QOTHO / AGRILASA BESPOKE PROFICIENCY TESTING SCHEME GUIDE

QM-GUI-023

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1 Overview:

1.1 Opening Statement & Declaration

1.1.1 Qotho Minerals (QM) is a SANAS Accredited Proficiency Testing Scheme Provider, No. PTS0012. The PT Programs introduced and offered within this Guide document, however currently falls outside the scope of Accreditation.

1.1.2 This document should be read in conjunction with QM-GUI-003 PT Scheme Guidelines, which contains more detailed information regarding the general structure and statistical protocols of the PT program. Key information contained in QM-GUI-003, is not repeated within this document.

1.1.3 All documents referred to within this Guide, can be found on either the QM or AgriLASA websites: www.qotho.co.za & www.agrilasa.co.za.

1.2 About the Collaboration:

QM specifically focuses on the design and implementation of Proficiency Testing Schemes (PTS), as well as the manufacturing and certification of Reference Materials. All our PT programs are pre-planned and paid-for programs, unless a special PT is arranged, to certify a commodity that is not currently in the Qotho PT Schedule.

Since its inception in 2013, QM has annually been introducing more PT Schemes within the mining industry. Participation in our schemes affords each laboratory the unique opportunity to assess the accuracy and comparability of their results with peer laboratories over time. Through the scheme, QRM's are generated, which provides an invaluable tool for further internal monitoring and instrument calibration.

QM is accredited to ISO/IEC 17043: 2023 as a PT Provider and to ISO 17034: 2016, as a mineral CRM Producer.

Agri-Laboratory Association of Southern Africa (AgriLASA) is a non-profit umbrella body, founded in 1993, and aims to provide a forum to promote analytical accuracy, encourage diversity, and provide networking opportunities between experts. Member laboratories share technical knowledge and experience, and address common challenges often encountered in agricultural laboratories.

The association strives to recommend and maintain standard methods of analysis within the disciplines, as well as for the certification of its member laboratories.

A comprehensive, inter-laboratory proficiency test scheme for all the disciplines is co-ordinated by the association. Round robins are regularly conducted to monitor the analytical performance of participating laboratories. The respective discipline committees monitor the efficacy of the scheme as a means to promote the reliability of analytical services offered.

As the running of Proficiency Testing Programs is not the core role of AgriLASA, it has entered a collaboration with QM, for the latter to plan and execute the Agrilasa PT objective, on its behalf, in line with ISO requirements set for QMs current accredited programs.

1.3 Combined Mission Statement:

Creating value for all our stakeholders by channelling resources to offer and execute proficiency testing programs, that contribute to improving the agricultural industry. The core objective of the PT programs is for agricultural laboratories to attain and/or maintain their AgriLASA certification, in compliance with the FERTILISERS, FARM FEEDS, AGRICULTURAL REMEDIES AND STOCK REMEDIES ACT, 1947 (ACT No. 36 OF 1947) and all its relevant Notices.

1.4 Proficiency Testing Schemes

1.4.1 ISO/IEC 17043: 2023 defines proficiency testing as an evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons.

1.4.2 Proficiency testing schemes entail the organisation, development and evaluation of tests (of the same item or similar items) by several laboratories, according to predefined conditions.

1.4.3 It is a requirement of ISO/IEC 17025: 2017, that Laboratories participate in inter-comparisons programs and/or PT schemes.

1.4.4 In addition, any laboratory that needs to demonstrate the quality of its analytical results in an independent way should participate in proficiency testing schemes, since the quality of the analytical results is directly linked to the quality of service / product, to the market credibility and brand image.

1.4.5 Participation in Proficiency Testing Schemes is an essential tool to demonstrate the technical competence of the laboratory, and it allows to:

1.4.5.1 Compare own results with those obtained by other laboratories.
1.4.5.2 Confirm the correct initial validation of a method.
1.4.5.3 Use the data obtained from participation in Proficiency Testing Schemes for validation of measurement methods.
1.4.5.4 Determine systematic errors.
1.4.5.5 Improve the test method used.
1.4.5.6 Learn from the methods used by other laboratories.
1.4.5.7 Monitor the accuracy and precision of the method.
1.4.5.8 Encourage collaboration between laboratories.
1.4.5.9 Demonstrate technical competence against third parties.

