Quality Assurance Manual

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1467 Spitfire Place, Port Coquitlam, BC V3C 6L4

Phone: 1.866.574.5100

Website: www.nee.ca

National Energy Equipment Inc. Authorization

Authored by:

Name:	Zanyar Farhadi / Roaa Hameed
Title:	National Quality Systems Manager / National Administrator
Phone:	(778) 588 7739 / (778) 588 7635
Email address:	zfarhadi@nee.ca / rhameed@nee.ca

Authorized by Measurement Canada to perform volumetric device inspections pursuant to the Weight and Measures Act and Regulations, National Energy Equipment serves customers across Canada in the upstream and downstream liquid hydrocarbon measurement industry.

NEEI - A0023

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Quality Management System

Authorization Signature

National Energy Equipment Inc.'s National Quality System Manager ensures the quality system meets the requirements of the ISO 9001:2015 and Measurement Canada's S-A-01:2017 standard.

In this manual anywhere mentioned S-A-01, it means S-A-01:2017 or the most current version. Also in this manual anywhere mentioned ISO 9001, it means ISO 9001:2015 or the most current version.

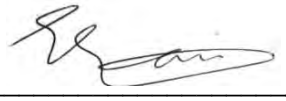
National Energy Equipment Inc.

Authorization

Approved by:

Name: ***Zanyar Farhadi***

Title: ***National Quality Systems Manager***

Signature: 

Date MM/DD/YYYY ***October / 10 / 2018***

Executive officer's Quality Policy Statement

This Quality Assurance Manual defines National Energy Equipment Inc.'s policies and objectives regarding the application of the principles of controlled Quality Assurance Program to ensure that all services rendered by the company are of the required quality, and comply fully with the customer's and Measurement Canada's stated requirements and expectations.

The Quality Assurance Program, as documented and implemented, is intended to comply fully with the requirements of Measurement Canada's S-A-01:2017 or its current version and the Weights and Measures Act and Regulations. NEEI is also committed to continuously improve the effectiveness of the Quality Assurance Program which provides a framework for measuring and refining our performance.

The content of this Quality Assurance Manual and supporting documents are applicable to all Accreditation Department's employees, and shall be observed and implemented by all personnel as applicable to their activities. No deviation is permitted without express permission of the Executive Officer and Measurement Canada.

The Quality Assurance Manual is hereby vested with full responsibility for the proper and timely implementation of the Quality System, together with the appropriate level of authority for ensuring its continuing effectiveness.

Zanyar Farhadi
Executive Officer/National Quality System Manager
National Energy Equipment Inc.

Executive officer's Quality Objectives

National Energy Equipment Inc.'s quality policy, objectives and commitment to quality are defined in the Executive Officer's Quality Policy Statement. The policy and the means of implementation are advised to all personnel of Accreditation Department by electronically publishing the Quality Assurance Manual, communication on quality matters by the Executive Officer and by induction routines mandated for new employees.

National Energy Equipment Inc. is committed to the development, implementation, and maintenance of a controlled quality system. NEEI is fully committed to recognize and comply with Measurement Canada's S-A-01: 2017 stated requirements and expectations. Also, NEEI shall uphold accreditation to perform in house and in field inspections in pursuant to the Weights and Measures Act and Regulations and to meet our goal of continuous improvement.

We are committed to meet the needs and expectations of our customers at all times. Our established Quality Objectives that shall be reviewed during management review are:

a) Understand the requirements of the customers and Measurement Canada.
b) Understand quality and reliability as our first priority in all examination /calibration results.
c) Ensure all staff understand the purpose of the management system related to quality.
d) Provide the best of services in order to meet the customers' needs and expectations.
e) Provide consistently accurate and reliable inspection result.
f) Provide continually training to our employees to enhance their skills, knowledge and technical competency.
g) Conduct regular audit of our internal processes.
h) Instill a need for continual improvement in everything we do.

These quality objectives are endorsed by:

Zanyar Farhadi
Executive Officer/National Quality System Manager
National Energy Equipment Inc.

Revisions Table

This document will continue to be periodically reviewed by the National Accreditation Department of National Energy Equipment Inc. to ensure its effectiveness with respect to its objectives.

Date	Revision	Section	Nature of Revision or Additions
2016-03-01	1	All sections	First Issue
2016-06-06	2	- Part2: QPM3 - Part2: QPM4	- Added NEE 06-Volumetric Prover checklist as required form, and corrected LOE's to 75%. - Added NEE 06-Volumetric Prover checklist as required form.
2017-08-21	3	- All sections	- All sections generally revised based on new requirements. - All QAM revision numbers changed to Rev 03 and specific issue date once approved by MC referencing Measurement Canada's standard's S-A-01:2016 and its guide - Added Measurement Representative definition and weight and measures organization definition in the definitions section - Edited point c and h with S-A-01:2016 section 3.2.1 point b & l. - Added point n, o, s,u,x from S-A-01:2016 at the end of section 3.0 (Responsibilities) as o, p, q, r, s consecutively. - Sections 4.2.2, 4.2.4, 6.2.2, 7.5.3, 7.6 and 8.2 modified editorial according to S-A-01:2016 guide - Edited last paragraph of section 4.2.4 , to include S-A-01: 2016 requirements - Added information to the end from S-A-01:2016 guide into sections 6.2.2 and 7.5.3 - Editorial modified for better coherence. And removed section "Forms" of QPM-01 to QPM-05 - Replaced measurement Canada Seizures with Measurement Canada Enforcement policy in QPM 06 - Updated all QPM regarding S-A-01:2016 guide and modified editorial for better coherence - Replaced forms NEE-07 with Inspection tool (Pit calibration use) in part 3 - Replaced forms NEE-08 with Inspection tool (Fuel use) in part 3 - Replaced forms NEE-15 with customer survey form in part 3
2018-09-07	4	All sections	- All sections generally revised based on the new revisions of S-A-01:2017 and ISO 9001:2015.
2018-09-25	5	- 4.4.1 - 5.3.1 - 7.2, 7.3 - 8.4,8.6 - 9.1 - 10	- Revised base on the Measurement Canada's Doc Review Report dated 2018-09-21 by Darryl Kuby.
2018-10-10	5.1	- 4.4, 5.1, 7.2, 7.5, 8.5,	- Revised base on the Measurement Canada's Doc Review Report dated 2018-10-10 by Darryl Kuby.

Introduction

National Energy Equipment, Inc. (NEEI), a British Columbia owned company, prides itself on delivering the highest quality and best value to our Customers. This philosophy has helped NEEI grow into the largest distributor of energy equipment products in Canada providing service from Vancouver Island to Newfoundland.

The joint resources of all branches across Canada and a culture of operational excellence, combine to create 250 million Industrial Distribution and Service Company with full range of world class product lines. A vast network of resources and industry professionals deliver business solutions that optimize performance and control cost in the industrial, bulk wholesales, transportation, commercial and retail sectors.

With over 60 years experience and Measurement Canada certification as an Authorized Service Provider (ASP) since 2004, National Energy Equipment Inc. serves customers in upstream, midstream, and downstream petroleum and liquid hydrocarbon measurement industry. With a network of over 150 trained technicians and contractors, NEEI's warranty certified work assures the greatest confidence in inventory control and trade device accuracy.

Our Inspector Technicians are certified to perform examinations according to the *Weights and Measures Act and Regulations* on gasoline, distillates, lube oil, aviation fuel, diesel exhaust fluid and propane for bulk loading racks, delivery trucks, commercial refuellers and retail dispensers. As an ASP for Measurement Canada, NEEI is authorized to verify, certify and service all products and devices listed on Schedule A of Accreditation Agreement on behalf of Measurement Canada. Also, NEEI's truck service centres are staffed with industry leading knowledgeable staff to inspect, install, certify and repair everything from the tank to piping, pump to hose reel, meter to overfill, point of sale to remote communications and highway tanks & TC Portable tanks for TDG inspections using CSA B620 standards. All that to serve NEE's objective to provide the best sales and service support in our industries, while synergizing product offerings for optimum benefit to our customers.

Part 1

Quality Management System (QMS)

1.0 General

This document contains the quality management criteria and administrative requirements that NEEI shall meet in order to maintain accreditation to perform examinations pursuant to the *Weights and Measures Act and Regulations* , and the current version of *S-A-01.*

1.1 Applicability

This document applies to all members of NEEI's accreditation program who are certified to perform examinations pursuant to the ***Weights and Measures Act and Regulations.*** The device and product types covered for NEEI Accreditation purposes are located in the most current version of *Schedule A*

1.2 Scope of National Energy Equipment Inc. Accreditation Program

National Energy Equipment Inc. is referred as NEEI in this document.

NEEI's quality management system shall address, as a minimum:

a) the control process for the receipt of devices, parts or components of devices;
b) the calibration or adjustments of devices;
c) initial factory and field examinations; subsequent factory and field examinations of approved weighing and measuring devices used for trade purposes;
d) the handling, cleaning, packaging, storage, delivery and preservation of devices;
e) the final examination of devices;
f) the retrieval of device locations for the purpose of examination;
g) The examination of conditionally approved devices is allowed by NEEI; however guidelines found in bulletin GEN-04 are to be followed prior to a device being examined.

2.0 Definitions

Term	Definition
Act	means, as applicable, the **Weights and Measures Act and Regulations.**
API	American Petroleum Institute.
ASTM	American Society for Testing and Materials.
As found Results	the results of tests performed or observations made upon arrival at the site and before the device is adjusted or repaired.
ATC	Automatic Temperature Compensator
Audit plan	describes the activities you intend to carry out to gather evidence to determine how well criteria are being met.
Audit scope	a statement defined by the specific focus, extent and boundary of an audit.
Authorized Service Provider	an organization that has been accredited for the verification and/or re-verification of meters by designated inspectors to carry out examinations under the **Weights and Measures Act and Regulations.**
Calibration	comparison of a measuring equipment, device or meter of unknown accuracy to another measuring equipment, device or meter of known accuracy (traceable to a recognized national standard) to detect, correlate, report or eliminate by adjusting any variation from the required performance limits of the unverified measuring equipment, device or meter.
CNG	Compressed Natural Gas.
Corrective Action	steps taken to remove the causes of an existing non-conformity. Designed to prevent the reoccurrence by eliminating causes.
CTP	Correction for the Temperature of the Prover Shell.
CTS	Coefficient Temperature Standard.
Device	a measuring machine or natural gas meter as defined in the **Weights and Measures Act and Regulations**.
Device Examination Certificate	the certificate issued to a device owner once the device examination data and results have been successfully submitted.
Device non-compliance	A condition where the device is not in accordance with the requirements. A descriptions of major non-compliances can be found in the section 2.2 of *Measurement Canada Enforcement Policy for Weighing and Measuring Devices, Part – Role of Authorized Service Providers.* And any non-compliance is not identified under major non-compliances is a minor one.
Device Type	any device type or sub-type described in *Schedule A*.
Examination (Inspection)	the activity of measuring, examining, evaluating, testing or gauging one or more characteristics of a device or meter to determine its acceptability, including documentation of results.
Examination (Inspection) sticker	a self-adhesive label that indicates the month and the year in which a device was examined and, if applicable, the month and the year of the next examination required.
Examination mark	a mark that indicates the year in which a device was examined.
Efficiency	**t**he relationship between results achieved (outputs) and resources used (inputs).
Final examination (Inspection)	the examination which is carried out on a device that ensures that the device meets all requirements specified in the Weights and Measures Act. Portions of the final examination may occur in process, provided that the results are not affected by further processing.

Term	Definition
Grade	a rank or category assigned to a product process or system specified where quality requirements are defined.
HSPP&D	Handling, Storage, Packaging, Preservation & Delivery.
IPO	Inspection Procedure Outline.
Initial Examination (Inspection)	a mandatory examination performed before a device is used in trade for the first time.
Inspector Technician (IT)	an individual, employed by NEEI, who has successfully completed training and recognized by Measurement Canada as a certified technician to conduct examination under The Weight and Measures Act.
Legal requirements	all pertinent requirements contained in *Weights and Measures Act and Regulations* , specifications and posted bulletins.
LOE	Limits of error.
LPG	Liquid Propane Gas.
Management Review	evaluate the adequacy and effectiveness of NEEI's quality management system and see where improvements can be made.
Management Representative	a person in authority who acts as the organization's representative and the main contact for Measurement Canada, who is the NQSM.
NA	National Administrator.
NAM	National Accreditation Manager.
NQSM	National Quality Systems Manager.
NOA	Notice of Approval issued by Measurement Canada.
Organization Number	an alpha numeric code assigned by Measurement Canada to NEEI that has been designated as inspector – A0023.
Online Reporting Application (ORA)	Measurement Canada web application that enables device examination data and result to be submitted to Measurement Canada. Once examination data results have been reported and submitted, a device examination certificate is issued by ORA to device owner.
Preventative Action	steps taken to prevent the occurrence of nonconformity.
Point of Service	the geographical location from where a recognized technician offers examination devices.
Procedure	a detailed and documented method of carrying out a process or activity. Can be used in training sessions or to demonstrate how a process is being managed or controlled.
Process	a series of actions which are planned and validated under controlled conditions to achieve desired results.
Product	devices being inspected to verify conformity to legal requirements.
Propane Dispenser	a device and components designed to measure LPG.
Quality Assurance	a set of activities intended to ensure quality requirements will be met.
Quality Management System	a collection of processes focused on achieving NEEI's quality policy and quality objectives expressed as the organizational structure, policies, procedures, processes and resources needed to implement quality management.
Quality Objectives	goals which serve as a frame work for action. May include procedures and resources and specific task assignments.

Term	Definition
Regrade	selecting a different requirement and assigning a new grade to a non-conforming product or device.
Regulations	the Weights and Measures Regulations.
Re-examination/ Re-inspection	any examination performed following a subsequent examination where a device has been rejected. Does not apply to the initial examination.
Release	formal permission to proceed to the subsequent step of a process.
Remote location	a location where limited activities covered by NEEI's scope of accreditation are conducted, and there is no delegated authority to make decisions that can impact on the quality management system.
Repair	restricted to context of non-conforming products. Making necessary adjustments so that products are suitable for their intended use.
Reporting location	the location of the manager the recognized technician reports to when performing examination services.
RTD	Remote Temperature Device.
Scrap	prevent or exclude a non-conforming device from service.
Site	an additional location or site that has received delegated authority from its accredited headquarters to make
Standard	a set of established guidelines to develop and manage materials, products, services, technologies and systems.
STP	Standard Test Procedure.
Subsequent Examination (inspection)	any examination other than the first (initial) examination of a device before it's used in trade. Subsequent examinations do not include additional initial examinations that may be performed until such time as the device is certified as meeting requirements for the first time.
SVM	Volumetric **Weights and Measures Act and Regulations** Specification.
Top manager	the person who directs and controls the organization at the highest level for the scope of accreditation being sought.
Traceability	identify and trace the history, distribution, location, and application of products, parts and materials.
Validation	a process where designed and developed procedures confirm that products meet the requirements designed for their intended use and application.
VCF	Volume Correction Factor.
Verification	use objective evidence to confirm outputs meet input requirements.
Witness Examination (inspection) Process	meant to facilitate NEEI's implementation of its quality management system prior to an accreditation audit. Measurement Canada issues the examination certificates, however the organization performs all other work set out in its quality management system.
Weight and Measures organization	an accredited organization or an organization seeking accreditation to perform inspections (examinations) pursuant to the Weight and Measures Act.

3. Responsibilities

NEEI shall:

a) publish Measurement Canada's updated policies, procedures, regulations and applicable legislation pertaining to Weights and Measures;

b) facilitate appropriate technical training registration, and distribute learning materials to NEEI technicians;

c) ensure that criminal record checks are initiated and conducted regarding the technicians that will perform work as an NEEI Inspector Technician under the Weight and Measures Act before technicians can be added to Schedule A. Specifically, NEEI's top manager must ensure that any offence for which a pardon has not been granted has no negative impact on the ITs' present behaviour or job performance. Also, the criminal record checks requirement applies to authorized user who request access to the Online Reporting Application (ORA) via web services, and before NEEI is granted access to the web services features of ORA;

d) advise the Minister of Measurement Canada through the Regional Auditor of any changes within NEEI which affect the conditions of the agreement; changes to *Schedule A*, top manager, manager representative or contact person;

e) ensure only NEEI's recognized inspector technicians perform examinations under our defined scope;

f) follow Measurement Canada Enforcement Policy for Weighing and Measuring Devices, Part – Role of Authorized Service Providers.

g) submit all device examination data and results to Measurement Canada through ORA. This also applies to devices that do not comply with the legal requirements and that cannot be repaired or brought to compliance for any reason at the time of examination;

h) Comply with the Online Reporting Application (ORA) Terns and Conditions of use for the submission of inspection data and results and issuance of device examination certificates. Submit all device inspection results, including the "as found" measurement error and other non-compliances (i.e. devices that are not configured or installed properly or located in an appropriate location, etc.) to Measurement Canada through the ORA. This also applies to devices that do not comply with the legal requirements and that cannot be repaired or brought to compliance for any reason at the time of inspection. Submitting results that are different from the actual performance of the device during inspection may lead to enforcement action;

i) The technicians report to Measurement Canada if the inspector has reasonable grounds to believe that the device is non conformant;

j) Not issue a statement purporting to show the results of an inspection of a device without making an inspection on that device;

k) Not mark a device to indicate that it has been inspected by recognized technician without making an inspection of that device;

l) review and evaluate submitted certificates and advise Inspector Technicians of errors and corrections;

m) conduct a comprehensive internal audit to ensure all aspects of the accreditation department comply with all the criteria and requirements pertaining to the *Weights and Measures Act and Regulations ;*

n) Return all unused examination stickers upon a request by Measurement Canada.

o) Ensure its accreditation remains in good standing;

p) Pay all Measurement Canada fees within the required time frames set out in invoices;

q) Provide inspection services in accordance with the Official Languages Act;

r) Use its accreditation in such manner that it does not bring Measurement Canada into disrepute, and must not make any statement regarding its accreditation which Measurement Canada may consider misleading or unauthorized;

s) Comply with the requirement of Measurement Canada in making reference to its accreditation in communication media such as documents, brochures or advertising. This includes the Use of Authorized Service Provider Logo, “Canada” Wordmark and Measurement Canada Corporate Signature.

4.0 Context of the organization

4.1 Understanding the organization and its context

NEEI determined external and internal issues in quality objectives (section 6.2), management review meetings results (section 9.3), internal and external audits results (section 9.2), and quality procedure manuals (part 2) that are relevant to its purpose and its strategic direction and that affect its ability to achieve the intended result(s) of its quality management system.

NEEI monitors and reviews information about aforementioned external and internal issues regularly.

4.2 Understanding the needs and expectations of interested parties

NEEI determined requirements of NEEI's employees, Measurement Canada, and Clients (customers who receives the services) that are relevant to the quality management system, in the internal and external audits results (section 9.2) to consistently provide products and services that meet their requirements.

NEEI monitors and reviews information about aforementioned interested parties and their relevant requirements.

4.3 Determining the scope of the quality management system`

For the purpose of obtaining Measurement Canada accreditation, the most recent copy of 'Schedule A' (APPENDIX 1) is clearly specified the types of devices that NEEI intends to examine and certify and, as applicable, the types of products measured by the devices and the physical standard types it will use.

4.4 Quality management system and its processes

4.4.1 NEEI's documented information is established and implemented to continually improve its quality management system as follows:

a) documented statement of a quality policy (Section 5.2) and quality objectives (section 6.2).

b) documents needed in the quality assurance manual (Section 8 – Operation) and quality procedure manuals (part 2 of this manual) to ensure the effective planning, operations and control of its processes including:

i. the inputs required and the outputs expected from these processes;
ii. the sequence and interaction of these processes;
iii. the criteria and methods needed to ensure the effective operation and control of these processes;
iv. the resources needed for these processes and ensure their availability;
v. the responsibilities and authorities for these processes;
vi. the risks and opportunities as determined in accordance with the requirements of 6.1;
vii. evaluate these processes and implement any changes needed to ensure that these processes achieve their intended results;
viii. the control of processes for the receipt of devices, parts or components of devices
ix. the calibration or adjustment of devices;
x. the handling, cleaning, packaging, storage, delivery and preservation of devices;
xi. the final inspection of devices and;
xii. the retrieval of devices for the purpose of inspection

4.4.2 NEEI maintained the aforementioned document information to support the operation of its services and retain them to make sure that the processes are being carried out as planned.

5 Leadership

5.1 Leadership and commitment

5.1.1 General

NEEI's top management is dedicated to communicating all quality matters by inducting routines mandated for new employees. Also, provide evidence of its commitment to the development, implementation and maintenance of the quality management system both within the calibration lab and on the field and continually improving its effectiveness by:

a) communicating with NEEI the importance of meeting customers as well as statutory and regulatory requirements;
b) ensuring that quality policy and quality objectives are established and measurable;
c) conducting management review meetings;
d) ensuring the availability of necessary resources.

5.1.2 Customer focus

Top management shall maintain documented quality system procedural instructions to govern contract review activities. NEEI shall ensure that individual customer requirements are determined and met according to S-A-01.
When appropriate, preliminary procedures may be developed to provide a thorough understanding to all involved parties as how to successfully implement the service contract and to aid with future contract reviews.
Section 8.2.2 Determination of requirements for products and services is included as a requirement of the standard.

5.2 Policy

5.2.1 Establishing the quality policy

NEEI is fully committed, without deviation, to meet requirements which ensure that the Quality System: is appropriate to the purpose of NEEI;

includes a commitment to comply with customer requirements and will continually improve the effectiveness of the quality management system;

provides a solid framework and adequate resources for training, establishing, implementing and reviewing quality objectives;

is communicated and understood within all NEEI personnel;

Is reviewed for continuing suitability.

For the purpose of obtaining Measurement Canada accreditation, NEEI's policy and objectives shall include a commitment to meeting Measurement Canada's requirements. (Refer to Executive Officer's Quality Policy Statement, page 6 of QAM).

5.2.2 Communicating the quality policy

NEEI's quality policy pertaining the application of the principles of controlled Quality Management is to ensure that all services rendered by employees of NEEI are of the required quality with the customer's expectations and in accordance to S-A-01.

The policy is available to be understood and maintained in this document (QAM) at NEEI's website for all employees in the organization and is distributed to relevant interested parties, as appropriate.

5.3 Organizational roles, responsibilities and authorities

NEEI's top management will appoint a member of management who is responsible for liaising with Measurement Canada on matters relating to the quality management system. NEEI's representative will have the responsibility and authority that includes:

a) ensuring that processes needed for the quality management system are established, implemented and maintained according to S-A-01;
b) reporting annually to top management on the performance of the quality management system and any need for improvement;
c) ensuring adequate resources and promotion of awareness of customer requirements throughout NEEI;
d) NEEI shall notify Measurement Canada of the appointment of the management representative in writing.

5.3.1 Responsibility and Authority

The authority to perform, issue inspection certificates or to submit device inspection data/results shall be documented. Top management shall ensure that the responsibilities and authorities are defined and communicated within NEEI.

Only recognized inspector technicians (IT's) of NEEI are authorized to inspect and certify devices on behalf of Measurement Canada. They shall calibrate as close to zero as possible, inspect, seal and mark in accordance with Measurement Canada's S-A-01. All device examination data and results shall be documented and submitted.

A. Responsibilities of the National Accreditation Manager (NAM)

As the senior member or management responsible for the Accreditation Program, the National Quality Systems Manger reports directly to the NAM on a regular basis. The NAM will assist with liaison senior management within NEEI. The National Accreditation Manager's responsibilities are not limited to but include:

- committing to the requirements of Measurement Canada's S-A-01 and Weights and Measures Act and Regulations and all legal requirements;
- supervising and assisting in the maintenance, training and implementing full commitment at all levels of NEEI throughout Canada;
- convening the annual management meeting, setting the location and mandate the attendees;
- implementing quality planning;
- ensure appropriate levels of resources are available for all employees;
- authorizing the acquisition of new examination test equipment;
- Responsible for notifying Measurement Canada of the appointment of NQSM in a signed legal document.

B. Responsibilities of the National Quality Systems Manager (NQSM)

The National Quality Systems Manager has the overall responsibility for NEEI's Quality System throughout all satellite offices across Canada. The title carries the responsibility to create, maintain and implement policy procedures and systems to be used within the Quality System. The NQSM will oversee, but can assign, any aspects of the policy maintenance to any other responsible personnel within the program. The responsibilities of the National Quality Systems Manager are not limited to, but include:

- committing to the requirements of Measurement Canada's S-A-01 and Weights and Measures Act and Regulations and all other legal requirements;
- liaise with Measurement Canada on a national level. The regional IT's will liaise with their local Measurement Canada Offices as required;
- approve any changes or discussions on process, policy or procedures before it is issued or re-issued;
- maintaining documents pertaining to quality procedures to ensure control over all internal documents and data related to NEEI's scope;
- responsible for the authority to maintain the retention time of quality controlled document and supervising the document destruction after retention time has lapsed;
- oversee and include contract procedures and reviews maintained by all personnel within the program;
- making final decisions within the quality planning process;
- ensure all identification and traceability procedures are maintained nationally through periodic assessment of Goods Receiving Reports;
- maintain quality procedures documents for the control, calibration, certification and maintenance of all measuring examination and test equipment that are used to "Certify for Use in Trade";
- ensure appropriate levels or resources available;
- authorizing the acquisition of new examination test equipment
- determine which products are defined as non-conformant and identifying the units through tagging;
- evaluating and documenting non-conformities and consider alternatives for disposing these units;
- maintaining and controlling all non-conforming product reviews. This system is subject to auditing;
- follow through the completion of any non-conformance reports received;
- ensure a Corrective and Preventative Action report is implemented;
- maintain the current standings of schedule A as well as the training and testing of all registered Inspector Technicians
- oversee training and implementation of new employees working within the Quality Management system;

- Ensure the documented procedures for examination and testing activities are carried out. This is to be done from receiving a device to its delivery in order to verify compliance to specified and legal requirements;
- accessing the validity of previous examinations when a test standard is found faulty or out of certification;
- ensures that all repaired devices are calibrated as close to zero as possible, sealed and reported on a short form to Measurement Canada;
- Planning, scheduling and conducting internal audits.

C. Responsibilities of the National Administrator (NA)

The National Administrator's responsibilities are assigned by the NQSM and must report back on the status of all assigned duties. The responsibilities of the National Administrator are not limited to, but include:

- committing to the requirements of Measurement Canada's S-A-01 and Weights and Measures Act and Regulations and all other legal requirements;
- maintaining all documentation in the national quality records system;
- assisting in the review and control of contract procedures;
- ensure Measurement Canada certifies all examinations, measuring and test equipment as required. These certificates must be current so the equipment can be used to "Certify for Use in Trade";
- maintaining the required approved verification stickers, examination certificates, sealing inserts and controlling all records of these transactions;
- maintaining the retention time of controlled records;
- controlling documentation by training and testing in the control procedures stated in the manuals;
- assisting, as required, in the changes, training, testing, and implementation of the elements of the quality management systems and procedures;
- holding controlled documents on file, including the removal of all outdated documents, stickers, seals and expired inventory;
- performing Ice Point Test every month;
- addressing non-conformities brought to attention by regional Inspector Technicians and will bring to the NQSM for authorization of the disposal of the product;

- ensuring Corrective and Preventative Action Reports are correctly implemented and appropriate action addressed and analyzed at the time of management review;
- maintaining and filing all records of all internal audits which are subject to review by Measurement Canada;

D. Responsibilities of a recognized Inspector Technician (IT)

Inspector Technicians are responsible for implementing the Quality Management System program in their assigned region by performing initial and subsequent examinations, testing and other duties outlined by the QMS program. IT's directly report to the home office of the National Quality Systems Manager. Additional duties which do not fall under the QMS will report to the regional supervisor. Inspector Technicians are mandated to follow all procedures outlined by Measurement Canada in the Field Inspection Manual and all other documentations released by Measurement Canada as well as the procedures outlined in NEEI's QAM. In the event where conflict arises between the procedures issued by Measurement Canada and those issued by NEEI, procedures issued by Measurement Canada will take precedence. The responsibilities of an Inspector Technician are not limited to, but include:

- committing to the requirements of Measurement Canada's S-A-01 and Weights and Measures Act and Regulations and all other legal requirements;
- liaising with the local Measurement Canada office when required;
- coordinating with the National Quality Systems Manager to ensure appropriate resources are maintained;
- maintaining their training both in theory and in practice through consistent attendance to offered seminars, Measurement Canada courses, testing and other recommendations made by the NQSM;
- accessing to Measurement Group page on NEEI website to review and download the most current versions of manuals and documents pertaining to the quality management systems and Measurement Canada's legal requirements when needed;
- maintaining and controlling assigned equipment and documentation. Equipment includes sealing pliers and dies. All documents are maintained electronically;
- ensuring proper documentation regarding identification and traceability of products is created and issued to the correct personnel; customer supplied product, work in progress and store product;
- Recognized technician submit examination data using ORA.

- assessing and validating all test hardware and software, measuring, testing and examination equipment;
- ensuring suitable environmental conditions for calibration, examination, measurement and testing;
- performing all services and repairs as required;
- performing Ice Point Test every month;
- caring and respecting the use of the test equipment and ensuring its good condition prior to its use within the program;
- performing all in-process, final examinations, subsequent examinations of products for review and disposition procedures of a product or service pertaining to that final examination;
- suspending the process, delivery or installation of a non-conforming product;
- mark, tag and seal devices as well as applying or removing indicators which display examination status;
- ensuring that all repaired devices are calibrated as close to zero as possible, sealed and reported on a short form to Measurement Canada;
- addressing non-conformities brought to attention by a foreman and will bring to the NQSM for authorization of the disposal of the product;
- reporting non-conformance reports from the shipper, receiver or foreman to the customer;
- adhering to the non-conformance procedures regarding non-conformance follow ups;
- Identifying and evaluate non-conforming products and assist in controlling the movement, storage and processing of the units.

E. Responsibility of Shippers and Receivers

Shippers and Receivers are responsible for the shipment and the receiving of all devices and parts involved with the examining and testing under the Quality Management System. Personnel working with devices under the Quality Management System will report directly to the National Quality Systems Manager, otherwise their distribution manager. When working with the quality management system, the responsibilities of the shipper and receiver are not limited to, but include:

- committing to the requirements of Measurement Canada's S-A-01 and Weights and Measures Act and Regulations and all other legal requirements;
- follow procedures outlined in QPM;
- examine all products against purchasing documents to ensure criteria is fully met;
- a Goods Receiving Report is to be filled out and delivered to the National Administrator;

- through the use of a non-conformance report, note damaged, lost and unsuitable customer supplied product to the National Quality Systems Manager and will process a non-conformance report if necessary;
- ensure appropriate content if forwarded to the pit for processing;
- ensure appropriate protection against deterioration and contamination while devices remain in the responsibility with NEEI;
- ensure proper packaging of product for transport by an approved transport company;
- Provide a clear description of all contents according to the legal requirements of Measurement Canada.

F. Responsibilities of the Internal Auditor

Quality Procedures for planning and implementing all internal quality audits will be maintained by the Internal Auditor. The responsibilities of the Internal Auditor are not limited, but include:

- performing quality audits a minimum of once per year, per location;
- be appropriately trained to perform audits according to the documented procedures;
- prepare an audit checklist and audit schedule;
- initiate non-conformances when deficiencies are found in the Quality Systems;
- communicate results of the internal audit with the personnel responsible in the area(s) audited;
- submit records of the audit to the National Quality Systems Manager for annual review;
- Auditors shall not audit their own work.

6 Planning

6.1 Actions to address risks and opportunities

6.1.1 When planning for the quality management system, NEEI shall consider the issues referred to in 4.1 and the requirements referred to in 4.2 and determine the risks and opportunities that need to be addressed to:

a) give assurance that the quality management system can achieve its intended result(s);

b) enhance desirable effects;

c) prevent, or reduce, undesired effects;

d) achieve improvement.

NEEI assures to achieve Quality Management System's intended results by implementing all quality procedural manuals (QPMs) by doing them properly and achieve organizational improvement by enhancing desirable and reduce the undesired effects to the quality management system.

6.1.2 NEEI shall plan :

a) actions to address mentioned risks and opportunities;

b) perform a proper way to:

1) integrate and implement the actions into its quality management system processes (section 4.4) by continuously reviewing documents and "Non-conformance corrective and preventive action report" forms (NEE-10).

2) evaluate the effectiveness of these actions.

Actions taken to address risks and opportunities shall be proportionate to the potential impact on the conformity of products and services.

NOTE 1 Options to address risks can include avoiding risk, taking risk in order to pursue an opportunity, eliminating the risk source, changing the likelihood or consequences, sharing the risk, or retaining risk by informed decision.

NOTE 2 Opportunities can lead to the adoption of new practices, launching new products, opening new markets, addressing new customers, building partnerships, using new technology and other desirable and viable possibilities to address the organization's or its customers' needs.

6.2 Quality objectives and planning to achieve them

6.2.1 NEEI's quality objectives pertaining the application of the principles of controlled Quality Management is to ensure that all services rendered by employees of NEEI are of the required quality with the customer's expectations and in accordance to S-A-01. Refer to Executive Officer's Quality Objectives, page 7 of QAM)

6.2.2 When planning how to achieve its quality objectives, NEEI shall determine

a) what will be done;
b) what resources will be required;
c) who will be responsible;
d) when it will be completed;
e) how the results will be evaluated.

All legal requirements will be implemented within the context of section 1.2 of S-A-01 in order to obtain or maintain accreditation. In each NEEI's quality objective, it is determined that what will be done exactly and when it will be completed with what required resources. Their evaluation will be done in the internal audits.

6.3 Planning of changes

All legal requirements will be implemented within the context of section 1.2 of S-A-01.

NEEI shall consider:

a) the purpose of the changes and their potential consequences;
b) the integrity of the quality management system;
c) the availability of resources;
d) the allocation or reallocation of responsibilities and authorities.

NEEI shall follow Measurement Canada legal requirements at all time.

7 Support

7.1 Resources

7.1.1 General

NEEI will determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the quality management system and enhance customer satisfaction by effectively meeting customer requirements.

NEEI shall consider:

a) the capabilities of, and constraints on, existing internal resources;

b) what needs to be obtained from external providers.

7.1.2 People

NEEI personnel performing any type of work, which affects product quality, will be competent on the basis of appropriate education, training, skills and experience. The NQSM will ensure that employees are aware of the quality program and have an introductory training program. NEEI's Accreditation head office, located in Port Coquitlam, British Columbia, maintains all employee files. Quality Assurance training and personnel files will be made available to Measurement Canada upon request.

