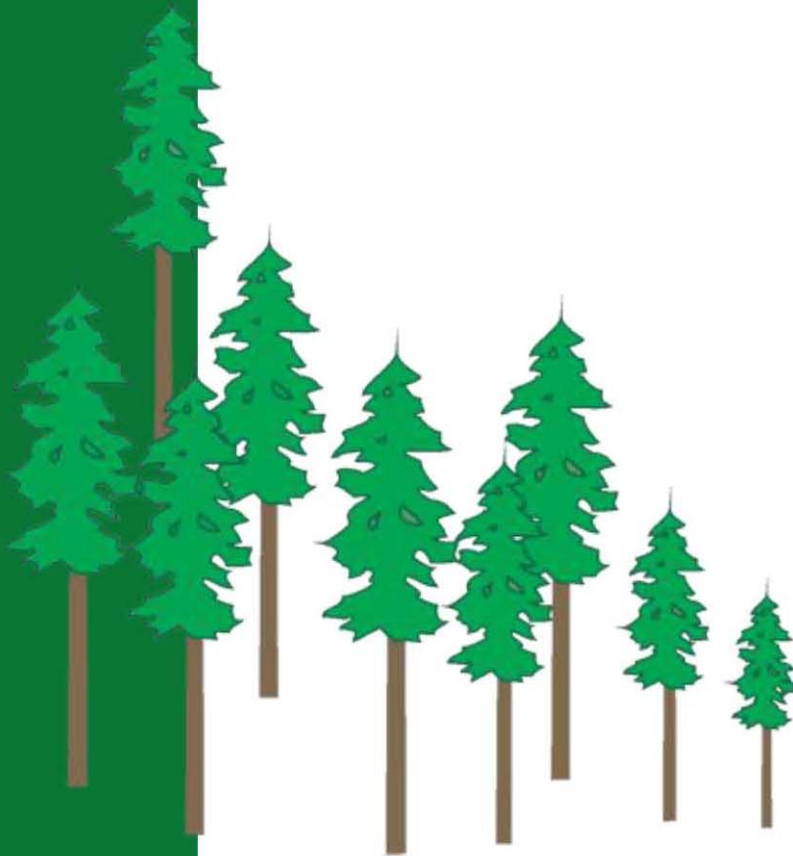




Log Scanner Standard Procedures and Options for Scanner Use



Timber Pricing Branch
2017

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Objective

This document provides the necessary support to advance the use of log scanner technology for the scaling of timber in the province of B.C., provides the approval process, and industry requirements and procedures. The specifications outlined in this paper are recognized as providing a foundation that supports the use of log scanner technology and meets all existing legislation and ministry business requirements.

Options

The options for log scanning are detailed in the Appendices as indicated. There are 4 different scanner options and options 1, 2 and 4 will require a 12 month test pilot before being approved by Timber Pricing Branch. Option 3 has been successfully piloted. The options are:

1. To use the sampling procedures-scaled volume/scanned volume (Option 1 - Appendix B),
2. The sampling procedures-scanned volume/scanned volume with an alternative to either maintain bundle or boom integrity (Option 2 - Appendix C)
3. The scaling station (Option 3- Appendix D),
4. The procedures for a scanner scale sorting line– volume scanned/volume scanned (Option 4 - Appendix E).

Log Scanner Committee

The development of this paper meets the requirements of the Provincial Log Scanning Technical Review Committee (LSC) Terms of Reference (Dec 13, 2012) and the agreement by the members of the LSC.

The publication of this paper does not preclude the continued development of more efficient regulations, procedures or system changes necessary to employ log scanners in the scaling of timber. As such, the group will continue its work on the long term opportunities for log scanners.

Certain conditions have been implemented to assist in assuring that the program is successful at the start. It is expected that some of these requirements and procedures will be removed or modified based on the success of the program.

Background

The relationship of Measurement Canada (**MC**), the Canadian Standards Association Log Scanner Committee (**CSA**) and the Provincial Log Scanning Technical Review Committee (**LSC**) to this project follows:

MC is responsible for ensuring the integrity and accuracy of measurement in the Canadian marketplace. It:

- develops and administers the laws and requirements governing measurement,
- evaluates, approves and certifies measuring devices, and
- investigates complaints of suspected inaccurate measurement.

