria for designation. Any verification procedure needs to consider the following:

- 1 Sites are specific geographically-defined parking lot areas comprising sidewalks, pathways, entrances etc.
- 2 Weather events where deicers / anticlers are used can be difficult to reliably predict more than hours ahead.
- 3 Representative / site managers may not be available during weather events.
- 4 The owner representative / site manager may apply some or all of road salt or may not be in direct control of / is directly responsible for snow and ice removal, the Contracting Company may be solely responsible.
- 5 Required SASC documents may not be kept on-site.

The site verification program would be for facility owners and managers and include Document Review and Site Visit.

3.1.2 Objectives of the Verification

The objectives of the verification for the faculty owners and managers are to:

- 1 Verify key information has been obtained and documented as per SASC requirements and procedures
- 2 Verify key information is accurate
- 1 Verify personnel have appropriate training as per SASC requirements documents
- 2 Verify personnel are competent with respect to implementing SASC leading practices
- 3 Verify records are retained as per SAS requirements
- 4 Verify continuous improvement efforts have been made as per SASC requirements
- 5 Identify Opportunities for Improvement (OFI) that can lead to reduce road salt application

All required documents should be part of the verification. Self-reporting and record submission is a common component of road salt management programs. However, companies involved in these programs have expressed difficulty in completing submission documents. This may be either or a combination of:

- Literacy / language proficiency of staff to prepare document
- Time constraints during winter season to prepare and submit information
- Financial burden of preparing documents

Reflecting the above, the organizations contacted for Task 1 reported that documentation and/or data is often incomplete or inaccurate. Therefore, SASC should strive to improve completion of key information in a way that minimises burden to the sites.

The following figure shows the general verification procedures.

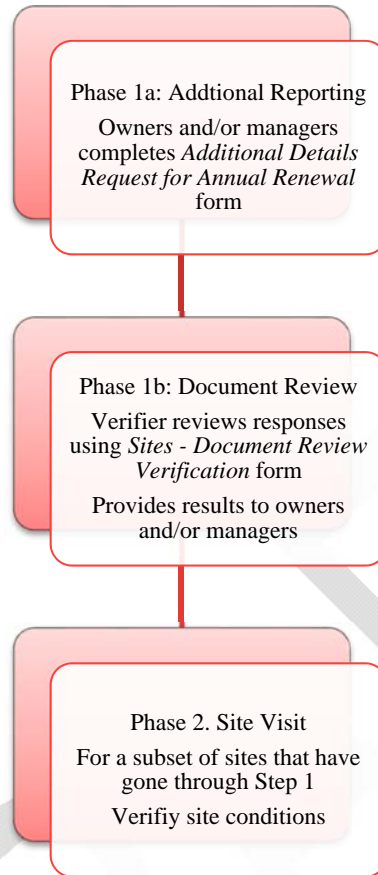


Figure 2. Verification Framework for Sites

3.1.3 Phase 1 - Sites: Verification Procedures for Document Review

The verification can be done regularly on sites as it is a low effort / cost review. It is recommended that records document reviews occur each year for ten percent (10%) of site members, with no more than once every three years for a “passing” site. For sites that “fail” the documentation review, it should be redone the next year.

The document review will:

- Verify key information has been obtained and documented as per SASC requirements and procedures
- Verify personnel have appropriate training as per SASC requirements documents
- Verify records are retained as per SASC requirements
- Verify continuous improvement efforts have been made as per SASC requirements
- Identify Opportunities for Improvement (OFI) that can lead to reduce road salt application

A key component is that the Faculty Owner / Manager explains how they meet the requirements and send supporting document using the Additional Details Request for Annual Renewal form (Appendix B). This provides the basis for the verifier to check that a) the approach is reasonable and b) they are doing what they said they are doing.

STEPS

- 1 SASC will select sites to be verified
- 2 SASC will contact the Faculty Owner/Manager and send the Additional Details Request for Annual Renewal form (Appendix B).
- 3 Phase 1a: Faculty Owner/Manager completes and returns the Additional Details Request for Annual Renewal form
- 4 SASC will contact verifier(s), assign selected sites and provide documents.
- 5 Phase 1b: the Verifier will review the Additional Details Request for Annual Renewal form and supporting documents using the *Sites - Document Review Verification Form* in Appendix B and provide to SASC.
- 6 SASC will review the completed form and discuss any issues with verifier.
- 7 SASC will send the completed form to the Faculty Owner / Manager
- 8 SASC will schedule and lead a telephone discussion with the Faculty Owner / Manager and Verifier to clarify findings. This is not a forum for the Faculty Owner / Manager to argue the findings but to learn what they need to do to improve.

QUALIFICATIONS

The verifier will need to have at least a basic knowledge regarding SASC practices and winter maintenance practices.

3.1.4 Phase 2 - Sites: Verification Procedures for Site Visit

The verification is higher effort / cost. It is recommended that the site visit should be done once for every site following a document review. The site verification should be redone the next year if significant shortcomings were found during the verification. Also, consideration should be given to redoing the site visit if there is a change in the designated person / site ownership.