7.1.3 Infrastructure

NEEI will effectively determine, provide and maintain the infrastructure needed to achieve conformity to product requirements within the:

a) buildings, workspace and associated utilities;

b) process equipment – both hardware and software;

c) Supporting transport and communication services.

The process control element will address the production and installation processes which directly affect product quality when the final examination occurs once installation is complete.
NEEI will follow the procedures in field inspection manual defined by Measurement Canada.

Processes are implemented and maintained to ensure devices are set up, configured and installed in accordance with the manufacturer's instructions, the requirements provided within Measurement Canada's Notice of Approval database and the requirements set out in the **Weights and Measures Act and Regulations,** prior to device examination and certification.

All process activities are governed by documented procedures, instructions and records of the work to be carried out according to the Quality System Management Manual.

7.1.4 Environment for the operation of process

A critical element in obtaining and maintaining proper process control is managing the work environment needed to achieve conformity to product requirements. NEEI is committed to sustaining work environment conditions, including, but not limited to, physical, social, psychological and environmental factors. NEEI will systematically examine the conditions both in the pit calibration and on the field to determine exactly what is needed.

7.1.5 Monitoring and measuring resources

7.1.5.1 General

NEEI shall determine and provide the resources needed to ensure valid and reliable results when monitoring or measuring is used to verify the conformity of products and services to requirements.

NEEI shall ensure that the resources provided:

a) are suitable for the specific type of monitoring and measurement activities being undertaken;

b) are maintained to ensure their continuing fitness for their purpose.

NEEI shall retain appropriate documented information as evidence of fitness for purpose of the monitoring and measurement resources.

7.1.5.2 Measurement traceability

NEEI shall determine the monitoring and measurement to be undertaken to provide evidence and determine requirements for product conformity. These processes will be monitored in a way where measurement can be carried out in a matter which is consistent with the requirements set out by Measurement Canada's S-A: 01.

NEEI shall establish processes to ensure that monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements. NEEI shall identify the necessary measuring apparatus or test standards used to perform final inspections. These shall be certified as prescribed in the applicable act. Also, NEEI may in some circumstances be able to borrow some certification equipment from the local Measurement Canada district office. The conditions which equipment may be borrowed is governed by bulletin GEN-37. To ensure valid results, measuring equipment will be:

a) calibrated by a registered Inspector Technician and issued a certificate prior to use, against measurement standards traceable to national measurement standards;
b) adjusted or re-adjusted as necessary;
c) identifiable to enable the status of calibration service;
d) safeguarded from invalidated adjustments;
e) Protected from damages during handling, maintenance and storage.

For the purpose of obtaining accreditation pursuant to Weights and Measures Act and Regulations , NEEI shall ensure that test standards are calibrated as prescribed in section 56 of the Weights and Measures Act and Regulations :

a) have a valid certificate of designated issued by Measurement Canada;
b) Are verified by Measurement Canada at the prescribed intervals or more frequently where verification is necessary to maintain the accuracy of the test standard.

Standards such as thermometers, pressure measuring instruments, test weights and other standards used by Inspector Technicians to inspect devices used in trade shall be monitored for accuracy at the frequency determined by Measurement Canada (i.e. monthly ice point tests on electronic thermometers, paragraph 5 of bulletin V-24, and quality records of results shall be maintained).
NEEI will provide clear instructions to its Inspector Technicians to verify the conditions (dents, leaks, rust etc) of borrowed or rented test standards and to ensure that applicable Measurement Canada certificated of designation are valid. A copy of the certificates of designation for those borrowed or rented test standards will be maintained by the accreditation organization.

7.1.6 Organizational knowledge

NEEI shall determine the knowledge necessary for the operation of its processes and to achieve conformity of products and services.
This knowledge shall be maintained and be made available to the extent necessary.
When addressing changing needs and trends, NEEI shall consider its current knowledge and determine how to acquire or access any necessary additional knowledge and required updates.

NOTE 1: Organizational knowledge is knowledge specific to NEEI; it is generally gained by experience. It is information that is used and shared to achieve NEEI's objectives.

NOTE 2: Organizational knowledge can be based on:

a) internal sources (e.g. intellectual property; knowledge gained from experience; lessons learned from failures and successful projects; capturing and sharing undocumented knowledge and experience; the results of improvements in processes, products and services);
b) external sources (e.g. standards; academia; conferences; gathering knowledge from customers or external providers).

7.2 Competence

NEEI shall:

a) determining the necessary competence for personnel performing work affecting product quality;
b) providing training and internal/ external audits;
c) evaluating the effectiveness of the training taken and identify training needs;

NEEI will establish, document, implement and maintain procedures.
For the purpose of obtaining Measurement Canada accreditation to perform inspection pursuant to the **Weights and Measures Act and Regulations**, NEEI shall have at least one employee who has successfully completed the mandatory Measurement Canada Training.
All inspector technicians shall be assessed theoretically and practically by Measurement Canada prior to being recognized. NEEI shall ensure that selected technicians to be recognized to perform inspection activates intended to meet the requirements of this standard shall have the appropriate experience and training. In order for a technician to be a recognized inspector technician under the

accreditation program, the technician's name must be listed in Schedule A if the agreement between NEEI and Measurement Canada for the particular device type, product type and physicals standard type, as applicable.

To maintain their authority to inspect devices, recognized technicians shall demonstrate on an on-going basis that they have maintained their knowledge and skills.

Where Measurement Canada advises NEEI that regulatory or procedural changes have occurred, NEEI shall ensure that at least one employee attend refresher courses conducted by Measurement Canada and provides training on the changes to any other personnel who may be carrying out inspections or parts thereof that are affected by the changes. Appropriate records shall be maintained of the training provided to employees by Measurement Canada.

Note that:

- NEEI will hold the required trainings in house, and the final exams are conducted by Measurement Canada;
- Measurement Canada will evaluate candidates through a theoretical and a practical examination. A mark of 70% or higher is required to pass examination;
- A candidate who fails an examination for the first time will be given an opportunity to take a make-up examination. A second failure will result in certain conditions having to be met, such as having to attend the training again and redo examination. A further failure would result in candidate not being qualified as a recognized technician by Measurement Canada. Even if a technician is already recognised for a certain scope, subsequent examination failure for new scopes could result in existing recognition being withdrawn;
- If the technician is not recognized within 12 months following the practical examination, another successful practical examination will be required before the technician can be recognized;
- Measurement Canada will determine the device type, product, standard, and procedure required for the practical examination based on the scope requested for the technician;
- Measurement Canada reserves the rights to monitor technicians at any time, if a recognized technician is found to no longer have the required knowledge or skills, the technician's recognition may be suspended by Measurement Canada;

- If specialized training is not yet available through Measurement Canada, Measurement Canada may accept that the training to be by other means. Measurement Canada can provide the conditions that must be met by NEEI given the specific circumstances. In all cases, Measurement Canada will remain responsible for evaluating all candidate through theoretical and practical evaluation;
- Measurement Canada reserves the right to refuse to add a technician to Schedule A of any authorized service provider or to restrict the technician's scope.

7.3 Awareness

NEEI's awareness of its quality management system includes:

a) ensuring that all personnel are aware of NEEI's quality policy and relevant quality objectives;
b) ensuring that all personnel are aware of the relevance, importance, quality and safety of their activities and how they contribute to the achievement of them.
c) ensuring all personnel understand where to access information, report incidences and request changes;
d) ensuring all personnel's contribution to the effectiveness of the quality management system, including the benefits of improved performance;
e) ensuring the implications of not conforming with the quality management system requirements;
f) Maintaining appropriate records of education, training, skills and experience.

7.4 Communication

NEEI shall determine the internal and external communications relevant to the quality management system, including:

g) on what it will communicate;
h) when to communicate;
i) with whom to communicate;
j) how to communicate;
k) who communicates.

NEEI will not be required to establish documented information describing internal communication processes. The effectiveness of internal communications will be determined during the audit process.

7.5 Documented information

7.5.1 General

NEEI's quality management system shall include:

a) documented information required by this International Standard;

b) documented information determined by NEEI as being necessary for the effectiveness of the quality management system.

7.5.2 Creating and updating

NEEI must establish, implement and maintain (i.e. procedures) according to this paragraph.
When creating and updating documented information, NEEI shall ensure followings:

a) identification and description, including a title, date, author, or reference number;
b) They are in either English or French. they are electronically controlled in PDF format ;
c) They should have been reviewed and approved for suitability and adequacy.
d) The updated documents should be recognized by a revision number and date.

7.5.3 Control of documented information

NEEI shall maintain access to current copies of the Weights and Measures Act and Regulations , specifications, bulletins and notices of approval. All documents and data changes that may affect the ability or manner in which NEEI ensures that devices meet the requirements of the Weights and Measures Act and Regulations, will be submitted to Measurement Canada for review and acceptance.
A documented procedure shall be established to define the controls needed:

a) to approve documents for adequacy prior to issue;
b) to review and update as necessary and re-approve documents;
c) to ensure that changes and the current revision status of documents are identified;
d) to ensure that relevant versions of applicable documents are available at points of use;
e) to ensure that documents remain legible and readily identifiable;
f) to ensure that documents of external origins are identified and their distribution is controlled, and
g) To prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose.

NEEI shall provide Inspector Technicians with current copies of the laws and requirements for the volumetric discipline set out by Measurement Canada and all other documents required for device examination and certification at all times:

a) Weights and Measures Act and Regulations;

b) applicable ministerial specifications;
c) applicable Measurement Canada bulletins;
d) applicable device inspection procedures (Field Inspections Manual, Inspection Procedure Outlines and Standard Test Procedures for mass and volume);
e) designation certificates for physical standard use;
f) applicable notices of approval;
g) The Online Reporting Application (ORA) user manual.
h) the Measurement Canada Enforcement Policy for Weighing and Measuring Devices, Part 1 - Role of Authorized Service Providers; and
i) Any other document required for device inspection and certification.

NEEI shall make quality records available, on request, to Measurement Canada representatives or those persons in the organization who require such information for the performance of its duties. Records shall be established and maintained to provide evidence of conformity to requirements and of the effective operation of the quality management system. Records shall remain legible, readily identifiable and retrievable. A documented procedure shall be established to define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of records.

NEEI will maintain a retention period for records relating to accreditation:

a) for examination reports and non-compliance reports, a minimum of three years;
b) the certificates of designation of test standards until the standard is withdrawn from service or a period of three designation cycles (the lesser of the two);
c) for policies and procedure, until superseded or revised;
d) for employee training records of those involved in the examination process, development, implementation and maintenance of the quality management system, the duration of their employment;
e) For other records, two years.

Pursuant to the Weights and Measures Act and Regulations , a certificate of inspection must be issued for every device that is certified for use in trade. The device inspection data and results must be submitted in the prescribed time frame. The Online Reporting Application User Manual provides all the necessary details regarding inspection certificates.

8 Operation

8.1 Operational planning and control

NEEI shall plan and develop the processes needed for product realization. Planning of product realization shall be

consistent with the requirements of the other processes of the quality management system.

In planning product realization, NEEI shall determine the following as appropriate:

a) quality objectives and requirements for the product;
b) the need to establish processes, documents and provide resources specific to the product;
c) required verification, validation, monitoring, inspection and test activities specific to the product and the criteria for the product acceptance;
d) Records needed to provide evidence that the realization processes and resulting product meet requirements.

NEEI will maintain documented procedures in the form of receiving examination reports, and completed Goods Receiving Report, as required by Measurement Canada. Procedures which deviate from those issued by Measurement Canada will be accepted following a review to determine whether the procedure is technically sound and ensuring the device will be tested at all of the required test points. Product realization is applied within the entire context of section 1.2. Other processes relating to the final inspection will be incorporated.

NEEI shall implement and maintain processes to ensure that devices are set up, configured and installed prior to device examination and certification, in accordance with:

- the manufacturer's instructions;
- the requirements provided in the applicable Notices of Approval;
- Requirements stated by Measurement Canada.

8.2 Requirements for products and services

8.2.1 Customer communications

Communication with customers shall include:

a) providing information relating to products and services;

b) handling enquiries, contracts or orders, including changes;

c) obtaining customer feedback relating to products and services, including customer complaints;

d) handling or controlling customer property;

e) establishing specific requirements for contingency actions, when relevant.

8.2.2 Determining the requirements for products and services

When determining the requirements for the products and services to be offered to customers, NEEI shall ensure that:

a) the requirements for the products and services are defined, including:

1) any applicable statutory and regulatory requirements;

2) those considered necessary by NEEI;

b) NEEI can meet the claims for the products and services it offers.

8.2.3 Review of the requirements for products and services

8.2.3.1 NEEI shall ensure that it has the ability to meet the requirements for products and services to be offered to customers. NEEI shall conduct a review before committing to supply products and services to a customer, to include:

a) requirements specified by the customer, including the requirements for delivery and post-delivery activities;

b) requirements not stated by the customer, but necessary for the specified or intended use, when known;

c) requirements specified by NEEI;

d) statutory and regulatory requirements applicable to the products and services;

e) contract or order requirements differing from those previously expressed.

NEEI shall ensure that contract or order requirements differing from those previously defined are resolved.

The customer's requirements shall be confirmed by NEEI before acceptance, when the customer does not provide a documented statement of their requirements.

NOTE: In some situations, such as internet sales, a formal review is impractical for each order. Instead, the review can cover relevant product information, such as catalogues.

8.2.3.2 NEEI shall retain documented information, as applicable:

a) on the results of the review;
b) on any new requirements for the products and services.

8.2.4 Changes to requirements for products and services

NEEI shall ensure that relevant documented information is amended, and that relevant persons are made aware of the changed requirements, when the requirements for products and services are changed.

8.3 Design and development of products and services

S-A-01 standard does not include design and development. This ISO subclause is included to align the clause numbering to ISO 9001 and is excluded from NEEI's Quality Assurance Manual.

8.4 Control of externally provided processes, products and services

8.4.1 General

NEEI shall ensure that purchases product conforms to specified purchase requirements. The type and extent of control applied to customer and the purchased product shall be dependent upon the effect of the purchased product on subsequent product realization or the final product.

NEEI shall evaluate and select suppliers based on their ability to supply product in accordance with NEEI's requirements. Criteria for selection, evaluation and re-evaluation shall be established. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained.

8.4.2 Type and extent of control

NEEI shall ensure that externally provided processes, products and services do not adversely affect the organization's ability to consistently deliver conforming products and services to its customers.

NEEI shall:

a) ensure that externally provided processes remain within the control of its quality management system;

b) define both the controls that it intends to apply to an external provider and those it intends to apply to the resulting output;

c) take into consideration:

1) the potential impact of the externally provided processes, products and services on NEEI's ability to consistently meet customer and applicable statutory and regulatory requirements;

2) the effectiveness of the controls applied by the external provider;

d) determine the verification, or other activities, necessary to ensure that the externally provided processes, products and services meet requirements.

8.4.3 Information for external providers

All purchases for NEEI are expedited by the National Purchasing Department and regular review of purchased items prevents duplicate orders being placed and stock levels controlled. All incoming replacement parts and device components will be inspected to ensure they conform to the manufacturer's specifications and that they are of types approved by Measurement Canada.

NEEI shall ensure the adequacy of requirements prior to their communication to the external provider.

NEEI shall communicate to external providers its requirements for:

a) the processes, products and services to be provided;

b) the approval of:

1) products and services;

2) methods, processes and equipment;

3) the release of products and services;

c) competence, including any required qualification of persons;

d) the external providers' interactions with the organization;

e) control and monitoring of the external providers' performance to be applied by NEEI

f) verification or validation activities that the organization, or its customer, intends to perform at the external providers' premises.

8.5 Production and service provision

When servicing entails any activity that affects the accuracy of a measuring device, the organization must implement processes to ensure compliance with section 35.1 of the Weights and Measures Regulations.

8.5.1 Control of production and service provision

NEEI will implement production and service provision under controlled conditions.

Controlled conditions shall include, as applicable::

a) the availability of documented information that defines:

1) the characteristics of the products to be produced, the services to be provided, or the activities to be performed;

2) the results to be achieved;

b) the availability and use of suitable monitoring and measuring resources;

c) the implementation of monitoring and measurement activities at appropriate stages to verify that criteria for control of processes or outputs, and acceptance criteria for products and services, have been met;

d) the use of suitable infrastructure and environment for the operation of processes;

e) the appointment of competent persons, including any required qualification;

f) the validation, and periodic revalidation, of the ability to achieve planned results of the processes for production and service provision, where the resulting output cannot be verified by subsequent monitoring or measurement;

g) the implementation of actions to prevent human error;

h) the implementation of release, delivery and post-delivery activities.

8.5.2 Identification and traceability

Where appropriate, NEEI shall identify the product by suitable means throughout product realization.

NEEI shall identify the product status with respect to monitoring and measurement requirements.

Where traceability is a requirement, NEEI shall control and record the unique identification of the product.

NEEI will establish, document, implement and maintain written procedures.
NEEI shall:

a) establish and maintain a system for seals, stickers or other means on the devices that indicate the status of the inspection and final acceptance;

b) control status indicators including the authority for applying and removing seals, stickers, stamps or other physical means of indicating the inspection status;

c) Seal devices which have passed inspection in the manner prescribed in the Weights and Measures Act and Regulations as set out in the applicable Notice of Approval issued by Measurement Canada.

Official seals and inspection markings shall be accepted by Measurement Canada prior to use by the organization and examination stickers are supplied by Measurement Canada. The organization shall ensure that appropriate controls are in place in order to safeguard seals, marks and stickers from being misplaced or misused.
Also, NEEI, as an organization accredited to perform inspections pursuant to the Weights and Measures Act and Regulations must:

a) affix examination stickers (inspection stickers)

b) mark devices with the appropriate inspection mark

NEEI must adhere to the requirements related to inspection certificates and their completion which are found in the Online Reporting Application User Manual.

8.5.3 Property belonging to customers or external providers

NEEI shall exercise customer or external providers product while under its control. NEEI will identify, verify and protect customer's or external provider's property by keeping record through the use of the Goods Receiving Report. NEEI personnel will make the NQSM aware of any damaged or unsuitable product by means of a Non-Conformance report; the customer or external providers will not be absolved from supplying unacceptable product.

8.5.4 Preservation

NEEI will preserve the product during internal processing and until delivery to the intended destination. This procedure will include controlled identification, handling, packaging, storage and protection against damage or deterioration.

NEEI's method for handling product will include providing personnel with all necessary equipment and skills to prevent damage and perform necessary maintenance to products.

NEEI will provide suitable storage facilities and maintain consistent environmental conditions where consideration is given to administrative procedures for product expiration dates. Storage procedures will include physical security, periodic evaluation to ensure no deterioration, legible markings and labeling. Minimizing the risks of damages will come into play when storage conditions are ordered and enable accurate identification of stock.

8.5.5 Post-delivery activities

NEEI shall meet requirements for post-delivery activities associated with the products and services.

In determining the extent of post-delivery activities that are required, NEEI shall consider:

a) statutory and regulatory requirements;

b) the potential undesired consequences associated with its products and services;

c) the nature, use and intended lifetime of its products and services;

d) customer requirements;

e) customer feedback.

NOTE: Post-delivery activities can include actions under warranty provisions, contractual obligations such as maintenance services, and supplementary services such as recycling or final disposal.

8.5.6 Control of changes

NEEI shall review and control changes for production or service provision other than customer satisfaction, to the extent necessary to ensure continuing conformity with requirements.

NEEI shall retain documented information describing the results of the review of changes, the person(s) authorizing the change, and any necessary actions arising from the review.

8.6 Release of products or services

NEEI will monitor and measure the characteristics of the product to verify when product requirements have been met. Documented procedures are in the form of receiving inspections with the Goods Receiving Report; examination procedures are stated in Measurement Canada's Field Inspection Manual. This shall be carried out at appropriate stages of the product realization process in accordance with the planned arrangements (see 8.1).

NEEI's recognized Inspector Technician will perform a final examination on products prior to leaving NEEI to ensure compliance with Measurement Canada's Weights and Measures Act and Regulations for the purpose of final inspection. Only Measurement Canada-approved devices and components are tested, verified or certified. NEEI will maintain records of each examination and test performed regarding the Measurement Canada requirements.

NEEI will maintain records which identify the names and addresses of the initial point of shipment of devices that are sold, leased for use in trade for future product audits conducted by Measurement Canada.

NEEI's quality management system documentation will include device evaluation and examination procedures which assess the overall compliance of device configuration, setting, installation and performance as outlined by Measurement Canada.

8.7 Control of nonconforming outputs

NEEI will ensure that products which fail to conform to product requirements are identified and controlled to prevent its unintended use or delivery. NEEI will deal with nonconforming products in the following ways:

a) by taking action to eliminate the detected nonconformity;

b) by authorizing its use, release or acceptance under concession by a relevant authority;

c) By taking action to preclude its original intended use.

Records of the nature of nonconformities and subsequent actions taken will be documented and maintained.

When a nonconforming product is corrected, it shall be subject to re-verification to demonstrate conformity to the requirements set out by Measurement Canada. When a nonconforming product is detected after delivery or use has commenced, NEEI will take the appropriate action to the effects or potential effects of the nonconformity. All non-conformance reports will be submitted to the NQMS for review.

Consideration should be given to NEEI for an investigation into the cause of the non-conformance. Records of investigation into the cause of the non-conformance, corrective and preventative action take and disposition must be retained.

9 Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.1 General

NEEI will apply suitable methods for monitoring and measuring the quality management system processes. These methods will demonstrate the ability of the process to achieve planned results. Corrective action will be taken to ensure conformity of the product when planned results are not achieved.

Early identification of nonconformities prior to the final delivery service increase efficiency of the operation and eliminates further processing of nonconforming items.

In order for use in trade, current requirements are that each weighing and measuring device shall be inspected individually; sampling is not permitted. The entire evaluation and inspection procedure shall be performed prior to the issuance of a certificate showing the device meets the requirements of the Weights and Measures Act and Regulations .

9.1.2 Customer Satisfaction

NEEI may monitor information relating to customer perception as to whether NEEI has met the customer's requirements. The measuring of performance of the quality management system may take into account:

a) satisfaction and opinion surveys;
b) track warranty claims;
c) study customer complaints and criticisms;

S-A-01 standard does not include customer satisfaction and is excluded from the standard.. This ISO subclause is included to align the clause numbering to ISO 9001.

9.1.3 Analysis and evaluation

NEEI shall analyse and evaluate appropriate data and information arising from monitoring and measurement. The results of analysis shall be used to evaluate:

a) conformity of products and services;

b) the performance and effectiveness of the quality management system;

c) if planning has been implemented effectively;

d) the effectiveness of actions taken to address risks and opportunities;

e) the performance of external providers;

f) the need for improvements to the quality management system.

9.2 Internal audit

NEEI will conduct internal audits at planned intervals to determine whether or not the quality management system:

a) conforms to the planned arrangements to the requirements of Weights and Measures Act and Regulations , and the current version of S-A-01;
b) Requirements are effectively implemented and maintained.

The audit program is planned, taking into consideration the status and importance of the processes and area to be audited, as well as the results of the previous audits. The audit criteria, scope, frequency and methods are to be defined by the selection of auditors. The selection of auditors will ensure objectivity, and impartiality of the audit process. NEEI will conduct internal audits, unless a written detailed assessment and justification is provided by Top management and is accepted by Measurement Canada. Auditors will not audit their own work.

The responsibilities and requirements for planning and conducting audits and for reporting results and maintaining records are defined in the documented procedure.

The management responsible for the department being audited will ensure that actions are taken without undue delay to eliminate detected nonconformities and their cause. Follow-up activities will include the verification of the actions taken and the reporting of verification results. NEEI will select and assign qualified auditors for each activity being audited.

The results of the audit are to be recorded by the lead auditor and communicated to the fellow auditors at the pre and post audit meetings. Records of these meetings will be kept by the NA. The final meeting will discuss corrections, non-conformances, preventative actions, opportunities for improvement and address other pertinent information.

9.3 Management review

9.3.1 General

Top management shall review the organization's quality management system, at planned intervals, to ensure its continuing suitability, adequacy, effectiveness and alignment with the strategic direction of NEEI.

9.3.2 Management review inputs

The management review shall be planned and carried out taking into consideration:

a) the status of actions from previous management reviews;

b) changes in external and internal issues that are relevant to the quality management system;

c) information on the performance and effectiveness of the quality management system, including trends in:

1) customer satisfaction and feedback from relevant interested parties;
2) the extent to which quality objectives have been met;
3) process performance and conformity of products and services;
4) nonconformities and corrective actions;
5) monitoring and measurement results;
6) audit results;
7) the performance of external providers;

d) the adequacy of resources;

e) the effectiveness of actions taken to address risks and opportunities (see 6.1);

f) opportunities for improvement.

NEEI will focus on effective implementation, compliance with the quality policy and trends which indicate problems. Measurement Canada does not require NEEI to establish and document these procedures, the effectiveness of the review input process will be determined during the audit process.

Considering customer satisfaction as an input to the management review process is optional and no action will be taken by Measurement Canada if NEEI does not consider that.

9.3.3 Management review outputs

The outputs of the management review shall include decisions and actions related to:

a) opportunities for improvement;

b) any need for changes to the quality management system;

c) resource needs.

NEEI shall retain documented information as evidence of the results of management reviews.

All review's outputs do not require to be established and documented, however the outputs must be addressed during the management review process.

10 Improvement

10.1 General

The organization shall determine and select opportunities for improvement and implement any necessary actions to meet customer requirements and enhance customer satisfaction.

10.2 Nonconformity and corrective action

10.2.1 When a nonconformity occurs, including any arising from complaints, the organization shall:

a) react to the nonconformity and, as applicable:
   1) take action to control and correct it;
   2) deal with the consequences;

b) evaluate the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:
   1) reviewing and analysing the nonconformity;
   2) determining the causes of the nonconformity;
   3) determining if similar nonconformities exist, or could potentially occur;

c) implement any action needed;

d) review the effectiveness of any corrective action taken;

e) update risks and opportunities determined during planning, if necessary;

f) make changes to the quality management system, if necessary.

Corrective actions shall be appropriate to the effects of the nonconformities encountered.

10.2.2 NEEI shall retain documented information as evidence of:

a) the nature of the nonconformities and any subsequent actions taken;

b) the results of any corrective action.

Records of the nature of nonconformities and subsequent actions taken will be documented and maintained.

When a nonconforming product is corrected, it shall be subject to re-verification to demonstrate conformity to the requirements set out by Measurement Canada. When a nonconforming product is

detected after delivery or use has commenced, NEEI will take the appropriate action to the effects or potential effects of the nonconformity. All non-conformance reports will be submitted to the NQMS for review.

Consideration should be given to NEEI for an investigation into the cause of the non-conformance. Records of investigation into the cause of the non-conformance, corrective and preventative action take and disposition must be retained.

10.3 Continual improvement

NEEI will continually improve the effectiveness of the QMS through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventative action and management review.

NEEI will consider the results of analysis and evaluation, and the outputs from management review, to determine if there are needs or opportunities that shall be addressed as part of continual improvement.

The NQSM will maintain an ongoing analysis of corrective and preventative actions taken during the year. Management reports will be included as Quality Records and maintained.

Considering customer satisfaction as an input to the continual improvement process is optional and no action will be taken by Measurement Canada if NEEI does not consider that.

Part 2

Quality Procedure Manual (QPM)

PURPOSE

To govern the tests and inspections in the *"Field Inspection Manual"* for all the products and devices in Schedule A, and to ensure they are performed in a consistent manner, and that they comply with the *Weights and Measures Act and Regulations* , and the current version of *S-A-01* and the requirements of NEEI quality management system.

The purpose of the Inspection Procedure Outlines *(IPO's),* and Standard Test Procedures *(STP's)* found in Measurement Canada's *"Field Inspection Manual"* is to provide Inspector Technicians with a guide to the inspection of the volumetric devices and systems. The IPO's and STP's in the Field Inspection Manual outline the minimum test procedures, which must be performed to insure the device and/or the system complies with legislation. The STP's and IPO's state how these tests should be performed.

The use of the IPO's and STP's to evaluate the compliance of a device or system should be considered the norm rather than the exception. In some circumstances, additional tests may be warranted. In cases such as these, the Regional Specialists should be consulted, and care must be taken to ensure these tests adhere to the intent of the *Weights and Measures Act and Regulations .* The procedures in the *"Field Inspection Manual"* must be adhered to without exception to ensure all inspections are carried out in a consistent manner.

Enforcement action shall be initiated when an infraction sufficient enough to warrant non-compliance with the legislation is identified. The enforcement shall be in accordance with the Regulations for Accredited companies of the Weights and Measures Enforcement Policy for Weighing and Measuring Devices.

QPM – 01: Type 50, 51 Dispensers and Refuellers

General:

This inspection procedure/checklist applies to devices used to measure refined petroleum products (ea. distillates, gasoline and DEF) in retail and commercial service. Dispensers have a maximum flow rate of 90 liters/minute or less while Refuellers have flow rates between 91 and 250 litres/minute.

Note that the Inspector Technician is responsible for all testing and inspection procedures.

Inspection Preparation for Field Work:

Prior to initiating any inspection, the inspector should create work order in ORA and check establishment records to determine:

- The number of devices located in the establishment;
- Any specialized equipment or test requirements (NOA);
- Previous enforcement action(s) and or restrictions;

Entrance Interview:

During the course of the entrance interview, the inspector shall:

- Identify themselves to the person in charge of the inspection site by showing their identification and presenting a business card.
- State the purpose of the inspection visit, briefly explain what the inspection will entail and advise of any special requirements (i.e. Equipment, product, slowing or stopping work in a particular area).
- Identify and adhere to all establishment and NEEI safety rules.

Exit Interview:

During the course of the exit interview, the inspector shall insure the trader understands:

- The results of the inspection (even if no violations were encountered).
- Any follow-up action, which must be taken to correct non-compliances.
- The inspector shall update/review the trader's information (contact name, fax number, e-mail address) and inform them that they will receive a copy of examination certificate from ORA.

Procedure Type 50-51

The *IPO's* and *STP's* are the minimum test requirements for the initial, subsequent inspection and verification of the device or system under test. Circumstances and type of inspection (i.e. initial,) may warrant additional tests. When an inspector deems it necessary to perform additional tests, care must be taken to ensure these tests adhere to the intent the *Weights and Measures Act and Regulations .* Inspector shall follow the Measuring Canada's *"Field Inspection Manual"* and inspector should be read in conjunction with the NOTICE OF APPROVAL (NOA) for the device or system being inspected. Certain devices have been exempted from particular requirements of the Weights and Measures Act, Regulations or

Specifications or have unique operating features, which may not be addressed in the Inspection Procedure. Weights and Measures Bulletins, Rulings and Interpretations should also be referenced as required.

All Inspector Technicians are responsible to complete and file the inspection report for all the examination work they conduct.

Visual Inspection:

#	Checklist (Visual Inspection)
1	Is the device approved for use in trade? (Act 8)
2	Is the device suitable for actual use? (R 271, 272)
3	Initially inspected and the initial inspection marking are complying (if applicable) (Dye or approval label) (R29, V8, V9)
4	Seals are intact (ATC and calibration seals if applicable)?
5	Printed ticket is complies?
6	Installation has been reviewed?
7	Marking and labeling of multiple outlets system is correct? (R282)
8	Is there leak in system?
9	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
10	Is the device primary register positioned for customer viewing?(R143, 144)

Standards Check:

#	Checklist (Provers)
1	Has a Prover Check list been completed for the appropriate prover size and tests to be done? (NEE - 06)
2	Has the Prover size been properly selected? Example: Minimum Prover size= 1 minute at full flow (V3-4.5, V24, STP's and IPO's)
3	Have the appropriate drip times been selected for the prover being used? (V3, Standards, Field Inspection Manual)
4	Is Bulletin V17 available for the shell temperature corrections for the type and size of the Prover to be used? (Refuellers only)

#	Checklist (Thermometers)
1	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
2	Does the thermometer have any damage?
3	Are the thermometers seals intact?
4	Does the thermometer display shows complete digits without defect?
5	Is the probe clear from any physical damage
6	Is the Certificate of designation for the thermometer current and readily available?
7	Is the Ice point test current and available for the thermometer in use?
8	Were the temperature correction factors applied properly in the Ice point testing procedures?
9	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

Notice of Approval (NOA) & MAL's

Inspector shall review the current copy of the NOA from Measurement Canada *Notice of Approval Database* to insure that the device is in every respect identical to that submitted for approval and to determine that there are no restrictions.

#	Checklist (Notice of Approval (NOA) & MAL's)
1	Is the most current Notice of approval for the device physically present?
2	Has the Notice of Approval been reviewed?
3	Have all Software versions been checked, and reviewed?
4	Check the NOA for info on approved components (printers, air eliminators...)
5	Register with ATC uses a volume correction factor, Authorized for the actual liquid (R236, SVM 2-4, Bulletin V10, 12, 13, and 18)
6	Is the device marked with the required information (Manufacturers name, model and serial number, approval Number, maximum and minimum flow rates, Volume Corrected to 15° C, etc.)? (NOA, R21)
7	Is the information located as required and marking permanent? (R18)
8	Marking plate is permanently and correctly affixed to the device? (R18)
9	Labeling/marking of multiple outlet systems are correct (Indicator valves or lights etc.)? (R282)

#	Checklist (Notice of Approval (NOA) & MAL's)
10	Marking device usage RESTRICTIONS correct? (NOA, R70)
11	Is the device installed in accordance with restriction and the Conditions listed in the NOA and in accordance with the Manufacturer's instructions? (NOA, R 68, 69, 70)
12	Is the device adequately secured and protected against abnormal environmental factors; connected to an adequate Electrical supply as prescribed by the manufacturer; and attached components do not adversely affect its performance? (R24, 141, 142)
13	Is the minimum graduation installed in accordance with restrictions and conditions listed in the NOA and in accordance with manufacturer's instructions? (NOA, R68, 69, 70)
14	Means of registration of total price; is there sufficient number of total digits? (SVM 1-21)
15	Has the device/system convenient means to allow for testing and inspection? (R284)
16	Blending Dispensers: if one meter is equipped with ATC and operational, all meters must be so equipped. (SVM2-27)
17	Are piping and accessories installed to minimize the passage of air or vapours? (R274)
18	Are adequate air prevention and elimination system in place; Air eliminator has not been obstructed (if applicable)? (R276, 279)
19	Are filter, strainer or other approved devices located immediately upstream from the meter? (R277)
20	Is there a sealed flow control valve or restrictor plate (if applicable)? (R280)
21	Is a check valve or other approved means installed to keep the primed and prevent backflow (if applicable)? (R280, SVM 1-34)
22	Is all product delivered downstream from the transfer point and all product retained upstream of the transfer point? Can the piping/hose downstream of the meter be readily inspected? (R282)
23	Do multiple outlet systems comply with installation and marking requirements? (R282)
24	Is a quick acting valve installed near the outlet for inspection purposes? (R283)
25	Is there an automatic means (solenoid valve) to stop flow when missing pulses are detected? (SVM 1-14)
26	In multi-product systems are there interlocked valves to prevent the delivery of more than one product at a time? ((SVM 1-38)
27	Are all automatic valves having a throttling effect located downstream of the meter? (285)
28	Is there a spring-loaded anti-drain valve installed at the outlet end of the delivery hose(s)? (R286)
29	ATC's temperature sensor and test well must be installed within one meter of the meter (if applicable) and no components are to be installed between the ATC sensor and the meter (SVM 2-23, 25)

#	Checklist (Notice of Approval (NOA) & MAL's)
30	Is the test thermal well installed adjacent to the sensor, so that it will retain thermal conducting fluid during a test? (if applicable) (SVM 2-24)
31	Provision for systems having hose(s) longer than 5 meters (if applicable) (V01)
32	Piping downstream of the meter should be closely examined to determine whether product can be re-directed to the feeding tank during a transaction.
33	Piping, valves and other components must be examined for leakage. Particular attention must be given to suction piping. For safety and accuracy; any leakage should be repaired before inspection.