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The CSA Log Scanner Committee is a technical body that provides the broad range of technical knowledge, experience and expertise required to develop federal standards. It seeks to balance interests among various stakeholders. When a draft standard has been agreed upon, it is submitted for public review, and amended if necessary. The CSA Log Scanner committee has met several times, and has recommended to MC that lengths and diameters are the attributes that require certification.

In order to implement scanner technology for trade in BC, the following two steps must first be approved by MC:

1. the scanner technology laws and requirements for measuring length and diameter,
2. each log scanning device will need to be evaluated, approved and certified, similar to a gas pump or weight scale certification.

Measurement Canada approved the Terms and Conditions developed by the CSA Log Scanner Committee in July 2014. MC is now accepting application from log scanner manufacturers to have their log scanner device approved for use in trade.

The ministry and industry have jointly developed procedures that meet existing legislated requirements. The province has procedures in place to determine and calculate volumes by species and grade in a format suitable to the ministry from those MC certified lengths and diameters.

The LSC was asked to examine and evaluate log scanning technology, and associated operational scaling procedures in BC. LSC's role is to develop short term and long term options, which could be implemented in BC after MC has approved the use of log scanner. In addition to the work and accomplishments that were done by the CSA log scanner committee members, the LSC members have developed measurement procedures (Appendix F) and options that were added to this report.

This committee consists of several members of the CSA Log Scanner committee, and it has had conference calls and meetings since November 2012.

CSA Log Scanner Committee members

Steve Laberge(chair, MFLNRO), Luciano Burtini (Measurement Canada), Ron Peasley (Measurement Canada), Bruce Moran (International Forest Products, BC), Randy England (West Fraser, BC), Peter Dyson (FPInnovations, BC), Gunther Eckert (Porter Engineering, BC), Norvin Laudon (Microtec Industries, BC), Roger Stewart (TimberWest, BC), Dan Bowes (gvt. ON), Rene Lemieux (gvt QC), Paul O'Dowd, (PGSCF (software company), QC), Marc Chenard (Comact, BC, QC), Steve Cooper (gvt NL), Robert Pelletier (Acadian Timber, NB), Glenn Dobransky (gvt AB), Max Matthews (Millar Western, AB), Stephan Meinke (USNR)

Provincial Log Scanning Technical Review Committee members

Steve Laberge(past chair, MFLNRO), Bruce Moran (IFP), Randy England (WF), Peter Dyson (FPI), Gunther Eckert (Porter), Norvin Laudon (Microtec), Roger Stewart (TW), Tom Spooner (MFLNRO), Rick Ranger (MFLNRO), Peter Ott (MFLNRO), Bart Bjarnason (Western Forest Products), Doug Strasky (USNR), Stephan Meinke (USNR), March Chenard (Comact), Jeff Pawelchak (Tolko), Erich Geddert (MFLNRO), Cynthia Lidstone (MFLNRO), Gary Newton (MFLNRO)

Discussion, Agreements and Next steps

LSC discussed many items related to the development of scanner technologies and necessary government controls. Some of the items that were discussed are:

- Length and diameter measurements procedures (Appendix F).
- Butt flare measurements.
- Scaling station option— preferred by industry in the Interior.
- Check scaling options— video cameras, ejecting logs from the chain for auditing purpose.
- HBS data compatibility-- .xml file submission.
- Reconciliation of timber marks and load integrity.
- Grade— determination made by scanner or by log scaler.
- Species—determination made by scanner or by log scaler.
- Volume calculations and Smalian's formula.
- Firmwood deductions—no deduction, determination made by log scaler.
- Timber mark integrity.
- Boom and bundle load integrity.
- Log scanner calibration procedures.
- Scale site authorization conditions.
- Training plan for industry and ministry staff.

All members agreed with the implementation plan for the short and mid-terms.

The committee will continue its work on the following items:

- Continue to discuss long term options.
- Develop regulation and legislation updates.
- Develop a list of software and HBS upgrades for a long term option.
- Monitor and review the procedures during and after a pilot project.
- Other items.

The provincial approval process, requirements and procedures for the four options are detailed in the appendices.

Appendix A: Provincial Approval Process:

The ministry is accepting applications from licensees to operate a log scanner for scaling as a pilot project.

Licensees will identify in the application what option will be used. How the option requirements and procedures will be met must be outlined in the application.

All applications must first be submitted to the local district manager. If the district manager supports the proposal it will be forwarded to the Area office for their support and then to Timber Pricing Branch for final decision. All applications will be dealt with in order of receipt by Timber Pricing Branch. In order to manage and maintain consistency in the implementation of log scanning the licensee's district and area, and Timber Pricing Branch will review all proposals.