1.5 Why choose Qotho as your Agricultural Proficiency Test Provider?

1.5.1 We are an independent service provider, therefore no opportunity exists for biased interpretation of results, as may be the case through in-house operated schemes.

1.5.2 QM has direct access to Technical Expertise within the AgriLASA membership network.

1.5.3 We provide standardised method preparation of testing samples in accordance with ISO standards.

1.5.4 Participation in the Qotho-run PTS provides a structured, annual PT framework and eliminates the need for laboratories to plan, organise and execute internal PTS.

1.5.5 The PTS samples are typical of those tested by laboratories on a daily basis, thereby replicating the daily testing work performed by the laboratory on samples received from customers.

1.5.6 Access to all general benefits that regular participation in PTS brings, including presentations and providing technical feedback on your laboratory's unique performance.

2 Reference Documents

2.1 Samples are prepared in accordance with the guidelines set out within the various AgriLASA subject matter Handbooks.

Qotho PT schemes complies with the requirements of the following international standards:

2.2 ISO/IEC 17043: 2023 – Conformity assessment – General requirements for proficiency testing.

2.3 ISO/IEC 13528: 2022 – Statistical methods for use in proficiency testing by inter-laboratory comparisons.

2.4 ISO/IEC 17034: 2016 - General requirements for the competence of reference material producers.

2.5 ISO/IEC 17025: 2017 - General requirements for the competence of testing and calibration laboratories.

2.6 ISO 33405: 2024 - Reference materials — Approaches for characterization and assessment of homogeneity and stability.

2.7 IUPAC International Harmonized Protocol for the proficiency testing of analytical chemistry laboratories.

3 Administrative details

3.1 Coordination and Responsibilities

3.1.1 Responsibility and coordination of the schemes lie with Qotho Minerals.

3.1.2 The PT Scheme Manager is responsible for the routine operations, monitoring & control of any subcontractors that may be used in the execution of the scheme.

3.1.3 All practices and procedures are documented in our internal Quality System.

3.2 Address:

36 Pelindaba Road, Broederstroom, Madibeng, NW, 0240 / PostNet Suite 173, Private Bag X0003, Ifafi, 0260, North West Province, South Africa.

3.3 Contact Persons:

Dr Hannelie de Beer **M:** [+27] (0)83 702 3393	PT Scheme Director Email: hannelie@qotho.co.za	Technical & Project Enquiries
Takudzwa Tsapayi M: [+27] 64 940 8440	Operations Manager Email: takudzwa@qotho.co.za	Technical & Project Enquiries
General PT Enquiries	Email: agri@qotho.co.za	All General PT enquiries / Appeals / Complaints & Comments / PT Administration/ PT Registrations / Survey Feedback / Marketing
Accounts Administration **O:** [+27] (0)87 004 3200	Accounts Administrators Email: accounts@qotho.co.za	Accounts / Statements / Quotations / Purchase Orders
PT Administration **O:** [+27] (0)87 004 3200	All PT Scheme Administration Email: admin@qotho.co.za	All General PT enquiries / Appeals / Complaints & Comments / PT Administration/ PT Registrations / Survey Feedback / Marketing
Sample delivery confirmation emails	logistics@qotho.co.za	Sample Tracking / Sample receipt

3.4 Advisors & Advisory Committee

3.4.1 The technical and statistical expertise of advisors may be utilised from time to time. Where the inputs of an advisor have been used for a specific scheme or round, this will be communicated in the final report of that particular round.

3.4.2 An Advisory Committee, consisting of AgriLASA Council who have expertise on the particular commodity, is responsible for the overall direction of the scheme.

3.5 Type of Schemes & Participation

3.5.1 All the schemes operated by Qotho Minerals can be classed as quantitative, simultaneous schemes, where the assigned values of the test items are determined only once results have been returned by all the participants, and participants are then assessed on the difference between their result and the assigned value.

3.5.2 The schemes are of a "closed" nature meaning they have a defined start and completion date. Qotho runs multiple rounds annually. All PT rounds run independent of one another.

3.5.3 The published Agricultural PTS are open to all agricultural laboratories that are registered with AgriLASA and that wish to prove or develop their competence in a particular field.