The following is needed to undertake the site visits:

- The completed Self Assessment – site form
- Presences of designated person
- The completed *Sites – Document Review Verification* form

The site visit will:

- Verify key site information is accurate
- Verify designated person(s) are competent with respect to implementing SASC leading practices
- Verify if an organization is reducing salt loss and optimizing salt use by effectively implementing enough leading practices.
- Identify Opportunities for Improvement (OFI) that can lead to reduce road salt application

STEPS

- 1 SASC will select sites to be visited as a sub-set of the sites selected for Document Review and notify verifiers of selection, and provide documents.
- 2 The Verifier will contact the Faculty Owner/Manager and schedule site meeting, preferably in the fall and if possible during rain so stormwater flow is evident.
- 3 The Verifier will undertake the site visit following the *Sites – Site Visit Verification Form* in Appendix B. and provide to SASC.
- 4 The Verifier will review the conclusions Faculty Owner / Manager and both parties sign the form.
- 5 The Verifier will send the completed form to SASC.



QUALIFICATIONS

The verifier will need to have a sound knowledge regarding SASC practices and winter maintenance practices.

3.2 CONTRACTORS

A Certified Contractor must meet the Smart About Salt Certification Standard and must submit an annual report verifying that they manage their salting operations to reduce the amount of salt they apply, while maintaining the safety of their clients. A Certified Contractor will likely maintain many sites, some of which may be Certified Sites.

The verification program should not include verification of on-site activities during an event for the following reasons:

- Weather events where deicers / anticiers are used can be difficult to reliably predict more than hours ahead. Scheduling verifiers to be on site during winter maintenance activities would be challenging.
- Contractors undertaking winter maintenance would be unlikely to be able to take the time for a review.
- Representative / site managers may not be available during weather events, which means two site visits would be needed to complete the verification.
- One site review would likely not provide sufficient information nor the records needed for a complete verification. Another review at the Contractor’s office / yard would be needed, adding additional burden to the verification process.

Given the above, the verification should occur at the Contractor’s office or works yard, wherever documents and records are kept, equipment is available and staff can be met.

REQUIREMENTS

A Certified Contractor must:

- 1 Submit an annual report certifying that they manage their salting operations to reduce the amount of salt they apply, while maintaining the safety of their clients. Completion of Self-Assessment – Operation Worksheet
- 2 Keep records (i.e., Daily Winter Logs, Site Information Sheets and a Supervisors’ Logs)
- 3 Recording information (e.g., salt applied, application rates for all spreaders, training)
- 4 Meet the Smart About Salt Certification Standard as shown in the Completion of Self-Assessment – Operation Worksheet (Minimum ratings are in Table 1)

Table 2. Activity and Rating Requirements

Activity	Minimum Rating
Entry to Program	
Rating Salt management training	2
Calibration	2
Material application rate	2
Tracking material usage / record keeping	3
Storage (for all applicable materials)	2
First Year	
Rating Salt management training	3
Calibration	3
Material application rate	3
Tracking material usage / record keeping	4
Storage (for all applicable materials)	3

Activity	Minimum Rating
After First Year	
Rating Salt management training	4
Calibration	4
Material application rate	4
Tracking material usage / record keeping	4
Storage (for all applicable materials)	3

OBJECTIVES OF THE VERIFICATION

The objectives of the verification for contractors are to:

- 1 Verify key information has been obtained and documented as per SASC requirements and procedures
- 2 Verify key information is accurate and rating is correct and meets the minimum required
- 3 Verify personnel have appropriate training as per SASC requirements documents
- 4 Verify personnel are competent with respect to implementing SASC leading practices
- 5 Verify records are retained as per SASC requirements
- 6 Verify continuous improvement efforts have been made as per SASC requirements
- 7 Identify Opportunities for Improvement (OFI) that can lead to reduce road salt application

All required documents should be part of the verification. Self-reporting and record submission is a common component of road salt management programs. However, companies involved in these programs have expressed difficulty in completing submission document. This may be either or a combination of:

- Literacy / language proficiency of staff to prepare document
- Time constraints during winter season to prepare and submit information
- Financial burden of preparing documents

Reflecting the above, the organizations contacted for Task 1 reported that documentation and/or data is often incomplete or inaccurate. Therefore, SAS should strive to improve completion of key information in a way that minimises burden to the sites.

A key component is that the Contractor explains how they meet the requirements (and send supporting document for Step 1. Document Review) using the forms in Appendix C. This provides the basis for the verifier to check that a) the approach is reasonable and b) they are doing what they said they are doing.

The following figure shows the verification process for contractors.