It will be important to maintain good communication with all parties during implementation (ministry, licensee's staff and contractors) and to have an approved implementation and training plan in place. Staff will be required to be trained in accordance with the plan before the site will be authorized to operate a log scanner for scaling timber. During this period, authorized scalers will be required to review the scale data on a daily basis for accuracy, before submitting to HBS.

Before Timber Pricing Branch conducts a final review for the site, the licensee will be required to fulfil all of the requirements. In addition to regular scale site inspections, companies should expect reviews at regular intervals regarding the installation of equipment and operations for the log scanner site. Each review will be conducted by the district, area and branch. Changes requested by the ministry after the reviews must be implemented by the licensee before the final authorization will be granted.

At the end of the implementation, there will be a requirement for licensees to report to the ministry on the performance measures; e.g.: safety improvements, errors in HBS, stratification and others.

The specifications, requirements and procedures in this document are subject to change by the ministry as we learn through the establishment of log scanner use. This document must be followed in addition to all existing scale site authorization conditions and procedures.

The steps are:

1. Submit an application and receive approval from Measurement Canada. Applications are currently being accepted.
 - See MC Terms and Conditions <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04709.html>
 - TDMD (log scanner) Application form can be found here: http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/h_lm00004.html
2. Follow the provincial approval process.
3. Identify the option in the application.
4. Outline how the requirements and procedures will be met.
5. Submit the proposal to the local district manager for support who will forward the application to the Area office and Timber Pricing Branch.

Appendix B:

Option #1 Sampling Option 1

Volume Scaled/Volume Scanned

I. Billing

Automated billing will be implemented that will adjust the average (mean) volume per load changes throughout an operating season.

Ratio statements will be issued for each timber mark recorded through a stratum as per the traditional weight scale sampling. The difference is that the ratio will reflect volume scaled to volume scanned (m^3/m^3).

Monthly billings will occur and will continue as an adjustment process, as per the traditional weight scale sampling.

II. Requirements and Procedures

1. The log scanner manufacturer must submit an application to Measurement Canada and receive approval for their log scanner device from Measurement Canada. Applications are being accepted by Measurement Canada. See MC Terms and Conditions for more information <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04709.html>
2. The licensee's log scanner must be certified by Measurement Canada.
3. The licensee must comply with the Weights and Measures Act and its related regulations.
4. The licensee must comply with the Forest Act and its regulations, and the scale site authorization conditions.
5. Log scanner sampling will be restricted to Hemlock-Balsam and second growth Douglas fir species homogeneous sorts that will be processed at the licensee's domestic mill.
6. The precision will be assumed to be 5% precision in the first year. For subsequent years, the precision will be based on historical data.
7. If there are more than 600 loads per sort or stratum, a sampling frequency cap of at least 1 in 40 will be set.
8. A sampling plan must be designed to achieve the sampling plan objective and be approved by the Area staff.
 - A stratum will be required for each timber sort for the mill. Clients may establish additional constraints (e.g. by contractor) to meet their business requirements. Where there are significant differences in stumpage rates or operating areas, stratification by timber mark may also be required.
 - A bundle of logs will represent the sampling unit.
 - Each stratum will be expected to provide sufficient samples to achieve a sampling precision of $\pm 5\%$, 19 times out of 20.