3.6 Events Calendar

3.6.1 The PTS events calendar is published annually, before the end of the third quarter, for the following calendar year.

3.6.2 All the programmes offered for the calendar year is listed, together with the date of sample dispatch, result reporting deadline, and report publication deadline.

3.6.3 Participants can therefore plan their PT participation well in advance, thus ensuring their compliance to ISO/IEC 17025: 2017. Please refer to QM-GUI-004 Events Calender.

3.7 Joining the Scheme & Scheme Costs

3.7.1 All the currently available schemes, with details relating to types of samples and frequency, can be found on the Qotho website www.qotho.co.za

3.7.2 Should laboratories wish to join the PT program, they first need to register with Agrilasa, by following this link: https://agrilasa.co.za/members_wp/member-application-form/

3.7.3 Once registered with AgriLASA the application form for the various Schemes can be completed and submitted to Qotho for processing. Based on the individual laboratory's requirements, Qotho will accordingly prepare a quotation for AgriLASA, who will in turn issue an invoice to the laboratory, for their annual participation in the elected programs

3.7.4 Participants are therefore responsible to AgriLASA, for the settlement of their invoices. QMs sole responsibility is the planning and comprehensive execution of the programs, on behalf of AgriLASA.

3.8 Confidentiality

3.8.1 In order to ensure confidentiality, participants in the scheme are allocated a unique reference code.

3.8.2 This approach enables results to be reported without linking the results to any particular laboratory.

3.8.3 Each laboratory will know their unique code and is therefore able to extract their own data from the report.

3.8.4 A general list of the participating laboratories to each scheme will reflect on each round being reported.

3.8.5 Laboratory Codes will NOT be made known to AgrilASA, thus ensuring the complete confidentiality and independence of the program.

4 Program Details

4.1 Disciplines

The following disciplines are currently being offered within the PT Program (these may be expanded in future):

Discipline		Minimum Quantity
Animal Feeds		150g
Fertilisers	Liquid	125ml
	Granular	170g
Plants		15g
Soils		300g
Water	Not Acidified	500ml

4.2 Sample numbers and frequency

4.2.1 6 rounds are available per annum, with samples in the various programs being distributed every second month.

4.2.2 Participants will receive 2 samples per discipline, per round. If registered for a discipline, participation in all 6 rounds throughout the year, is compulsory

4.3 Sample ID Codes

QM Discipline code	Discipline	Identifying Code
QPT-022-###	Fertiliser	Granular – FrG
		Liquid – FrL
QPT-023-###	Animal Feeds	FEE
QPT-024-###	Plant	PLT
QPT-018-###	Soils	SOI
QPT-025-###	Water (Not Acidified)	W*n*A

###: chronological sample number:

- Example sample code: QPT-022-002-WnA

The instruction letter will contain a table with a detailed list of samples distributes, as well as (for plants & feed) a clear descriptive as to what the sample is, eg: Soya Feed; Citrus leaf; etc.

4.4 Analytes

The following analytes are currently available within the various commodity programmes. Additional analytes may be introduced where there is sufficient interest from participating laboratories.

Please ensure that results are reported in the specified units of measurement. Adherence to this requirement is essential, as non-compliance may affect performance evaluations.

4.4.1 Fertiliser

Analyte	Unit	Analyte	Unit	Analyte	Unit
As	mg/kg	K-cs/ws	%	P	Total %
B	Total %	Mg	mg/kg	P-cs	%
Ca	Total %	Moisture	%	P-ws	%
Cd	mg/kg	N	Total %	Pb	mg/kg
Cl	%	N-NH4	%	pH - H2O	No unit
Cr	mg/kg	N-NO3	%	S	Total %
Cu	mg/kg	N-Urea	%	Se	mg/kg
Hg	mg/kg	Ni	mg/kg	Zn	Total %