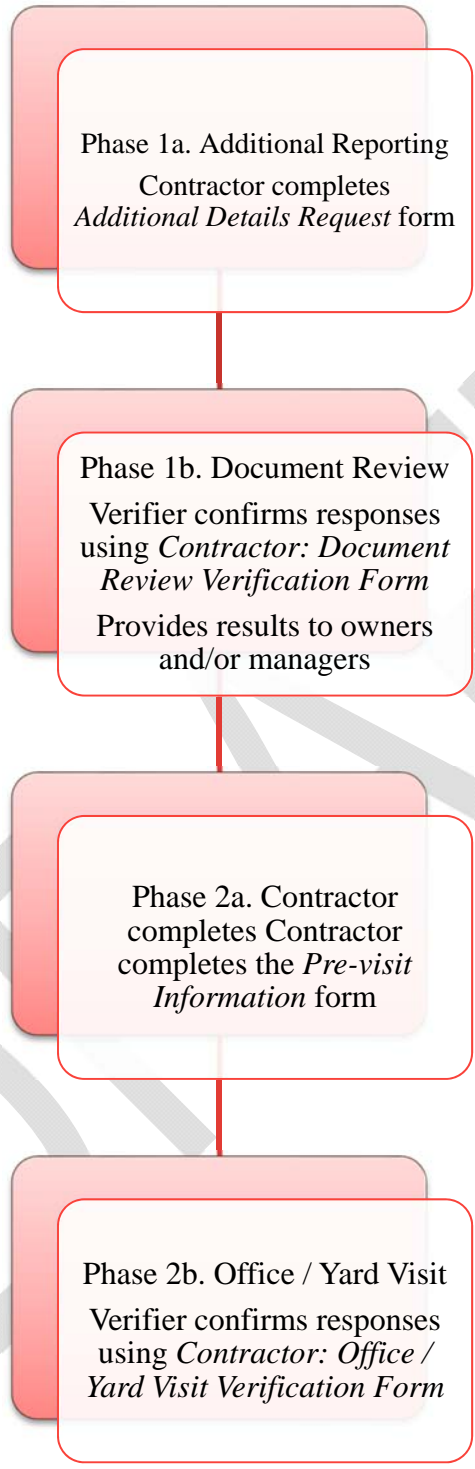


Figure 3. General Verification Process for Contractors

3.2.1 Phase 1: Contractor Verification Procedures for Document Review

A document verification can be done more regularly for contractors as it is a lower effort / cost review. It is recommended that records document reviews occur each year for ten percent (10%) of contractors, with new certified contractors being verified within the first 3 years, and no more than once every three years for any other contractor.

For sites that documentation was found to be insufficient, the contractor should be put on “probation” pending a successful verification the next year.

The document review will:

- Verify required information on Annual Certification Report is accurate
- Verify records are retained as per SASC requirements

STEPS

- 1 SASC will select contractors to be verified
- 2 SASC will contact the selected Contractors and send the *Additional Details Request* form (Appendix C) **NOTE NOT COMPLETED YET).**
- 3 Phase 1a: the Contractor completes and returns the *Additional Details Request* form
- 4 SASC will contact verifier(s), assign selected sites and provide documents.
- 5 Phase 1b: The Verifier will review the completed *Additional Details Request* form using the *Contractor: Document Review Verification Form* in Appendix C and provide to SASC.
- 6 SASC will review the completed form and discuss any issues with verifier.
- 7 SASC will send the completed form to the Faculty Owner / Manager.
- 8 SASC will schedule and lead a telephone discussion, if needed, with the Contractor and Verifier to clarify findings. This telephone call is not for the Verifier to justify the findings, or for the Contractor to argue the findings. The call is for the Contractor to clarify what needs to be done to become compliant.

QUALIFICATIONS

The verifier will need to have an advanced knowledge regarding SASC practices and winter maintenance practices.

3.2.2 Contractor: Verification Procedures for Office / Yard Visit

The verification is high effort / cost. It is recommended that the yard / office visit should be done for 50% of contractors who have had the documentation review, focusing on poor performers.

For sites where the office / yard verification was found to have significant short comings, the verification should be redone the next year.

If creditable and consistent complaints are received regarding excessive salt use, the Contractor should be included in the yearly verification.

The following documents / records / information will be reviewed during the site visit and need to be available:

- Self Assessment – contractor
- Training Records for supervisors and employees and sub-contractors
- Daily Winter Log (s)
- Other records of salt applied at each site

Site Survey Sheet / Site Information Sheet and Supervisors’ Log are mentioned in the the Annual Certification Report but not in the Guide and are not included in the verification as there is no criteria in which to review against.



The visit will:

- Verify that the information reported and the assertions made are correct
- Verify personnel have appropriate training as per SASC requirements documents
- Verify records are retained as per SASC requirements
- Verify continuous improvement efforts have been made as per SASC requirements
- Identify Opportunities for Improvement (OFI) that can lead to reduce road salt application

The visits will require the Verifier to use best judgement in determining compliance.

STEPS

- 1 SASC will select and notify Contractors to be verified and provide the *Pre-Visit Information* form (Appendix C)
- 2 Phase 2a: the Contractor completes and returns the *Pre-Visit Information* form
- 3 **NOTE THE FORM IS NOT YET COMPLETED BUT WILL INCLUDE REQUIREING ACCESS TO:**
 - a Documents to be reviewed
 - i Equipment Calibration records
 - ii Application rates
 - iii Daily Winter Log Sheet for week selected by SASC
 - b Winter Maintenance Equipment (plows, spreaders, etc.)
 - c Facilities: Salt Storage
 - d Staff
 - i Supervisors,
 - ii The person who completes the annual compliance reports,
 - iii Person(s) who knows where records are kept.
- 4 SASC will contact verifier(s), assign selected contractors and provide completed *Pre-Visit Information* form.
- 5 The Verifier will contact the Contractor and schedule site meetings, preferably prior to the winter season.
- 6 The Verifier will conduct the on-site verification using the *Contractor: Office Yard Visit Verification Form* in Appendix C (**NOTE NOT COMPLETED YET**).
- 7 The Verifier will review the conclusions with the Contractor, and both parties sign the form
- 8 The Verifier will send the completed form to SASC.