Inspection Procedure:

Inspector Technicians (IT) shall follow the Measurement Canada's most current *"Field Inspection Manual"* and use this procedure as reference only if printed.

#	Test Outline	Inspection Procedure
1	Display Segment Test, *STP-3*	- Blanks out for 0.5 seconds then blinks 8888. - Check that all segments of each digit illuminate and extinguish as required.
2	Display Minimum Graduation Size	Reference: SVM 1-20 (A to E), V7, R126, 127,128,139
3	Return to Zero Test, *STP-1*	-Reset the device to zero -In the case of mechanical registers where the digits are returned to zero by mechanical advancement, ensure that the elements of registration are obscured until zero position is reached. -Mechanical printers must be interlocked so that they can print only the delivered/displayed volume. -In the case of devices that use a push button, or other similar mechanisms, to initiate the reset-to-zero process, ensure that the process cannot be stopped until the zero position is reached. -All means of indication and recording of a device (gross, volume, net volume, printed volume) including money register on price computing devices, must all return to zero when the reset-to-zero mechanism is activated. This requirement applies as well to computers interfaced to measuring devices. -The ability of a device to properly return-to-zero can be assessed every time the device is reset-to-zero following performance tests.

#	Test Outline	Inspection Procedure
4	Interlock Test, *STP-2*	-When the device is off and registering a quantity, attempt to turn the pump on and deliver product without resetting the register to zero. -Any attempt to deliver product before resetting the device must fail.
5	Delivery Cross Over Test, *STP-15*	- Following a flow test on one unit; while the pump is still operating, carefully place the nozzle in a safe place out of the traffic. -Attempt to obtain product from the second unit without returning the register to zero or without activating the on/off levers/ switch. -Any attempt to obtain product from a non-activated / non- reset-to-zero unit must fail.
6	Flow Rate Determination *STP-21*	-Flow Rate (L/min) = Number of litres X 60 (Sec/min), Elapsed Time (min) -If max rated flow of a device is exceeded then the installation of a sealable flow control valve or orifice plate may be necessary. (R280) Or you can also do this when you do the fast flow
7	Prover Wet Down, *STP-22*	- Fill Prover to nominal capacity. (While doing this Maximum flow rate can be performed). -Inspect prover for leaks while unit is full, being sure to complete the prover checklist. -Empty prover and allow draining. (Draining time starts when continuous stream breaks to a drip).
8	Prover Shell Correction, *STP -23*	-As stated in Bulletin V-17 “The factors are rounded to the nearest 10ml and are suitable for reading of the + 1% of the nominal prover volume. - Ensure to use Thermometer Corrections for appropriate probes where applicable
9	Slow Flow Test, *STP-4*	-For dispensers and Refuellers Minimum Approved Flow Rate + 5 Litres/min. -For all meters other than dispensers and Refuellers Minimum Approved Flow Rate + 10% of Minimum Approved Flow Rate -Limit of Error (LOE) for this test is +/- 100ml in service -Limit of Error (LOE) for Refuellers is +/- 3/8% = 0.9375 L in service -Meter Error % =(meter registration – corrected prover volume/corrected prover volume) x 100

#	Test Outline	Inspection Procedure
10	Fast Flow Test, *STP-5*	-This accuracy test is to be completed at the maximum possible flow rate within approved limits of the device. -The LOE (limits of Error) for this test is +/- 100ml Dispensers and +/- 3/8 % for Refuellers. In service -If the flow rate is higher than the approved Max, install an orifice plate downstream of the meter.(R280,V3) -Ensure prover shell correction factors and thermometer probe corrections are used.
11	Backlash Test, *STP-14*	-This test is performed on Dispensers and Refuellers only. -Quick repetitive starting and stopping of product flow after the fast flow test to determine the accuracy of the meter. (Repetitive start and stops 5 (five) times minimum). -A second delivery must not be outside the Limits of Error.
12	Automatic Temperature Compensator (ATC) *STP-18*	-This procedure tests the ability of the ATC to make that conversion within the applicable limit of error. -Ensure sufficient product is circulated to stabilize the temperature to within 0.5ºC during the test run -Stop delivery, then begin a new delivery and take temperature readings at the meter with the electronic thermometer at 25%, 50%, 75% and 95% of the test volume. Average temperature,(Remember to consider probe corrections if applicable). NET /GROSS = VCF -The temperature found from the calculated VCF from the Net and Gross run must match the average temperature as per API Table found during the run +/- 1deg C. (R 270) -The minimum run to calculate ATC is found in SVM 2-22, and is defined as the minimum graduation size multiplied by 2000. 0.1 X 2000 = 200 litres for Refuellers 0.01 X 2000 = 20 litres for dispensers

#	Test Outline	Inspection Procedure
13	Repeatability, *STP-7*	-This test applies to any metering device. It should be performed when the difference between the result of the fast test and the result of the slow test exceeds the absolute value of the in-service limit of error for the particular test quantity used. LOE on 100ml Prover = 100ml X 2/5 = 40ml LOE on 0.9375 l prover = 0.9375l X 2/5 = .375 litres -If the Inspector did the FAST RUN last, the result can be used as the first run for the repeatability test at the fast flow. -On Initial Inspections Repeatability Test must be performed. -The repeatability test requires three consecutive test runs at the same rate of flow. Repeatability test may be performed at flow rate other than fast rate.
14	Computed Value Test, *STP-10*	This test ensures that computed total price values, when provided, are correct within applicable limits of error. -Following a flow test multiply the indicated volume by the price per unit volume. -The computed value must match rounded up to the nearest cent.
15	Anti-drain Test, *STP-11*	- Conduct this test as a full fast-flow test, recording all readings - Following an accuracy test turn the pump off - Open the nozzle while holding the hose above the level of the nozzle. Some product may flow from the nozzle as it empties, but there should be no steady flow. - Close the nozzle reset the meter to zero without re-priming the hose and perform another fast flow accuracy test. The results of this test cannot be outside the LOE for the test. - Although there are no specific limits of error for product leaking from a faulty check valve or anti-drain valve, any leakage must not affect the accuracy of subsequent tests in such a manner that it will cause measurement errors beyond the allowable limits of error. - Ensure the system is full at all times.

#	Test Outline	Inspection Procedure
16	Hose Expansion, *STP-12*	This test verifies that there is no measured but undelivered product, beyond the prescribed limits of error, filling the hose due to expansion because of excessive or weakened materials. This test is intended to simulate actual use by the device operator. -Perform a full flow test. Note the results (turn off the pump) - Open the nozzle to relieve the pressure in the hose, paying attention not to lose any product due to gravity in the case of a faulty anti-drain valve. - Close the nozzle and drain test measure. Start the dispenser. Open the nozzle and proceed with another full flow test. Note the result. -During these tests did the device remain within the appropriate LOE? +/- 100ml on test volume of 20 liters for conventional dispensers - Refuellers +/- 937ml on test volume of 250 liters
17	Agreement Between Registers, *STP-9*	-Run a fast flow test and print at least one ticket. -Compare its value with the visual indication, ensure they agree -Run a slow flow test and print at least one ticket. -Compare its value with the visual indication, ensure they agree -A measuring machine with two indicator faces check for agreement at the start and at the stop test
18	EMI/RFI Susceptibility Test, *STP-20*	While there is not an LOE provided for these tests, a change of more than one increment of registration is considered to be sufficient to indicate that the device is susceptible to EMI and/or RFI.
19	Masking or Suppression test, *STP-24*	This test is normally done when a problem is suspected.
20	Prepay Test, *STP-17*	-This test verifies the precision of any automatic shut-off mechanisms. -The dispensers must indicate at least the present amount (present price or present quantity) and not go beyond 50ml (5 times the value of minimum increment prescribed by SVM 1-20. -Any Shortage Indicates Non- Compliance -This test is not a volume accuracy test that requires a test measure.
21	Product Blend Test, *STP-16*	-Performance test on mid ratio and blends are optional. -An ATC test does not need to be conducted on product. -To avoid contamination determine where the test product will be returned to storage before delivering blended product. -Interlock should also prevent the delivery of unauthorized blends. -Weights and Measures legislation only deals with quantity and computed price. Any suspected instances of incorrect blend or product quality are to be reported to the device owner, and, if necessary, to other authorities (provincial government, transport Canada or Environment Canada etc.

#	Test Outline	Inspection Procedure
22	ATC Temperature Sensor Failure Test, *STP-19*	-Confirm that the temperature sensor and test thermal well have been installed in accordance with SVM 2-11, during operation of the device, disconnect the temperature sensor. The flow of product should stop either immediately or within few liters. -The device should indicate a probe or temperature failure and should not dispense. -This test is normally only done on initial inspection or if a problem is suspected. If this test is done on some dispensers it may require resetting the system using a laptop. Be aware of the dispensers and their requirements before doing this test.
23	Printer Requirements *Bulletin V-20*	-To ensure the printer ticket has all necessary information included in its design. - Refer to bulletin V-20. Hand written receipts are only acceptable if the customer is present and able to see starts and stop of the register readings.
24	Review *IPO's*	Go to the *IPO's* and review to ensure that all tests have been completed to this point, ensure that all tests and visual inspections have been completed before moving on to Markings.
25	Marking	-Is the device marked with all required information? -Is the marking is of a permanent nature? -If a plate is used, is it permanently affixed to the device? -Price per unit faceplate marked with monetary units (if applicable)? -When replacing a missing serial plate and unable to obtain information regarding serial numbers, a new serial plate may be made taking information from NOA. *(GEN-39)* Example: A-0023-014-1234567 A-0023------is NEEI's Accreditation number 014---------is the Inspector Technician's number 1234567—is the ORA certificate number -Plate information includes: Manufacturer, Model Number, Serial Number, Approval Number, Max/Min Flow Rating, and Initial Inspection markings.(R21) *(GEN-39)*
26	Sealing	Reference: R32, R 234, 235, 246, SVM 1-8, 9, SVM 2-7, 10 Other than initial inspection were all seals and stickers in place before the inspection began
27	Paperwork	Write the examination certificate and complete work order on ORA (Online Reporting Application). Then submit to accreditation department in Port Coquitlam by mail or email weekly at maximum

QPM – 02: Type 52 – Bulk, Rack, and Truck Mounted Petroleum Product

General:

This inspection procedure/checklist applies to all bulk, rack, and truck mounted meters for petroleum products, initial examination, subsequent inspections and calibration.

Note that the Inspector Technician is responsible for all testing and inspection procedures.

Inspection Preparation:

Prior to initiating any inspection, the inspector should create work order in ORA and check establishment records to determine:

- The number of devices located in the establishment.
- Any specialized equipment or test requirements (NOA).
- Previous enforcement action(s) and or restrictions.

Entrance Interview:

During the course of the entrance interview, the inspector shall:

- Identify themselves to the person in charge of the inspection site by showing their identification and presenting a business card.
- State the purpose of the inspection visit, briefly explain what the inspection will entail and advise of any special requirements (i.e. Equipment, product, slowing or stopping work in a particular area).
- Identify and adhere to all establishment and NEEI safety rules.

Exit Interview:

During the course of the exit interview, the inspector shall insure the trader understands:

- The results of the inspection (even if no violations were encountered).
- Any follow-up action, which must be taken to correct non-compliances.
- The inspector shall update/review the trader's information (contact name, fax number, e-mail address) and inform them that they will receive a copy of examination certificate from ORA.

Procedure Type 52

The IPO's and STP's are the minimum test requirements for the initial, subsequent inspection and verification of the device or system under test. Circumstances and type of inspection (i.e. initial,) may warrant additional tests. When an inspector deems it necessary to perform additional tests, care must be taken to ensure these tests adhere to the intent the **Weights and Measures Act and Regulations.** Inspector shall follow the Measuring Canada's "Field Inspection Manual and inspector should be read in conjunction with the NOTICE OF APPROVAL (NOA) for the device or system being inspected. Certain devices have been exempted from particular requirements of the Weights and Measures Act,

Regulations or Specifications or have unique operating features, which may not be addressed in the Inspection Procedure. Weights and Measures Bulletins, Rulings and Interpretations should also be referenced as required.

All Inspector Technicians are responsible to complete and file the inspection report for all the examination work they conduct including printed ticket if any.

Visual Inspection:

#	Checklist (Visual Inspection)
1	Is the device approved for use in trade? (Act 8)
2	Is the device suitable for actual use? (R 271, 272)
3	Initially inspected and the initial inspection marking are complying (if applicable) (Dye or approval label) (R29, V8, V9)
4	Seals are intact (ATC and calibration seals if applicable)?
5	Printed ticket is complies?
6	Installation has been reviewed?
7	Marking and labeling of multiple outlets system is correct? (R282)
8	Is there leak in system?
9	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
10	Is the device primary register positioned for customer viewing?(R143, 144)

Standards Check:

#	Checklist (Provers)
1	Has a Prover Check list been completed for the appropriate prover size and tests to be done? (NEE - 06)
2	Has the Prover size been properly selected? Example: Minimum Prover size= 1 minute at full flow (V3-4.5, V24, STP's and IPO's)
3	Have the appropriate drip times been selected for the prover being used? (V3, Standards, Field Inspection Manual)
4	Is Bulletin V17 available for the shell temperature corrections for the type and size of the Prover to be used? (Refuellers only).

#	Checklist (Thermometers)
1	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
2	Does the thermometer have any damage?
3	Are the thermometers seals intact?
4	Does the thermometer display shows complete digits without defect?
5	Is the probe clear from any physical damage
6	Is the Certificate of designation for the thermometer current and readily available?
7	Is the Ice point test current and available for the thermometer in use?
8	Were the temperature correction factors applied properly in the Ice point testing procedures?
9	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

Notice of Approval (NOA) & MAL's

Inspector shall review the current copy of the NOA from Measurement Canada Notice of Approval Database. To insure that the device is in every respect identical to that submitted for approval and to determine that there are no restrictions.

#	Checklist (Notice of Approval (NOA) & MAL's)
1	Is the most current Notice of approval for the device physically present?
2	Has the Notice of Approval been reviewed?
3	Have all Software versions been checked, and reviewed?
4	Check the NOA for info on approved components (printers, air eliminators...)
5	Has the device bear the initial inspection marks? (R29, V8, V9)
6	Is the device suitable for actual use? (R 271, 272)
7	Register with ATC uses a volume correction factor, Authorized for the actual liquid (R236, SVM 2-4, Bulletin V10, 12, 13, and 18)
8	Is the device marked with the required information (Manufacturers name, model and serial number, approval Number, maximum and minimum flow rates, Volume Corrected to 15° C, etc.)? (NOA, R21)
9	Is the information located as required and marking permanent? (R18)
10	Marking plate is permanently and correctly affixed to the device? (R18)

#	Checklist (Notice of Approval (NOA) & MAL's)
11	Labeling/marking of multiple outlet systems are correct (Indicator valves or lights etc.)? (R282)
12	Initial Inspection Marks are present (if applicable) (Dye or approval label)? (R29)
13	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
14	Marking and labeling of multiple outlets system is correct? (R282)
15	Marking device usage RESTRICTIONS correct? (NOA, R70)
16	Is the device installed in accordance with restriction and the Conditions listed in the NOA and in accordance with the Manufacturer's instructions? (NOA, R 68, 69, 70)
17	Is the device adequately secured and protected against abnormal environmental factors; connected to an adequate Electrical supply as prescribed by the manufacturer; and attached components do not adversely affect its performance? (R24, 141, 142)
18	Is the device primary register positioned for customer viewing?(R143, 144)
19	Is the minimum graduation installed in accordance with restrictions and conditions listed in the NOA and in accordance with manufacturer's instructions? (NOA, R68, 69, 70)
20	Means of registration of total price; is there sufficient number of total digits? (SVM 1-21)
21	Has the device/system convenient means to allow for testing and inspection? (R284)
22	Blending Dispensers: if one meter is equipped with ATC and operational, all meters must be so equipped. (SVM2-27)
23	Are piping and accessories installed to minimize the passage of air or vapours? (R274)
24	Are adequate air prevention and elimination system in place; Air eliminator has not been obstructed (if applicable)? (R276, 279)
25	Are filter, strainer or other approved devices located immediately upstream from the meter? (R277)
26	Is there a sealed flow control valve or restrictor plate (if applicable)? (R280)
27	Is a check valve or other approved means installed to keep the primed and prevent backflow (if applicable)? (R280, SVM 1-34)
28	Is all product delivered downstream from the transfer point and all product retained upstream of the transfer point? Can the piping/hose downstream of the meter be readily inspected? (R282)
29	Do multiple outlet systems comply with installation and marking requirements? (R282)
30	Is a quick acting valve installed near the outlet for inspection purposes? (R283)
31	Is there an automatic means (solenoid valve) to stop flow when missing pulses are detected? (SVM 1-14)
32	In multi-product systems are there interlocked valves to prevent the delivery of more than one product at a time? (SVM 1-38)

#	Checklist (Notice of Approval (NOA) & MAL's)
33	Are all automatic valves having a throttling effect located downstream of the meter? (285)
34	Is there a spring-loaded anti-drain valve installed at the outlet end of the delivery hose(s)? (R286)
35	ATC's temperature sensor and test well must be installed within one meter of the meter (if applicable) and no components are to be installed between the ATC sensor and the meter (SVM 2-23, 25)
36	Is the test thermal well installed adjacent to the sensor, so that it will retain thermal conducting fluid during a test? (if applicable) (SVM 2-24)
37	Provision for systems having hose(s) longer than 5 meters (if applicable) (V01)
38	Piping downstream of the meter should be closely examined to determine whether product can be re-directed to the feeding tank during a transaction.
39	Piping, valves and other components must be examined for leakage. Particular attention must be given to suction piping. For safety and accuracy; any leakage should be repaired before inspection.
40	Have the appropriate drip times been selected for the prover being used? (V3, Standards, Field Inspection Manual)
41	Are the current Inspection Certificates readily available for the prover being used?
42	Is Bulletin V17 available for the shell temperature corrections for the type and size of the Prover to be used? (Refuellers only)
43	Has a Prover Check list been completed for the appropriate prover size and tests to be done? (NEE - 06)
44	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
45	Is the Certificate of accuracy for the thermometer current and readily available?
46	Is the Ice point test current and available for the thermometer in use?
47	Were the temperature correction factors applied properly in the Ice point testing procedures?
48	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

Inspection Procedure:

Inspector Technicians (IT) shall follow the Measurement Canada's most current "Field Inspection Manual" and use this procedure as reference only if printed.

#	Test Outline	Inspection Procedure
1	Display Segment Test, *STP-3*	- Reset register without PTO engaged - Blanks out for 0.5 seconds then blinks 8888. - Check that all segments of each digit illuminate and extinguish as required.
2	Display Minimum Graduation Size	Reference: SVM 1-20 (A to E), V7, R126, 127,128,139 To ensure the register display conforms to regulations governing the minimum increment of measure to be displayed
3	Return to Zero Test, *STP-1*	-Reset the device to zero -In the case of mechanical registers where the digits are returned to zero by mechanical advancement, ensure that the elements of registration are obscured until zero position is reached. -Mechanical printers must be interlocked so that they can print only the delivered/displayed volume. -In the case of devices that use a push button, or other similar mechanisms, to initiate the reset-to-zero process, ensure that the process cannot be stopped until the zero position is reached. -All means of indication and recording of a device (gross, volume, net volume, printed volume) including money register on price computing devices, must all return to zero when the reset-to-zero mechanism is activated. This requirement applies as well to computers interfaced to measuring devices. -The ability of a device to properly return-to-zero can be assessed every time the device is reset-to-zero following performance tests.
4	Prover Wet Down, *STP-22*	- Fill Prover to nominal capacity. (While doing this Maximum flow rate can be performed). -Inspect prover for leaks while unit is full, being sure to complete the prover checklist. -Empty prover and allow draining. (Draining time starts when continuous stream breaks to a drip).
5	Flow Rate Determination *STP-21*	-Flow Rate (L/min) = Number of litres X 60 (Sec/min), Elapsed Time (min) -If max rated flow of a device is exceeded then the installation of a sealable flow control valve or orifice plate may be necessary. (R280)

#	Test Outline	Inspection Procedure
6	Interlock Test, *STP-2*	-When the device is off and registering a quantity, attempt to turn the pump on and deliver product without resetting the register to zero. -Any attempt to deliver product before resetting the device must fail. -It is required that metering systems such as vehicle mounted meters, loading rack meters equipped with only one delivery outlet unless the diversion of liquid is readily apparent to the purchaser by means of selector valves, lights and signs. This does not apply to metering systems used to fuel or defuel aircraft and to propane metering systems intended to be used to fill large tanks (5000 litres or more) -Truck mounted meters equipped with dual outlets must also be equipped with selector valves such as three-way two port valves so that only one hose may be used at a time: 1.Set the meter for one outlet 2. Attempt to deliver product from the other. 3. Check for leaks between the two outlets at intermediate positions of the selector valve. 4. Ensure that the selection feature of multiple outlet systems designed for the use of one hose at a time operates as prescribed.
7	Prover Shell Correction, *STP -23*	-As stated in Bulletin V-17 “The factors are rounded to the nearest 10ml and are suitable for reading of the + 1% of the nominal prover volume. - Ensure to use Thermometer Corrections for appropriate probes where applicable
8	Slow Flow Test, *STP-4*	- The accuracy curve of a meter is dependent on the flow rate. Every meter is rated, and approved with a minimum and maximum flow rate within which it must operate accurately. This test verifies the accuracy at the rated minimum or slowest metering speed, whichever is greatest.. -For all meters other than dispensers and Refuellers (Minimum Approved Flow Rate) + (10% of Minimum Approved Flow Rate) - Limit of Error (LOE) for this test is +/-.25% - Ensure use if the prover correction factors and temperature probe correction tables -Meter Error % =(meter registration – corrected prover volume/corrected prover volume) x 100
9	Intermediate Flow Test *STP-06*	- This test applies to any metering device equipped with a register that has a linearization feature, (meter curve correction factors). - Set the device to display or print the programmed correction factors. -Determined whether there are odd or extreme values that have been programmed at particular flow rates. -Perform an accuracy test at the suspected flow rate following the procedure for a fast flow test.

#	Test Outline	Inspection Procedure
10	Fast Flow Test, *STP-5*	-This accuracy test is to be completed at the maximum possible flow rate within approved limits of the device. - The LOE (limits of Error) for this test is +/-.25% -If the flow rate is higher than the approved Max, install an orifice plate downstream of the meter.(R280,V03) -Ensure prover shell correction factors and thermometer probe corrections are used. - Meter Error % = [(Register – Corrected Prover)/ Corrected Prover] X 100
11	Repeatability, *STP-7*	-This test applies to any metering device. It should be performed when the difference between the result of the fast test and the result of the slow test exceeds the absolute value of the in-service limit of error for the particular test quantity used. LOE on 500L Prover = 1.25LX 2/5 = .5L -If the Inspector did the FAST RUN last, the result can be used as the first run for the repeatability test at the fast flow. -On Initial Inspections Repeatability Test must be performed. -The repeatability test requires three consecutive test runs at the same rate of flow. Repeatability test may be performed at flow rate other than fast rate
12	Linearization (Electronic Only) *STP-30*	-At any flow rate within the approved range; the meter must provide accurate measurement, regardless of any linearization circuits. Normal enforcement procedures apply when non-compliance is detected. Where it appears that the meter may have been deliberately set to provide short-measure at the usual or normal operating flow rate the meter must be reported to Measurement Canada as a major non-conformance and is subject to seizure by MC. -Deliberate manipulation of the linearization circuits may be detected as follows: It will appear when checking the preset values. One correction factor will have been set significantly lower than the others. A test of the meter at the flow rate for the correction factor would confirm that the meter short measures.
13	Computed Value Test, *STP-10*	This test ensures that computed total price values, when provided, are correct within applicable limits of error. -Following a flow test multiply the indicated volume by the price per unit volume. -The computed value must match rounded up to the nearest cent.

#	Test Outline	Inspection Procedure
14	Anti-drain Test, *STP-11*	- Conduct this test as a full fast-flow test, recording all readings - Following an accuracy test turn the pump off - Open the nozzle while holding the hose above the level of the nozzle. Some product may flow from the nozzle as it empties, but there should be no steady flow. - Close the nozzle reset the meter to zero without re-priming the hose and perform another fast flow accuracy test. The results of this test cannot be outside the LOE for the test. - Although there are no specific limits of error for product leaking from a faulty check valve or anti-drain valve, any leakage must not affect the accuracy of subsequent tests in such a manner that it will cause measurement errors beyond the allowable limits of error. - Ensure the system is full at all times.
15	Split Compartment Test *STP-08*	A split compartment/out-of-product test verifies the proper operation of air elimination systems when the storage tank or supply lines for the product being measured is pumped dry. It also shows how consistent the transfer point operations are working. -At the normal operating rate of the meter; start the test from a compartment containing less liquid than the capacity of the prover. -Continue the pumping until product runs out and causes the register to stop or until a Maximum of 30 seconds has elapsed whichever comes first. -Without shutting off the pump; open the valve from the compartment that contains sufficient product to complete the test. -Continue the delivery until the product level is in the readable portion of the prover neck sight-glass. -Compare the meter register reading to the volume actually delivered into the prover. The difference is in litres Vs Last fast flow. For meter size 2.5 inch or smaller, the LOE is 2.25 litres For meter size 3 inch or larger, the LOE is 3.75 litres

#	Test Outline	Inspection Procedure
16	Hose Expansion, *STP-12*	This test verifies that there is no measured but undelivered product, beyond the prescribed limits of error, filling the hose due to expansion because of excessive or weakened materials. This test is intended to simulate actual use by the device operator. -Un-Reel all but the last row in the hose from the hose reel -At the end of the test run, while the hose is pressured, close the quick acting valve or stop button on the flow computer so that the automatic flow control valve closes.(“Note”, this will isolate the pressurized hose from the other components of the measuring system) -Note the measurement indicated by the gauge plate of the prover -Open the nozzle for 5 seconds draining the resulting product into the prover. -Note the measurement indicated by the gauge plate. Determine the difference in volume from measurement taken in step 3. -Amount of registration on the register shall not exceed 1.25 liters.(based on 500litres standard)
17	Agreement Between Registers, *STP-9*	-Run a fast flow test and print at least one ticket. -Compare its value with the visual indication, ensure they agree -Run a slow flow test and print at least one ticket. -Compare its value with the visual indication, ensure they agree -A measuring machine with two indicator faces check for agreement at the start and at the stop test
18	EMI/RFI Susceptibility Test, *STP-20*	While there is not an LOE provided for these tests, a change of more than one increment of registration is considered to be sufficient to indicate that the device is susceptible to EMI and/or RFI.
19	Delivery Cross Over Test, *STP-15*	- Following a flow test on one unit; while the pump is still operating, carefully place the nozzle in a safe place out of the traffic. -Attempt to obtain product from the second unit without returning the register to zero or without activating the on/off levers/ switch. -Any attempt to obtain product from a non-activated / non- reset-to-zero unit must fail.

#	Test Outline	Inspection Procedure
20	Product Blend Test, *STP-16*	-Performance test on mid ratio and blends are optional. -An ATC test does not need to be conducted on product. -To avoid contamination determine where the test product will be returned to storage before delivering blended product. -Interlock should also prevent the delivery of unauthorized blends. -Weights and Measures legislation only deals with quantity and computed price. Any suspected instances of incorrect blend or product quality are to be reported to the device owner, and, if necessary, to other authorities (provincial government, transport Canada or Environment Canada etc.
21	Automatic Temperature Compensator (ATC) *STP-18*	-This procedure tests the ability of the ATC to make that conversion within the applicable limit of error. -Ensure sufficient product is circulated to stabilize the temperature to within 0.5ºC during the test run -Stop delivery, then begin a new delivery and take temperature readings at the meter with the electronic thermometer at 25%, 50%, 75% and 95% of the test volume. Average temperature,(Remember to consider probe corrections if applicable). NET /GROSS = VCF -The temperature found from the calculated VCF from the Net and Gross run must match the average temperature as per API Table found during the run +/- 1deg C. (R 270) -The minimum run to calculate ATC is found in SVM 2-22, and is defined as the minimum graduation size multiplied by 2000. 0.1 X 2000 = 200 litres for Refuellers 0.01 X 2000 = 20 litres for dispensers
22	ATC Temperature Sensor Failure Test, *STP-19*	-Confirm that the temperature sensor and test thermal well have been installed in accordance with SVM 2-11, during operation of the device, disconnect the temperature sensor. The flow of product should stop either immediately or within few liters. -The device should indicate a probe or temperature failure and should not dispense. -This test is normally only done on initial inspection or if a problem is suspected. If this test is done on some dispensers it may require resetting the system using a laptop. Be aware of the dispensers and their requirements before doing this test.
23	Printer Requirements *Bulletin V-20*	-To ensure the printer ticket has all necessary information included in its design. - Refer to bulletin V-20. Hand written receipts are only acceptable if the customer is present and able to see starts and stop of the register readings.

#	Test Outline	Inspection Procedure
24	Dual Product, Single Meter Applications	If the system is a dual product, single meter system you must carry out number of tests using the other products used in the system. 1. Line flush to avoid cross contamination of the products. 2.Wet Down 3.Slow Flow Test 4.Fast Flow Test 5.Repeatability Test (if necessary) 6.Hose Expansion Test 7.Split Compartment Test (if required) 8.ATC Tests
25	Review *IPO's*	Go to the IPO's and review to ensure that all tests have been completed to this point, ensure that all tests and visual inspections have been completed before moving on to Markings.
26	Marking	-Is the device marked with all required information? -Is the marking is of a permanent nature? -If a plate is used, is it permanently affixed to the device? -Price per unit faceplate marked with monetary units (if applicable)? -When replacing a missing serial plate and unable to obtain information regarding serial numbers, a new serial plate may be made taking information from NOA. (GEN-39) Example: A-0023-014-1234567 A-0023------is NEEI's Accreditation number 014---------is the Inspector Technician's number 1234567—is the ORA certificate number -Plate information includes: Manufacturer, Model Number, Serial Number, Approval Number, Max/Min Flow Rating, and Initial Inspection markings.(R21) (GEN-39)
27	Sealing	Reference: R32, R 234, 235, 246, SVM 1-8, 9, SVM 2-7, 10 Other than initial inspection were all seals and stickers in place before the inspection began.
27	Paperwork	Write the examination certificate and complete work order on ORA (Online Reporting Application). Then submit to accreditation department in Port Coquitlam by mail or email weekly at maximum

QPM – 03: Type 50, 51, 52 – Propane Metering

General:

This inspection procedure/checklist applies to all dispenser, bulk, rack, and truck mounted meters for Propane metering, initial examination, subsequent inspections and calibration, using gravimetric prover.

Note that the Inspector Technician is responsible for all testing and inspection procedures.

Inspection Preparation:

Prior to initiating any inspection, the inspector should create work order in ORA and check establishment records to determine:

- The number of devices located in the establishment.
- Any specialized equipment or test requirements (NOA).
- Previous enforcement action(s) and or restrictions.

Entrance Interview:

During the course of the entrance interview, the inspector shall:

- Identify themselves to the person in charge of the inspection site by showing their identification and presenting a business card.
- State the purpose of the inspection visit, briefly explain what the inspection will entail and advise of any special requirements (i.e. Equipment, product, slowing or stopping work in a particular area).
- Identify and adhere to all establishment and NEEI safety rules.

Exit Interview:

During the course of the exit interview, the inspector shall insure the trader understands:

- The results of the inspection (even if no violations were encountered).
- Any follow-up action, which must be taken to correct non-compliances.
- The inspector shall update/review the trader's information (contact name, fax number, e-mail address) and inform them that they will receive a copy of examination certificate from.

Procedure Type 50, 51, and 52 Propane Metering

The IPO's and STP's are the minimum test requirements for the initial, subsequent inspection and verification of the device or system under test. Circumstances and type of inspection (i.e. initial,) may warrant additional tests. When an inspector deems it necessary to perform additional tests, care must be taken to ensure these tests adhere to the intent *the Weights and Measures Act and Regulations* . Inspector shall follow the Measuring Canada's *"Field Inspection Manual"* and inspector should be read in conjunction with the NOTICE OF APPROVAL (NOA) for the device or system being inspected. Certain devices have been exempted from particular requirements of the Weights and Measures Act,

Regulations or Specifications or have unique operating features, which may not be addressed in the Inspection Procedure. Weights and Measures Bulletins, Rulings and Interpretations should also be referenced as required.

All Inspector Technicians are responsible to complete and file the inspection report for all the examination work they conduct, with printed ticket if applicable.