4.4.2 Soil

Analyte	Unit	Analyte	Unit	Analyte	Unit
B (H2O)	mg/kg	Fe (Mehlich III)	mg/kg	P (Bray 1)	mg/kg
B (Mehlich III)	mg/kg	K (Am. acet.)	mg/kg	P (Bray 2)	mg/kg
C	%	K (Ambic 1)	mg/kg	P (Mehlich III)	mg/kg
Ca (Am.acet.)	mg/kg	K (Ambic 2)	mg/kg	P (Olsen)	mg/kg
Ca (Ambic 1)	mg/kg	K (Mehlich III)	mg/kg	P (Resin)	mg/kg
Ca (KCl)	mg/kg	Mg (Am.acet.)	mg/kg	P (Truog (mod))	mg/kg
Ca (Mehlich III)	mg/kg	Mg (Ambic 1)	mg/kg	pH (CaCl2)	No unit
Cl (KNO3)	mg/kg	Mg (KCl)	mg/kg	pH (H2O)	No unit
Clay	%	Mg (Mehlich III)	mg/kg	pH (KCl)	No unit
Cu (0.1 M HCl)	mg/kg	Mn (0.1 M HCl)	mg/kg	S (Acid – Am.acet.)	mg/kg
Cu (Ambic 1)	mg/kg	Mn (Ambic 1)	mg/kg	S (Am.acet.)	mg/kg
Cu (DTPA)	mg/kg	Mn (DTPA)	mg/kg	S (Ca-phosp.)	mg/kg
Cu (EDTA)	mg/kg	Mn (EDTA)	mg/kg	S (Mehlich III)	mg/kg
Cu (Mehlich III)	mg/kg	Mn (Mehlich III)	mg/kg	Sand	%
Density	g/ml	N - NH4 (K2SO4 ext.)	mg/kg	Silt	%
EC	mS/m	N - NH4 (KCl ext.)	mg/kg	Zn (0.1M HCl)	mg/kg
Ext.acidity (K2SO4)	cmol(+)/kg	N - NO3 (K2SO4 ext.)	mg/kg	Zn (Ambic 1)	mg/kg
Ext.acidity (KCl)	cmol(+)/kg	N - NO3 (KCl ext.)	mg/kg	Zn (DTPA)	mg/kg
Fe (0.1M HCl)	mg/kg	Na (Am.acet.)	mg/kg	Zn (EDTA)	mg/kg
Fe (Ambic 1)	mg/kg	Na (Mehlich III)	mg/kg	Zn (Mehlich III)	mg/kg
Fe (DTPA)	mg/kg	P (Ambic 1)	mg/kg		
Fe (EDTA)	mg/kg	P (Ambic 2)	mg/kg		

4.4.3 Water

Analyte	Unit	Analyte	Unit	Analyte	Unit
As	µg/L	H_2PO_4	mg/L	NO_3	mg/L
B	µg/L	HCO_3	mg/L	Pb	µg/L
Ca	mg/L	Hg	µg/L	pH	No unit
Cd	µg/L	K	mg/L	SAR	No unit
Cl	mg/L	Mg	mg/L	SO_4	mg/L
COD	No unit	Mn	µg/L	Total Anions	me/L
Cu	µg/L	Mo	mg/L	Total Cations	me/L
EC	mS/m	Na	mg/L	Total Dissolved Solids	mg/L
F	mg/L	NH_4	mg/L	Total Hardness ($CaCO_3$)	mg/L
Fe	µg/L	NO_2	mg/L	Zn	µg/L

4.4.4 Feed

Analyte	Unit	Analyte	Unit	Analyte	Unit
ADF	%	Fe	mg/kg	Non-reducing sugars	%
Ash	%	K	%	Nx6.25-Protein	%
Ca	%	Lignin (ADL)	%	P	%
Cl	%	Mg	%	S	%
Crude Fat	%	Mn	mg/kg	Se	mg/kg
Crude Fibre	%	Moisture	%	Starch	%
Cu	mg/kg	Na	%	Zn	mg/kg
Fat (Acid Hydrolysis)	%	NDF	%		

4.4.5 Plant

Analyte	Unit	Analyte	Unit	Analyte	Unit
Al	mg/kg	K	%	Ni	mg/kg
B	mg/kg	Mg	%	P	%
Ca	%	Mn	mg/kg	S	%
Cl	%	Mo	mg/kg	Si	%
Cu	mg/kg	N	%	Zn	mg/kg
Fe	mg/kg	Na	mg/kg		

4.5 Sample treatment:

4.5.1 Granular Fertiliser:

4.5.1.1 Granular Fertiliser samples are finely milled and may experience some clumping – the samples are homogenous, and members are encouraged to mix the sample well and break up any clumps that may have occurred