Log Scanner Standard Procedures and Options for Scanner Use

9. The licensee must maintain the equipment, inspect, check the accuracy on a daily basis and calibrate the log scanner as required, and provide standard operating procedures for those checks and calibrations. As there are variables at each site, e.g. temperature, mountings, type of sensors, the committee will review this requirement for each site.
10. The licensee must have breakdown procedures in place. Trained staff must be available during all hours of operation to deal with issues. All occurrences of log scanner breakdown must be reported to the local district and area offices.
11. There must be no opportunity for unauthorized staff to edit the log scanner data.
12. The licensee must provide access to all data including any adjustments made to volumes on sales transactions based on scanned volumes.
13. The licensee must agree to save the Crown harmless from any liability that may result from the use of the scale data by other parties.
14. For water transportation, the licensee must affix additional tags that must be visible and legible in water.
15. The timber sale manager must agree with the scaling arrangements prior to approval of any timber tenures issued by BCTS.
16. The licensee must provide documentation satisfactory to the ministry that adequate controls are in place to provide for an unbiased and random sample selection that will maintain sample integrity.
17. The unbiased and random sample selection must be ensured through sample selection programs incorporated into weight scale software that is recognized and approved by the ministry. This may be done at a centralized location, an office or at the destination mill.
18. The licensee must arrange for district staff to program the sample selector on the laptop or computer.
19. The licensee must provide an authorized official scaler with the conditions to scale timber that ensure the integrity of the sample loads.
20. An authorized official scaler must scale all samples at an authorized scale site and must review the scale data on a daily basis.
21. The licensee must provide opportunities for the Ministry to randomly inspect the production not selected as samples to ensure consistency of product. The boom must remain intact until after a sample(s) has been selected.
22. The licensee will be required to submit the following control data to the Ministry:
 - Scale returns for every load/bundle of timber removed from the harvest area.
 - Scale returns will be recorded on site, as if it were on a weight scale detail return with all the required fields completed e.g. Transport ID, LDS.
 - The volume calculated from the log scanner for each bundle, including samples, will be recorded in the gross weight field of each weight scale detail return. A zero (0) value will be entered in the tare weight field.
 - All scale returns will be recorded and submitted to HBS.
 - All scale returns will be prepared and signed by an authorized licenced scaler.
 - All samples will be submitted and labelled accordingly in HBS with the correct event type SS (sample scale) or RS (remote sample).

Log Scanner Standard Procedures and Options for Scanner Use

- All samples will include the log scanner calculated volume in the gross weight field. A zero (0) value will be entered in the tare weight field.
23. The licensee must record the following information in a ledger at the scale site:
- Maintenance and inspections;
 - Software issues and breakdowns;
 - Incorrect stratification;
 - Functionality of the log scanner and other electronic components;
 - Any changes made to the scale data;
 - Other issues.

Appendix C:

Option 2 - Sampling Option #2

Volume Scanned/Volume Scanned

The licensee who selects this option must choose between maintaining the bundle load integrity or the boom integrity.

The licensee must follow all the requirements and procedures described below.

I. Billing

Automated billing will be implemented throughout a cyclic billing year. Monthly billing will occur as an adjustment process, as per the traditional weight scale sampling.

Ratio statements will be issued for each timber mark recorded through a stratum as per traditional weight scale sampling. The difference is that the ratio will reflect volume to volume (m^3/m^3), which will equal to "1" at the end of the cyclic billing year.

II. Requirements and Procedures

1. The log scanner manufacturer must submit an application to Measurement Canada and receive approval for their Timber Dimension Measuring Device. Applications are being accepted by Measurement Canada. See MC Terms and Conditions for more information <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04709.html>
2. The licensee's log scanner must be certified by Measurement Canada.
3. The licensee must comply with the Weights and Measures Act and its related regulations.
4. The licensee must comply with the Forest Act and its regulations, and the scale site authorization conditions.
5. The licensee's log scanning scaling system must be programmed to report lengths and diameters, and calculate log volumes as per the Measurements Procedures document. This document may be updated from time to time, and if so the log scanning scaling system must be reprogrammed as required.
6. Log scanner sampling will be restricted to Hemlock-Balsam and Douglas fir species homogeneous sorts that will be processed at the licensee's domestic mill.
7. The sampling frequency and the number of samples required will be calculated to achieve an historic precision for species and grades similar to weight scaling. This will be done using the spreadsheet developed by the ministry. The minimum number of samples will be as calculated. After the first year, the committee will assess whether the sampling frequencies require changing.
8. A sampling plan must be designed to achieve the sampling plan objective and be approved by the area office.
 - A stratum will be required for each timber sort for the mill. Licensees may establish additional constraints (e.g. by contractor) to meet their business requirements. Where there are significant differences in stumpage rates or operating areas, stratification by timber mark may also be required.