Visual Inspection:

#	Checklist (Visual Inspection)
1	Is the device approved for use in trade? (Act 8)
2	Is the device suitable for actual use? (R 271, 272)
3	Initially inspected and the initial inspection marking are complying (if applicable) (Dye or approval label) (R29, V8, V9)
4	Seals are intact (ATC and calibration seals if applicable)?
5	Printed ticket is complies?
6	Installation has been reviewed?
7	Marking and labeling of multiple outlets system is correct? (R282)
8	Is there leak in system?
9	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
10	Is the device primary register positioned for customer viewing?(R143, 144)

Standards Check:

#	Checklist (Thermometers)
1	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
2	Does the thermometer have any damage?
3	Are the thermometers seals intact?
4	Does the thermometer display shows complete digits without defect?
5	Is the probe clear from any physical damage
6	Is the Certificate of designation for the thermometer current and readily available?
7	Is the Ice point test current and available for the thermometer in use?
8	Were the temperature correction factors applied properly in the Ice point testing procedures?
9	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

Notice of Approval (NOA) & MAL's

Inspector shall review the current copy of the NOA from Measurement Canada *Notice of Approval Database*. To insure that the device is in every respect identical to that submitted for approval and to determine that there are no restrictions.

#	Checklist (Notice of Approval (NOA) & MAL's)
1	Is the most current Notice of approval for the device physically present?
2	Has the Notice of Approval been reviewed?
3	Have all Software versions been checked, and reviewed?
4	Check the NOA for info on approved components (printers, air eliminators...)
5	Has the device bear the initial inspection marks? (R29, V8, V9)
6	Is the device suitable for actual use? (R 271, 272)
7	Register with ATC uses a volume correction factor, Authorized for the actual liquid (R236, SVM 2-4, Bulletin V10, 12, 13, and 18)
8	Is the device marked with the required information (Manufacturers name, model and serial number, approval Number, maximum and minimum flow rates, Volume Corrected to 15° C, etc.)? (NOA, R21)
9	Is the information located as required and marking permanent? (R18)
10	Marking plate is permanently and correctly affixed to the device? (R18)
11	Labeling/marking of multiple outlet systems are correct (Indicator valves or lights etc.)? (R282)
12	Initial Inspection Marks are present (if applicable) (Dye or approval label)? (R29)
13	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
14	Marking and labeling of multiple outlets system is correct? (R282)
15	Marking device usage RESTRICTIONS correct? (NOA, R70)
16	Is the device installed in accordance with restriction and the Conditions listed in the NOA and in accordance with the Manufacturer's instructions? (NOA, R 68, 69, 70)
17	Is the device adequately secured and protected against abnormal environmental factors; connected to an adequate Electrical supply as prescribed by the manufacturer; and attached components do not adversely affect its performance? (R24, 141, 142)
18	Is the device primary register positioned for customer viewing?(R143, 144)
19	Is the minimum graduation installed in accordance with restrictions and conditions listed in the NOA and in accordance with manufacturer's instructions? (NOA, R68, 69, 70)
20	Means of registration of total price; is there sufficient number of total digits? (SVM 1-21)

#	Checklist (Notice of Approval (NOA) & MAL's)
21	Has the device/system convenient means to allow for testing and inspection? (R284)
22	Blending Dispensers: if one meter is equipped with ATC and operational, all meters must be so equipped. (SVM2-27)
23	Are piping and accessories installed to minimize the passage of air or vapours? (R274)
24	Are adequate air prevention and elimination system in place; Air eliminator has not been obstructed (if applicable)? (R276, 279)
25	Are filter, strainer or other approved devices located immediately upstream from the meter? (R277)
26	Is there a sealed flow control valve or restrictor plate (if applicable)? (R280)
27	Is a check valve or other approved means installed to keep the primed and prevent backflow (if applicable)? (R280, SVM 1-34)
28	Is all product delivered downstream from the transfer point and all product retained upstream of the transfer point? Can the piping/hose downstream of the meter be readily inspected? (R282)
29	Do multiple outlet systems comply with installation and marking requirements? (R282)
30	Is a quick acting valve installed near the outlet for inspection purposes? (R283)
31	Is there an automatic means (solenoid valve) to stop flow when missing pulses are detected? (SVM 1-14)
32	In multi-product systems are there interlocked valves to prevent the delivery of more than one product at a time? ((SVM 1-38)
33	Are all automatic valves having a throttling effect located downstream of the meter? (285)
34	Is there a spring-loaded anti-drain valve installed at the outlet end of the delivery hose(s)? (R286)
35	ATC's temperature sensor and test well must be installed within one meter of the meter (if applicable) and no components are to be installed between the ATC sensor and the meter (SVM 2-23, 25)
36	Is the test thermal well installed adjacent to the sensor, so that it will retain thermal conducting fluid during a test? (if applicable) (SVM 2-24)
37	Provision for systems having hose(s) longer than 5 meters (if applicable) (V01)
38	Piping downstream of the meter should be closely examined to determine whether product can be re-directed to the feeding tank during a transaction.
39	Piping, valves and other components must be examined for leakage. Particular attention must be given to suction piping. For safety and accuracy; any leakage should be repaired before inspection.
40	Has the Prover size been properly selected? Example: Minimum Prover size = 1 minute at full flow (V3-4.5, V24, STP's and IPO's)
41	Have the appropriate drip times been selected for the prover being used? (V3, Standards, Field Inspection Manual)
42	Are the current Inspection Certificates readily available for the prover being used?

#	Checklist (Notice of Approval (NOA) & MAL's)
43	Is Bulletin V17 available for the shell temperature corrections for the type and size of the Prover to be used? (Refuellers only)
44	Has a Prover Check list been completed for the appropriate prover size and tests to be done? (NEE - 06)
45	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
46	Is the Certificate of accuracy for the thermometer current and readily available?
47	Is the Ice point test current and available for the thermometer in use?
48	Were the temperature correction factors applied properly in the Ice point testing procedures?
49	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

Scale Calibration Check

#	Checklist (Scale Calibration Check)
1	Ensure the prover pump outlet hose to the hose reel is disconnected
2	Ensure the pump outlet hose is fully scale born (if applicable)
3	Ensure the ISC valve is closed
4	Ensure all hoses from the Hydrometer chamber are fully scale born (if app.)
5	Release the weighbridge by lowering the mechanism
6	Exercise the scale 5 or 6 times by camming the scale up and down
7	Ensure the weighbridge is free floating
8	Ensure the load cells are properly oriented
9	Ensure adequate clearance around the scale platform
10	Energize the scale by powering-up the scale indicator
11	Remove all test weights from the scale and Zero the scale weight indicator
12	Place 50 Kg or 100 lb over each load cell, one at a time
13	Determine if all load cells are reading within 20 grams of each other
14	IF NOT A CELL MUST BE MADE BY ASJUSTING THE POTENTIOMETER IN THE JUNCTION BOX
15	Determine that each cell agrees with the other within 20 grams
16	Once load cells are in agreement with each other, remove the weights
17	Check zero and re-zero if necessary

Weight Build-up Test

#	Checklist (Weight Build-up Test)
1	Place weights equally on both sides of the scale
2	Note scale reading at 40Kg, 80Kg, 160Kg, or 100 lb, 200 lb, 400 lb etc until 80% scale capacity
3	Scale reading should be within 20 grams of true scale weight
4	IF NOT, then a scale calibration must be performed
5	DO NOT, exceed 80% of tank capacity as this would mean tank overfilled

Reference Scale Sensitivity Test

The purpose of the sensitivity test is used to determine whether the device is capable of sensing a small change of load and of changing its indication accordingly. This test is performed at no load and at the top end of the scale's testing range.

#	Checklist (Reference Scale Sensitivity Test)
1	Automatic zero tracking features disabled or mass added to take it outside its range
2	Smoothly add certified test standard(s) equal to scale graduation
3	Record the indication
4	Repeat the test near or at the top of the scale testing range
5	Record indication
6	The addition or removal of the load must cause a change of 1 graduation. If the reference scale does not meet this requirement, it is not deemed suitable.

Reference Scale Repeatability Test

The purpose of this test is to determine if the scale can repeat indication when the same load is reapplied to the scale several times, in approximately the same manner.

#	Checklist (Reference Scale Repeatability Test)
1	Use a test load or test quantity of approximately ½ the range that the reference scale is intended to be used
2	Apply test load to the weighting element and note the indication
3	Remove the entire load
4	Repeat test at least two more times by applying the load approximately the same area of the weighting element and in the same manner
5	Note all indications obtained
6	Ensure the results of the test do not exceed one graduation for the same load
7	The reference scale can be used if the difference between the results obtained for the same load, does not exceed 1 scale graduation. If the reference scale does not meet this requirement, it is not suitable for use.

Mobile Propane Prover – Setup Checklist

#	Checklist (Mobile Propane Prover – Setup)
1	Check over trailer before it leaves the yard
2	Ensure all certification required hydrometers, weights, thermometer etc. accompany the prover and are readily available
3	At site, park trailer and disconnect from truck in a safe area ta is close to power
4	Park truck or device to be inspected close, so hoses from all units reach
5	Leveling Trailer • Level both sides and both ends of the trailer, repeat as often as necessary • Ensure the trailer wheels are off the ground • Place safety cones as required around the test area • Place fire extinguisher of appropriate size and rating for product used 10 to 15 feet upwind of the testing site • Plug in prover to warm load cells make sure cords are arranged so you are not falling over them.

#	Checklist (Mobile Propane Prover – Setup)
6	Release Weighbridge Procedures • Remove front stops • Lift bed to top of cam • Remove protection stops at all loads cells • Set loads cells with adjustment nuts • Ensure gap maintained between adjusting bolt and load cell • Release weighbridge • Exercise weighbridge 5 or 6 times • Ensure bed is floating freely • Bungee cord weighbridge handle to ensure bed remains floating • Ensure ISC valve is closed at prover • Ensure all hoses to hydrometer chamber are scale born • Energize scale (if not already done) • Let load cells warm up • Ensure all electrical grounding is in place and working. Double check grounds are operational.

Hook-UPS for Running Tests

#	Checklist (Hook-UPS for Running Tests)
1	Pump product back truck
2	Remove prover reel hose from truck and close valves
3	Reel up prover hose so is completely scale born
4	Close prover doors to prevent scale movement from wind
5	Tare scale
6	Hook up truck reel hose to prover inlet
7	Start computer on device to be tested
8	Turn on PTO
9	Open hose valve and prover inlet valve and run appropriate amount of product to complete the test
10	Adjust the truck idle as required
11	Check temperatures for averaging during run at 4 positions of floe
12	Run completed, turn off PTO

#	Checklist (Hook-UPS for Running Tests)
13	Close valves at prover inlet and truck reel hose
14	Pump Off -Attach prover reel hose to truck liquid valve -Open valves as required -Start pump and pump off
15	REPEAT PROCEDURE FOR ANY OTHER RUNS THAT ARE REQUIRED BY INSPECTION

Connection to truck or Device for circulation and Testing

#	Checklist (Connection to truck or Device for circulation and Testing)
1	Connect prover hose reel to truck liquid input
2	Open valve on Nozzle on prove line
3	Open valve on truck liquid in line slowly
4	Check for leaks
5	Set computer to calibration
6	Open all pertinent truck valves
7	Open truck vapor line
8	Open pump by-pass line
9	Open truck internal valves
10	Attach truck hose reel to prover inlet line
11	Open and close valve at prover inlet then check for leaks
12	Place certified thermometers in the proper thermal wells
13	Put computer in the start position
14	Start pump
15	Check for leaks again
16	Start computer
17	Open prover valve start flow
18	Open prover ISC valve
19	Start prover pump to begin circulation of product
20	Continue to circulate until temperature stabilizes at 0.5 °C
21	Filling Hydrometer Chamber -Remove truck hose reel line from prover inlet and attach to Hydrometer Chamber Inlet

Conducting a Run and Empty Prover

#	Checklist (Conducting a Run and Empty Prover)
1	• Re-set computer to initiate a run • Tare scale • Connect supply line to prover inlet • Turn on pump (if slow run use small pump) • Re-set computer for any run up • Open supply line downstream valve • Run appropriate amount of product • On completion of run close downstream supply line valve • Turn off pump • Disconnect supply line (as per previous instructions) • Let scale stabilize before taking any weight readings
2	Empty Prover and Hydrometer • Open valve and turn on pump-off pump simultaneously • When prover tank is empty, open downstream hydrometer valve • Tap hydrometer to ensure hydrometer is not over evacuation hole • When empty close downstream hydrometer chamber valve • Close valve and turn off pump simultaneously

Hydrometer Procedures for Liquefied Gas Products

#	Checklist (Hydrometer Procedures for Liquefied Gas Products)
1	Hydrometer Purging • Use this procedure with the filling procedure • Connect a supply to Hydrometer chamber inlet valve • Slowly deliver a small quantity of product (2cm) to the chamber • Stop dispensing product and close the inlet bale • Open small purge valve on top of chamber SLOWLY • Allow the liquid to boil, changing from a liquid to vapour state • Ensure the vapour displaces and evacuate any air • Ensure the temperature drop does not exceed 5 °C to prevent damage • Boil product for 10 to 15 seconds • Close purge valve • Repeat if necessary

#	Checklist (Hydrometer Procedures for Liquefied Gas Products)
2	Floating Hydrometer • After above procedure float the hydrometer, fill the chamber to ¾ full • Above procedure done slowly to prevent damage to hydrometer and temperature prob. • Do not vent chamber and check leaks • Ensure chamber is out of sunlight and wait for temperature stabilization
3	Hydrometer and Thermometer Reading • The thermometer must be read to the nearest 0.1°C • The hydrometer must be read to 0.25 kg/m3 (1/2 graduation) • Record the readings • Correct the temperature reading from the thermometer certification • Correct the hydrometer readings from the hydrometer certification • Double check all reads frequently at least at start and at finish • Convert observed density and temperature reading to 15°C using appropriate • Tables or Measurement Canada computer program
4	Temperature reading: the temperature inside the hydrometer chamber should be recorded immediately after the hydrometer reading is determined. Both reading must be corrected to the correction factor on the certificates
5	Repeatable results: A second set of readings should be made. The corrected result should agree to within a value of two graduations of the proceeding corrected density reading.
6	More readings: this procedure should be repeated until two consecutive readings agree
7	If the product supply tank is refilled during inspections, the new density and test runs must be performed as the density of the product may have changed
8	A small amount of liquid product may be left in the hydrometer chamber to ensure vapor is present and to eliminate the need for purging at the next inspection

Inspection Procedure:

Inspector Technicians (IT) shall follow the Measurement Canada's most current *"Field Inspection Manual"* and use this procedure as reference only if printed.

#	Test Outline	Inspection Procedure
1	Display Segment Test, *STP-3*	- Reset register without PTO engaged - Blanks out for 0.5 seconds then blinks 8888. - Check that all segments of each digit illuminate and extinguish as required.
2	Display Minimum Graduation Size	Reference: SVM 1-20 (A to E), V7, R126, 127,128,139 To ensure the register display conforms to regulations governing the minimum increment of measure to be displayed.
3	Return to Zero Test, *STP-1*	-Reset the device to zero -In the case of mechanical registers where the digits are returned to zero by mechanical advancement, ensure that the elements of registration are obscured until zero position is reached. -Mechanical printers must be interlocked so that they can print only the delivered/displayed volume. -In the case of devices that use a push button, or other similar mechanisms, to initiate the reset-to-zero process, ensure that the process cannot be stopped until the zero position is reached. -All means of indication and recording of a device (gross, volume, net volume, printed volume) including money register on price computing devices, must all return to zero when the reset-to-zero mechanism is activated. This requirement applies as well to computers interfaced to measuring devices. -The ability of a device to properly return-to-zero can be assessed every time the device is reset-to-zero following performance tests.

#	Test Outline	Inspection Procedure
4	Interlock Test, *STP-2*	-When the device is off and registering a quantity, attempt to turn the pump on and deliver product without resetting the register to zero. -Any attempt to deliver product before resetting the device must fail. -It is required that metering systems such as vehicle mounted meters, loading rack meters equipped with only one delivery outlet unless the diversion of liquid is readily apparent to the purchaser by means of selector valves, lights and signs. This does not apply to metering systems used to fuel or defuel aircraft and to propane metering systems intended to be used to fill large tanks (5000 litres or more) -Truck mounted meters equipped with dual outlets must also be equipped with selector valves such as three-way two port valves so that only one hose may be used at a time 1.Set the meter for one outlet 2. Attempt to deliver product from the other. 3. Check for leaks between the two outlets at intermediate positions of the selector valve. 4. Ensure that the selection feature of multiple outlet systems designed for the use of one hose at a time operates as prescribed.
5	Slow Flow Test, *STP-4*	- The accuracy curve of a meter is dependent on the flow rate. Every meter is rated, and approved with a minimum and maximum flow rate within which it must operate accurately. This test verifies the accuracy at the rated minimum or slowest metering speed, whichever is greatest.. -For all meters other than dispensers and Refuellers (Minimum Approved Flow Rate) + (10% of Minimum Approved Flow Rate) - Limit of Error (LOE) for this test is +/-.75% - Ensure use if the prover correction factors and temperature probe correction tables -Meter Error % =(meter registration – corrected prover volume/corrected prover volume) x 100
6	Intermediate Flow Test *STP-06*	- This test applies to any metering device equipped with a register that has a linearization feature, (meter curve correction factors). - Set the device to display or print the programmed correction factors. -Determined whether there are odd or extreme values that have been programmed at particular flow rates. -Perform an accuracy test at the suspected flow rate following the procedure for a fast flow test.

#	Test Outline	Inspection Procedure
7	Fast Flow Test, *STP-5*	-This accuracy test is to be completed at the maximum possible flow rate within approved limits of the device. - The LOE (limits of Error) for this test is +/-.75% -If the flow rate is higher than the approved Max, install an orifice plate downstream of the meter.(R280,V03) -Ensure prover shell correction factors and thermometer probe corrections are used. - Meter Error % = [(Register – Corrected Prover)/ Corrected Prover] X 100
8	Repeatability, *STP-7*	-This test applies to any metering device. It should be performed when the difference between the result of the fast test and the result of the slow test exceeds the absolute value of the in-service limit of error for the particular test quantity used. LOE on 500L Prover = 1.25LX 2/5 = .5L -If the Inspector did the FAST RUN last, the result can be used as the first run for the repeatability test at the fast flow. -On Initial Inspections Repeatability Test must be performed. -The repeatability test requires three consecutive test runs at the same rate of flow. Repeatability test may be performed at flow rate other than fast rate.
9	Computed Value Test, *STP-10*	This test ensures that computed total price values, when provided, are correct within applicable limits of error. -Following a flow test multiply the indicated volume by the price per unit volume. -The computed value must match rounded up to the nearest cent.
10	Prepay Test (Motor Fuel Dispensers) *STP-17*	-Request the operator to set a prepaid quantity of less than the test measure volume. -Run a full-flow test. -Repeat the test but this time by requesting the operator to set a prepaid amount of money -As a prepay test starts with the hose pressurized and ends with the hose unpressurized except for the anti-drain valve pressure, a hose expansion test may be done immediately after a prepay test to ensure that the prepay mode is not causing excessive errors in subsequent deliveries -The dispensers must indicate at least the preset amount (preset price or preset quantity) and not go beyond 50 ml (5 times the value of minimum increment prescribed by SVM.1-20).
11	Agreement Between Registers, *STP-9*	-Run a fast flow test and print at least one ticket. -Compare its value with the visual indication, ensure they agree -Run a slow flow test and print at least one ticket. -Compare its value with the visual indication, ensure they agree -A measuring machine with two indicator faces check for agreement at the start and at the stop test

#	Test Outline	Inspection Procedure
12	EMI/RFI Susceptibility Test, *STP-20*	While there is not an LOE provided for these tests, a change of more than one increment of registration is considered to be sufficient to indicate that the device is susceptible to EMI and/or RFI.
13	Delivery Cross Over Test, *STP-15*	- Following a flow test on one unit; while the pump is still operating, carefully place the nozzle in a safe place out of the traffic. -Attempt to obtain product from the second unit without returning the register to zero or without activating the on/off levers/ switch. -Any attempt to obtain product from a non-activated / non- reset-to-zero unit must fail.
14	Automatic Temperature Compensator (ATC) *STP-18*	-This procedure tests the ability of the ATC to make that conversion within the applicable limit of error. -Ensure sufficient product is circulated to stabilize the temperature to within 0.5ºC during the test run -Stop delivery, then begin a new delivery and take temperature readings at the meter with the electronic thermometer at 25%, 50%, 75% and 95% of the test volume. Average temperature, (Remember to consider probe corrections if applicable). NET /GROSS = VCF -The temperature found from the calculated VCF from the Net and Gross run must match the average temperature as per API Table found during the run +/- 1deg C. (R 270) -The minimum run to calculate ATC is found in SVM 2-22, and is defined as the minimum graduation size multiplied by 2000. 0.1 X 2000 = 200 litres for Refuellers 0.01 X 2000 = 20 litres for dispensers
15	ATC Temperature Sensor Failure Test, *STP-19*	-Confirm that the temperature sensor and test thermal well have been installed in accordance with SVM 2-11, during operation of the device, disconnect the temperature sensor. The flow of product should stop either immediately or within few liters. -The device should indicate a probe or temperature failure and should not dispense. -This test is normally only done on initial inspection or if a problem is suspected. If this test is done on some dispensers it may require resetting the system using a laptop. Be aware of the dispensers and their requirements before doing this test.
16	Printer Requirements *Bulletin V-20*	-To ensure the printer ticket has all necessary information included in its design. - Refer to bulletin V-20. Hand written receipts are only acceptable if the customer is present and able to see starts and stop of the register readings.
17	Procedure for Determining Density *STP-41*	The procedure provides guidance to inspection staff needing to determine the density of a product during gravimetric testing of liquid gas meters.

#	Test Outline	Inspection Procedure
18	Review *IPO's*	Go to the *IPO's* and review to ensure that all tests have been completed to this point, ensure that all tests and visual inspections have been completed before moving on to Markings.
19	Marking	-Is the device marked with all required information? -Is the marking is of a permanent nature? -If a plate is used, is it permanently affixed to the device? -Price per unit faceplate marked with monetary units (if applicable)? -When replacing a missing serial plate and unable to obtain information regarding serial numbers, a new serial plate may be made taking information from NOA. *(GEN-39)* Example: A-0023-014-1234567 A-0023------is NEEI's Accreditation number 014---------is the Inspector Technician's number 1234567—is the ORA certificate number -Plate information includes: Manufacturer, Model Number, Serial Number, Approval Number, Max/Min Flow Rating, and Initial Inspection markings.(R21) *(GEN-39)*
20	Sealing	Reference: R32, R 234, 235, 246, SVM 1-8, 9, SVM 2-7, 10 Other than initial inspection were all seals and stickers in place before the inspection began.
27	Paperwork	Write the examination certificate and complete work order on ORA (Online Reporting Application). Then submit to accreditation department in Port Coquitlam by mail or email weekly at maximum

QPM – 04: Type 50.10,52.10-12,52.20-22 – Gravimetric Testing of Lube Oil Meters

General:

This inspection procedure/checklist applies to all dispenser, bulk, rack, and truck mounted meters for Lube Oil meters, initial examination, subsequent inspections and calibration, using gravimetric prover.

Note that the Inspector Technician is responsible for all testing and inspection procedures.

Inspection Preparation:

Prior to initiating any inspection, the inspector should create work order in ORA and check establishment records to determine:

- The number of devices located in the establishment.
- Any specialized equipment or test requirements (NOA)
- Previous enforcement action(s) and or restrictions.

Entrance Interview:

During the course of the entrance interview, the inspector shall:

- Identify themselves to the person in charge of the inspection site by showing their identification and presenting a business card.
- State the purpose of the inspection visit, briefly explain what the inspection will entail and advise of any special requirements (i.e. Equipment, product, slowing or stopping work in a particular area).
- Identify and adhere to all establishment and NEEI safety rules.

Exit Interview:

During the course of the exit interview, the inspector shall insure the trader understands:

- The results of the inspection (even if no violations were encountered)
- Any follow-up action, which must be taken to correct non-compliances
- The inspector shall update/review the trader's information (contact name, fax number, e-mail address) and inform them that they will receive a copy of examination certificate from ORA.

Procedure Type 50.10, 52.10-12, 52.20-22 – Gravimetric Testing of Lube Oil Meters

The Specialised Test Procedure is the minimum test requirements for the initial, subsequent inspection and verification of the device or system under test. Circumstances and type of inspection (i.e. initial,) may warrant additional tests. When an inspector deems it necessary to perform additional tests, care must be taken to ensure these tests adhere to the intent *the Weights and Measures Act and Regulations* . Inspector shall follow the Measuring Canada's *"Field Inspection Manual"* and inspector should be read in conjunction with the NOTICE OF APPROVAL (NOA) for the device or system being inspected. Certain devices have been exempted from particular requirements of the Weights and Measures Act, Regulations or Specifications or have unique operating features, which may not be addressed in the Inspection Procedure. Weights and Measures Bulletins, Rulings and Interpretations should also be referenced as required.

All Inspector Technicians are responsible to complete and file the inspection report for all the examination work they conduct.

Visual Inspection:

#	Checklist (Visual Inspection)
1	Is the device approved for use in trade? (Act 8)
2	Is the proper Notice of Approvals present and read? (for meter and register)
3	Is the device suitable for the actual use? R2721, R272
4	Initially inspected and the initial inspection marking are complying? R29,V08,V09
5	Are the flow rates within the approved range?(NOA, R290)
6	Seals are intact?
7	Printed ticket is complies? V-20
8	Installation has been reviewed?
9	Is there leak in system?

Notice of Approval (NOA) & MAL's

Inspector shall review the current copy of the NOA from Measurement Canada *Notice of Approval Database*. To insure that the device is in every respect identical to that submitted for approval and to determine that there are no restrictions.

#	Checklist (Notice of Approval (NOA) & MAL's)
1	Is the most current Notice of approval for the device physically present?
2	Has the Notice of Approval been reviewed?
3	Have all Software versions been checked, and reviewed?
4	Check the NOA for info on approved components (printers, air eliminators...)
5	Has the device bear the initial inspection marks? (R29, V8, V9)
6	Is the device suitable for actual use? (R 271, 272)
7	Register with ATC uses a volume correction factor, Authorized for the actual liquid (R236, SVM 2-4, Bulletin V10, 12, 13, and 18)

#	Checklist (Notice of Approval (NOA) & MAL's)
8	Is the device marked with the required information (Manufacturers name, model and serial number, approval Number, maximum and minimum flow rates, Volume Corrected to 15° C, etc.)? (NOA, R21)
9	Is the information located as required and marking permanent? (R18)
10	Marking plate is permanently and correctly affixed to the device? (R18)
11	Labeling/marking of multiple outlet systems are correct (Indicator valves or lights etc.)? (R282)
12	Initial Inspection Marks are present (if applicable) (Dye or approval label)? (R29)
13	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
14	Marking and labeling of multiple outlets system is correct? (R282)
15	Marking device usage RESTRICTIONS correct? (NOA, R70)
16	Is the device installed in accordance with restriction and the Conditions listed in the NOA and in accordance with the Manufacturer's instructions? (NOA, R 68, 69, 70)
17	Is the device adequately secured and protected against abnormal environmental factors; connected to an adequate Electrical supply as prescribed by the manufacturer; and attached components do not adversely affect its performance? (R24, 141, 142)
18	Is the device primary register positioned for customer viewing?(R143, 144)
19	Is the minimum graduation installed in accordance with restrictions and conditions listed in the NOA and in accordance with manufacturer's instructions? (NOA, R68, 69, 70)
20	Means of registration of total price; is there sufficient number of total digits? (SVM 1-21)
21	Has the device/system convenient means to allow for testing and inspection? (R284)
22	Blending Dispensers: if one meter is equipped with ATC and operational, all meters must be so equipped. (SVM2-27)
23	Are piping and accessories installed to minimize the passage of air or vapours? (R274)
24	Are adequate air prevention and elimination system in place; Air eliminator has not been obstructed (if applicable)? (R276, 279)
25	Are filter, strainer or other approved devices located immediately upstream from the meter? (R277)
26	Is there a sealed flow control valve or restrictor plate (if applicable)? (R280)
27	Is a check valve or other approved means installed to keep the primed and prevent backflow (if applicable)? (R280, SVM 1-34)
28	Is all product delivered downstream from the transfer point and all product retained upstream of the transfer point? Can the piping/hose downstream of the meter be readily inspected? (R282)

#	Checklist (Notice of Approval (NOA) & MAL's)
29	Do multiple outlet systems comply with installation and marking requirements? (R282)
30	Is a quick acting valve installed near the outlet for inspection purposes? (R283)
31	Is there an automatic means (solenoid valve) to stop flow when missing pulses are detected? (SVM 1-14)
32	In multi-product systems are there interlocked valves to prevent the delivery of more than one product at a time? ((SVM 1-38)
33	Are all automatic valves having a throttling effect located downstream of the meter? (285)
34	Is there a spring-loaded anti-drain valve installed at the outlet end of the delivery hose(s)? (R286)
35	ATC's temperature sensor and test well must be installed within one meter of the meter (if applicable) and no components are to be installed between the ATC sensor and the meter (SVM 2-23, 25)
36	Is the test thermal well installed adjacent to the sensor, so that it will retain thermal conducting fluid during a test? (if applicable) (SVM 2-24)
37	Provision for systems having hose(s) longer than 5 meters (if applicable) (V01)
38	Piping downstream of the meter should be closely examined to determine whether product can be re-directed to the feeding tank during a transaction.
39	Piping, valves and other components must be examined for leakage. Particular attention must be given to suction piping. For safety and accuracy; any leakage should be repaired before inspection.
40	Has the Prover size been properly selected? Example: Minimum Prover size = 1 minute at full flow (V3-4.5, V24, STP's and IPO's)
41	Have the appropriate drip times been selected for the prover being used? (V3, Standards, Field Inspection Manual)
42	Are the current Inspection Certificates readily available for the prover being used?
43	Is Bulletin V17 available for the shell temperature corrections for the type and size of the Prover to be used? (Refuellers only)
44	Has a Prover Check list been completed for the appropriate prover size and tests to be done? (NEE - 06)
45	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
46	Is the Certificate of accuracy for the thermometer current and readily available?
47	Is the Ice point test current and available for the thermometer in use?
48	Were the temperature correction factors applied properly in the Ice point testing procedures?
49	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

Platform Scale Calibration Procedure:

#	Checklist (Platform Scale Calibration Procedure)
1	Zero the device
2	Apply s test load of 1/3 Max (between 30% and 35% id acceptable) on the center of the platter (position number 1 on the appropriate graphic below). Record the indication. This position established the Maximum Permissible Error (MPE) applicable to the load. Loading of this position mandatory when the load used is not comprised of known standards (unknown load'0- optional when the load is known.
3	Apply the same test load on the device in such manner that the center of gravity of the test load lies approximately at the center of one of the numbered target boxes in the following illustration. Record the indication.
4	Proceed in the same manner with each of the other numbered target boxes. The test load should not overhang the edge of the Load Receiving Element 9LRE). Record the indications
5	Most LRE's will be rectangular, however, regardless of the shape of the LRE, it should be divided into quarters as illustrated and the appropriate test load applied in the approximate center of each quarter.

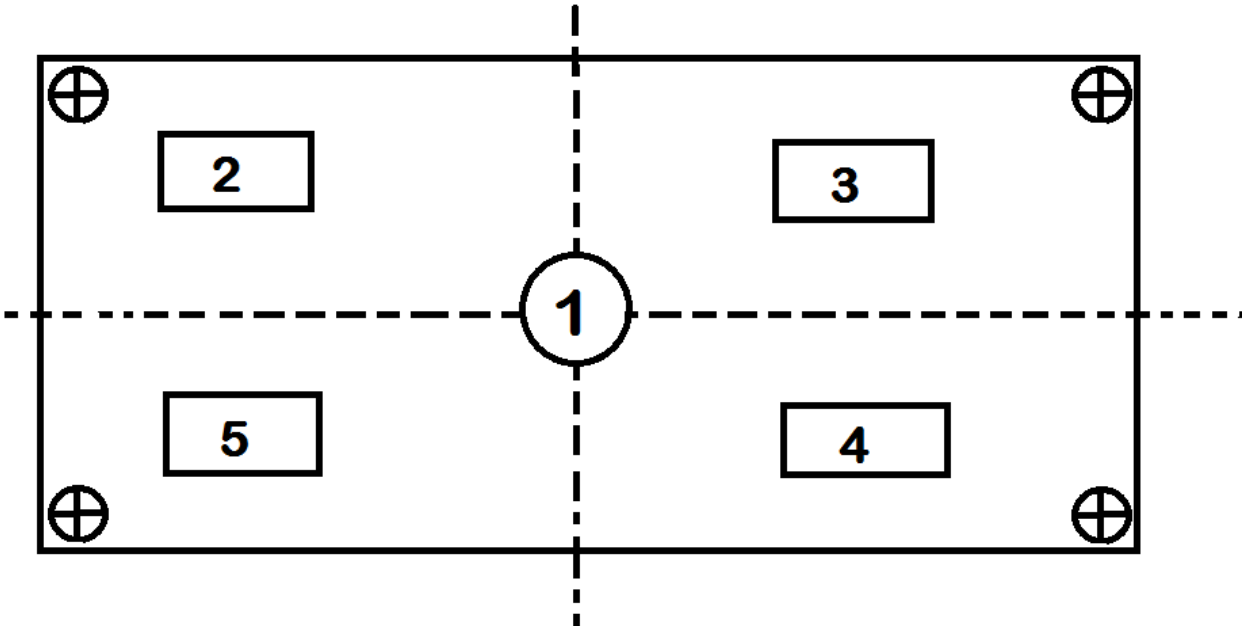


Figure1: Number of Supporting Points ≤ 4

A four load cell bench scale is shown with support in each of the four corners. The scale is divided vertically and horizontally into four equal quadrants. The center of the scale is numbered 1, while the four quadrants are then numbered in the center of each quadrant, clockwise starting from upper left quadrant, from 2 to 5. These are the locations for applying the test loads.

⊕ Identifies support point (Lever chair, load cell stand, flexure element, etc.)

Option: 25% Max placed on the LRE over the load cell may also be used to perform corner tests on platform, floor or bench scales having four (4) support points.

Two Pan Scale or Balance

Loading for two pan scale or balance is the same as for the bench platform scale. The test procedure is also the same, but the following loading pattern shall be observed.