4.5.1.2 Samples should be dried at 40˚± 5˚C for at least 12 hours before.

4.5.2 Liquid fertilisers:

4.5.2.1 Laboratories are required to heat liquid fertiliser samples to 60˚C before analyses commence. This will ensure all crystals are dissolved, and samples are homogeneous

4.5.2.2 To report density and pH, make use of the samples “as is”, i.e do not dilute the sample first

4.5.3 Soil

4.5.3.1 Two mixed soil samples will be provided per sample, per round.

4.5.3.2 Soil samples have been crushed and sieved to 0.15mm> size <2 mm. Texture analysis and bulk density can be tested for in the soil sample, as provided. Mix the samples thoroughly prior to analysis.

4.5.3.3 Samples should be dried at 40˚± 5˚C for at least 12 hours before.

4.5.4 Water:

4.5.4.1 Water samples are not acidified (500ml) samples.

4.5.4.2 Determine the pH on the day the sample is received

4.5.4.3 Storage and analysis shall be conducted under controlled environmental and quality conditions

4.5.4.4 Round robin samples shall be treated in the same manner as routine samples

4.5.4.5 All analytes in water shall be tested for using the not – acidified water sample, including TDS and Conductivity

4.5.4.6 Agitate the sample thoroughly, by shaking, prior to analysis.

4.5.5 Feed

4.5.5.1 Feed samples are finely milled and may experience some clumping – the samples are homogenous, and members are encouraged to mix the sample well and break up any clumps that may have occurred.

4.5.5.2 Samples are to be stored in air-tight containers, once opened.

4.5.6 Plant

4.5.6.1 Plant samples are finely milled – the samples are homogenous, and members are encouraged to mix the sample well prior to analysis.

5 PT Execution

5.1 Sample Selection

5.1.1 The sample types used within the various rounds throughout the year, is selected, with guidance from the Technical Advisory Committee.

5.1.2 Participants in the scheme will be offered the opportunity to supply the testing material for a round. This will enable participants to obtain scheme data on their own matrix and material type. Please contact the Operations Manager to obtain details of quantities required, etc. All costs related with the supply and delivery of the material to our offices in Broederstroom, will be for the participants' account.

5.2 Preparation & Homogeneity

5.2.1 Samples are prepared according to the ISO standard (where relevant), or the various AgriLASA Handbooks, which are accessible on the AgriLASA website Members Portal.

5.2.2 Blended samples are divided by means of a rotary splitter, until the desired subsample size is reached.

5.2.3 Homogeneity tests will then be conducted, as per the criteria of the Harmonized Protocol for Proficiency Testing of Analytical Chemistry Laboratories, ISO 13528 as well as ISO 33405.

5.2.4 If the samples pass the homogeneity test, they may be used in a PT round.

5.2.5 If homogeneity is not achieved, the entire batch will be re-processed, until homogeneity is achieved.

5.3 Delivery and Retention

5.3.1 Appropriately packaged samples are dispatched to participants.

5.3.2 On the day of dispatch, the Instruction Letter & tracking number will be e-mailed to all the registered participants.

5.3.3 It is the responsibility of the participants to read and comply with the emailed instructions.

5.3.4 Once packages are delivered, the onus to maintain the integrity and stability of the material, transfers to the recipient thereof.

5.3.5 Participants are requested to check the contents of the packaging upon receipt and to contact Qotho, should they consider that the integrity of the material has been jeopardised.

5.3.6 The participant must retain the sample for that particular round until the final report from Qotho is issued for that round (this will enable them to investigate any non-conformances they might get).

5.3.7 On completion of the PT Round (once report is deemed final), participants can dispose of the samples, as per their internal sample disposal protocol.

5.4 Reporting of Results

5.4.1 In order to enable reports to be processed and issued as soon as possible after the closure of the test round, deadlines for the return of results are specified and must be adhered to. Refer to QM-GUI-004 Events Calendar, that is published on the Qotho webpage. Deadlines are also clearly indicated within the Instruction Letters. No lenience will be provided, to report results beyond the reporting deadline, as QM has downstream deadlines to meet, in order to satisfy the PT program design.

5.4.2 Results received after the reporting deadline cannot be included in the report. The report is however available to all participants subscribing to the scheme, regardless of whether their results were submitted or not.