QUALIFICATIONS

The verifier will need to have an advanced knowledge regarding SAS practices and winter maintenance practices.

4 RECOMMENDATIONS

The following are recommendations for SASC to facility verification with respect to the SASC stated goals and desires:

- Recommendation 1. Include reporting of all anti-icing/de-icing products used into the Annual Certification Report for contractors so it can be verified.*
- Recommendation 2. Include requiring sites to have a complaints protocol (SASC can provide template) and require reporting in the Annual Certification Report.*
- Recommendation 3. Include requiring Contractors to have a complaints response protocol (SASC can provide template) and require reporting in the Annual Certification Report.*
- Recommendation 4. Have site managers / staff be part of a monitoring program. Staff can record conditions and salt application. The latter can be done using a standard area (like a hula hoop) and photograph. The amount of salt applied can be qualitatively determine via comparison to a standard photograph. The photographs should be included in the Annual Certification Report. Protocol to be added to Site Designation Guide.*



Figure 4. Standard Area (hula hoop) Photo

- Recommendation 5. Revise Application for Certification and Annual Renewal form to include a clause that Faculty Owners and Managers are required to provide information as requested for verification.*
- Recommendation 6. Self-Assessment – site form should be revised to include date when last updated*
- Recommendation 7. SASC should determine what constitutes a “fail” with respect to the Document Review*
- Recommendation 8. SASC should determine a dispute resolution mechanism for verification results*
- Recommendation 9. Revise Application for Certification and Annual Renewal form to include questions regarding if the Faculty Owners and Managers apply salt themselves and to what extent.*
- Recommendation 10. Develop a Site Verification Notification form to send to Faculty Owners and Managers.*
- Recommendation 11. Revise Application for Certification and Annual Renewal form to include a clause that Faculty Owners and Managers are required to participate in the site visit.*
- Recommendation 12. SASC should determine what constitutes a “fail” with respect to the site visit.*
- Recommendation 13. SASC should develop a complaints process for sites.*



- Recommendation 14. Certified sites should have a sign / notice at entrance that includes: SASC Certified Site designation, site identifier, and notice that complaints for excessive salt use can be made by taking a picture of sign and texting it to the number shown.*
- Recommendation 15. Develop a Verification Information Request form to send to Contractors*
- Recommendation 16. Revise Application for Certification and Annual Renewal form to include a clause that Contractors are required to provide information as requested for verification.*
- Recommendation 17. Self-Assessment – contractors form should be revised to include date when last updated*
- Recommendation 18. SASC should determine what constitutes a “fail” with respect to the Document Review*
- Recommendation 19. SASC should determine a dispute resolution mechanism for verification results*
- Recommendation 20. For contractors that documentation was found to be insufficient, SAC should have a “probation” status pending a successful verification the next year.*
- Recommendation 21. For contractors, the Application for Certification and Annual Renewal form should be revised to be a table. The table should ask for the following information for each site the contractor services: total salt used (if known), total area serviced, number of winter events, and average application rate*
- Recommendation 22. If documentation verification for Contractors is found to be insufficient, SAC should have a “probation” status / process pending a successful verification the next year.*
- Recommendation 23. Develop a spread sheet that, for each site, has area and events for each site that the contractor can use.*
- Recommendation 24. Develop a Site Verification Notification form to send to Faculty Owners and Managers*
- Recommendation 25. Revise Application for Certification and Annual Renewal form to include a clause that Faculty Owners and Managers are required to provide information as requested for verification.*
- Recommendation 26. SASC should determine what constitutes a “fail” with respect to the contractor’s office / yard visit*
- Recommendation 27. SASC should determine a dispute resolution mechanism for verification results*
- Recommendation 28. SASC should develop a requirement for developing or a complaints process for contractors (form could be developed by SASC).*



APPENDIX A – REFERENCE DOCUMENT DETAILS

Requirement Documents and Possible Verification Criteria

1. Guide to Smart About Salt Designation – Site and Self-Assessment – Site Worksheet
2. Application for Certification Annual Renewal Smart About Salt Certified Site
3. Guide to Smart About Salt Designation – Contractor and Self-Assessment –Worksheet
4. Application for Certification and Annual Renewal Smart About Salt Certified Site

Leading Practices Documents

- Essentials of Salt Management Training / Workbook
- Snow Operations Risk Management Guide



REQUIREMENT DOCUMENTS AND POSSIBLE VERIFICATION CRITERIA

APPLICATION FOR CERTIFICATION AND ANNUAL RENEWAL SMART ABOUT SALT CERTIFIED SITE

- 1 Declaration statement
 - i Criteria: completed plus signed and dated
- 2 Training and Record Keeping
 - i Criteria: are site “operators” trained in best salt management practices that is consistent with the Smart About Salt learning goals
 - ii Criteria: contractors that apply salt on our site are trained in Smart About Salt
 - iii Criteria: Our clients and employees are aware that our facility is a Smart About Salt Certified Site.
 - iv Criteria: Records of salt applications are kept