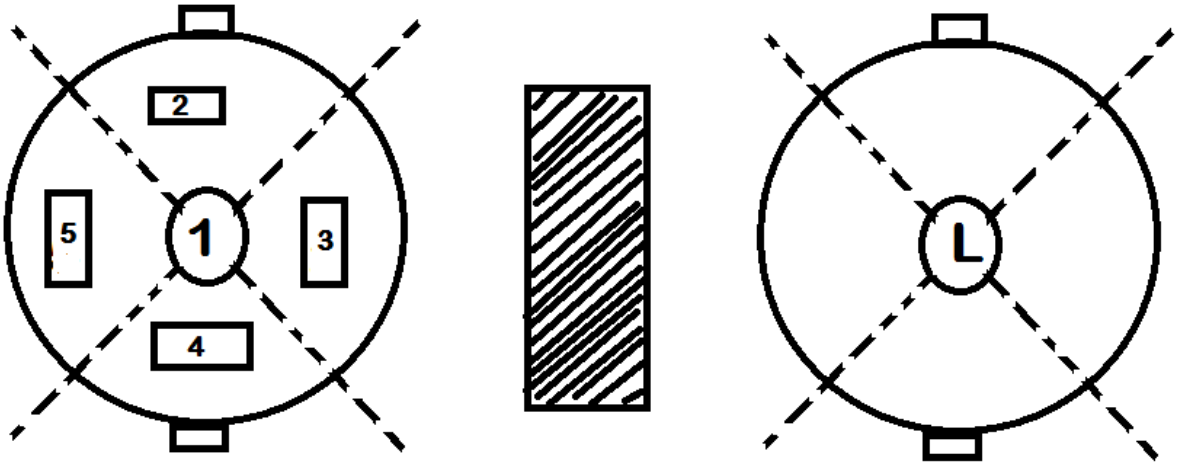


Figure 2: Two Pan Scale or Balance (equal or unequal arm)

Two round scale pans are shown. The first pan is divided diagonally into equal quadrants. The center of the first pan is numbered 1, while the four quadrants are then numbered in the center of each quadrant, clockwise starting from the top quadrant, from 2 to 5. These are the locations for applying the test loads. The second pan is labeled with an L in the exact center. This is the location for the counterweight. Once the left pan has been tested, the procedure is repeated for the right pan.

Practical Evaluation Check List for Gravimetric testing of Lube Oil Standards:

#	Checklist (Practical Evaluation Check List for Gravimetric testing of Lube Oil Standards)
1	Thermometer: -Check the certificate of calibration to make sure it is current (not expired date). -Make sure you are using the appropriate probe for the application. -Check the condition of the probe and the instrument (no damage, burnt out segments etc.). -Thermometer has minimum grad size of .1°C or less. -Check the log to ensure an ice point test has been done within the last 30 days. -Review the calibration certification for any calibration errors listed on the calibration document and the corrections are used for the probe in question.

#	Checklist (Practical Evaluation Check List for Gravimetric testing of Lube Oil Standards)
2	Test Standards (weights) -Check the certificate of calibration to make sure it is current for the local standards. -Check for any changes to the standards before using them. -Check the calibration adjustment ole to insure all calibration material is still in place and is marked with the logo date. -Make sure you have the correct amount of standards to properly check the reference scale to the required capacity.
3	Pycnometer -Check the certificate of calibration to make sure it is current (not expired date) -Check the pycnometer for signs of damage. -When taking a sample, check the mixture to ensure it is free of air. -Make sure the temperature is stable +/-.1°C and equalized with the pycnometer temperature. -When taking temperature make sure the probe does not touch the sides or bottom of the pycnometer. -Check the temperature after the weighing to make sure it has remained the same or not varied y more than .1°C.

Reference Scale – Density Determination

#	Checklist (Reference Scale – Density Determination)
1	Allow scale to warm up according to the instruction supplied by the manufacturer. If none available allow minimum of 5-10 minutes.
2	Make sure the scale is supported on a sturdy bench and is protected for drafts, wind etc.
3	Ensure you have a class 11 or better scale with a minimum graduation size .1g.
4	Ensure you have sufficient test standards to check the scale at a capacity equal to the weight of the filled pycnometer.

Lube Oil (Pistol) Dispensers

#	Checklist (Lube Oil (Pistol) Dispensers)
1	Check the appropriate notice of approval to ensure the dispenser is an approved model and design.
2	Ensure the meter is being used on the products listed in the notice of the approval

Information Plates

#	Checklist (Information Plates)
1	Ensure the meter, register or lube oil dispenser has a proper ID plate with the required space for initial markings.
2	Ensure the plate is permanently affixed to the device
3	Ensure the plates om a visible location
4	Ensure the required information is marked on the plate-model, serial number, approval number, and capacity.

Register Markings

#	Checklist (Register Markings)
1	Ensure the register's display indicates the correct symbols for the units of measurement
2	Ensure the register display the correct words or symbols for a momentary value.
3	If required by regulation, ensure the statements "Volume Corrected to 15°C is displayed in the correct locating.

Seals

#	Checklist (Seals)
1	Ensure seals are affixed to the mechanical calibration adjustment area of a register.
2	Ensure the register is sealed to the meter.
3	Ensure an electronic register's calibration is sealed whether it is a calibration switch or sealing software parameters.
4	Ensure the ATC switch is sealed.
5	Ensure temperature probe is sealed.
6	Ensure any other required seals installed

Indicator and Settings

#	Checklist (Indicator and Settings)
1	Check the register settings to see if linearization is used and the difference between
2	Settings are compliant with the requirements.
3	Is the minimum graduation size appropriate for he intended use?
4	Ensure the correct density setting is used for the intended product.
5	Ensure the ticket printer connected and is activated
6	Determine the correct average temperature of the product
7	Correct the indicated scale reading of delivered product (Scale error or correction factors)
8	Determine the correct test quantity delivered (corrected scale reading. Correction factors).
9	Correctly determine the meter error
10	What is the applicable LOE for the meter

Fast Flow Test:

#	Checklist (Fast Flow Test)
1	Do the required number of fast flow runs.
2	Fast flow test is performed on the outlet offering highest flow rate.
3	Do run at a constant flow.
4	Test run must be the minimum amount as per STP 27 Appendix 2.
5	Temperatures are recorded at four points during the run 25%, 50%, 75% and 95%. Temperatures must be averaged.
6	Record the indicated scale reading (correcting for scale error).
7	Determine the meter error.
8	Determine the applicable LOE for this device.
9	Does the device pass/fail-evaluating all requirements.

Repeatability Test:

#	Checklist (Repeatability Test)
1	Is a repeatability test required?
2	What qualifies as repeatability test?
3	Appropriate amount of product as per STP27 Appendix 2
4	Record temperature at the four points and average the temperature
5	Record and correct the indicated scale reading as required
6	Determine the known test quantity for each run (using corrected scale reading and other correction factors).
7	Correctly determine the meter repeatability error
8	Determine applicable LOE for this test
9	Does the meter pass/fail-evaluating all requirements

Agreement of Registration:

#	Checklist (Agreement of Registration)
1	Verify the agreement of indications and recordings
2	What is the applicable LOE for this test

QPM – 05: Conventional Pipe Provers

General:

This inspection procedure/checklist applies to all bulk and rack meters for Petroleum products, Propane, fertilizer and Lube Oil, initial examination, subsequent inspections and calibration, using conventional pipe provers.

Note that the Inspector Technician is responsible for all testing and inspection procedures.

Inspection Preparation:

Prior to initiating any inspection, the inspector should create work order in ORA and check establishment records to determine:

- The number of devices located in the establishment.
- Any specialized equipment or test requirements (NOA)
- Previous enforcement action(s) and or restrictions.
- Be sure that you know and have record of the last product tested by our equipment (pipe prover). Records must indicate the method used to clean the equipment. This ensures that no contamination will occur during the current testing.

Entrance Interview:

During the course of the entrance interview, the inspector shall:

- Identify themselves to the person in charge of the inspection site by showing their identification and presenting a business card.
- State the purpose of the inspection visit, briefly explain what the inspection will entail and advise of any special requirements (i.e. Equipment, product, slowing or stopping work in a particular area).
- Identify and adhere to all establishment and NEEI safety rules.

Exit Interview:

During the course of the exit interview, the inspector shall insure the trader understands:

- The results of the inspection (even if no violations were encountered)
- Any follow-up action, which must be taken to correct non-compliances
- The inspector shall update/review the trader's information (contact name, fax number, e-mail address) and inform them that they will receive a copy of examination certificate from ORA.

Procedure for Conventional Pipe prover

The Specialised Test Procedure is the minimum test requirements for the initial, subsequent inspection and verification of the device or system under test. Circumstances and type of inspection (i.e. initial,) may warrant additional tests. When an inspector deems it necessary to perform additional tests, care must be taken to ensure these tests adhere to the intent *the Weights and Measures Act and Regulations* . Inspector shall follow the Measuring Canada's *"Field Inspection Manual"*, this specialised test procedure and inspector should be read in conjunction with the NOTICE OF APPROVAL (NOA) for the device or system being inspected. Certain devices have been exempted from particular requirements of the Weights and Measures Act, Regulations or Specifications or have unique operating features, which may not be addressed in the Inspection Procedure. Weights and Measures Bulletins, Rulings and Interpretations should also be referenced as required. All Inspector Technicians are responsible to complete and file the inspection report for all the examination work they conduct.

Visual Inspection:

#	Checklist (Visual Inspection)
1	Is the device approved for use in trade? (Act 8)
2	Be sure that the prover being used has been calibrated and is currently certified by Measurement Canada. (Any modifications made to the prover since it was last calibrated that may affect calibrated volume, must be brought to the attention of Measurement Canada and the recognized technician, and no further use of the equipment in question may be authorized until follow –up inspection can be provided.)
3	You must confirm that the prover will be used within its stated capacity. This information is available; however, if it is not present, estimate the probable displacer velocity range: ·See WORK INSTRUCTIONS
4	Is the proper Notice of Approvals present and read? (for meter and register)
5	Is the device suitable for the actual use? R2721, R272
6	Initially inspected and the initial inspection marking are complying? R29,V08,V09
7	Are the flow rates within the approved range?(NOA, R290)
8	Seals are intact?
9	Printed ticket is complies? V-20
10	Installation has been reviewed?
11	Is there leak in system?

Notice of Approval (NOA) & MAL's

Inspector shall review the current copy of the NOA from Measurement Canada *Notice of Approval Database*. To insure that the device is in every respect identical to that submitted for approval and to determine that there are no restrictions.

#	Checklist (Notice of Approval (NOA) & MAL's)
1	Is the most current Notice of approval for the device physically present?
2	Has the Notice of Approval been reviewed?
3	Have all Software versions been checked, and reviewed?
4	Check the NOA for info on approved components (printers, air eliminators...)
5	Has the device bear the initial inspection marks? (R29, V8, V9)
6	Is the device suitable for actual use? (R 271, 272)
7	Register with ATC uses a volume correction factor, Authorized for the actual liquid (R236, SVM 2-4, Bulletin V10, 12, 13, and 18)
8	Is the device marked with the required information (Manufacturers name, model and serial number, approval Number, maximum and minimum flow rates, Volume Corrected to 15° C, etc.)? (NOA, R21)
9	Is the information located as required and marking permanent? (R18)
10	Marking plate is permanently and correctly affixed to the device? (R18
11	Labeling/marking of multiple outlet systems are correct (Indicator valves or lights etc.)? (R282)
12	Initial Inspection Marks are present (if applicable) (Dye or approval label)? (R29)
13	Units of measurement and if applicable the cents/litre or dollar/litre faceplate markings are appropriate (Location, size, appropriate decimals and numbers)? (R153, 136 and 137)
14	Marking and labeling of multiple outlets system is correct? (R282)
15	Marking device usage RESTRICTIONS correct? (NOA, R70)
16	Is the device installed in accordance with restriction and the Conditions listed in the NOA and in accordance with the Manufacturer's instructions? (NOA, R 68, 69, 70)
17	Is the device adequately secured and protected against abnormal environmental factors; connected to an adequate Electrical supply as prescribed by the manufacturer; and attached components do not adversely affect its performance? (R24, 141, 142)
18	Is the device primary register positioned for customer viewing?(R143, 144)
19	Is the minimum graduation installed in accordance with restrictions and conditions listed in the NOA and in accordance with manufacturer's instructions? (NOA, R68, 69, 70)
20	Means of registration of total price; is there sufficient number of total digits? (SVM 1-21)
21	Has the device/system convenient means to allow for testing and inspection? (R284)

#	Checklist (Notice of Approval (NOA) & MAL's)
22	Blending Dispensers: if one meter is equipped with ATC and operational, all meters must be so equipped. (SVM2-27)
23	Are piping and accessories installed to minimize the passage of air or vapours? (R274)
24	Are adequate air prevention and elimination system in place; Air eliminator has not been obstructed (if applicable)? (R276, 279)
25	Are filter, strainer or other approved devices located immediately upstream from the meter? (R277)
26	Is there a sealed flow control valve or restrictor plate (if applicable)? (R280)
27	Is a check valve or other approved means installed to keep the primed and prevent backflow (if applicable)? (R280, SVM 1-34)
28	Is all product delivered downstream from the transfer point and all product retained upstream of the transfer point? Can the piping/hose downstream of the meter be readily inspected? (R282)
29	Do multiple outlet systems comply with installation and marking requirements? (R282)
30	Is a quick acting valve installed near the outlet for inspection purposes? (R283)
31	Is there an automatic means (solenoid valve) to stop flow when missing pulses are detected? (SVM 1-14)
32	In multi-product systems are there interlocked valves to prevent the delivery of more than one product at a time? ((SVM 1-38)
33	Are all automatic valves having a throttling effect located downstream of the meter? (285)
34	Is there a spring-loaded anti-drain valve installed at the outlet end of the delivery hose(s)? (R286)
35	ATC's temperature sensor and test well must be installed within one meter of the meter (if applicable) and no components are to be installed between the ATC sensor and the meter (SVM 2-23, 25)
36	Is the test thermal well installed adjacent to the sensor, so that it will retain thermal conducting fluid during a test? (if applicable) (SVM 2-24)
37	Provision for systems having hose(s) longer than 5 meters (if applicable) (V01)
38	Piping downstream of the meter should be closely examined to determine whether product can be re-directed to the feeding tank during a transaction.
39	Piping, valves and other components must be examined for leakage. Particular attention must be given to suction piping. For safety and accuracy; any leakage should be repaired before inspection.
40	Has the Prover size been properly selected? Example: Minimum Prover size = 1 minute at full flow (V3-4.5, V24, STP's and IPO's)
41	Have the appropriate drip times been selected for the prover being used? (V3, Standards, Field Inspection Manual)
42	Are the current Inspection Certificates readily available for the prover being used?
43	Is Bulletin V17 available for the shell temperature corrections for the type and size of the Prover to be used? (Refuellers only)

#	Checklist (Notice of Approval (NOA) & MAL's)
44	Has a Prover Check list been completed for the appropriate prover size and tests to be done? (NEE - 06)
45	Is an Electronic Thermometer with a 0.1 °C graduation or less available?
46	Is the Certificate of accuracy for the thermometer current and readily available?
47	Is the Ice point test current and available for the thermometer in use?
48	Were the temperature correction factors applied properly in the Ice point testing procedures?
49	Are the appropriate API tables available for the temperature compensation factors (TCF) to be calculated?

During Set-up of Pipe Prover:

#	Checklist (During Set-up of Pipe Prover)
1	Be sure to inspect the condition of the metering installation being tested. This includes, but may not limited to; checking the condition of the prover fittings, and ensuring the gaskets are provided and in quality condition
2	Before connecting our pipe prover to the metering installation, be absolutely sure there is an adequate system for product return.
3	To ensure proper air and/or vapour venting
4	Locate the prover as close to the metering installation as possible, without jeopardizing suitable and safe working conditions. Be sure that the hoses have room to flex.

Connection of Pipe Prover to Metering Installation:

#	Checklist (Connection of Pipe Prover to Metering Installation)
1	If prover connections come equipped with the metering installation, they should be used. If necessary, the metering system outlet can be connected to the product return line.
2	If prover connections do not come equipped with the metering installation, which is the case with the majority of bottom loading systems, the pipe prover inlet must be connected to the delivery end of the metering installation
3	Be sure that you know and have record of whether the prover was last used on low vapour pressure liquid or high vapour pressure liquid.
4	Once the prover has been successfully connected to the metering installation, liquid must be allowed to pass through the meter and the prover until the temperature and pressure have stabilized to within +/- 0.5 degrees C and +/- 50 kPa
5	While the stabilization process is taking place you must check for leakage from the four-way valve by slowly opening the bleed valve or referring to the differential pressure gauge.

Determine and Establish the Proving "K" Factor:

#	Checklist (Determine and Establish the Proving "K" Factor)
1	Once stabilization of the prover and metering installation is complete
2	Be sure to recall the current programmed meter factor from the metering installation flow computer. This figure shall be recorded
3	Be sure to attain and record: - the meter volume, - total pulse count, - flow rate, - temperatures - pressures, which can be attained by a run at normal meter operating flow rate
4	You must calculate the proving K factor using the appropriate equation

Proving Runs and Proper Determination of Applicable Factors:

#	Checklist (Proving Runs and Proper Determination of Applicable Factors)
1	to conduct three proving runs at each operating speed in order to establish meter repeatability
2	Be sure that the pulse totalizer and meter register are reset to zero prior to beginning a run.In order to provide a quality test, be sure that the proper procedure is followed throughout the proving run
3	record all test data on proper work sheets at the completion of each proving run
4	If the system is stable and the flow rate is constant, system (meter) repeatability can be evaluated by calculating the difference between the highest and the lowest pulse count and dividing the result by the average pulse count. In terms of a percentage, the result should be less than 0.05.
5	Calculate the correction factors as they are applicable, and be sure to record them on the proper worksheet
6	Next, be sure to calculate the corrected prover volume (CPV) and the corrected meter volume (CMV) using
7	The new or "remained same" meter factor must now be calculated
8	Once the meter factor has been calculated you must calculate the meter registration error (E) using the appropriate equation

Calibrating the Flow Computer:

#	Checklist (Calibrating the Flow Computer)
1	Be sure the new meter factor (Mfn) determined at the time of the current proving is entered into the flow computer with the corresponding flow rate
2	Make sure the scale is supported on a sturdy bench and is protected for drafts, wind etc.
3	Ensure that the correct form of the meter factor is programmed. Depending on the metering installations format, either the meter factor or meter accuracy factor must be placed into memory
4	Be sure that you do not change the originally programmed base “K”

Post Proving Responsibilities:

#	Checklist (Post Proving Responsibilities)
1	Be sure that the prover is de-pressured and drained properly
2	bleed off any excess gas remaining in prover
3	Once the prover is completely drained, it must be properly cleansed, so not to contaminate the next liquid product to be run through it. This includes, but may not be limited to, cleansing with pressurized air, gasoline, or diesel. Consult authorized trader before cleansing the prover.
4	Properly disconnect hoses and stow them properly either on the prover (our hoses), or back in their correct place of storage (designated work site hoses).
5	Be sure that the hoses are properly fastened and/or stored, to ensure that they will not dislodge or be subjected unsatisfactory conditions.
6	Be sure also that meter and prover plugs and seals are properly replaced so to eliminate any chance of unwanted leakage.
7	Disconnect the grounds, and prepare the prover for transport.
8	Be sure that all remaining equipment used prior to or during the proving is properly placed back where it belongs. This includes, but may not be limited to, thermometers, gauges, and tools
9	Be sure that all documentation related to the proving has been completed and authorized by proper personnel
10	Make sure all proper work and authorized documentations are turned in to the Port Coquitlam branch, accreditation department

Interior prover piping cleansing procedure for Pipe Prover

The following procedures of interior cleansing ensure that no contamination and/or volumetric displacement occur during the liquid meter inspection process. Interior cleansing of prover piping is performed after every Inspection.

Cleansing After Proving Liquefied Petroleum Gas (LPG)

#	Checklist (Interior prover piping cleansing procedure for Pipe Prover)
1	The cleansing of pipe provers upon the completion of proving LPG's requires the use of nitrogen to purge the product out of the prover piping
2	Upon completion of the proving process, slowly discontinue the flow of product through the prover. This is done by slowly closing both the meter in and out valves and the prover in/out valves. This will allow the prover to depressurize enough to begin the nitrogen purge. Be sure to open and close the bleed valves before moving to next step.
3	Connect the nitrogen hose to the purging inlet, using the proper fitting, located on the side of the prover (just behind the tool compartment). Connect the outflow hose to the purging outlet on the opposite side of the prover, using the proper fitting
4	Slowly open both valves (purging inlet/outlet), and allow the nitrogen to push the LPG out of the prover piping. Allow this to continue until the truck is depressurized. Upon completion of the purging, you should be able to hear the nitrogen "whistling" through the pipes
5	Close both the in/out valves on the prover, and disconnect the hoses. Be sure that they are properly stowed back where they came from
6	After cleaning of the Volumetric Standard and all associated equipment, verify the condition of the Volumetric Standard and all associated equipment and document any non-conformities

Cleansing after Proving off Color Products (i.e. bunker)

#	Checklist (Cleansing after Proving off Color Products (i.e. bunker))
1	The cleansing of pipe provers upon completion of proving "off color" products requires a complete flush of the prover piping using either a naptha or gasoline product.
2	Upon completion of the proving process, the pipe prover is connected to a naptha or gasoline product flushing system.
3	The gasoline or naptha product is flushed through the prover piping, making sure to swing the four-way valve in the process. This ensures the "off color" and gasoline products are completely flushed through the piping.
4	A visual inspection of the product exiting the prover piping is then completed to ensure there is no "off color" liquid remaining. If the product exiting the prover is clear, the process is deemed complete.

Viscosity Liquids – special requirements

Low viscosity liquids (i.e. lube oil), while not highly flammable, and create static electricity, which can ignite other vapours in the test equipment (i.e. provers). For this reason, meters which measure low viscosity liquid should be initially inspected with pipe provers. Using pipe provers will significantly reduce the risks associated with testing these liquids with an open prover

Applicable Safety Procedures:

#	Checklist (Viscosity Liquids – special requirements)
1	Consult Low the designated trader about disposal of test liquid which may become contaminated with mineral spirits.
2	Only stainless steel provers with a spray ball shall be used. This will provide for proper cleaning procedures.
3	Be sure that the prover and all other vehicles involved are properly grounded.
4	Always have a fire extinguisher at your disposal. Be sure that it is in proper working condition, and readily available.
5	Be sure the prover is flushed with mineral spirits before testing begins, and between each run.
6	Before testing begins and between each proving run, be sure to test the prover for explosive mixtures by taking samples with a vapour detector from both the top and the bottom of the prover.
7	Complete each run at the minimum flow rate.

Aircraft Refueling Systems (Aviation Fuel):

Additional precaution must be taken when proving aircraft refueling meters. The designated trader shall be consulted regarding the necessary steps and precautions to be followed when handling the product. The steps required to do a quality cleansing of the prover, as to eliminate any chance of product contamination, shall also be brought to the attention of the designated trader.

Applicable Safety Procedures:

#	Checklist (Aircraft Refueling Systems (Aviation Fuel))
1	**Meter Used in Fuel Mode Only** - If the metering installation does not permit de-fueling of an aircraft using the meter, the standard procedure for pump supplied meters should be used.
2	**Meter Used in De-fuel Mode** - If the metering installation is designed so that the meter can be used to de-fuel an aircraft, the standard procedure for a pump supplied meter should be used to test the meter in fuel mode only. The prover shall be filled with the bottom loading connections. Once the fuel mode test is completed, the prover must not be drained. -The prover must remain filled, as the meter will be tested in de-fuel mode by draining the prover through the meter. -With the prover piping and hoses full, set the meter to de-fuel mode. This includes setting both the piping and the valves to de-fuel mode. -Be sure that the hose and upstream piping (used in de-fuel mode) are full. -Determine and record the liquid product level in the prover (PD). -Set the meter register to zero. -Drain the prover through the meter as if it were de-fueling an aircraft. -When the prover is empty, record the meter's reading (MD). -Set the system back in fuel mode and set the meter register to zero. Fill the prover in fuel mode and record the meter (MF) and prover (PF) readings. -Results of the proving on both fuel and de-fuel modes must now be calculated

Repeatability Test:

#	Checklist (Repeatability Test)
1	Is a repeatability test required?
2	What qualifies as repeatability test?
3	Appropriate amount of product as per STP27 Appendix 2
4	Record temperature at the four points and average the temperature
5	Record and correct the indicated scale reading as required
6	Determine the known test quantity for each run (using corrected scale reading and other correction factors).
7	Correctly determine the meter repeatability error
8	Determine applicable LOE for this test
9	Does the meter pass/fail-evaluating all requirements

Inspection Procedure – WORK INSTRUCTIONS

#	Checklist (Inspection Procedure – WORK INSTRUCTIONS)
1	Procedure for estimating the probable displacer velocity range: **Vd = 0.212 x Fl / Dia** Where: - Vd = the displacer velocity in m/s - Fl = the meter's flow rate in 1/min - Dia = the inside diameter of the prover in cm Once you have made the calculations, make sure that the probable displacer velocity falls within the following: **Bi-directional ball type prover: 0.1 m/s to 3.0 m/s** Although conventional pipe provers can be operated outside of this range, it may be unclear whether repeatability errors are a result of the meter or the prover.
2	Procedure for pressuring the prover when meter installation is equipped with prover connections -The system pump must be running. -The liquid shall be diverted into the prover by opening the prover loop valves on the metering installation. This must be done slowly as not to pressure up the prover too quickly. -The inlet and outlet of the prover can now be isolated by closing the block and bleed valve positioned between the prover connection points. -This will allow for the flow of the product to move through the prover, and stabilize both temperature and pressure. -The seal integrity shall be confirmed by slowly and carefully opening the bleed below the valve. -You must now wait until both the temperature and pressure of the prover and metering installation stabilize.
3	Procedure for pressuring the prover when meter installation is not equipped with prover connections: -The system pump must be running. -The delivery end of the metering installation is connected to the inlet of the prover, using only the appropriate API or dry break fitting. -The prover outlet is connected directly to the return line or to a vessel awaiting fill. -In this situation, with this type equipment, the liquid flow rate can be controlled by the prover ball using the inlet and outlet valves on the prover. -Again, do not attempt to pressure up to quickly, and allow the prover and metering installation time to stabilize.
4	Determining procedures based on previous use of the prover (low vapor pressure liquid / high vapor pressure liquid): -If the prover was previously used to test an installation running a low vapor pressure liquid, and a low vapor pressure liquid is currently being tested, all vapors should be vented to the atmosphere while the prover is filling. -If the prover was previously used to test an installation running a high vapor pressure liquid (i.e. propane), and is currently going to be used on a high vapor pressure liquid, no venting is required, as the vapor remaining in the prover will be condensed into liquid by adding line pressure.

#	Checklist (Inspection Procedure – WORK INSTRUCTIONS)
5	Procedure for attaining meter volume, total pulse count, flow rate, temperatures and pressures: -With all compensating devices inactive, liquid flow shall be stopped. With the flow computer and pulse counter both reset to zero, a proving run at the normal meter operating flow rate of at least 10,000 pulses should be made. The volume of the liquid delivered at the normal operating meter flow rate must be greater than 90% of the total volume of the delivery. When this is complete, you can record meter volume, total pulse count, flow rate, temperatures and pressures.
6	Procedure for calculating proving K factor, using the appropriate equation: -For Meters Equipped with Mechanical Registers or Flow Computers able to Indicate in Raw Units: Proving K = Input Pulses / Gross Meter Registration - For Meters Equipped with Flow Computers using Meter Accuracy Factors: Proving K = Input Pulses / Meter Registration x Meter Accuracy Factor - For Meters Equipped with Flow Computers using Meter Factors: Proving K = Input Pulses x Meter Factor / Meter Registration
7	Procedure for providing quality proving runs: -In order to initiate the proving run, the four-way valve operated (“swung”). Temperature and pressure readings shall be recorded from both the prover and the meter at the 1/3 and 2/3 points during the proving run. Both the temperature and pressure of the prover shall be taken upstream of the displacer. At the completion of the proving run (round trip), the total pulse count shall be recorded and the counter reset to zero. Before beginning the next proving run (reversing the flow), sufficient time must be allowed to let the ball complete its travel into the launching chamber. You will hear a distinct “click” when the ball has reached the chamber.
8	Procedure for calculating applicable correction factors: i) Cts = 1 + [Tp – 15] y ii) Cps = 1 + P x d / E x t iii) Cpl (m/p) = [1 / 1 – (P – PE)] x F iv) Ctl (m/p) = refer to Properties of Water and Compressibility Where: Ctl = Volume reduction factor Cpl = Pressure reduction factor Cts = Correction to temperature of steel Cps = Correction for pressure on steel y = Coefficient of cubical expansion per degrees C of the material P = Internal pressure in kPa (gauge) d = Internal diameter of the pipe prover in cm E = Modulus of elasticity for the material of construction in units per kPa t = Wall thickness of the pipe prover in cm PE = Equilibrium vapour pressure in kPa at the measurement temperature (T) of the test liquid F = Compressibility factor for hydrocarbons

#	Checklist (Inspection Procedure – WORK INSTRUCTIONS)
9	Procedures used to calculate CPV and CMV: CPV = Cts x Cps x Ctlp x Cplp x Certified Prover Volume CMV = Average number of pulses x (Ctlm x Cplm / Kp)
10	Procedure for calculating new or “remained same” meter factor: New Meter Factor = Corrected Prover Volume / Corrected Meter Volume = CPV / CMV = Mf n
11	Procedure for calculating the meter registration error (E): i) For Meters Equipped with Mechanical Registers or Flow Computers which indicate raw units: E(%) = (1 – New Meter Factor) x 100% ii) For Meters Equipped with Flow Computers other than those described above: E(%) = (Meter Factor Programmed – New Meter Factor) x 100%
12	Procedure for determining volume of liquid product in volumetric can prover: CVP – CVN + PVN = TPV Where: CVP = Calibrated Prover Volume CVN = Calibrated Prover Neck Volume PVN = Proving Run Neck Volume TPV = Total Proving Run Volume Note: Proving Run Neck Volume is measured by taking reading from measured sight glas
13	Procedure for calculating results on both fuel and defuel modes when testing aircraft refueling systems: % = (PF – PD + MD – MF / MF) x 100% Where: PF = prover’s indication on fuel mode test PD = prover’s indication on defuel mode test MD = meter’s registration on defuel test MF = meter’s registration on fuel test -The deviation (%) must be within the limits of error -Because of the significant differences between the two modes (fueling and defueling) in a system, you cannot take the test results for one of the two modes and assume that the other is also correct. In order to certify the system for refueling, defueling, or both, tests must be completed in each of the modes of operation for certification of both to be acquired.
14	Procedure for calculating meter factor when proving with volumetric can prover: Prover Volume / Meter Volume = Meter Factor Correction for temperature of steel (CTS) 15 degrees C – Prover Temperature x 0.00003348 + 1 x Prover Volume

Mathematical Determination of Meter Performance Using Bi-Directional Conventional Pipe Provers

Correction Factors for Temperature and Pressure Effects On the Prover Volume:

Provers most generally operate at temperatures and pressures different from those at which the prover's base volume was determined (standard reference conditions of 15 degrees C and 101.325 kPa). For this reason, specific correction factors must be applied for different types of provers.

Conventional Pipe Prover Applications:

For conventional pipe provers the relationships for the correction of the base volume for operating at temperatures other than base conditions, or the effect of temperature on the steel of the prover pipes (Ctsp) is given as:

Ctsp = 1 + [Tp – 15] y

Where:

Tp = Temperature in degrees C of the prover

y = Coefficient of cubical expansion per degrees C of the material

(See expansion coefficients)

For operating at pressures other than base conditions (Cpsp), the correction of the base volume or effect of the pressure on the steel of the prover pipes is determined using: **Cpsp = 1 + (Pp x d / E x t)**

Correction Factors for Temperature and Pressure Effects On the Liquid Volume:

Corrections for the difference in temperature and pressure of the liquid product when it is in the prover and when it is in the meter must also be made. Generally, temperature and pressure correction factors for liquids are calculated, or looked up in tables using the liquid's density at 15 degrees C.

Correction of Low Vapour Pressure Liquid Volumes for Temperature and Pressure Effects:

Low vapour pressure liquids are those that remain in a liquid state at atmospheric pressure (Vp < 101.325 @ 15 degrees C). With low vapour pressure liquids, corrections are made to standard reference conditions (15 degrees C and 101.325 kPa).

Correction for the effect of temperature on the low vapour pressure liquid (Ctl) or the Volume Correction Factor (VCF) is usually determined from lookup tables and associated algorithms. In order to use these tables, the value of the density of the product in kg/m cubed at 15 degrees C is required. For the purposes of pipe proving, the density of the product should be determined to within +/- 1 kg/m cubed. The volume of a product at the reference of 15 degrees C (V @ 15 degrees C) is then determined using: **V @ 15 degrees C (m/p) = V @ T (m/p) x Ctl (m/p) = V @ T (m/p) x V CF (m/p)**

Under conditions where the temperature difference between the liquid in the meter and in the prover differ by less than +/- 0.5 degrees C, the values of Ctlm and Ctlp can be considered equal or unity.

Because normally liquid products are effectively incompressible, correction for the difference in pressure between the meter and the prover becomes unnecessary, unless that difference exceeds 200 kPa. At this point the pressure differential is significant and correction will be needed. Compressibility correction factors for the meter (Cplm) and prover (Cplp) can be calculated: **Cpl (m/p) = 1 / 1 – [P – PE] x F**

Where:

P = Internal gauge pressure in kPa gauge

PE = Equilibrium vapour pressure in kPa at the measurement temperature of the test liquid.

1. This will be “0” for liquids which have an equilibrium vapour pressure less than 101.325 kPa (14.7 psi) or atmospheric pressure at 15 degrees C

F = Compressibility factor for hydrocarbons with a density of 653 kg/m cubed or more

Correction of High Vapour Pressure Liquid Volumes for Temperature and Pressure Effects

High vapour pressure liquids (Vp > 101.325 @ 15 degrees C) are those which must be placed under pressure to remain a liquid. Unlike normal liquid products, corrections for high vapour pressure liquids are made to standard reference conditions of 15 degrees C and equilibrium vapour pressure (PE or Vp).

The correction for the effect of temperature on the high vapour pressure liquid (Ctl) or the Volume Correction Factor (Vcf), is again determined from a series of lookup tables and associated algorithms.

However, the Volume Correction Factors are now determined containing corrections for the change in vapour pressure of the product with temperature. Again, in order to use these tables, the density of the product in kg/m cubed at 15 degrees C is required. See determining volume of product equation found above.