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- A bundle of logs will represent the sampling unit.
 - Each stratum will be expected to provide sufficient number of samples to achieve a sampling precision similar as obtained under weight scaling for species and grades.
 - If there are more than 600 loads per sort or stratum, a frequency cap of at least 1 in 40 will be set.
9. The licensee must provide documentation satisfactory to the ministry that adequate controls are in place to provide for an unbiased and random sample selection that will maintain sample integrity.
 10. The unbiased and random sample selection must be ensured through sample selection programs incorporated into weight scale software that is recognized and approved by the ministry. This may be done at a centralized location, an office or at the destination mill.
 11. The licensee must arrange for district staff to program the sample selector on the laptop or computer.
 12. The sampling frequency will be adjusted, as required, proportionally by the ministry to deal with samples that cannot be found by the licensee. The licensee must ensure bundle tags are visible and must have rigorous procedures in place.
 13. The licensee must provide an authorized official scaler with the conditions to scale timber that ensure the integrity of the sample loads.
 14. An authorized official scaler must scale all samples at an authorized scale site and must review the scale data on a daily basis.
 15. The licensee must provide opportunities for the ministry to randomly inspect the production not selected as samples to ensure consistency of product. The boom must remain intact until after a sample(s) has been selected.
 16. The licensee must maintain the equipment, inspect, check the accuracy on a daily basis and calibrate the log scanner as required, and provide standard operating procedures for those checks and calibrations. If the measurement is outside the “d” e.g. 1 cm, the licensee must use the approved breakdown procedures. As there are variables at each site, e.g. temperature, mountings, type of sensors, the committee will review this requirement for each site.
 17. The licensee must have breakdown and emergency procedures in place. Trained staff must be available during all hours of operation to deal with issues. All occurrences of log scanner breakdown must be reported immediately to the local district and area offices.
 18. There must be no opportunity for unauthorized staff to edit the log scanner data.
 19. The licensee must provide access to all data including any adjustments made to volumes on sales transactions based on scanned volumes.
 20. The licensee must agree to save the Crown harmless from any liability that may result from the use of the scale data by other parties.
 21. For water transportation, the licensee must affix additional tags that must be visible and legible in water.
 22. Based on the alternative selected, the licensee must develop “cut off” procedures to ensure correct “cut off” between bundle loads or booms. The local district and area offices must approve the procedures.

Log Scanner Standard Procedures and Options for Scanner Use

23. The licensee must count the number of bundles in each boom at the origin and at the destination. At the destination, the bundles can be counted either at the log sort or at the mill.
24. The licensee must reconcile the bundles with the most current version of the bundle addendum form (RCOTT01).
25. The licensee must submit the following control data to the ministry:
 - a) Scale returns for every load/bundle of timber removed from the harvest area.
 - b) Scale returns must be recorded on site, as if it were on a weight scale detail return with all the required fields completed e.g. Transport ID, LDS, etc.
 - c) All scale returns must be recorded and submitted to HBS using a ministry approved software.
 - d) All scale returns must be prepared and signed by an authorized licenced scaler.
 - e) All samples must be submitted and labelled accordingly in HBS with the correct event type SS (sample scale) or RS (remote sample).
 - f) If the bundle integrity alternative is selected, the licensee must submit additional data as follows:
 - I. The volume calculated from the log scanner for each bundle, including samples, will be recorded in the gross weight field of each weight scale detail return. A zero (0) value will be entered in the tare weight field.
 - II. All samples will include the log scanner calculated volume in the gross weight field. A zero (0) value will be entered in the tare weight field.
 - III. The original sample scaled volume by species/grades is adjusted proportionally by the licensee to the scanned volume for that bundle.
 - g) If the boom integrity alternative is selected, the licensee must choose either to scan or not to scan the samples and must submit additional data as per sub-section I or II, as follows:
 - I. All bundles are scanned, including the sample load
 - i. The average volume for each bundle must be calculated from the log scanner boom calculated volume, including samples, for a given boom e.g., $\text{total boom volume} / \# \text{ of bundles for that boom} = \text{Average bundle volume for each bundle in that boom}$.
 - ii. The average volume will be recorded in the gross weight field of each weight scale detail return. A zero (0) value will be entered in the tare weight field.
 - iii. The original sample scaled volume by species/grades is adjusted proportionally by the licensee to the average volume for that bundle.
 - II. All bundles are scanned, except the sample load
 - i. The average volume for each bundle must be calculated from the log scanner boom calculated volume, except samples, for a given boom e.g., $\text{total boom volume} / \# \text{ of bundles for that boom} = \text{average bundle volume for each bundle in that boom, except the sample load}$.
 - ii. The average volume will be recorded in the gross weight field of each weight scale detail return, except the sample. A zero (0) value will be entered in the tare weight field.

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- iii. The original sample scaled volume by species/grades is recorded in the gross weight field of the weight scale detail return. A zero (0) value will be entered in the tare weight field.
 - iv. The scale data must be submitted to HBS in an .xml format as per the normal weight scaling and piece scaling process using a ministry approved software.
26. The licensee must submit a daily audit log report to the district office monthly.
27. The licensee must record the following information in a ledger at the mill or scale site, as applicable:
- Maintenance and inspections;
 - Software issues and breakdowns;
 - Incorrect stratification;
 - Functionality of the log scanner and other electronic components;
 - Any changes made to the scale data;
 - Other issues.