GUIDE TO SMART ABOUT SALT DESIGNATION – SITE AND SELF-ASSESSMENT – SITE WORKSHEET

- 1 Site Map
 - a Criteria: Confirm map includes the features listed. Evidence: Map / onsite review
- 2 Identifying Problem and Priority Areas
 - a Criteria: Confirm problem and priority areas identified. Evidence: Map / onsite review
- 3 Identifying Low Traffic Areas
 - a Criteria: Confirm Low Traffic Areas. Evidence: Map / onsite review
- 4 Developing Solutions
 - a Criteria: INTENT BASED – Have reasonable attempt made to address problem and priority areas identified
 - Eliminate or reduce sources of water
 - Improve control of drifting snow
 - Restrict access to, or close low use areas
 - Adjusting the drainage pattern of a parking lot to reduce the amount of melt water that flows over driving and pedestrian areas.
 - Removing obstacles to improve snow plowing and site drainage
 - Incorporating anti-icing and liquid application techniques into your snow and ice control toolbox.
- 5 Determine Your Goals and Action Plans:
 - a Criteria: Action Plans tied to solutions and problem and priority areas and includes target year
- 6 Application for Certification and Annual Renewal
 - a Criteria: confirm that form is complete – see below for details

CONTRACTOR DESIGNATION GUIDE AND SELF-ASSESSMENT – OPERATION WORKSHEET

- 1 Determine Your Goals and Action Plans
 - a Criteria: Confirmation on evaluation level (see below)
 - b Criteria: identify future goals, a target years for items with a score less than four. For items rated words a 4 Action Plan to maintain level.
- 2 Complete the Application for Designation
 - i Completed your *Self-Assessment – Operation Worksheet*;
 - ii To get into the program you must achieved the following minimum ratings (see below)
 - iii Complete the Application for Designation – Smart About Salt Certified Contracting Company including the Declaration section



- iv Complete the Annual Certification Report (see below for specific requirements)
 - (1) Company Information
 - (2) Complete the Salt Use Summary
 - (3) Complete the Self-Assessment Summary.
 - (4) Complete the Certification Compliance Report (bottom of page 2)
 - (a) Complete the Training section
 - (i) Criteria: show system in place for salt management training.
 - (ii) Criteria: Supervisors must be trained in Salt Management (successful completion of the Smart About Salt Operator Training Course is sufficient).
 - (b) Complete the Record Keeping section:
 - (i) Criteria: demonstrate use of logs consistent with Landscape Ontario’s Daily Winter Log
 - (ii) Criteria: salt use data is captured by event and location.
 - (iii) Criteria: example of record keeping form(s) must be attached to application.
 - (c) Complete the Calculating Areas and Amounts section:
 - (i) Criteria: demonstrate calculating site areas,
 - (ii) Criteria: demonstrate application rates are know / determined
 - (d) Criteria: demonstrate equipment calibration
 - (e) Criteria: Declaration.
- 3 Submit the Application for Designation
 - a Criteria 1: confirm submission
- 4 Review of the Application for Designation
 - a Internal SASC activity – no verification

APPLICATION FOR CERTIFICATION AND ANNUAL RENEWAL

- 1 Declaration statement
 - i Criteria: completes
 - ii Criteria: signed and dated
- 2 Salt Use Summary
 - a Total Area Serviced
 - i Criteria: Paved Areas measurement is accurate
 - ii Criteria: Walkways areas measurement is accurate
 - b Total Salt Used
 - i Criteria: Seasonal total salt used weight is accurate reported
 - ii Criteria: Number of winter events is accurate reported
 - iii Criteria: Average Application Rate is accurately calculated
 - c Total Area Serviced
 - i Criteria: Paved Areas measurement is accurate
 - ii Criteria: Walkways areas measurement is accurate
- 3 Self-Assessment Summary

Practice	N/A	Rating (based on the information in the Smart About Salt Training manuals)	
		Current	Target / Year
Equipment Calibration	Criteria: Confirm NA	Criteria: For each practice, there is a clear rationale for the criteria against the description. In the <i>Self-Assessment</i> -	Criteria: Confirm if should be done
Material Application Rates			
Material Usage Record			
Use of Liquid Materials			
Use of Low or Non-chloride Materials			
Winter Season Salt Storage			
Liquid Storage			



Material Storage over Summer		<i>Operation Worksheet</i>	
Plowing Operations			
Salt Management Training		Notes: Also confirm from pervious year	

4 Certification Compliance Report

a Training

- i Criteria: Demonstrate internal salt management training program
- ii Criteria: Demonstrate training program is consistent with the Smart About Salt learning goals
- iii Criteria: Demonstrate reported number of employees and subcontractors that apply salt in your operations is accurate
- iv Criteria: Demonstrate reported number of employees and subcontractors that have completed Smart About Salt Training is accurate
- v Criteria: Demonstrate reported number of employees and subcontractors that have completed internal training is accurate