Again, under the conditions where the temperature difference between the liquid in the meter and the prover differ by less than +/- 0.5 degrees C, the value of Ctlm and Ctlp can be considered equal or unity

When meters measuring highly compressible liquids (i.e. propane) are proved, it becomes necessary to compensate for the difference in liquid volume resulting from the differences in pressure between the meter and the prover.

Compressibility factors for the meter (Cplm) and the prover (Cplp) can be calculated using:

Cpl (m/p) = 1 / 1 – [P – PE] x F

Where:

P = Internal gauge pressure in kPa gauge

PE = Equilibrium vapour pressure in kPa at the measurement temperature of the liquid

Most vapour pressure charts are provided in terms of absolute pressure. Therefore 101.325 kPa must be subtracted from tabled values to get the vapour pressure in terms of gauge pressure

F = Compressibility factor for light hydrocarbons from API chapter 12.2.1M

API Correction of Vapour Pressure for Commercial Gas Liquids

In order to apply the above equation, the equilibrium vapour pressure of the product (PE) must be calculated. Therefore, the volume of a product at equilibrium vapour pressure and at the temperature in the meter or prover (Tm/p) is given by the following equation:

V@T (m/p) = V@P(m/p) x Cpl(m/p)

C) Proving K Factor (Kp)

The Proving K Factor is defined as the number of pulses produced by the test pulse generator per unit of uncompensated and uncorrected volume (gross volume) displayed on the meter’s register.

Selection of Method for Determining Proving K Factors:

In situations where the prover uses the flow meter's pulser as a test pulse generator, the proving K and the meters base K factor are identical. The base K factor programmed in the flow computer or the factor marked on the meter will be used as the proving K factor during most proves. However, Measurement Canada advocates the calculation of the proving K factor in situations where the mechanical meter is being proved and where proving repeatability problems have been identified. This holds true whether an additional pulse transmitter is used or the existing meter's pulse transmitter is used. The method for determining the proving K factor is essentially the same for any type prover with any type of installation. When the installation is equipped with a flow computer, the calculation must be modified to suit the particular flow computer's method of determining the gross quantity of liquid delivered. However, the following indicates procedures to be used with different type meter set-ups:

Calculating the Proving K for Meters with Mechanical Registers

Proving K = Number of Input Pulses / Displayed Gross Volume

With mechanical registers, the total number of pulses received from the test pulser for each run is divided by the gross registered meter volume.

Calculating the Proving K Factor for Meters with Multiple Programmable Step Type Meter Accuracy Factors:

This calculation remains the same as that for determining the proving K factor for meters with mechanical registers, with some modifications for the flow computer's method of determining the displayed volume. When proving meters such as the Brooks Petrocount II and the Smith Accuload 1, where the flow computer calculates the displayed volume using the following equation:

Displayed Volume = Number of Input Pulses Meter Pulser Base K Factor x Meter Accuracy Factor

It follows then that the proving K factor (Kp) can be calculated by the equation:

Proving K Factor = Number of Input Pulses Test Pulser Displayed Volume x Meter Accuracy Factor

The meter Accuracy Factor (Brooks) or the Correction Factor (Smith), must be the factor which is applied by the register at the tested flow rate. This is usually the programmed slow flow rate.

Calculating the Proving K Factor for Meters with Multiple Programmable Linear Interpolated Meter Factors:

Some devices (i.e. Smith Accuload II) employ linear interpolation to continually calculate meter factors as a function of flow rate. As a result of this constant calculation, it is very difficult to determine the actual meter factor being applied during a proving run. The manufacturers of these devices have made it possible to display volume in terms of uncompensated and unaltered volume, which shows volume with meter factor removed. When this option is selected, the calculation for the proving K factor (Kp) is identical to that of a mechanical register:

Proving K Factor = Number of Input Pulses Test Pulsar Displayed Gross Volume

Calculating Meter Error from Proving Data Based on Volumes:

When using pipe provers, the ratio of the corrected prover volume (CPV) to the corrected meter volume (CMV) must be determined in order to calculate the meter error. When compared to the factor previously programmed in the flow computer (Mfp), the meter error can be calculated:

CPV = Cts x Cps x Ctlp x Cplp x Certified Base Prover Volume

CMV = Average number of pulses x (Ctlm x Cplm / Kp)

The new or calculated meter factor (Mfn) is the factor which must be programmed in order to have the flow computer indicate the true or correct volume. If the meter is equipped with a mechanical register, the new meter factor is the number which the registration must be multiplied by, in order to indicate the true units of volume. The new meter factor is calculated by using the following equation:

$$\textbf{New Meter Factor (Mfn)} = \frac{\textbf{Corrected Prover Volume}}{\textbf{Corrected Meter Volume}}$$

The meter registration error in terms of percentage is then:

Meter Registration(%) = (Mfp – Mfn) x 100%

When proving meters equipped with flow computers using meter accuracy factors as in section C, the meter factor programmed (Mfp) is the inverse of the meter accuracy factor programmed. For flow meters equipped with mechanical registers or flow computers equipped as in section C, the meter factor programmed in equation above (Meter Registration %) may be replaced with 1.0000. In order to re-calibrate a flow computer, the existing or old meter factor or meter accuracy factor must be replaced with the new meter factor, or its inverse for flow computers using meter accuracy factors.

Calculating Meter Error from Proving Data based on K Factors:

A second method for calculating the new meter factor involves the use of a ratio of the base K to the net K-factor. This method is commonly used on older SVP's and PCC's, and can be calculated as follows:

NET K = Average number of pulses x Ctlm x Cplm

Certified Prover Volume = Cts x Cps x Ctlp x Cplp

The new meter factor is then calculated by the equation:

New Meter Factor = Kp / NET K

The meter can now be evaluated using (Meter Registration %) equation.

Rounding of Calculated Quantities

In order to ensure comparable results during the determination of liquid product quantities, correction factors such as Cts, Cps, Ctl, and Cpl are to be rounded to five significant figures (four decimal places). Quantities determined during the proving process such as the meter factor, corrected volumes, and the proving K, are also rounded to five significant figures. This ensures there will be no confusion or altered figures when comparing results.

Confirming Meter and Prover Performance using Conventional Pipe Provers

Meter Accuracy:

Conventional pipe prover output consists of manually observed and recorded temperature and pressure readings and pulse count data.

The pulse counter supplies the data telling the total number of pulses received during each full run (round trip of the displacer ball) and is reset to zero manually. Meter accuracy is evaluated based upon the results of an average of a series of proving runs. This usually consists of five full runs, depending on repeatability. Provided that the temperature, pressure and flow rate remain consistent for the entire run, the meter factor can be determined using the average number of pulses per pass and the average temperature and pressure. If the temperature and pressure vary throughout the run, then the meter factor should be calculated for each pass and averaged.

Meter Repeatability:

Provided the meter's flow rate is constant for each pass, repeatability (meter and prover) can be evaluated during each proving run by direct reference to the raw pulse count. To determine repeatability using conventional pipe provers, you must use data from all five consecutive runs with consistent temperature, pressure and flow, to determine the difference between the highest pulse count and the lowest pulse count divided by the lowest pulse count for each run. Expressed as a percentage, the difference should not be greater than 0.05%.

QPM – 06: Measurement Canada Enforcement Policy

This policy give NEEI guidance with respect to the actions it is expected to take to support Measurement Canada examination programs and enforcement activities.

This policy provides instructions about rejections and warnings related to devices, notifications to Measurement Canada of serious non-compliances, and actions related to devices seized by Measurement Canada inspectors.

NEEI is expected to take certain required actions when devices do not comply with the legislation in their test and examinations.

ITs are expected to educate and instruct their clients (traders) so that they comply with the legislation. They should contact their accreditation office or designated Measurement Canada Alternative Service Delivery representative if they have questions about any actions they are required to take.

1. Used in trade devices Non-compliances

- Check devices for one or more of the following non-compliances, regardless of whether corrective actions were taken or not:

  1- A non-approved device found to be used in trade.

  2- An approved device found to be used in trade without prior initial examination and the device cannot be readily examined or, upon initial examination, it does not fully comply with the **Weights and Measures Act and Regulations**.

  3- An approved device found to be used in trade without prior initial examination and the trader refuses to have the device examined.

  4- A device has been modified or installed in such a way that it facilitates fraud.

  5- An approved device found to be used in trade which has previously been examined, but does not meet current installation requirements.

  When ITs find one of the aforementioned non-compliances, they must report a non-compliance set out in Above subsection within two (2) business days by submitting device examination data and test results in ORA or must provide the following information to the NEEI accreditation office.

  - The name of the device owner.
  - The address where the device is located.
  - Information to identify and describe the device.
  - The nature of the non-compliance.

- Check devices for one or more of the following non- compliances, if the device cannot be repaired or brought into compliance at the time of examination:

  1- A device found with a measurement error in excess of three times the applicable limit of error and the error is in favour of the trader.

  2- An interlock that prevents a device from being used before its registration has been returned to zero is found to be inoperative (e.g., faulty interlocks on gasoline dispensers).

3 - The registration of total price is not in mathematical agreement with the value derived from the indicated quantity and unit price;

4 - The difference between the displayed total price and the computed total price is greater than the monetary value derived from the allowable device limit of error for that test quantity and the displayed unit price; and

5 - The error is in favour of the trader.

When ITs find one of the aforementioned non-compliances, they must report a non-compliance set out in Above subsection by submitting device examination data and test results in ORA.

2. Not used in trade devices Non-compliances

ITs should check the devices which are not used in trade and:

- When ITs find an approved device that has **not** previously been examined, is not being used in trade and is not marked "Not for Use in Trade", they with the consent of the trader, should affix a "Not for Use in Trade" sticker to the device.
- When ITs find an approved device that has previously been examined, but is no longer being used in trade and is marked "Not for Use in Trade". ITs should change the status of the device to inactive in ORA.
- When ITs find an approved device that has previously been examined, but is no longer being used in trade and is not marked "Not for Use in Trade", ITs With the consent of the trader, should affix a "Not for Use in Trade" sticker to the device and should change the status of the device to inactive in ORA.

3. **Measurement Canada Seizures**

NEEI under the scope of its accreditation is not authorized to seize devices.

The following procedure applies to all NEEI recognized Inspection Technicians (ITs) and Service personnel when required to handle any Measurement Canada seized device.

- NEEI personnel FOR ANY REASON cannot handle a Measurement Canada seized device UNTIL PERMISSION TO DO SO IS RECEIVED FROM MEASUREMENT CANADA.
- A release must be obtained from the Local Measurement Canada offices where the seizure order was issued.
- The release may come in the form of a release number or verbally in some cases. When obtaining a release from the local Measurement Canada offices the following information must be obtained:
    1. Release number if applicable.
    2. Name of person giving the release.
    3. Time and date release was obtained.
    4. Name of the person receiving the release.
    5. Any further instruction that Measurement Canada may offer.

- Form **NEE-02: Measurement Canada Seizure Release** must be completed before any work can commence on seized devices. Form NEE-02 contains all mentioned information.

- When the device has been brought into compliance and an inspection carried out the release number or person giving the release should be noted on the Inspection Certificate issued by NEEI.
- When in the field all the same procedures will apply. The following additions also apply:

The Inspector Technician in the field; will liaise with Measurement Canada To obtain the release and fill out Form NEE-02 Once the release has been obtained he may proceed with the work and or inspections.

1. Upon completion of the work and inspections to bring the device into compliance the Inspector Technician will note the release number or other authorization on the Inspection Certificate.
2. The Inspector Technician will remove any tags placed by Measurement Canada and make sure all seals are in place as per NOA or W&M Act and Regulations. He will then attach the Measurement Canada seizure tags to his copy of the Inspection Certificate and send the documentation to the NQSM as per procedures.
3. The seizure tags will then be filed in the controlled files along with the required documentation. If Measurement Canada requires that the tags be returned then copies are taken for NEEI's controlled files and the original tags are submitted to Measurement Canada along with copies of the Inspection Certificates within 5 days of completion of the inspections as per requirements.

Records:

The records will consist of the required documentation as required by the Quality Assurance Manual, and W&M Act and Regulations.

QPM – 07: Measurement Standards/Proving Equipment, Control and Maintenance

Purpose:

To govern the control, and maintenance of all Measurement Standards/Proving Equipment, ensures this is performed in a consistent manner, and that this complies with the requirements for NEEI quality procedure.

Scope:

This procedure applies to all Measurement Standards/Proving Equipment, including any software that used in initial and subsequent examinations. The Inspector Technician is responsible for all calibration and maintenance procedures.

Procedure:

List of all the Measurement Standards are in Appendix-1 and they will be up dated as required by NQSM or NA. All the Measurement Standards shell be certified by Measurement Canada laboratory or Measurement Canada's approved laboratory and they must have the current certificate with the standard and a copy on file at all time. The re-certification are carried out more often if deemed necessary by the Inspector Technicians using the equipment. No adjustments are to be made to equipment where accuracy in measurement is concerned unless the concerned equipment is re-certified by Measurement Canada.

Mobile Provers:

Mobile Provers are listed in Appendix-1. It shows the status of calibration, Certificate dates, Location and Capacity of the standard etc. All mobile provers will be safely parked in their designated areas when not in use. The "Volumetric Prover Checklist" Form NEE- 06 will be filled out, dated and signed by the Inspector Technician before being used. If for any reason the Form NEE- 06 inspection fails a non-conformance form must be filled out and given to the NQSM who will implement corrective actions to solve the problem. The prover will be tagged with a "Non-Conformance" tag until all corrective actions have been completed. The National Quality Systems Manager or Inspector Technicians in their local regions can only remove the Non-Conformance tag. All documentation is to be kept and filed in the prover maintenance file. New Measurement Canada certification may be required. If a non-conformance was issued a copy of both forms is to be submitted to the management review file.

Upon completion of service/examination a copy of Form NEE-06 will be attached to the ORA Certificate and calibration Worksheet and submitted to accreditation office to file. This will effectively show the prover was inspected before and after service.

All prover trailers will carry a copy of the current Measurement Canada Certification in the documentation holder on the trailer.

Stationary Provers:

All stationary provers are listed on Appendix-1. Current Measurement Canada certifications are maintained on file and with the equipment. Re-certification is carried out as specified in the Weights and Measures Act and Regulations. Re-certification will be carried out at any time if deemed necessary by the Inspector Technicians or the National Quality

Systems Manager. The NA is responsible for the current status of the documentation and its maintenance. The "Volumetric Prover Checklist" Form NEE-06 is filled out, dated and signed by the inspector using the equipment each time it is put into service.

If Form NEE- 06 shows "Inspection Failed" for any reason a non-conforming form must be filled out stating reasons and suggested repairs. The Non-Conforming form must be passed to the National Quality Systems Manager or MST in their local regions for immediate correction procedures. The prover is tagged with a "Non-Conformance tag" Form NEE-09 until corrective action is completed. The National Quality Systems Manager or local MST can only remove the "Non-Conformance tag" when corrections are completed. New Measurement Canada certification may be required. Documentation is to be maintained in the prover file and a copy is to be placed in the management review file so it can be reviewed to ascertain whether a preventive action can be put into effect.

20-Liter Measure Checklist:

All 20-liter measures are listed on the form found in Appendix-1 as to their current calibration status and location. Current Measurement Canada Certifications are maintained on file. Re-Certification is carried out as specified in the **Weights and Measures Act and Regulations**. Re-certification will take place more often if deemed necessary by the inspectors or the National Quality Systems Manager or the local Inspector Technicians. The Administrator and the Administrative Assistant are responsible for maintaining documentation.

The "20 Liter Measure Checklist" Form NE-013 is filled out, dated and signed by the inspector using the equipment each time a Measure is put into service.

If FormNE-013 show "Inspection failed" a non-conforming form must be filled out stating reasons and suggested repairs. The Non-conformance form is passed on to the National Quality Systems Manager or local Inspector technician for immediate correction procedures. The prover is tagged with a "Non-conformance Tag" Form NE-018 until Corrective action is completed. Only the National Quality Systems Manager or local Inspector Technician can remove the "Non Conformance Tag" after the corrections have been completed. New Measurement Canada certification may be required. Documentation is to be maintained in the prover files. A copy is to be placed in the management review file to ascertain whether preventative action is necessary.

Software and Firmware:

At Present National Energy Equipment does not have access to any software or Firmware that effects calibration of products? The software or Firmware is only used in operating systems at the present time.

All Measurement Standards:

The Inspector Technician shell use appropriate measurements standard for specific inspection, and equipment must be certified by Measurement Canada. Certified measurement standard cannot be adjusted unless re-certified by

Measurement Canada. Reference Measurement Canada bulletin *V-03.* The Inspector Technician must insure that equipment is capable of the required accuracy and precision. The Inspector Technician must identify equipment to indicate certification status. The Inspector Technician must insure that the calibration records are maintained so they may have future access. All calibration records are to be completed on the appropriate NEE form and turned into the NQSM for filing in the equipment maintenance files. The NQSM is responsible to maintain these files and they are subject to management review at the management meetings held once a year. The Inspector Technician must assess and document the validity of previous inspection and test results when equipment is suspected of being out of calibration or the certification has lapsed. The Inspector Technician must ensure suitable environmental conditions for calibration, inspection, measurement and testing. The Inspector Technician must be able to ensure accuracy and fitness for use when handling, preserving, and storing equipment. The Inspector Technician must safeguard inspection, measuring, and testing facilities.

Determination if Measurement Standard is out of calibration:

The Inspector Technician upon inspection of equipment using the appropriate inspection form (NEE-06) finds the calibration of the equipment suspect. The suspect equipment is removed form service and a non-conformance tag is attached to the equipment (NEE-11). The Inspector Technician will inform the NQSM of his findings in detail and corrective actions to be taken through the use of a non-conformance report (NEE-10). All calibration reports for every meter are kept on file for each piece of testing equipment back to the current issue of Certification by Measurement Canada. These reports are kept and maintained by the NQSM in his equipment maintenance files.

Assessment of previous measurements is done through current and previous calibration reports filed for the particular device. The results of the calibrations are reviewed to determine any trends toward the outer limits of tolerances or any instances where re-calibration of devices previously calibrated by NEEI was required or for any unusual errors found by the Inspector Technicians. Currently the as found errors of volumetric standards must be obtained from Measurement Canada. The NQSM and the IT will remove all the previous calibration reports from the equipment maintenance files for the suspect equipment. These reports will be used as a comparison to the most current calibration reports to determine if any trends, shifts or radical failures have occurred.

The NQSM and IT will review any previous inspection reports to determine if any changes have occurred. The Inspector Technician and NQSM also carry out an assessment of the validity of previous inspections.

If the reports show any discrepancies the equipment will be re-certified by Measurement Canada to insure compliance. If the reports do not show any anomalies the re-certification of the equipment will be at the NQSM or IT's discretion. MC will not return the suspect equipment to service until re-certification if any doubts by the NQSM or IT are not addressed.

If MC finds the equipment upon re-certification out of compliance, all tests done by the suspect equipment back to the previous certification will be reviewed and the customers informed of any discrepancy. The NQSM or Inspector Technicians will arrange any tests or re-certification resulting from the inspections with the customer. A report will be filed to MC and for the Management review process.

Upon completion of any repairs or corrections that have to be made to bring the equipment into the required standards an inspector technician must do a new and full inspection. A prover checklist form must be filled out and filed with the appropriate documentation. This form will state that the equipment has been checked and is ready to be put back into service.

Measurement Canada will be informed of any found discrepancies to customer equipment due to the calibration of NEEI testing equipment. MC approval is required for any changes that will effect measuring functions of any devices also re-certification by MC will also be done.

All documentation is filed by the NQSM, in the specified equipment's folder in the NQSM's controlled equipment maintenance file. All discrepancies in the above procedures are noted on a Non-conformance Tag NEE-09 and the corrective action and follow through are on the Corrective and Preventive Action Report NEE-10. All NEE-10 and NEE-09 are subject to management review.

Loaned, Leased and Rented Equipment:

All loaned, leased and rented equipment by National Energy Equipment Inc. is subject to the same inspection and testing procedures as above and others that are appropriate listed in the Quality Assurance Manuals. The said equipment must meet or surpass all Weights and Measures Regulations and Standards for test equipment. The loaned, Leased and rented equipment must have current Certificates of Certification issued by Measurement Canada. Copies of these Certificates must be retained by the Inspector Technician and turned into the NQSM on the completion of usage of the said equipment. The NQSM will maintain documentation in a special folder for each piece of loaned, leased or rented equipment and file it in the NQSM's controlled equipment maintenance file.

Where new equipment is to be purchased by NEEI

The decisions to purchase new equipment or replace old equipment where major expenditures are required are made by the NQSM, Inspector Technicians and senior staff in each region. Minor expenditures (under $1,000.00) can be made by the NQSM. The recommendations for the new equipment, along with the proper specifications as to type and use will be forwarded by the NQSM who will double check the specifications to make sure they are adequate for the purpose the new equipment is intended (new acquisition or replacement of old equipment) and that all regulations have been met or exceeded. The NQSM will then acquire estimates to cost and time frame for delivery of the new equipment. The estimates are then forwarded to the National Accreditation Manager and the financial officer to be approved and the purchases made. Once the new equipment is received, the IT for the region the equipment goes will ensure that all the required Measurement Canada regulations have been met. The IT will insure equipment is approved and certified by Measurement Canada before the equipment is put into service. Once the required procedures have been completed; the new equipment will be controlled, maintained and added to the appropriate Measurement Standard listing for the region in which the equipment was put into service.

QPM – 08: Field Inspection/ Onsite Examination

Purpose:

To govern Field Inspections to ensure they are performed in a consistent manner, and that they comply with the requirements for Quality control, **Weights and Measures Act and Regulations**, SVM's, STP's, Appropriate Bulletins, and IPO's.

Scope:

This procedure applies to all field inspections and on-site work to be done by NEEI Inspector Technicians.

Procedure:

1. Call the customer before leaving the branch to ensure the customer is aware of the times, dates, and reason for the field inspection or service.
2. Review Inspector Technician Documentation to ensure the Inspector Technician has the proper equipment and documentation before leaving for the field location.
3. Ensure all proper information/documentation is present for the devices that are to be Inspected or serviced such as Measurement Canada's Notice of Approvals. If information is not readily available, make sure you have a means of obtaining it on site from the customer or by retrieving the information from the manufacturers or Measurement Canada web site.
4. Ensure that all provers are checked against the Volumetric Prover Checklists (NEE-06) and all results recorded.
5. After traveling to site and on set up repeat the Prover Checklist to ensure no damage has occurred on route.
6. Conduct the examination in accordance with procedures for the device or devices being inspected. Completing all required documentation.
7. Complete the ORA certificate onsite and make sure all the records on ORA is up-to-date and has current contact information for trader/customer.
8. Do housekeeping before you leave the site. The site must be as it was or better than when you arrived.

Notes:

- The information on the Inspection Certificate and Inspection documentation such as checklists and calibration reports will provide product traceability for each device located in the field. The Inspection Certificate will permit for location of the devices inspected via the customer name, address, location, device serial number, signature of NEEI Inspector Technician, date of inspection and test standard used for the inspection.
- In the Field and Shop (factory) the product is also identified though its unique Serial Number situated on the Serial Data Plate affixed to the device. In Subsequent Field and Shop (factory) inspections; NEEI Inspector Technicians will eventually encounter devices with missing or damaged Plates. In such cases, NEEI Inspector Technicians will affix an NEEI Serial Data Plate with all pertinent information stamped on it such as make, model number, flow

rating, MC approval number and a new serial number. The new serial number is assigned a unique serial number. *(GEN-39)*

- In the case where two or more devices without serial numbers occur on a site: The devices are put on the same certificate followed by a (-) 1 or in the case of the second device (-) 2 etc.
- Only Inspector Technicians can issue Inspection Certificates.
- Copies of Inspection Certificates are retained by NEEI as part of the QA Records and are made available to MC personnel on request. The Inspection Certificates as part of the Quality Records are also maintained and filed for audit purposes.

Onsite Examination:

- In field inspections; the responsibility for the compliance of the devices rest solely on the owner of the devices (not NEEI). A device may be found as nonconforming to MC legal requirements (rejected) but NEEI's QA system is not at fault. The issuing of a non-conformance in this instance is neither required nor meaningful.
- For field inspections (device not in the custody of NEEI), a device that does not comply with MC requirements (and cannot be repaired to comply with MC requirements) is rejected. NEEI does not have the legal authority to restrict the use of the device. NEEI's responsibility is to issue a rejected certificate for the device, and reporting to MC as required by the Enforcement Policy for Accredited Organizations.

Records:

A copy of ORA certificate, appropriate calibration forms, copy of printed ticket (if applies) for the applicable device and prover checklist will be kept on file.

QPM – 09: Marking – Device Name Plate

Purpose:

To govern the Marking of the device, to ensure it is performed in a consistent manner and that it complies with the requirements for QA manual. Insure that the procedures also comply with the **Weights and Measures Act and Regulations**.

Scope:

This procedure applies to the Marking of device and Related Equipment or Accessories inspected by NEEI Inspector Technicians. The Inspector Technician is responsible for all Testing and Inspection procedures.

Procedure:

Reference to Weights & Measures Regulations Section 21 through 31 and Require NOTICE OF APPROVALS for the device or devices. They shall be marked with the following information:

1. The name of the manufacturer or importer of the machine, equipment or accessories;
2. The model number and serial number of the machine, equipment or accessories;
3. The Approval number of the machine, equipment or accessories;
4. In the case of a volumetric liquid meter,
   a) The minimum and maximum flow rates, and
   b) Where the meter is equipped with an automatic temperature compensator, the words “Volume corrected to 15 degrees C” immediately adjacent to the registration of net quantity.
5. In the case of equipment or accessories, the range for which they are approved pursuant to Section 3 of the Act; and
6. Any other information that is required by the Notice of Approval issued pursuant to section 3 of the Act.

Marking Devices on Initial inspection

A device shall be marked by means of a steel die or, where it is not practicable to do so by means of a sticker.

- If a steel die is used, devices shall be marked in letters of not less than 3 mm or 1/8 inch in height.
- NOT FOR USE IN TRADE UNTIL INSPECTED or words to that effect shall be marked in letters not less than 12mm or ½ inch in height.
- Devices marked permanently NOT FOR USE IN TRADE shall be marked in letters not less than 12mm or ½ inch in height.

Location:

An inspection mark shall be located

a. In the case of measuring machine that has a plate or plates permanently affixed to the machine, on the blank area of the plate referred to in W&M Subsection 18 (2).

b. In the case of a measuring machine that does not have a plate or plates permanently affixed to the machine, on a part of the machine where it will be readily legible to a person using the machine under normal conditions of use.

Replacement Plates:

In the case of a missing plate, a new plate will be made up and attached to the device in question containing all required information from the Notice of Approval. *(GEN-39)*

In the event that the site has two devices or more that requires a new data plate and serial number; A (-) and the number of the devices is indicated by a -1, -2 following the certificate number.

If a serial number is missing, a new one can be made up comprising of variations of The Certificate number "A-00230014-1234567"

- A-0023: National Energy Equipment Inc. organization #
- 0014: Inspector Technician #
- 1234567: ORA Certificate Number

All replacement of plates are to be reported to Measurement Canada on a short form within 5 days unless the situation regarding loss is such that it should be reported within 24 hours.

QPM – 10: Examination Stickers, Official Seal, Sealing Equipment, Steel Dies/ stamps and controlled copy of required documentation

Purpose:

To govern the Control of Examination Stickers, Sealing Equipment, Steel Dies/stamps and controlled copy of required documentation to ensure the controls are carried out in a consistent manner and comply with the requirements for quality and control.

Scope:

The procedure applies to:

- Examination Stickers
- Official seal (paper seal)
- Sealing Equipment
- Steel Dies/stamps for marking
- Metal Plates
- Controlled copy of required documents

The Inspector Technician is responsible for all Testing and inspection procedures.

The NQSM and NA are responsible for control and maintenance of the above documents and equipment with associated parts.

Procedure:

1. All unused copies of Examination Stickers, Documentation and official seals are secured in a locked file cabinet located in the Administration area. Unused Sealing tools and associated parts are secured in the same cabinet. The NQSM and NA are the only people with access to this cabinet. Access to this cabinet will be made to Measurement Canada on request.
2. The NQSM and NA are the only persons that are able to issue Examination Stickers, Documentation and official seals and Sealing Tools to Inspector Technicians.
3. Sealing tools with the A0023 are only for Inspector Technicians and only used for inspections. When conducting service work (IT's or Service Techs), a service sealer (not controlled under this QMS program) shall be used to seal devices.
4. The IT will sign for Inspection Certificates along with Verification Stickers as required. This will be recorded on Form NEE-04 sticker and label Controlled forms.
5. The IT will retain Examination Sticker, Official Seal (paper seal), Initial Inspection Stamps, Marking Plates, whole puncher and Sealing Tools in a secure box.
6. The IT upon issuing an Examination Sticker, will, under the proper number sequence on the NEE-04, form list the ORA certification number and required information for each item issued.

7. The required Examination Stickers are applied to customer's equipment. ORA Examination Certificates will be sent to the device owner by Measurement Canada and copies of the ORA inspection certificate shell be sent to NQSM or NA to file in accreditation department for audit purposes.
8. When the IT used all the examination stickers that have been issued to them by NQSM or NA, and completes the Form NEE-04, they will return the NEE-04 form to NQSM or NA. The IT will be issued another 50 of Examination Stickers and required Official Seal following the above procedures. The NQSM or the NA will keep the form in file for audit purposes.
9. If for any reason the Examination Stickers or Official seals are spoiled they will be marked VOID and have to be destroyed by the technician to avoid miss-use. These spoiled stickers will be recorded on the NEE-04 form as broken or spoiled, and a copy of the NEE-04 form is sent to NQSM or NA when applying for new batch.
10. If the Examination Sticker or Sealing Tools of an IT are lost or misplaced by the IT they must inform the NQSM immediately. A non-conformance will be issued and a complete review will be carried out by the NQSM. A management review will be immediately convened if deemed necessary.
11. Upon completing the examination copies of the ORA certificates, and required documents shell be sent to the NQSM or the NA they will inspect the documentation for errors or spoiled Inspection Certificates.
12. The NQSM and or the NA will periodically inspect the Inspector Technicians "Inspector Documentation and equipment" for content and security. If any discrepancies are found, a nonconformity could result.

The Inspector Technician is responsible for the safety and security of all controlled documentation and sealing equipment in their possession. Only the IT will have access to the inspector documentation and sealing tools. In the case of an emergency the NQSM will also have access to the IT's the inspector documentation and sealing tools, however when opening the documents he must be accompanied by another supervisor as a witness to.

QPM – 11: Controlled Documents – Change /Updates/Forms

Purpose:

To govern the change/update of the Controlled Documents to ensure Controls are performed in a consistent manner, and comply with the requirements for QA Manual. All changes to documentation must be approved and accepted by Measurement Canada prior to issue or re-issue.

To govern the control and Maintenance of Measurement Canada Controlled Documentation. Controlled copies of Acts, Regulations, any IPOs/STP's, Bulletins, Guidelines, Field Inspection manual and M/C Procedure Manuals that can be downloaded from the government web sites.

All personnel that require access to documentation will have access at all locations either electronically or via hard copies.

Scope:

These procedures apply to all controlled documentation. All employees are responsible for controlling documentation. The NA will manage the document control system. The Executive officer is responsible for the review and approval for adequacy of all documents and data prior to issue or reissue, and is authorized to make changes to controlled documents and data.

Document and Data Changes:

Only the NQSM may make changes to documents. Changes to documents from all regions shall be reviewed and approved by the NQSM. The NQSM will consult with the NA and the IT's of the other regions to insure that the changes will be workable in all regions. The NQSM will do this via repetition of the Document and Data Control procedure. The NQSM will then forward the documentation to Measurement Canada for approval and acceptance. The current revision status updated on Quality Assurance Manual Master Document, and changes shall be identified in the electronic document by means of (pointing hand) for 90 days.

All required documents and data changes regarding inspection procedures or changes which may affect the ability of or manner in which NEEI ensures that devices meet the requirements of the Measurement Canada's S-A-01 Standard and Weights and Measures Act will be submitted for review and acceptance by Measurement Canada prior to being implemented (Measurement Canada Accreditation Bulletins).

All NEE forms are there to assist in the control of documentation and procedures so they may be carried out in an efficient and consistent manner.

Controlled documents are listed as follows:

Management Reviews:

Reference:	Part 1 - Quality Management System & Measurement Canada S-A-01	
QPM 15:	Management Review Program	
Form:	NEE-14	Management Review
	NEE-15	Customer Survey

The NQSM holds all current documents on file for the bi-yearly Management Committee review Meetings. After management review all documents are then filed and maintained by the NA or NQSM.

Product Identification and Traceability:

Reference: Part 1 - Quality Management Systems & Measurement Canada S-A-01

Forms:

- NEE-16 Lube Oil Inspection worksheet
- NEE-07 Inspection tool (Pit Calibration Use Only)
- NEE-08 Inspection tool (Fuel use)
- NEE-13 Goods Receiving Report

Documents are controlled and filed by the NA ensuring adequate access to all personnel concerned.

Control of Inspection, Measuring and Test Equipment:

Reference: Part 1 -Quality Management Systems & Measurement Canada S-A-01

Appendix-1: Measurement Standard Inventory

Forms:

- NEE-06 Volumetric Prover Checklist
- NEE-05 Ice Point Test

Documents are held on file, with related documents by the NQSM or NA. Ensuring access to all concerned personnel. Copies of documents are sent to Measurement Canada where applicable.

Calibration worksheet, ORA certificate, and Examination Sticker:

Reference: Part 1 -Quality Management Systems & Measurement Canada S-A-01

Appendix-1: Measurement Standard Inventory

Forms:

- NEE-04 Sticker and label control
- NEE-12 Equipment Receipt

The NQSM holds all current documents on file for the bi-yearly Management Committee review Meetings. After management review all documents are then filed and maintained by the NA or NQSM.

Non-conformance Records

Reference: Part 1 -Quality Management Systems & Measurement Canada S-A-01

Forms:

- NEE-11 Not-To-Be Used in Trade
- NEE-09 Non-conformance Report

The NQSM holds all current documents on file for the bi-yearly Management Committee review Meetings. After management review all documents are then filed and maintained by the NA or NQSM.