Appendix D:

Option 3

Scaling Station Option

Definition: Scaling Station

The scaling station is used to scale sample loads and/or individual logs. It is an indoor or enclosed environment where logs are bucked to sawmill lengths, debarked and scaled on a chain or table by an authorized licenced scaler in a sawmill-like setting. The MC certified log scanner lengths and diameters are used to calculate volume. The licenced scaler also determines the species, grade and applies the necessary volume deduction, if required.

I. Billing

Piece scaled loads will be processed as per the traditional HBS billing process.

HBS Ratio statements and monthly billings will be issued for each timber mark recorded through a stratum as per traditional weight scale sampling.

II. Requirements and Procedures

1. The log scanner manufacturer must submit an application to Measurement Canada and receive approval for their log scanner device from Measurement Canada. Applications are being accepted by Measurement Canada. See MC Terms and Conditions for more information <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04709.html>
2. The licensee's log scanner must be certified by Measurement Canada.
3. The licensee must comply with the Weights and Measures Act and its related regulations.
4. The licensee must comply with the Forest Act and its regulations, and the scale site authorization conditions.
5. The licensee must maintain the equipment, inspect and check the accuracy on a daily basis and calibrate the log scanner as required, and provide standard operating procedures for those checks and calibrations. As there are variables at each site, e.g. temperature, mountings, type of sensors, the committee will review this requirement for each site.
6. The licensee must have breakdown procedures in place. Trained staff must be available during all hours of operation to deal with issues. All occurrences of log scanner breakdown must be reported to the local district and area offices.
7. Malfunctions at the scaling station that affect the accuracy of scaling or grading will result in loads and red tag loads being scaled outside the scaling station, in their "as delivered form".
8. Debarking of logs shall be carried out in a method that minimizes fibre damage.

Log Scanner Standard Procedures and Options for Scanner Use

9. The logs in the scaling station must be bucked to desired lengths for the mill. This must be established in the bucking order or permission, which is included in the Scale Site Authorization.
10. Scaling under artificial lighting is only authorized where a lighting plan for the scale area is prepared by an independent qualified lighting technician and implemented as planned.
11. There must be no opportunity for unauthorized staff to edit the log scanner data.
12. The licensee must provide access to all data to the ministry including any adjustments made to volumes on sales transactions based on scanned volumes.
13. The licensee must provide documentation satisfactory to the ministry that adequate controls are in place to maintain load integrity.
14. An authorized licenced scaler must accurately identify species and grades.
15. An authorized official scaler must scale all loads, assess each log and review the scale data on a daily basis.
16. Timber to be scaled shall be made available in a manner that allows the scaler unobstructed access to each individual log to facilitate viewing and recording of scale data. The scaler must have the ability to control the speed at which logs are presented.
17. In order to facilitate check scaling of logs the following procedures will be used:
18. Each log must be numbered as it is scaled in order to allow a log by log comparison.
19. The check scaler will be provided the ability to perform a check scale under the same conditions as the original scale including the use of the scaling station. The last load scanned shall be set aside as a potential check scale load and shall be available to be rescanned under the supervision of a check scaler.
20. Following the completion of check scales, the checked loads shall only be released by permission from the check scaler. The check scaler releases the load to the scaler who then has the final word on what steps to take next. A reasonable time must be made available for the check scaler to review the logs with the industry scaler, and allow for second scales and second check scales to take place. An area outdoors must be allotted for the logs to be laid out and reviewed if required.
21. The licensee will arrange for district staff to program the sample selector on the laptop or computer.
22. The licensee must provide opportunities for the ministry to randomly inspect the production not selected as samples to ensure consistency of product.
23. The licensee will be required to submit the following control data to the Ministry:
24. Scale returns for every load/bundle of timber removed from the harvest area.
25. Scale returns will be recorded on site with all the required fields completed e.g. Transport ID, LDS.
26. The volume calculated from the log scanner for each bundle, including samples, will be recorded on the scale return.
27. All scale returns will be recorded and submitted to HBS.
28. All scale returns will be signed by an authorized licenced scaler.
29. All samples will be submitted and labelled accordingly in HBS with the correct event type PS (primary scale), SS (sample scale) or RS (remote sample).