LEADING PRACTICES DOCUMENTS

ESSENTIALS OF SALT MANAGEMENT TRAINING / WORKBOOK

Weather

- Air Temperature
- Cloud Cover
 - The amount of cloud cover affects many things including air and pavement temperatures and the amount of precipitation
- Precipitation
 - The timing, path and intensity of precipitation can be monitored using radar.
- Dewpoint Temperature
 - Potential source of moisture (and ice) even on clear days
- Barometric Pressure
 - Changes in barometric pressure signal when fronts and high and low-pressure systems move in and out.
 - A rise in pressure generally signals improving weather
 - A drop-in pressure generally signals poor weather coming
- Winds (speed and direction)
 - Just like barometric pressure, a change in wind direction can indicate when a storm is coming or ending
 - Winds (above 15 km/hr or 9 m/hr) can also produce drifting, a real problem even between storm events
- Visibility
 - Poor visibility is not only hazardous for drivers but for snow plow operators as well
 - Poor visibility can indicate that a storm is approaching or intensifying or that the winds have picked up and drifting has become an issue
- Pavement Temperature
 - Salt is less effective at colder temperatures



- Ice also tends to form first on bridges and in low-lying areas

Mechanical Snow Removal

- Shovel or plow first

The 5 R's of Salt Management

1. Right Material
 - a. Do you require an abrasive material (e.g. sand) for traction?
 - b. Do you need to melt ice with a chemical?
 - c. Is there a correct chemical for the job?
 - d. What form and size of the chemical is right for the conditions?
2. Right Time
 - a. Reactive: Break the ice/pavement bond
 - b. Proactive: Prevent the ice/pavement bond
3. Right Amount
 - a. Factors affecting where to place material:
 - Pavement temperature(s)
 - Snow accumulation (don't apply salt to melt snow; plow and shovel first!)
 - Desired level of service
 - Time required to level of service
 - Material being used
4. Right Place
 - a. Under the snow...not on it!
 - b. Factors affecting where to place material:
 - Precipitation type
 - Surface type
 - Pedestrian/traffic flow
 - i. Facility type and location
 - c. Placement techniques:
 - Spot-treating: Apply to icy areas
 - Broadcasting: Spread over the entire surface
 - Windrowing: Spread on high spots, brine flows to low spots
5. Retain It
 - To Work Salt needs time to work
 - Do not plow/shovel too soon
 - Pre-wet to activate the salt so it will work faster Material Advantage

Liquids

- Pre-mixing (liquid added to the salt or sand stockpile) – lesser preferred



- Pre-wetting (liquid added to the salt or sand at the spinner)
- Anti-icing (liquid applied directly to bare surface)
- When to use DLA: First in a series of strategies Prior to forecasted event During times when traffic and parking lot use is low When pavement temperatures are at or above -6C (21F) for Sodium Chloride brine) can be colder for enhanced brines Prior to frost, light sleet and light or moderate snow events (<2.5 cm/ hr or 1 in/hr)
- When not to sue DLA: Prior to forecasted rain or freezing rain event When snow is blowing and drifting When pavement temperatures are colder than -6C (21F) (Sodium Chloride brine) When pavement temperature is predicted to drop sharply
- De-icing (liquid applied to snow or ice)
- Different Liquid Materials (Salt Brine (Sodium Chloride) (23.3%), Magnesium Chloride (various concentrations), Calcium Chloride (36.0%), Sugar beets (exclusively mixed with salt brine), Corn (mixed with Magnesium Chloride)

Calibration

- What to Calibrate
- types of equipment that should be calibrated:
- Application Rate Formula for Calibration
- Solid material: $\text{weight/test area} = \text{application rate}$
- Liquid material: $\text{volume/test area} = \text{application rate}$
- When to Calibrate
- Beginning of the Season: The calibration of all equipment should be checked and verified at least annually, usually in the fall before the winter season starts
- During the Season: Calibration should be part of the regular maintenance routine for equipment
- After Service: Whenever the equipment requires service you will need to recalibrate
- Calibration Records

Application Rates

- Using Multiple Application Rates

Materials Storage and Handling

- Salt Handling Procedures
- Monitor deliveries and get the salt undercover quickly
- Carefully load spreaders
- Clean-up spills immediately
- Manage wash water
- Don't overload loaders or spreaders
- Spread only what is needed
- Return extra storage
- Salt Storage – Solid Material
- Impermeable floor
- Roof or cover to keep salt dry
- Located away from drainage
- Properly sized and oriented to protect stored salt from elements (wind, rain, snow)
- Easy access for equipment



- Salt Storage – Liquid Material
- Use secondary containment: Double-walled tanks / External containment Minimum 100% capacity
- Bollards around tank
- Labelled contents
- Tamper proof
- Locks on nozzles
- Locate away from wells, catch basins and surface water
- Good Housekeeping Practices
- Keep salt dry
- Clean up spills
- Conduct regular storage inspections
- Repair any damage
- Use the oldest bags of salt first (to keep them from getting hard)

Risk Management and Record Keeping

- Keeping Good Records

Site Assessment

- Assessing the Site
- Identify service area(s) + locations that will be closed
- Calculate area to be serviced
- Identify/fix drainage issues
- Identify/fix drifting problems
- Identify/fix snow storage areas
- Prepare/approve a site plan
- Creating a Site Plan that includes
 - Areas to be serviced
 - Salt/environmentally sensitive areas
 - Emergency exits
 - Walkways, doorways
 - Snow storage location(s)
 - Hazard areas (man-made vs. natural ice)
- Estimate Material Needed Per Site Visit Material Needed
- Calculate Site Area