Corrective Action Records:

Reference: Part 1 -Quality Management Systems & Measurement Canada S-A-01

Form:

- NEE-10 Non-conformance Corrective and Preventive Action report

The NQSM holds all current documents on file for the bi-yearly Management Committee review Meetings. After management review all documents are then filed and maintained by the NA or NQSM.

Internal Quality Audits:

Reference: Part 1 -Quality Management Systems & Measurement Canada S-A-01

QPM-16: Internal Audit Program

NQSM or NA are responsible for controlling and filing the documentation. Audit reports are filed as a QA report. All documentation will be made available for Management reviews. Measurement Canada will be copied where and when applicable.

Training Records:

Reference: Part 1 -Quality Management Systems & Measurement Canada S-A-01

Form:

- NEE-03 Employee Training Record

The NQSM or NA is responsible to control and file all training documentation. The NA is responsible for the maintenance of the documentation. Controlled Measurement Canada documentation field control and recall controlled copies of M/C documentation including the following are subject to these controls:

- Acts
- Regulations
- IPO's/STPs
- Bulletins
- SVMs
- Guidelines
- Procedure Manuals

The majority of the above documentation is maintained and controlled by Measurement Canada on the government web site through electronic means. Where it is not controlled by Measurement Canada, National Energy Equipment will control, issue, and recall any M/C documentation that requires maintenance or replacement.

- The NA will maintain and file all hardcopies of M/C controlled documents in a locked file located in the Administration Offices.

- The NA and the NQSM are the only personnel that will have access to this file. The contents of the file will be made available to M/C on request.
- The NQSM or the NA will issue copies of M/C documentation as required by the IT's. These copies are stamped "NOT CONTROLLED IF PRINTED".
- All documentation is subject to the same controls and signs out, sign in procedures for Examination Sticker, Official Seals, Marking Plates and Measurement Canada Documentation and Seals.
- The NA and the NQSM will be responsible for destroying or returning MC documentation to Measurement Canada; this will be carried out at Measurement Canada's discretion.

Quality Procedure Manual, Forms and Appendices:

The above manuals are available to all personnel at any location via Electronic Viewing. This complete manual is kept on the National Energy Equipment Inc.'s Main Server in the Toronto Office. This System is backed up daily. The Manuals are password protected and cannot be altered in any form. The Manual is a read only copy. It cannot be printed unless permission and passwords have been obtained from the NQSM. All printed copies must also be stamped "NOT CONTROLLED IF PRINTED".

All documentation is destroyed as per Quality Management System Manual – Retention Times of Specific Quality Records.

QPM – 12: Non-Conformance

Purpose:

To govern the review and disposition of non-conformance's, processes and systems to ensure they are performed in a consistent manner, and that they comply with the requirements for quality and control. This procedure will ensure product that does not comply with specific requirements are prevented from unintended use or installation.

Scope:

This procedure applies to all non-conformances, non-conforming products, including services, and to all quality procedures that are determined to not meet specified requirements for quality and control. Non-conformance Reports (NEE-10) shall also be initiated when an activity or process is not conducted as required by NEEI quality assurance documentation or the QMS documentation itself exhibits nonconformities.

The Inspector Technician that performed the final inspection is responsible for all review and disposition procedures of product or service. The National Quality System Manager is responsible for this procedure if a non-conformance is found in a quality procedure via submission, review and authorization for issue of form NEE-01 Quality Procedures Changes Form. Where changes may be required all forms from all regions must be submitted to the NQSM. The NQSM will review the changes with the NA and IT's from all regions and then makes the changes accordingly so that all regions are satisfied and the changes are workable. Measurement Canada will be notified by the NQSM. Measurement Canada will review and accept any changes affecting quality prior to implementation. (S-A-01)

Procedure:

In Shop:

1. The receiver through a GRR report starts the receiving and finds a Nonconforming product.
2. The product is then passed to an Inspector technician.
3. The Inspector technician then assumes responsibility for the product during the in process inspections. The inspector technician or the Quality systems manager has the authority to document findings, recommend corrective action and follow up on instances of nonconformity.
4. All NEEI service personnel are responsible to report any nonconformity to the Inspector Technician or the Quality systems manager.
5. The Inspector Technician that performed the inspection reviews all nonconforming products in accordance with documented quality procedures. The review is recorded and includes a description of the action taken to either.
6. Rework product to meet specified requirements. ("Certify for use in trade").
7. Accept with or without repair by concession of the customer. If not repaired the product will be tagged indicating "Not for Use in Trade until Inspected".
8. Degrade for alternative applications, and tagged "Not for use in trade".
9. Tagged "Not for use in trade" (NEE-11).
10. "Non Conformance, Corrective and Preventive Action Report" (NEE-10) shall be sent to NQSM.

After final inspection by the Inspector technician the product will be tagged or labeled:

- Inspector technician will issue a certificate after completing and passing all the test.
  OR
- FAILED INSPECTION OR TESTING “NOT FOR USE IN TRADE”.
- The occurrence of non-conformance is reported to the customer.
- All repaired or reworked product is re-inspected in accordance with the Quality System and documented procedures. (See: QPM-13; Preventive and Correction Action Problem Solving).

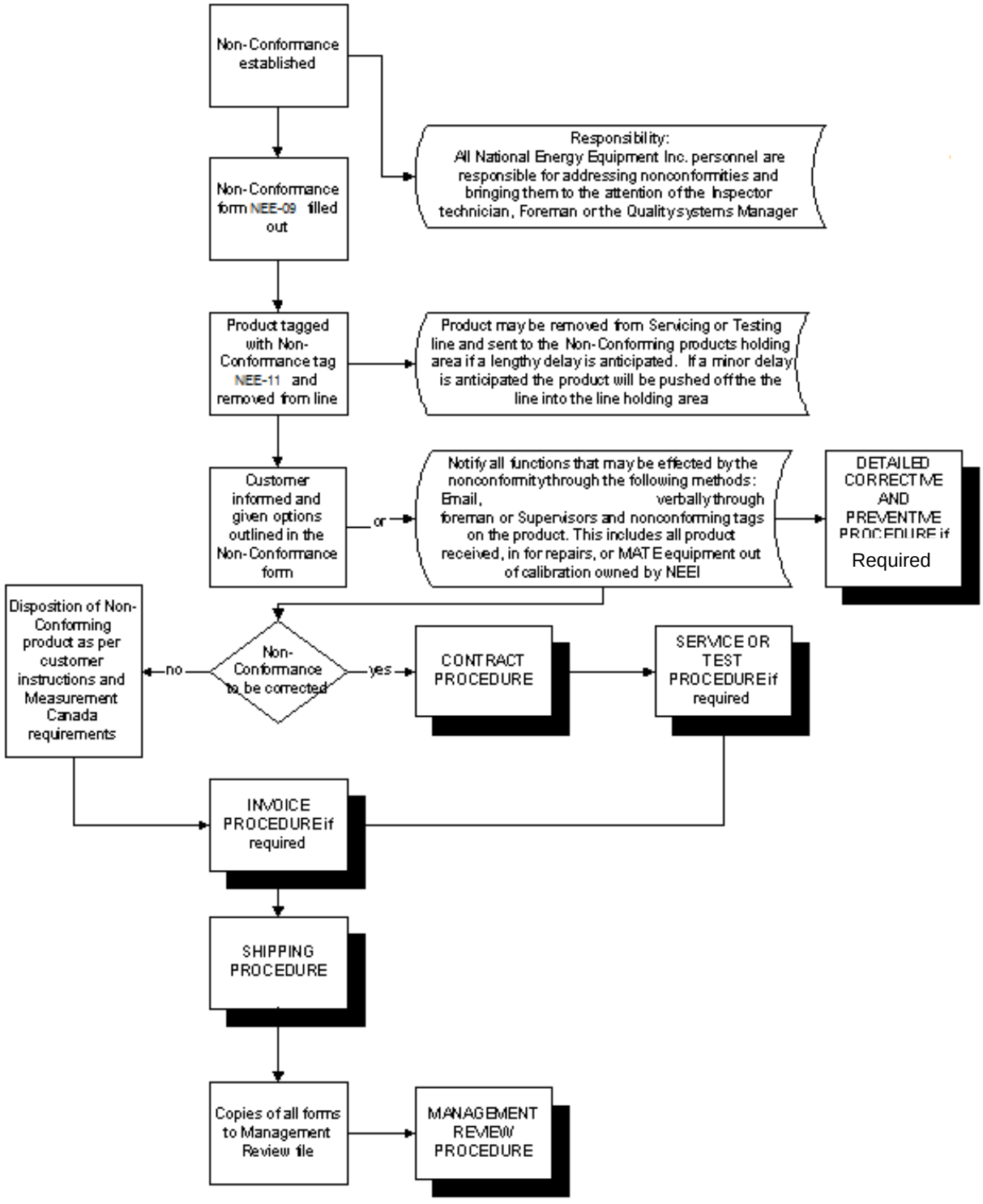
In Field Inspection:

The responsibility for the compliance of the devices rest solely on the owner of the devices (not NEEI). A device may be found as nonconforming to MC legal requirements (rejected) but NEEI’s Quality system is not at fault. The issuing of a non-conformance in this instance is neither required nor meaningful.

For field inspections (device not in the custody of NEEI), a device that does not comply with MC requirements (and cannot be repaired to comply with MC requirements) is rejected. NEEI does not have the legal authority to restrict the use of the device. NEEI’s responsibility is to issue an inspection certificate rejecting the device and reporting to MC as required by the Enforcement Policy for Accredited Organizations.

FLOW CHARTS:

NON-CONFORMANCE OF A PRODUCT PROCEDURE



QPM – 13: Corrective and Preventive Action

Purpose:

To govern the implementation of corrective and preventive action, ensure it is performed in a consistent manner, and that it complies with the requirements for quality and control.

Scope:

This procedure applies to all actual or potential nonconformities within the implementation of the quality system. This procedure will ensure the elimination of the occurrence of nonconformities.

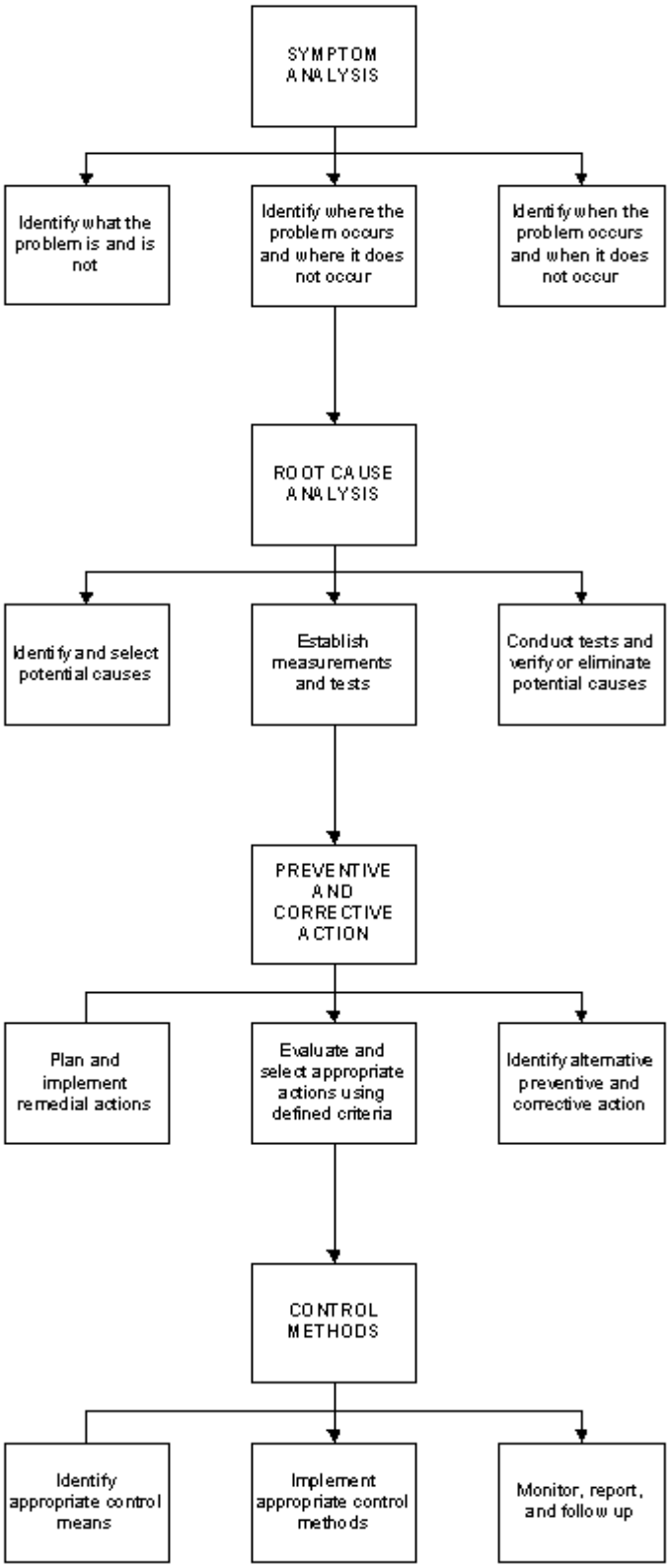
The National Quality system Manager, and Inspector Technicians are responsible for review of the investigations into nonconformities and the resultant changes proposed or implemented to eliminate these nonconformities. These investigations and results are to be submitted to the Management Review.

Procedure:

All National Energy Equipment Inc.'s personnel are responsible for reporting nonconformities and suggesting corrective and preventive action to their supervisors for assessment and possible implementation.

1. A non-conformance is established.
2. Non-conformance procedures in QPM-12 are being implemented or have been completed.
3. Non-conformance Corrective and preventative Action report (NEE-10) is submitted to the NQSM and Inspector technician to review and establish if a corrective or preventive action is required.
4. If an establishing a corrective or preventive action is required where a procedure is not already established; the NQSM with concerned personnel will produce a corrective or preventive action procedure that will address the root cause of the nonconformity, document the procedures and submit it to the NQSM for review.
5. The NQSM and the Executive Officer will review the corrective or preventive action and make any required changes to make sure it meets the Measurement Canada S-A-01 requirements, **Weights and Measures Act and Regulations** and the Quality Assurance Manual requirements.
6. NQSM will implement the corrective or preventive action.
7. The NQSM will periodically after implementation test and record the implementation, adequacy and the effectiveness of the corrective or preventative action. On completion this report is placed in the Management review file for review at the next Management Review meetings.
8. The NQSM will submit any further changes or adjustments he deems necessary to the NAM.
9. Once the corrective or preventive action has proved effective, the Changes to the Quality manuals will be made according to procedure.
10. All corrective and preventive actions are reviewed as to their implementation, adequacy and effectiveness at the Management Review meetings.
11. Internal Audit procedures will again review the corrective and preventive actions as to implementation, adequacy and effectiveness as required.
12. All documentation regarding corrective and preventive action is filed and maintained by the Administrator.

FLOW CHART PREVENTIVE AND CORRECTIVE ACTION PROBLEM SOLVING



QPM – 14: Inspector Technician Training Program

Purpose:

To govern the training of Inspector Technicians, ensure it is performed in a consistent manner, and that it complies with the requirements for QA manual.

Scope:

This procedure applies to the identification of training needs and the provision of subsequent training of all personnel performing jobs under the accreditation agreement.

Specific Training on the QMS/QPM is given through Orientations, Quizzes and Seminars conducted in house by either the NQSM, MST or the NA. All such training exercises are documented on the personnel training form (NEE-03) for each employee. These documents are kept and maintained by the NQSM and the NA.

The National Quality System Manager and the National Administrator are responsible for ensuring this procedure is implemented and maintained.

Requirements:

Technicians wanting to become Recognized Inspector Technicians to perform initial / subsequent inspections on behalf of Measurement Canada must meet the following requirements:

1. Candidates must have their Criminal Background Check completed and must have a clean records
2. Candidates must sign the training agreement with (HR)
3. Candidates must pass the Pre- requisite exam
4. One month of employment is necessary
5. Candidate must have minimum grade 10-11 math
6. Excellent reading and writing skills (English or French)
7. Post-secondary education is an asset

Bulk – Retail Petroleum

Course Objective / Outline:

The objective of this course is to provide students with necessary knowledge to inspect and certify devices and to ensure that the requirements of the Weights & Measures Legislation are met.

1. There will be a five day in-class training session (theoretical). Students will be quizzed on a daily basis to ensure they have a thorough understanding of the material covered.
2. A theoretical evaluation (exam) will be administered on the last day of the training by Measurement Canada. A minimum mark of 70% is required to pass.
3. Takes two weeks to receive the result back and candidate who successfully pass the theoretical exam will be able to take practical evaluation.

4. There will be a 4 days practical training session for those candidates seeking to inspect dispensers / Refuellers only. On the 5th day there will be a practical evaluation administered by Measurement Canada. A minimum mark of 70% is required to pass.
5. There will be a 4 day practical training session on Bulk / Truck meters including a witness inspection. On the 5th day there will be a practical evaluation administered by Measurement Canada. A minimum of 70% mark is required to pass.

All Exams are offered and monitored by Measurement Canada.

Successful Candidates will be added to National Energy Schedule A as Recognized Inspector Technicians, and will be qualified to perform Initial Inspections / Subsequent Inspections on petroleum and chemical products.

Propane Metering

Additional course pre-requisite:

Successful completion of Bulk/Retail Petroleum training. The candidate must also have written the integral (Bulk/Retail) exam.

Course Objectives / Outline:

The objective of this course is to provide students with necessary knowledge to inspect and ensure that the requirements of the Weights & Measures legislation are met. Participants are expected to have a thorough knowledge of the device (s) and have successfully passed their Petroleum evaluation.

1. There will be a 4 days in-class training session (theoretical), and one day hands on prover training, with the final exam on the last day. Students will be quizzed on a daily basis to ensure they have a thorough understanding of the material covered.
2. A theoretical evaluation (exam) will be administered on the last day of the training by Measurement Canada. A minimum mark of 70% is required to pass.
3. Takes two weeks to receive the result back and candidate who successfully pass the theoretical exam will be able to take practical evaluation.
4. Successful candidate will have a 3 day practical training session offered by National Energy and a practical evaluation monitored by Measurement Canada on the 4th day. A minimum of 70% is required to pass.

All Exams are offered and monitored by Measurement Canada.

Successful Candidates will be added to National Energy Schedule A as Recognized Inspector Technicians, and will be qualified to perform Initial Inspections / Subsequent Inspections on propane metering systems

Gravimetric Proving of Lube Oil Meters

Additional course pre-requisite:

1. Successful completion of Bulk Petroleum Meters or Retail Petroleum training.
2. Candidates must acquire a laptop with version 2003 of MS Excel or higher. A basic knowledge of Excel is also required. Trainers may provide candidates with the spreadsheets and worksheets that will be used during the course and examination.

Course Objectives / Outline.

The objective of this course is to provide students with the necessary knowledge to inspect and ensure that the Weights and Measures legislative requirements are met. This course does not address theory of operation or technical aspects relating to design of the devices. Participants are expected to have a thorough working knowledge of the devices for which they are seeking accreditation or registration prior to receiving this training. Participants are expected to have adequate Mathematic and language skills to enable them to complete this course. Participants are also expected to familiarize themselves with the general contents of the training manual prior to the course.

1. There will be a 3 days in-class training session (theoretical), and one day hands on prover training, with the final exam on the last day. Students will be quizzed on a daily basis to ensure they have a thorough understanding of the material covered.
2. A theoretical evaluation (exam) will be administered on the last day of the training by Measurement Canada. A minimum mark of 70% is required to pass.
3. Takes two weeks to receive the result back and candidate who successfully pass the theoretical exam will be able to take practical evaluation.
4. Successful candidate will have a 4 day practical training session offered by National Energy and a practical evaluation monitored by Measurement Canada on the 5th day. A minimum of 70% is required to pass.

All Exams are offered and monitored by Measurement Canada.

Successful Candidates will be added to National Energy Schedule A as Recognized Inspector Technicians, and will be qualified to perform Initial Inspections / Subsequent Inspections on Lube oil metering systems.

Pipe Provers

Additional course pre-requisite:

Successful completion of Bulk/Retail Petroleum training. The candidate must also have written the integral (Bulk/Retail) exam.

Course Objectives / Outline:

The objective of this course is to provide students with the necessary knowledge to inspect and ensure that the Weights and Measures legislative requirements are met. This course specifically applies to the use of pipe provers when carrying out an inspection. The course will entail the following: the types of pipe provers and the necessary considerations for each style of prover in regards to theory and design; a general overview of the applicable calculations, corrections, and appropriate tables to be used; general test procedures and considerations for testing trade meters using pipe provers; applicable legislation, related documents, and reference material. This course is not designed to evaluate a student's mathematical skills, but all students should be aware of the basic theory of pipe proving and the associated corrections involved. This will involve being able to interpret given data and utilize the appropriate reference material to perform some calculations.

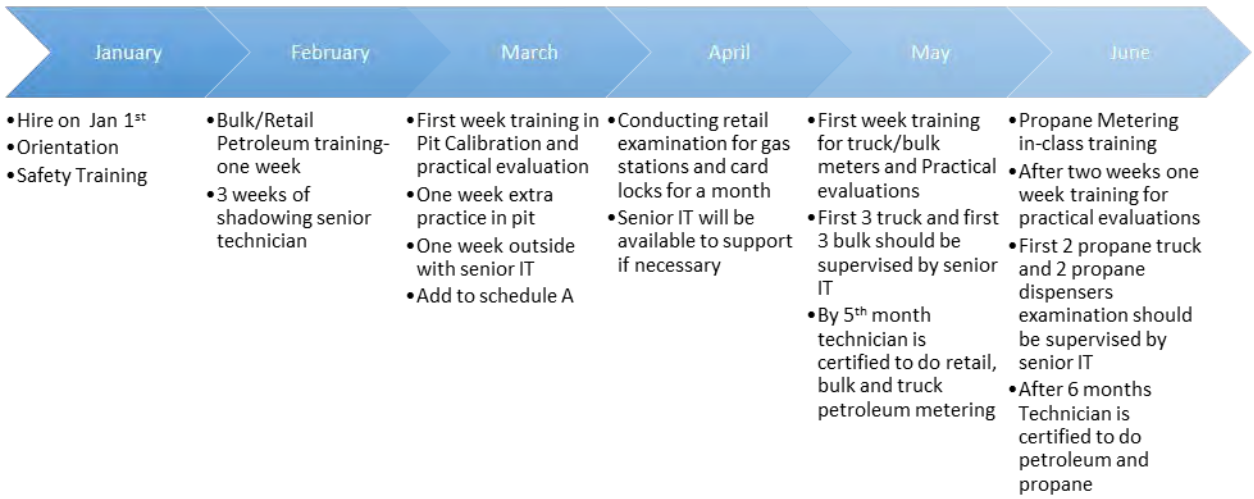
1. There will be a 3 days in-class training session (theoretical), and one day hands on prover training, with the final exam on the 5th day. Students will be quizzed on a daily basis to ensure they have a thorough understanding of the material covered.
2. A theoretical evaluation (exam) will be administered on the last day of the training by Measurement Canada. A minimum mark of 70% is required to pass.
3. Takes two weeks to receive the result back and candidate who successfully pass the theoretical exam will be able to take practical evaluation.
4. Successful candidate will have a 4 day practical training session offered by National Energy and a practical evaluation monitored by Measurement Canada on the 5th day. A minimum of 70% is required to pass.

All Exams are offered and monitored by Measurement Canada.

Successful Candidates will be added to National Energy Schedule A as Recognized Inspector Technicians, and will be qualified to perform Initial Inspections / Subsequent Inspections using pipe provers.

Training Timeline:

The timeline below shows the training process for the new hire or existing technicians that are required to go through the training to become an IT.



QPM – 15: Management Review

Purpose:

To govern the Management Review, ensure it is performed in a consistent manner, and that it complies with the requirements for quality and control. This Management Review will ensure the continuing suitability and effectiveness in satisfying the requirements of the Quality Management System, the Quality Assurance Manual, and the *Weights and Measures Act and Regulations* .

Scope:

This procedure applies to the review of the quality system at at planned intervals or may be called at any time as required by the NAM, NQSM or NA. The review may include, but not be limited to, assessment of Internal Quality Audits, customer feedback concerning the quality system, compliance to the requirements of Measurement Canada, the adequacy of the organizational structure, including staffing and other resources, and trends that may indicate problems. The NQSM is responsible for the Management Review procedure.

The scope of this meeting is to review section 9.3 Management Review, of QMS manual and its subsections (9.3.1, 9.3.2 and 9.3.3) in detail, and discuss improvement opportunities. The review will take place once a year or at any time deemed necessary by the top management. Records from all management reviews are maintained by accreditation department, and a copy kept at the head quarter of accreditation department for audit purposes.

Procedure:

Part 1- Quality System Manual 9.3, review of the management review procedure and “Management Review Report” (NEE-14) will be used.

QPM – 16: Internal Audit Program

Introduction:

An audit is simply another form of inspection and testing – except that, in this case the product being inspected is the management system itself. Like a product inspection, an audit simply compares how things actually are, to how we think they are and how they ought to be. Audits help uncover areas that are in need of attention and they can be an opportunity to draw back from the day-to-day details and to take look at the whole process with fresh eyes. Despite being such a (potentially) positive tool in the management system toolkit, audits often induce the same kind of stress as end of year exams.

However, a good Internal Audit process can reduce the stress, since you can uncover the problems yourself and resolve them before the external auditor begins.

Purpose:

To govern the planning and implementation of internal quality audits, ensure it is performed in a consistent manner, and that it complies with the requirements QA manual. The NAM, NQSM, NA and internal auditors are responsible to conduct internal audit for every branch at least once a year or any time deemed by top management.

The objective of the internal audit is to gain objective evidence to permit the audit team to make a statement regarding the judgment of National Energy Equipment Inc.'s compliance to the audit standards under which accreditation was granted by Measurement Canada.

Scope:

Internal audit assess the required elements based on audit plan of the quality assurance program. The audit focused on National Energy Equipment Inc.'s accreditation program for device that includes both compensated and uncompensated Factory and field initial inspections and Factory and subsequent field inspections of measuring devices and related processes to perform inspections on behalf of Measurement Canada.

The accreditation department is responsible for all internal audit procedures to be performed at a minimum of once a year. And Audit may be called at any time deemed necessary by the National Accreditation Manager or National Quality System Manager. All audit reports and conclusions must be submitted for Management review at the annual Management Review Meeting.

Audit Standards and Method:

The auditor shall use an audit checklists based on the International Standard, ISO 9001 and the Measurement Canada accreditation standard, S-A-01, Criteria for Accreditation of Organizations to Perform Inspections Pursuant to the Electricity & Gas Inspection Act and the Weights & Measures Act.

Reference Documents:

- The Weights and Measures Act & Regulations, Notice of Approvals, Specifications, Bulletins and associated documentation.

- National Energy Equipment Inc.'s Quality Assurance Manual
- Non conformance Corrective and Preventive Action Report (NEE-10)
- Audit checklist

Responsibilities of the Internal Auditor:

Planning and implementing all internal quality audits will be maintained by the Internal Auditor. The responsibilities of the Internal Auditor are not limited, but include:

- Performing quality audits a minimum of once per year, preceding the external audit by 6 to 8 weeks;
- Checking the previous corrective action reports (NEE-10)
- Be appropriately trained to perform audits according to the documented procedures;
- Prepare an audit checklist;
- Initiate non-conformances when deficiencies are found in the Quality Systems;
- Communicate results of the internal audit with the personnel responsible in the area(s) audited;
- Submit records and conclusions of the audit to the National Quality Systems Manager for annual Management Review meeting.

Quality Management System 9.2 Internal Audit:

NEEI will conduct internal audits at planned intervals to determine whether or not the quality management system:

A. conforms to the planned arrangements to the requirements of **Weights and Measures Act and Regulations,** and the current version of S-A-01;

B. Requirements are effectively implemented and maintained.

The audit program is planned, taking into consideration the status and importance of the processes and area to be audited, as well as the results of the previous audits. The audit criteria, scope, frequency and methods are to be defined by the selection of auditors. The selection of auditors will ensure objectivity, and impartiality of the audit process. NEEI will conduct internal audits on annual basis including the accreditation headquarters, unless a written detailed assessment and justification for a longer frequency is provided by NEEI and is accepted by Measurement Canada. Auditors will not audit their own work.

The responsibilities and requirements for planning and conducting audits and for reporting results and maintaining records are defined in the documented procedure.

The management responsible for the department being audited will ensure that actions are taken without undue delay to eliminate detected nonconformities and their cause. Follow-up activities will include the verification of the actions taken and the reporting of verification results. NEEI will select and assign qualified auditors for each activity being audited.

NEEI will conduct internal audits of all its sites on an annual basis. This includes the internal audit of the accredited headquarters of the organization, unless a written detailed assessment and justification for a longer frequency is provided by the organization and accepted by Measurement Canada.

The results of the audit are to be recorded by the lead auditor and communicated to the fellow auditors at the pre and post audit meetings. Records of these meetings will be kept by the NA. The final meeting will discuss corrections, non-conformances, preventative actions, opportunities for improvement and address other pertinent information

Internal Audit Process:

Plan for Internal Audit:

Internal Audits need to be scheduled at planned intervals to check that the quality system conforms to requirements and that the system is effective. 'Requirements' include the standard, ISO 9001 and the Measurement Canada accreditation standard, S-A-01, Criteria for Accreditation of Organizations to Perform Inspections Pursuant to the Electricity & Gas Inspection Act and the Weights & Measures Act, as well as the National Energy Equipment Inc.'s Quality Assurance documentation

You don't need to audit every process all at one time. The External Audit may be like this, but internal audits can be spread out with different processes audited at different times – a series of 'mini-audits'.

The standard recommends that you consider how important the processes are, their risks, their prior history of problems, and also your quality objectives. With a series of 'mini-audits' you can set different audit frequencies for different processes.

Audit Planning Meeting:

An audit planning meeting shall held annually before starting internal audits, with NEE's Audit Team. The audit team to plan and schedule the internal audit for the year. Minutes of this meeting are retained in quality records files and maintains by National Quality System Administrator.

Define the requirements for each audit:

The plan already identifies the area that needs to be audit, now audit team needs to define what criteria they will audit against. Our Quality System Manual indicates that the form of a formal checklist with a pre-determined list of questions needed for audit interview. Any previous findings or issues related to the audit area should also be checked. Even with pre-defined questions, an auditor will still need to 'follow their nose' if something is not quite right. You can define the criteria for the audit prior to each audit rather than having to set this up at the planning stage. These requirements (checklists, documents, records, etc) should be communicated to the auditee some time prior to the actual audit taking place. (Specify the time in your audit procedure – a week is reasonable).

Conduct the audit:

An audit must start with an opening meeting where the auditor meets the auditee(s), sets the expected timetable and out how the audit will be conducted.

During the audit, the auditor will work systematically through the checklist or procedure, examining evidence that the process meets the criteria. It's common to markup the checklist with notes and a quick finding result, e.g.,

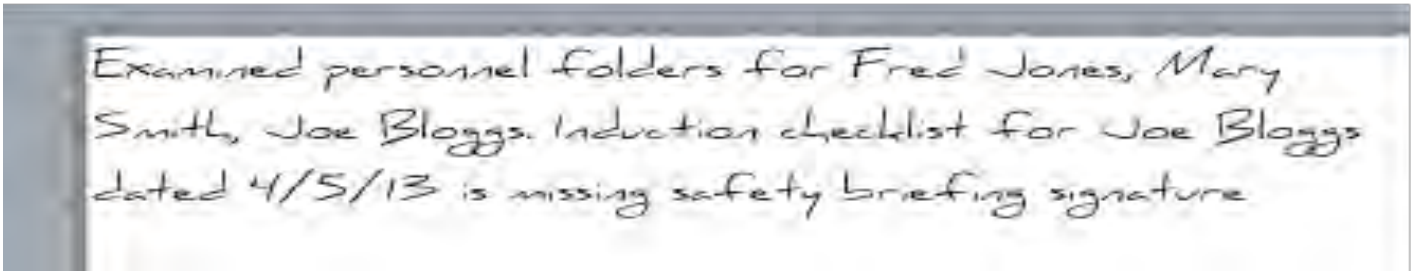
C – Compliant,

NI – Needs Improvement,

NC – Non-conformance,

Customer Communication		
The company has determined and implemented effective arrangements for communicating with customers in relation to:		
Product information.	C	Very well done, specs, progress reports etc:
Enquiries, contracts or order handling, including amendments.	Ni	see above + variations managed - process not controlled adequately
Customer feedback, including customer complaints.	NC	No formal customer complaint handling system in place

When recording the audit, it is important to write down exactly what evidence was examined to establish the finding – regardless of the finding. e.g. auditing employee training records the auditor writes:



(Note that the date is an important part of the evidence).

Usually the auditor will discuss the finding with the auditee before recording it. This is to ensure the finding is understood and to confirm there is actually a problem, e.g. the auditee above may reveal that Joe Bloggs' personnel folder includes a separate safety briefing record with the required signature. This can sometimes negate the finding, or just change it – i.e. the signature is there, but it is not following the procedure. In this example, the consequences of not following the procedure are minor and the audit finding should reflect that.

The audit will finish with a closing meeting where the lead auditor gives an overall summary of the audit and discusses each audit finding to ensure they are understood.

Document the Audit Findings:

An internal auditor shall submit a formal written report on the audit to management several days later. However, there's no requirement in the standard for a formal audit report but as company policy and help to improve the quality system all internal auditor should send short report to the management of each location. Auditor need to be ensured that the findings are recorded and communicated to the management.

Records of the audit need to be retained by the auditor, which will typically include:

- Completed Audit Checklists
- Notes on objective evidence examined, and interviewed.
- Audit Findings (cross referenced to your Non-conformance Register).
- Audit Report.
- Non conformance Corrective and Preventive Action Report (NEE-10)

QPM – 17: Ice Point Testing of Electronic Thermometers

Purpose:

Ice point testing of electronic thermometers with 0.1 deg. Increments of registration.

Scope:

See Measurement Canada Ice Point test information *(TE-LP-001)*

Because the sensors of electronic thermometers are susceptible to damage, and electronic components are susceptible to drift, a scheduled check should be performed every month. The purpose of this check, an ice point test, is to evaluate the performance of electronic thermometers, ensuring that the calibration has not shifted beyond the acceptable limits of error.

Frequency:

If the Thermometer is used on a regular basis then the ice point test must be done every month. If the thermometer is only used occasionally it must be ice point tested before each inspection takes place. The Thermometers must be sent to Measurement Canada for re-calibration every two years or as often as deemed necessary.