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30. All loads will include the log scanner calculated volume in the volume field.
31. The licensee must record the following information in a ledger at the scale site:
 - Maintenance and inspections;
 - Software issues and breakdowns;
 - Stratification errors;
 - Functionality of the log scanner and other electronic components;
 - Any changes made to the scale data;
 - Other issues.

Appendix E:

Option #4 –

Scanner Scale Sorting Line – Volume Scanned/Volume Scanned

The operator who selects this option must choose between maintaining the load, bundle load integrity or the boom integrity. It is generally anticipated that the majority of the throughput will be based on truckloads delivered by land or water.

The licensee must follow all the requirements and procedures described below.

I. Billing

Automated billing will be implemented throughout a cyclic billing year. Monthly billing will occur as an adjustment process, as per the traditional weight scale sampling.

Ratio statements will be issued for each timber mark recorded through a stratum as per traditional weight scale sampling. The difference is that the ratio will reflect volume to volume (m^3/m^3), which will equal to “1” at the end of the cyclic billing year.

II. Requirements and Procedures

1. The log scanner manufacturer must submit an application to Measurement Canada and receive approval for their Timber Dimension Measuring Device. Applications are being accepted by Measurement Canada. See MC Terms and Conditions for more information <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04709.html>
2. The licensee’s log scanner must be certified by Measurement Canada.
3. The licensee must comply with the Weights and Measures Act and its related regulations.
4. The licensee must comply with the Forest Act and its regulations, and the scale site authorization conditions.
5. The licensee’s log scanning scaling system must be programmed to report lengths and diameters, and calculate log volumes as per the Measurements Procedures document. This document may be updated from time to time, and if so the log scanning scaling system must be reprogrammed as required.
6. Log scanner sampling will be initially restricted to Hemlock-Balsam and Douglas fir species sorts.
7. The method of determining species and Ministry of Forests Statutory Log Grades is yet to be determined. If sampling is to be employed a sampling frequency and the number of samples required will be calculated to achieve an historic precision for species and grades similar to weight scaling. This will be done using the spreadsheet developed by the ministry. The minimum number of samples will be as calculated. After the first year, the committee will assess whether the sampling frequencies require changing.
8. A sampling plan must be designed to achieve the sampling plan objective and be approved by the area office.

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- A stratum will be required for each timber sort for the mill. Licensees may establish additional constraints (e.g. by contractor) to meet their business requirements. Where there are significant differences in stumpage rates or operating areas, stratification by timber mark may also be required.
 - A load or bundle of logs will represent the sampling unit.
 - Each stratum will be expected to provide sufficient number of samples to achieve a sampling precision similar as obtained under weight scaling for species and grades.
 - The coefficient of variation (CV) will be assumed to be 10% (5% precision) in the first year. For subsequent years, the CV will be based on historical data.
 - If there are more than 600 loads per sort or stratum, an initial frequency cap of at least 1 in 40 will be set.
9. If throughput is sourced from water delivered boomed production, an initial minimum of one sample per boom will be required.
10. The licensee must provide documentation satisfactory to the ministry that adequate controls are in place to provide for an unbiased and random sample selection that will maintain sample integrity.
11. The unbiased and random sample selection must be ensured through sample selection programs similar to that used in weight scale software that is recognized and approved by the ministry. This may be done at a centralized location, an office or at the destination log scanning/sorting facility.
12. Programing the sample selector on the laptop or computer will be done in a manner similar to that for weight scale sampling.
13. The sampling frequency will be adjusted, as required, proportionally by the ministry to deal with samples that cannot be found by the licensee. Loads or bundles will be visually identifiable.
14. The licensee must provide an authorized scaler with the conditions to scale timber that ensure the integrity of the sample loads or logs.
15. An authorized scaler must scale all samples at an authorized scale site. The scale data must be reviewed on a daily basis.
16. The licensee must provide opportunities for the ministry to randomly inspect the production not selected as samples to ensure consistency of product. The boom must be available for viewing for a reasonable period of time.
17. The licensee must maintain the equipment, inspect, check the accuracy on a daily basis and calibrate the log scanner as required, or more often as required, and provide standard operating procedures for those checks and calibrations. As there are variables at each site, e.g. temperature, mountings, type of sensors, the committee will review this requirement for each site.
18. The licensee must have breakdown and emergency procedures in place. Trained staff must be available during all hours of operation to deal with issues. All occurrences of log scanner breakdown must be recorded.
19. There must be no opportunity for unauthorized staff to edit the log scanner data.
20. For water transportation, the licensee must affix adequate tags to ensure that the bundles are identifiable.
21. Based on the alternative selected, the licensee must develop “cut off” procedures to ensure correct “cut off”. The local district and area offices must be able to audit the procedures.