SNOW OPERATIONS RISK MANAGEMENT GUIDE

Site Preparation / Inspection and Snow Maintenance On-site

- Site map prepared with client and included in contract.
- Contract includes clearly stated expectations such as:
 - Maintenance triggers
 - Snow / ice accumulations
 - Time to respond
 - Response times

- Service areas
- Snow removal around parked vehicles
- Snow storage areas
- De-icing materials & application rates
- Contract includes site map and identifies:
 - Areas to be serviced
 - Priority service areas
 - Walkways
 - Entrances / exits
 - Accessible parking stalls / ramps
 - Loading zones
 - Secondary service areas
 - Areas not to be serviced
 - Areas that can be closed off (areas of low traffic, that have poor surface quality or any area agreed upon with the client and contractor)
 - Snow storage areas identified and calculated¹
 - Salt vulnerable features and/or plants
 - Areas where ice may build or snow may accumulate based on previous winter maintenance observations at site and including snow fences
- Items of concern
 - Uneven surfaces
 - Areas with poor drainage / ponding issues
 - Downspouts discharging onto walkways
- Contract includes verbiage that informs client that liability cannot be assumed for slip, trip and fall incidents in areas where hazards have been previously identified (e.g. areas with poor drainage, ponding, downspouts discharging onto walkways, uneven surfaces, etc.
- Contract covers requirement for signage on-site warning persons of potential slippery conditions (e.g. “Slippery Conditions May Exist”).
- Record keeping requirements²
- Logs completed before departing site recording*:
 - Location
 - time (start / finish)
 - date
 - extent of work (services performed)
 - pavement condition
 - weather observations (type, amount)
 - temperature
 - type and amount of material (e.g. de-icer, sand) used, or;
- GPS on all vehicles / equipment that record the above¹
- Catch basins clear so surface run off does not freeze
- Snow stored in areas where adequate drainage is provided so that surface run-off will not drain into parking / walking areas resulting ice formation creating slippery areas and the need for additional salting



- Clear (e.g. plow, blow, brush, shovel) new snow
- Site measurements & salt / de-icer discharge rates calculated²
- Downspouts discharging onto walkways / serviced areas are identified / addressed prior to winter season accumulations prior to any de-icing application (i.e. no burning off 2 inches of fresh snow) (SIMA)
- Prevent snow & ice from bonding to driving and walking surfaces. Prioritize anti-icing techniques as a standard practice. (SIMA)
- Spot treat problem areas (e.g. north facing areas) (SIMA)
- Keep salt covered (i.e. tarps, lids, covers) to protect from moisture and potential spillage during applications (sidewalks, lots, roads, etc.), and during transport between sites. (SIMA)
- Snow fences in place as required (maintained)

De-Icer / Salt Application Rates

- Application rates established based on Smart About Salt Winter Salt Management Program – Core Accreditation Standards – Material Application Rates Protocol¹ & 2
- Salt documentation forms include salt output estimates per application (SIMA)
- All application equipment operators trained on company policies and general salt/ice management techniques (e.g. Smart About Salt) (SIMA)
- Verify that any site where salt will be applied is not listed as a salt-sensitive area or zone by local, provincial or federal regulations. (SIMA)
- Manage a defined ice monitoring process (e.g. “ice watch”) to ensure proactive and effective spot treatment (SIMA)
- Optimize salt use with techniques such as blending and pre-treating, to accelerate de-icing and/or lower the effective temperature of salt. (SIMA)
- Anti-icing process defined in a snow response plan and implemented as a standard operating procedure. Training includes specific weather scenarios where anti-icing may be ineffective (e.g. heavy rain, temperature, etc.) (SIMA)
- Blended or pre-treated salt (solid) used for pre-storm applications to prevent bonding of snow and ice in acceptable conditions. (SIMA)
- Technology utilized to accurately automate the process of tracking and reporting salt application data³ (SIMA – Level 2)
- Standardized process to measure salt output by site, portfolio of sites, and per storm (per site). (SIMA – Level 2)
- Salt brine (NaCL, MGCL, CaCL, etc.) or other liquid de-icer used as an efficiency strategy for direct liquid anti-icing of paved surfaces and for prewetting solid salts (SIMA – Level 2)
- Pre-service audit conducted of salt brine quality, checking for salt concentration accuracy and any agitation / mixing needs. (SIMA – Level 2)

Equipment Calibration / Verification

- Equipment calibration / verification based on Smart About Salt Winter Salt Management Program – Core Accreditation Standards – Winter Material Spreader Calibration Protocol¹
- Standardize spreader/sprayer application rates across equipment types. Calibrate application rates for minimum required salt output based on weather variables (surfaces temperature, moisture, etc.) (SIMA)
- Established calibration process for all salt application equipment (solid and liquid) takes into account flow settings, (gates, valve/nozzles, etc.), conveyor/auger and spinner speeds, ground speed, and material (size/density, etc.) (SIMA)