Procedure:

Basic equipment:

The following basic equipment is required:

- Distilled water, 4 L jug
- Ice trays, 4 × 1/3 L capacity
- Blender with ice-crushing capability, 1 L capacity
- Wide-mouth vacuum-insulated thermal flask, 1 L capacity
- Plastic gloves, non-powdered
- Utensils/forceps
- Beaker, 0.5 L or larger

Set-up:

All equipment that will come in contact with the water and ice and will be used in the preparation of an ice-point bath shall be cleaned and rinsed with distilled water before use. Ice trays should be filled with distilled water and put inside a freezer for sufficient supply of ice prior to the preparation process.

Instructions:

1. Use either clean plastic gloves or cleaned and rinsed utensils to handle the ice and equipment.
2. Empty a tray of ice (made with distilled water) into the blender's container. Add enough distilled water to have the ice float freely in the blender's container. Put the lid on the container and crush ice by using the appropriate setting

on the blender. Add more water if the crushed ice clings to the wall of the blender's container during the operation. The resulting mixture should be composed of only fine shavings of ice in water (no chunks).

3. Pour the water from the container into the beaker. Transfer all the shaved ice into the thermal flask making sure there are no ice pieces present. When filling the bath with ice shavings, ensure that there are no air bubbles. Repeat the ice crushing until the flask is full. Gently pack the slushy mixture to release any trapped air in the flask and fill in the voids.
4. Drain any excess water by tilting the flask until there is no free flowing water. Ensure that the top layer of the ice remains moist (not white).
5. Cover the ice-point bath using its lid. Allow the contents and the flask to thermally equilibrate for 15 minutes before use.
6. Pre-cool the temperature sensors in the beaker filled with cold distilled water, obtained from the ice bath, and any extra ice. Pre-cooling reduces the time to reach equilibrium at the ice point and helps to preserve the bath at the ice point for prolonged use. Insert the sensor portion of the thermometer, such as the bulb of a liquid in glass thermometer or the sensing element of a probe, to a depth of at least 7 cm, or sufficient depth to eliminate immersion errors, below the bath liquid level (this does not apply to full-immersion type liquid-in-glass thermometers). Keep the sensor portion of the thermometer 3 to 4 cm above the bottom of the bath to avoid the zone at the bottom of the flask where the water will accumulate.

The melt water accumulating at the bottom of the flask has a temperature slightly greater than 0 °C and should therefore be drained frequently by tilting the bath. The bath will maintain a temperature of 0 °C for approximately 30 minutes, depending on usage and equipment.

Note: Impurities in ice and water usually lower the bath equilibrium temperature by several millikelvins. As denser melt water settles to the bottom, excessive amounts can reach higher local temperatures. Large chunks of very cold ice (not properly shaved) added to a bath can produce local temperature depressions.

Note: The ice point can be reproduced with an uncertainty of about 10 mK (0.01 °C). When prepared by rigorous application of this procedure, the uncertainty can be reduced to approximately 2 mK (0.002 °C).

Records:

Use form NEE- 05 Ice Point Test to record the ice point results. Keep a copy with you thermometer and keep the expierd one in file.

QPM – 18: Standards, Inventory Database

Purpose

To govern any change or update of NEEI's standards nationally to ensure consistency and accuracy of information, and to comply with Measurement Canada requirement of having inventory tracking procedure. All changes to national standards list must be approved by NQSM. NQSM shall notify Measurement Canada of any addition or removal of standards prior to certification.

This procedure will ensure that each test standard in the acquisition of NEEI is tracked and its location is known. In addition, according to the current version of *S-A-01,* having such instructions will assure that the test standards are calibrated as prescribed in the *Weights and Measures Regulations*. As such, all standards shall have valid certificates of designation issued by Measurement Canada, and are verified by Measurement Canada at the prescribed intervals or more frequently, where verification is necessary, to maintain the accuracy of the test standards. Hard copies of standards' certificates from all NEEI locations must be kept in NEEI's Accreditation Department, Port Coquitlam branch as well as they must be listed in Appendix1.

Scope

These inventory procedures will apply to all the standards in the acquisition of NEEI nationally. The procedures explain the methodology of updating existent standards, adding new ones to Appendix1, sending and receiving standards for certification, and filing standards' certificates. The NA will manage the standards' inventory updates, and maintain a record of three consecutive years of the expired certificates for each standard to comply with Measurement Canada requirements. It is also NEEI technicians' responsibility to maintain the standards' condition, ensure the standards they use have valid certificates of designation, and to communicate with NA and NQSM for repairs and certification requests.

The NQSM is responsible for the review and approval of standard's updates or changes before issuing them to Measurement Canada, then will communicate back with the NA to confirm.

Procedure:

The Master Standard Inventory Sheet, (Appendix1), updates procedure is divided into two main processes depending if the standard is new addition to NEEI's inventory or existent with expired certificate. NA and NQSM only can do any update to Appendix1.

New Standard:

Any standard that is not on NEEI's Appendix1 "Master Sheet" tab is considered new and needs to be added to Measurement Canada's inventory prior to sending it for certification. This is done as follow:

1. Label the standard and its parts (if any) with a designated Serial Number (S/N). It's a unique identification number for each standard either assigned by the manufacturer or NA/NQSM will come up with it;
2. Add the standard to Appendix1 "Updates" tab. Make sure to fill in all the columns and enter notes in the comments section such as binder's name, sign out personal or location etc.;
3. Send a request to NQSM to approve the updates;

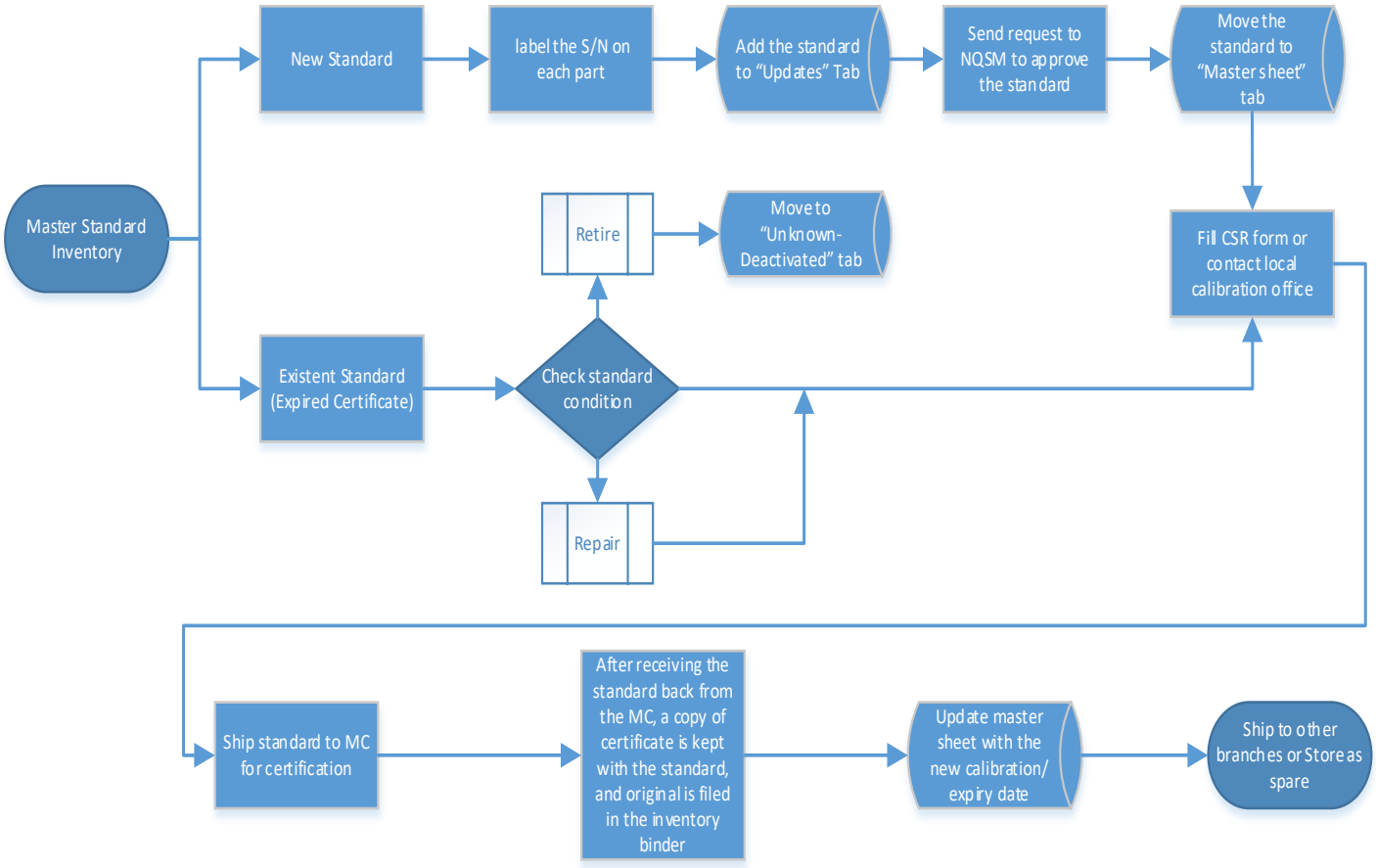
4. NQSM confirms with Measurement Canada the addition of the standard to NEEI and Measurement Canada's inventories;
5. Then NA moves the new standard from "Updates" tab to the "Master Sheet" tab after NQSM approval;
6. Fill out Measurement Canada CSR (Calibration Service Request) form for non-prover standard's calibration. Read CSR procedure for details;
7. For prover's certification, contact local calibration office to arrange calibration date and availability (no CSR form needed);
8. Ship standard to Measurement Canada for certification. Attach CSR form if applicable;
9. after receiving the certified standard back from Measurement Canada, a copy of the certificate is kept with the standard, and the original is filed in the related Inventory Certificate Binder;
10. Update the standard's information on Appendix1 with the new calibration dates. Add comments specifying the date received, location to be sent to etc.; whichever is applicable.
11. Ship standard to other branch or store as spare after confirming with NQSM.

Existent standard:

Any standard that is already on NEEI's Appendix1 "Master Sheet" tab is considered an existing item that might be expired and needs to be certified. This process of recertification does not require notifying Measurement Canada prior to that unless the standard is deactivated or removed from Appendix1.

1. Check the expired standard's condition first and ensure it's on the "Master Sheet" tab, Appendix1;
2. If the standard needs repair, contact the NQSM to analyze the defect and repair requirements;
3. Once the standard is repaired, send it to Measurement Canada for recertification (Proceed to step 5);
4. Unless the standard cannot be repaired, then move to "Deactivated-Unknown" tab, Appendix1, with adding comments stating the date and defect description. NQSM to contact Measurement Canada to remove the defective standard from their list;
5. If the standard is working in good condition, fill out Measurement Canada CSR (Calibration Service Request) form for non-prover standard's calibration. Read CSR procedure for details;
6. For prover's certification, contact local calibration office to arrange calibration date and availability (no CSR form needed);
7. Ship standard to Measurement Canada for certification. Attach CSR form if applicable;
8. After receiving the certified standard back from Measurement Canada, a copy of the new certificate is kept with the standard, and the original is filed in the related Inventory Certificate Binder. Make sure to keep the expired standard's certificate (up to three certificates) in the back of the newest one;
9. Update the standard's information on Appendix1 with the new calibration dates. Add comments specifying the date received, location to be sent to, binder's name, etc; whichever is applicable.
10. Ship standard to other branch or store as spare after confirming with NQSM.

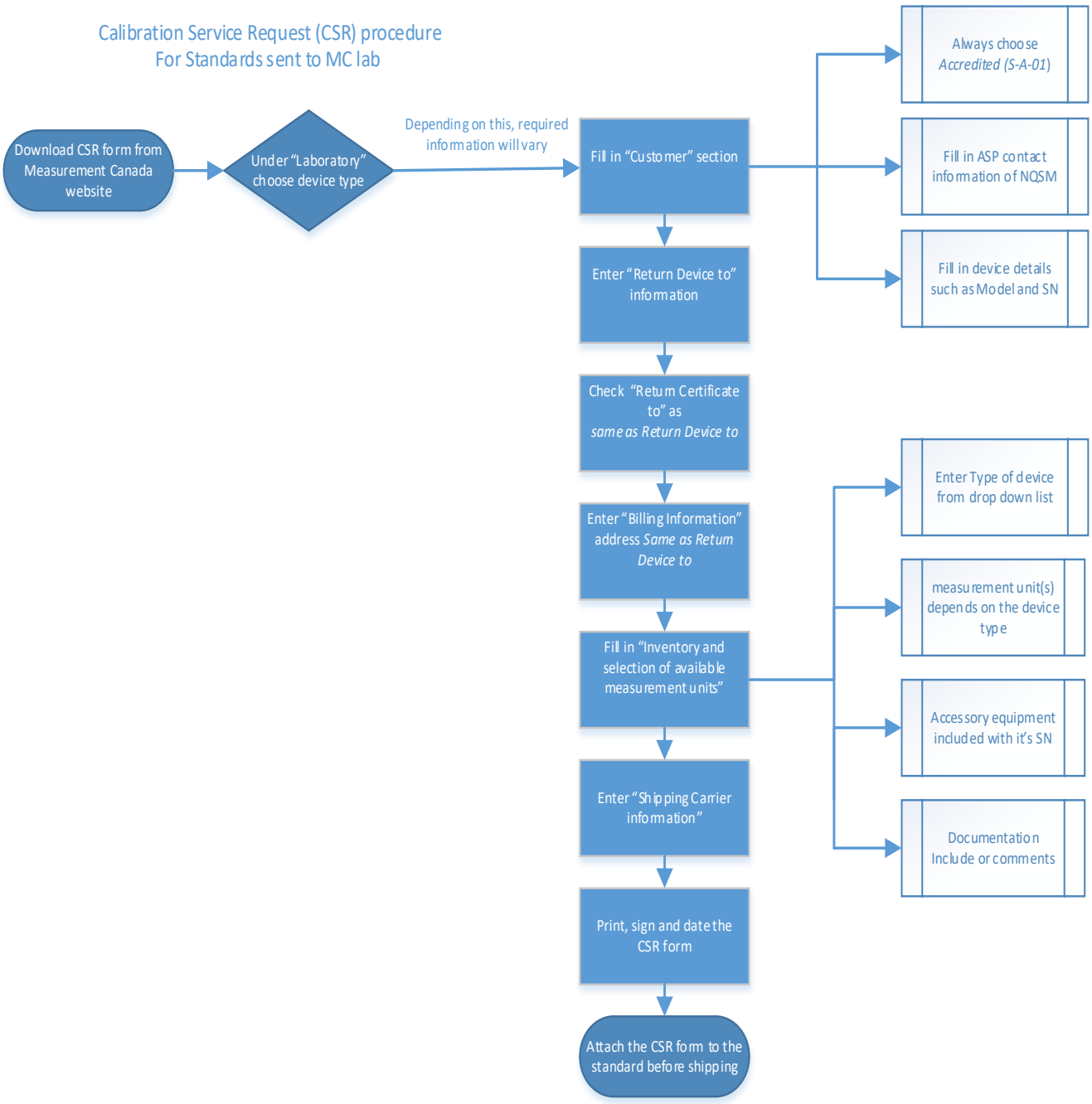
Flow Chart: Master Standard Inventory Procedure



CSR (Calibration Service Request):

This is a Measurement Canada form that needs to be filled out when requesting calibration for standards that needs to be sent to Ottawa, CA laboratories. This form needs to be completed, dated and signed by the sender, then attached to the standard (except provers) when shipped to Measurement Canada laboratories. See below flow chart for detailed instructions.

Flow Chart: calibration Service Request (CSR)



QPM – 19: Control of Records

Purpose

To govern the control of records for all the documents and forms under NEEI's quality management system to ensure those records remain legible, readily identifiable and retrievable to Measurement Canada representatives or all NEEI's personnel who require such information to perform their duties. NQSM and NA will keep records of the controlled document established and maintained to provide evidence of conformity to requirements and of the effective operation of the quality management system.

This procedure will ensure that all NEEI's technicians and accreditation department's personnel understand and implement the importance of following the filing procedure of quality assurance's documents to guarantee accuracy of records.

Scope

The control of records' procedures apply to all NEEI's recognized technicians and accreditation department's employees. The procedures define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of records by identifying the IT's and accreditation's designated controlled documents. NQSM and NA will manage the control of records submitted to NEE's Accreditation Department. Also, it is the IT's responsibility to follow the filing procedure and on timely manner.

All the controlled documents records nationally will be kept in hard or digital copies in NEEI's Accreditation Department, Port Coquitlam branch only. NEEI will maintain a retention period for records relating to accreditation a minimum of three years, and a maximum of seven years.

Procedure:

The control of records procedure lists the controlled documents for both IT and NA with description and filing directions to ensure traceability and accuracy of controlled records' data, as well as compliance with the requirements of *Weights and Measures Act and Regulations* , and the current version of *S-A-01.* All changes to the control of records procedures must be approved by NQSM in accordance to Measurement Canada's requirements, then communicated with NEEI's employees to ensure accurate application and understanding of the updates.

QPM-19-1: Inspector Technician's (IT) Controlled Documents:

All NEEI's technicians are responsible of maintaining the below controlled documents record, and following filing directions:

Item#	Controlled Document	Description	Filing directions
1	Ice Point Test form (IPT)	Inspector must have valid IPT with thermometer at all times.	A hard copy and valid IPT form is kept with the thermometer at all times.
2	Inspection Report	Inspector should fill out inspection report for each examination. Keep a blank digital or hard copy on hand.	A digital or hard copy of full inspection report is sent to NA weekly.
3	Non-conformance Corrective and Preventive Action report	Inspector should have access to hard copy or digital copy of this report.	A digital or hard copy of the report is sent to NQSM and NA.
4	ORA Manual	Inspector must have access to the most current copy of ORA manual. Must be kept digitally or hard at all time.	A digital or hard copy of the most current version is kept with the technician.
5	Schedule A	Inspector must have access to most current copy, hard or digital, of Schedule A.	A digital or hard copy of the most current Schedule A is kept with the technician.
6	Short form	Inspector should have access to hard copy or digital copy of this form.	A signed copy is sent to NA as soon as short form is issued.
7	Standards' Certificates	Inspector must have a valid copy of the standards certificates at all time.	Original copy of standard's certificate is sent to NA when a test standard is certified and a copy of standard's certificate should be with the standard.
8	Status Tag	Inspector must have access to hard or digital copies of two tags. First one is "Not to be used in trade tag", and the second is" Non- Conformance" tag.	Notify NQSM when it is in use.
9	Sticker and label control form	Each inspector must know and track the number of stickers/seals on hand at all times by using this form	A filled digital or hard copy form is sent to NA when requesting more stickers/seals
10	Volumetric Prover checklist	Must be filled out before leaving to the site, at the site before examination, and after coming back from the site. Keep a blank digital or hard copy on hand.	A digital or hard copy of prover checklist is sent to NA weekly with the rest of examination paperwork.

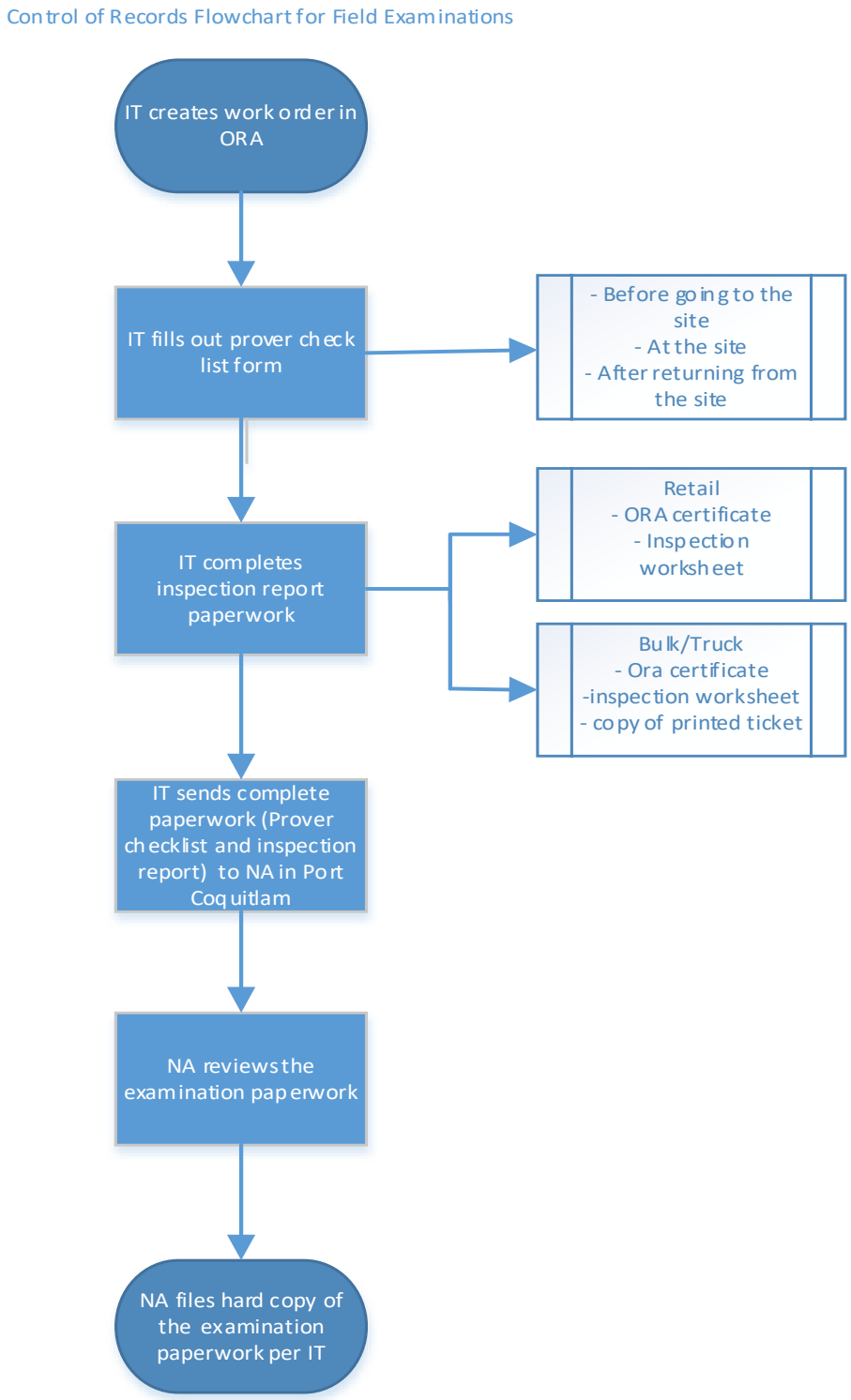
QPM-19-2: Accreditation Department's Controlled Documents (NEEI Port Coquitlam Office)

The NQSM and NA are responsible for control and maintenance of the below documents. Accreditation department will keep a record of the listed controlled documents for a minimum of three years, hard copies or soft, and records of a maximum seven years in the warehouse.

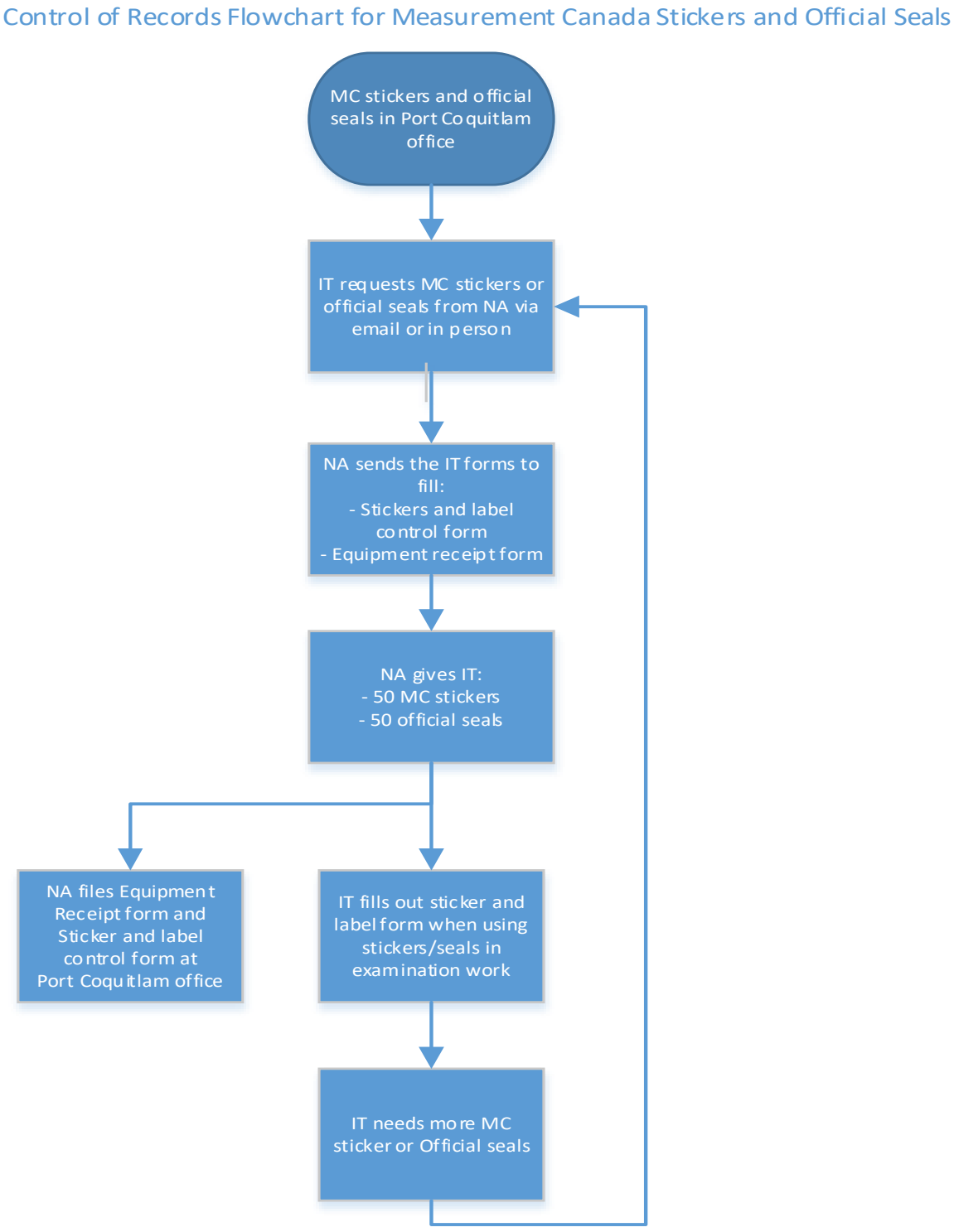
Item#	Controlled Document	Description
1	CSR (Calibration Service Request)	Digital copies of all standards' CSR's are to be kept in Port Coquitlam office, accreditation department.
2	Current and expired hard copies of standards' certificates	Hard copies of expired and current standards' certificates are to be stored in separate binders in Port Coquitlam office.
3	Employee file	Each employee reports to accreditation department must have individual hard file to keep all the training/criminal records and notices.
4	Employee training record	Accreditation to file hard copies of its employee's training courses and results.
5	Equipment receipt	Hard copies must be kept in Port Coquitlam office when assigning any item to the employees.
6	GRR (Goods Receiving Report)	Digital copies must be kept in Port Coquitlam office for the branch's pit calibration.
7	Inspection Report	Accreditation stores hard copies of each technician's inspection reports.
8	Management review	Accreditation must keep digital copy of the yearly management review report.
9	Master standard Inventory sheet (Excel)-Appendix1	One digital copy of Appendix1 must be updated and kept by accreditation department, Port Coquitlam at all times.

QPM-19-3: Flow Charts Related to Control of Records:

Control of Records Flowchart for Field Examinations:



Control of records flowchart for Measurement Canada stickers and official seals:



Part 3

Forms Index, Definitions and Usage

NEE-01 QUALITY PROCEDURE CHANGES FORM

This form is to be used when requesting a change to a current or existing procedure or a new procedure. It must be filled out and submitted to the NA for approval who in turn will send it to the NQSM to be approved and implemented.

NEE-02 MEASUREMENT CANADA SEIZURE RELEASE

This form is mandatory when Measurement Canada has seized a unit and then the trader wants the unit brought into compliance and certified. NEEI cannot work on any item that is under MC seizure until MC gives written permission. No exceptions. This form must be filled out completely and signatures obtained before any work can proceed.

NEE-03 EMPLOYEE TRAINING REPORT

This form is for recording any training done for employees. It must be submitted to Accreditation Offices in Port Coquitlam to be filed in the controlled files. Port Coquitlam will record the information on a master copy for each employee and also foreword a copy to Human Resources in Mississauga.

NEE-04 STICKER AND LABEL CONTROL

This form is used to control stickers and labels used in the inspection procedures by inspector technicians. It is mandatory that each sticker or label be accounted for; therefore the inspector technician is issued a given number of stickers and labels he must keep track of where they were used. The IT must send the completed form NEE-04 showing the distribution of his previous stickers and labels along with his request for new stickers or labels. A new form will accompany each new issue of stickers and labels. This precaution is used to prevent, misuse, loss, theft and any other forms of damage to stickers or labels.

NEE-05 ICE POINT TEST

This form is to be used when conducting Ice Point Tests on certified electronic Thermometers. A copy of this form is to be forwarded to Port Coquitlam after each test for filing in the controlled files.

NEE-06 VOLUMETRIC PROVER CHECKLIST

This is a checklist for all volumetric provers and must be filled out before conducting any work and must be filled out on return or completion of work. Any damage that might occur during use will be reported via this form. It is to be given to the foreman or NA to ensure repairs take place before the unit leaves on another job. This form must also be turned in with any inspection or calibration documentation. This checklist is to ensure the prover meets all Measurement Canada and NEEI's Quality System requirements before it is used on any specific inspection or calibration service work. This form must accompany documentation.

NEE-07 INSPECTION TOOL (PIT CALIBRATION USE ONLY)

This tool must be used when inspecting/calibrating dispensers at the pit by Inspector technicians. They must send a copy of the worksheet with the prover checklist and ORA certificate to the accreditation department.

NEE-08 INSPECTION TOOL (FUEL USE)

This tool must be used when inspecting/calibrating dispensers, trucks, bulk for propane and petroleum devices by Inspector technicians. This inspection tool sends a copy of the worksheet automatically to the accreditation department.

NEE-09 NON-CONFORMANCE TAG

This tag is to be attached to any product that has been issued a non-conformance for any reason. An Inspector technician can only remove it.

NEE-10 NONE CONFORMANCE CORRECTIVE AND PREVENTIVE ACTION REPORT

This form is used when a recommended action is suggested to prevent a non-conformance, or if a non-conformance has occurred and needs more specific action than is suggested on the Non-Conformance. This form may be obtained from an NA or Inspector Technician or from the NQSM. All personnel involved in the Quality system are required to fill out and submit the form to an Inspector Technician or NA. The non-conformance, if possible, will be handled locally and the proper forms submitted to the National office to be recorded for future Management meetings. Form NEE-10 is to assist the management to improve NEEI Quality system as required.

NEE-11 NOT TO BE USED IN TRADE TAG

This tag is used when units are found not suitable to be used in trade under the W&M Act and Regulations. Also any units the trader deems are not used in trade are to be so tagged. Any unit that is not suitably marked "Not for Used in Trade" is deemed to be used in trade and must be inspected. This is the trader's responsibility and NEEI can advise that the unit should not be used, but cannot state it cannot be used for any reason, that is the Traders decision. NEEI must report all findings to Measurement Canada in a timely manner.

NEE-12 INSPECTOR TECHNICIAN (IT) CHECKLIST

This form is used by Port Coquitlam when they send out seals, pliers, etc to IT's, it must be signed and returned to Port Coquitlam along with any old seals etc. that are outdated and require destruction. This form is used to update and take inventory of the controlled inspector documentation and equipment. This is too inventoried and brought up to date every three months.

NEE-13 GOODS RECEIVING REPORT

Shippers and receivers as a receiving document and a traceability document use this form. A copy of this form is to accompany all units and products received for service or inspection. Distribution is also considering the use of this form in their division.

NEE-14 MANAGEMENT REVIEW REPORT

This form is used to ensure all required items in the agenda are reviewed at the Management meetings. This is only an outline and other items may be added as required. This form and the minutes of the Management Meetings are filed in Port Coquitlam for Audit purposes.

NEE-15 CUSTOMER SURVEY

This form is used to collect all required items to identify their level of satisfaction with an existing service, and to discover their express and hidden needs and expectations for future.

NEE-16 LUBE OIL TESTING WORKSHEET

This form is to be used as a written form for lube oil testing worksheet, all flows etc. are listed on this form and submitted along with the required documentation when testing.

References and Appendix

References:

- Measurement Canada: *S-A-01*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00432.html)
- *Weights and Measures Act* and Regulations
  *(*http://laws-lois.justice.gc.ca/eng/acts/W-6/*)*
- *Bill C-41*
  (*http://www.parl.gc.ca/About/Parliament/LegislativeSummaries/bills_ls.asp?ls=C14&Mode=1&Parl=40&Ses=3&source=library_prb&Language=E*)
- Measurement Canada *Laws an Requirements by Discipline*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00116.html)
- *Measurement Canada Enforcement Policy for Weighing and Measuring Devices, Part – Role of Authorized Service Providers.*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00440.html)
- Measurement Canada *Laws and requirements*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00115.html)
- *Notice of Approval Database*
  (https://www.ic.gc.ca/scripts/mcprod.wsc/noa-ada-eng.w)
- Measurement Canada *Appendix 3*
  https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00509.html
- Measurement Canada *Field Inspection Manual*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04380.html)
- Field Inspection Manual *Volumetric Measuring Devices-Appendix2*
  (http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04436.html)
- Field Inspection Manual *Part 2: Inspection Procedure Outlines (IPO's)*
  (http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04384.html)
- Field Inspection Manual *Part 3: Standard Test Procedure (STP's)*
  (http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04396.html#Part3)
- Measurement Canada *Load Discrimination Test*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04324.html)
- Measurement Canada Ice Point test information *(TE-LP-001)*
  (https://www.ic.gc.ca/eic/site/mc-mc.nsf/vwapj/TE-LP-001-eng.pdf/$file/TE-LP-001-eng.pdf)

Appendix

- Appendix -1: Schedule A