5.4.3 Results shall be reported on the AgriLASA website

5.4.4 Results for multiple methods e.g., N by Kjeldahl and N by Dumas can be submitted. All results will be accepted and scored

5.4.5 Where possible, participants are requested to report two results per analyte (duplicate) per method. These duplicate results will be averaged, for statistical and evaluation purposes, but are useful when establishing inter and within sample homogeneity.

5.4.6 If calculations are used, only the final result must be reported.

5.4.7 Please ensure the results and reporting units are correct before submission. Errors cannot be rectified at a later stage

5.4.8 Report both the date samples are received and the date of analysis when submitting results via the PT Portal

5.4.9 Unless otherwise instructed, participants may use any test method that they believe technically appropriate.

5.4.10 Participants are asked to treat the test material in the same way as they would a routine sample (unless instructed to do otherwise, in the Instruction letter).

5.4.11 The procedures used, must be stated when reporting the results.

5.4.12 Where participants use CRMs as part of their analysis protocol, it is requested that the results of such CRM's analysed with the sample, be reported as well. The portal does not currently allow provision to report the CRM data, but this will be introduced during the course of 2026 (This information assists with the confirmation of metrological traceability, should the material qualify to be certified, at a later stage).

5.5 Collusion and Falsification of Results

5.5.1 Not returning genuine results, defeats the objective of participating in a proficiency scheme.

5.5.2 Certain measures are built into the scheme to try and prevent collusion.

5.5.3 Participants will be contacted directly, if collusion is expected.

5.5.4 The responsibility, however, ultimately lies with each participant, to operate and conduct themselves in a professional manner.

5.5.5 Proficiency testing samples may not be outsourced or subcontracted to external laboratories.

5.6 Report Format

5.6.1 Reports will be distributed electronically (pdf format) to all participants in the scheme. It will include details of the material tested, its composition, its assigned value, the method of evaluation applied, as well as graphic and tabular representation of participants' (participant codes, not actual names) results and performance. Where appropriate, comparative analysis of the various techniques used, per analyte, will also be included.

5.6.2 Reports shall also be available on the website, once the appeals period has lapsed and any amendments (where relevant) has been applied.

5.7 Complaints, Advice and Feedback

5.7.1 Through continuous communication and feedback, Qotho Minerals welcomes the comments of participants to the scheme. These can be forwarded to admin@qotho.co.za. Our Complaints and Appeals Form QM-FQC-012 can also be used for this purpose and is available upon request.

5.7.2 An appeals period of 7 days is allowed. If no appeals are received, the report is then deemed to be final. No appeals will be considered after the appeals period.

5.7.3 All appeals will be investigated and where justified, Qotho will make the necessary corrections to the evaluation and re-issue the report. No amendments to reports will be done, as a result of transcription errors by participants.

5.7.4 Where possible, practical and relevant, the necessary improvements will be incorporated into future rounds.

6 Data Processing & Statistical Evaluation

Please refer to QM-GUI-003, for more details.

7 Reference Materials

7.1 On completion of a round, analytical values will be assigned to the particular samples, based on the results of the PT round. A list of all the material available and their assigned values, will be made available to participants, upon request. This material will be on sale to laboratories, for use as Reference Materials. The reference materials will be available to the sponsor of the material, at a significantly discounted rate. Once adequate data is available, certification of the material will be done by Qotho, after which a COA will be issued.

8 Disclaimer: Cooperation with participants

8.1 AgriLASA is committed to supporting members regarding the use of our products and services, and will work with Qotho, to resolve any appeals/queries received.

8.2 The AgriLASA Technical Committee is willing to assist participants with the interpretation of the PT report, if requested to do so.

8.3 The Qotho Technical team will assist participants to develop an understanding of the statistical methodologies applied.

8.4 If you have any queries, please contact AgriLASA at ptscheme@agrilasa.co.za or Qotho at admin@qotho.co.za, should you require any assistance.

9 Document Approval

This document was approved on 20 October 2025:

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This document has been electronically signed using an Advanced Electronic Signature (AES) in terms of the Electronic Communications and Transactions Act No. 15, 2002 (ECT Act). Any amendments to the document can be detected by reference to the Signature Panel displayed in the electronic pdf version of the document.

10 Document Amendments

New document.