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22. The licensee must count the number of bundles in each boom at the origin and at the destination. At the destination, the bundles can be counted either at the log sort or at the mill.
23. The licensee must reconcile the bundles with the most current version of the bundle addendum form (RCOTT01).
24. The licensee must submit the following control data to the ministry:
 - a) Scale returns for every scale parcel (load/bundle) of timber removed from the harvest area.
 - b) Scale returns must be recorded. All the required fields must be completed e.g. Transport ID, LDS, etc.
 - c) The scale data must be submitted to HBS in an .xml format as per the normal weight scaling and piece scaling process using a ministry approved software.
 - d) All scale returns must be prepared and signed by an authorized individual.
 - e) All samples must be submitted and labelled accordingly in HBS with the correct event type SS (sample scale) or RS (remote sample).
25. The licensee must record the following information in a Maintenance and Anomaly log at the scale site, as applicable:
 - Maintenance and inspections;
 - Hardware and software issues;
 - Other issues as determined.

Appendix F: Log Scanner Measuring Procedures

Definitions:

TDMD: Timber Dimension Measuring Device (log scanner)

"Callipering" a log means to measure the diameter at a point other than at the cut face by placing the scale stick across the log and projecting two perpendicular sight lines to the points where the measurement is read (Scaling manual Figure 6.4).

Normal taper is the ratio (cm/m) of the diameter expressed in centimeter per meter of log length.

Using only the TDMD certified measurements, the process for manufacturers to calculate lengths, top and butt diameters is as follows:

Butt and top diameters

Diameter will be measured in two positions on the log. The measured values, the longitudinal positions at which they were taken, and the overall log length will be displayed on the screen in the "Legal for Trade (Measurement Canada approved)" section. Slice diameters are measured using the circumference approach and rounded to the next 'd' as requested by Measurement Canada. Rounding is mathematical, i.e. ≥ 0.5 rounds to the next bigger cm, < 0.5 rounds to the next smaller cm. Diameters are computed by averaging the data in a 10 cm window, thus producing a measurement every 10 cm.

1. To calculate the top diameter:
 - Measure the diameter at a longitudinal distance of 20 cm from the top. If the measurement is not valid, the scanner will, starting at 20 cm, search for and use the next valid measurement.
 - Subtract the product of the calculated taper (see item 4 below) in cm/m x the longitudinal distance to the top.
 - Example: $31 \text{ cm} - (1 \text{ cm/m} \times 0.3 \text{ m}) = 30.7 \text{ cm}$
 - The resulting diameter is converted to rads (T) as per the BC Scaling manual.
2. To calculate the butt diameter:
 - Measure the diameter at the midpoint along the length of the log. If the measurement is not valid, the scanner will, starting at the midpoint, search for and use the next closest valid measurement.
 - Add the product of the calculated taper (see item 4 below) in cm/m x the longitudinal distance to the butt
 - Example: Log is 5 m in length. $30 \text{ cm} + (1 \text{ cm/m} \times 2.5 \text{ m}) = 32.5 \text{ cm}$
 - The resulting diameter is converted to rads (B).
 - Measure the diameter at a longitudinal distance of 20 cm from the butt. If the measurement is not valid, the scanner will, starting at 20 cm, search for and use the next closest valid measurement.
 - If the extrapolated butt measurement (B) is greater than the actual butt measurement taken in the previous step, the extrapolated butt measurement will be discarded and the actual butt measurement will be used as B instead.

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3. If a minimum of two scanned measurements are not found for a log, this log will be rejected and be manually scaled.
4. Taper is calculated using a best linear fit of the diameters, measured every 10 cm, from the actual measured diameter position at or near 20 cm to the actual measured diameter position at or near the midpoint, expressed in cm/m. To provide maximum accuracy, the diameters used in the taper calculation are unrounded.

Recording

- Record the radius of each end to the nearest centimetre.

Length

- Use gross length produced by TDMD. (0.1m)

Volume

- The volume is calculated by the Smalian's formula as per section 10 of the Scaling Regulation:

http://www.bclaws.ca/Recon/document/ID/freeside/446_94#section10