- Settings, rates, and maximum salt output per site documented in all operations manuals and site binders. Information incorporated into preseason training programs (SIMA)
- Calibrate equipment in the preseason, mid-season, and any time changes are made to the equipment (e.g. repair) or a significant change is made to the material (e.g. fines, (size/grade) pre-treatment, etc.) (SIMA)

Material Usage Tracking (Smart About Salt)

- Amount of material used is tracked by following Smart About Salt Winter Salt Management Program – Core Accreditation Standards – Material Usage Tracking Protocol¹, as follows:
- Using Site Map, calculate the total area of walkways and paved areas that need to be serviced considering parking lots, private sidewalks, municipal sidewalks, and gravel surfaced areas (if any).
- Calculate Amount of Salt to be Applied at the Site² using application rates developed in Protocol 2 (light, medium and heavy) and multiply by the areas measured from BP above). This will give an estimated salt usage per application.
- Calculate yearly amount of salt to be applied.³ Using average area snowfalls and snowfall amounts obtained from various sources (e.g. internet) and the amount of salt required at each site (see BP above) calculate how much material required for the site in one year.
- Complete application tracking sheet for each storm event. Site conditions and amount of material used recorded each time operators on site.
- Train your staff on how to track their salt usage.
- Monitor Salt Application – verify for human error. Since some crews will apply more material than others, inquire why there is more or less applied. This verification should be performed at regular intervals (e.g. following storms, monthly, end of season).
- Re-evaluate – Each year will be different. Compare numbers and use results as a basis for upcoming years.

On-Site Snow Storage / Dumping Areas

- Snow storage locations pre-determined and recorded on site plan (included in contract with client).
- Snow storage areas calculated¹
- Off-site snow storage / dumping areas predetermined in the event that on-site snow storage areas are at capacity²
- Approved off-site snow storage sites used³
- Signage provided on large snow piles stating “Danger – Do Not Enter” or similar.
- On-site snow storage / dumping areas located in areas where there is adequate drainage so that surface run-off will not drain into parking / walking areas resulting in ice formation creating slippery areas and the need for additional salting
- Snow storage areas cordoned off before leaving site.
- Snow does not block drains
- Salt not used to aid in melting of snow piles
- Where possible, snow stored in areas where sun promotes rapid melting

Off-Site Snow Storage Disposal Sites

- Dumping sites approved by local municipality are designated and used

Property Damage or Slip, Trip, Fall / Incident Management

- Record of all slip, trip, fall incidents
- All incidents and losses are reported
- Motorist complaints investigated as near misses / incidents



- Signage provided on site informing persons that “Slippery Conditions May Exist”.

Bulk Salt Purchasing

- none

Bulk Salt Loading / Storage / Transport

- Salt stored on pads of impermeable asphalt or concrete
- Site drainage directed away from stored materials to keep stockpiles as dry as possible.1
- Drainage that is contaminated should be directed to a waste water treatment plant, collected and used for brine production, or sent for proper disposal
- Bagged materials are stored securely and indoors if possible
- Loading areas where spreaders are loaded from the storage pile are impermeable asphalt or concrete pads.
- Spreaders not overloaded so that material spills off the vehicle
- Spilled salt in the yard / loading area promptly collected and returned to the storage pile
- Spreaders / salt laden vehicles should only be washed in a location where the wash-water is properly managed (see BP 3 above)
- Liquid storage tanks designed so that a plumbing failure will not result in release of the contents.
- Liquid storage tanks protected from vehicle impact
- Liquid storage tanks provided with secondary spill containment.
- Keep a minimum of five average events worth of material on hand during the season. (SIMA)
- Bulk material tightly covered during transport, following all local and provincial regulations for securing and covering loads. (SIMA)
- Monitor salt inventory weekly for quality control (integrity of storage, leaching, etc.), post storm for inventory management. (SIMA)

Vehicle Inspection

- Vehicle checklist forms utilized and up to date (trip/daily log) – includes spreader / applicator
- Vehicle in condition to operate (i.e. weather)

Vehicle / Equipment Maintenance

- Drivers training to perform pre-trip and post-trip inspections and report deficiencies
- Timely repairs of deficiencies
- Written records of service

Operator Selection Criteria

- Staff are certified for the work they are performing

Driver / Operator / Employee Manual

- General operating procedures
- Regular training and awareness sessions

Driver / Operator Training

- Training program documented with records maintained
- Training materials regularly updated (at least annually) to stay current with changing regulations and technologies
- Training includes
- snow maintenance operations on-site,



- salt management (i.e. Smart About Salt)
- accident reporting,
- log book compliance
- Emergency response training mandatory for all employees
- Mentoring program in place and encouraged by senior management
- Structured, written curriculum using qualified instructors
- Comprehensive test at the conclusion of training that aspires mastery not just a passing grade

Record Keeping & Legal Review

- Formal written Document Management system
- Records (data, decisions, change orders, quality control, etc.) are required to be kept for a predetermined length of time

Complaint Handling

- Written procedure for handling Claims and Complaints



APPENDIX B – SITES: DOCUMENT REVIEW AND SITE VISIT VERIFICATION FORMS

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APPENDIX C – CONTRACTOR: DOCUMENT REVIEW AND OFFICE / YARD VERIFICATION FORMS

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