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Manual for T-VER Validation and Verification

(Version 02) B.E. 2566

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1. Introduction

Thailand has proposed a Nationally Determined Contribution (NDC) to tackle climate change to the United Nations Climate Change (UNFCCC) Secretariat. It confirms its intention in the essence that “Thailand has set a target to reduce greenhouse gas emissions by 30% in the year 2030 (B.E. 2573) from the business as usual and reduce greenhouse gas at 40% increase when received an international support. In addition, Thailand determines its carbon impartiality target within the year 2050 (B.E. 2593) and achieves net zero greenhouse gas emissions in the year 2065 (B.E. 2608).”

Thailand Greenhouse Gas Management Organization (Public Organization) or TGO, an agency responsible for promoting the national greenhouse gas management, has developed a “Thailand Voluntary Emission Reduction Program” or a “T-VER Project” as a voluntary mechanism to support the voluntary reduction of greenhouse gas emissions in Thailand and utilize the amount of emissions reduced and/or stored known as “carbon credit” generated from the T-VER project in exchange or sale or offsetting for the greenhouse gas emissions generated by organizations, services, individuals, or products; or use as information for reporting the performance of greenhouse gas emission reduction. The T-VER project must be developed in reference with the specifications with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements (ISO 14064-2: 2019). There are two types of project development standards for the T-VER project, namely “Standard T-VER project” and “Premium T-VER project”.

Implementing a T-VER project in order to create a conformation standard of greenhouse emission from the project, TGO determines a validation and verification process developed by the Validation and Verification Body (VVB), a juristic entity and a third party. This voluntary body shall systematically work and receive accreditation according to the general principles and requirements for bodies validation and verifying environmental information (ISO 14065: 2020), IAF MD6, and the general principles and requirements for validation

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and verification bodies (ISO 17029: 2019) to perform validation and verification of the T-VER project. This is an important process to verify in conformity with the criteria, methods, and conditions of project development and confirming the carbon credit assessment, as well as increasing the credibility of the T-VER project.

TGO, therefore, develops documents and Guideline for T-VER Validation & Verification (Version 02). These documents are intended to serve as a guidance and a conformity standard for the Validation and Verification Body (VVB) in the T-VER project’s validation and verification process. These documents are developed based on the specification with guidance for the verification and validation of greenhouse gas statements (ISO 14064-3: 2019) which has comprehensive content, Guidelines for Validation and Verification Methods according to other relevant criteria as specified by the TGO.

2. Terms and definitions

Terms	Definitions
Standard T-VER	The T-VER project that the project participant wishes to voluntarily participate in reducing greenhouse gas emissions by setting standards according to Thailand’s national standards and will be referred as “Standard T-VER”.
Premium T-VER	The T-VER project that the project participant wishes to voluntarily participate in reducing greenhouse gas emission by setting high standards in line with the guidelines under Article 6 of the Paris Agreement and will be referred as “Premium T-VER”.
Greenhouse Gas	Composition of gases in the atmosphere both existing in nature and created by man. It can absorb and emit radiation at wavelengths in the range of infrared radiation emitted by the Earth's surface, atmosphere, and clouds.
Global Warming Potential (GWP)	The global warming potential that causes global warming depending on the efficiency of thermal radiation and the age of that gas in the atmosphere compared to the thermal radiation of carbon dioxide. The T-VER project refers to the GWP value from the IPCC Fifth Assessment Report (AR5).
Greenhouse Gas Reduction	Reduction, absorption, sinking and storing greenhouse gases.

Terms	Definitions
Greenhouse Gas Source	A source or process that releases greenhouse gases into the atmosphere.
Greenhouse Gas Sink and Reservoir	A source or process by which greenhouse gas are extracted from the atmosphere and trapped in the physical composition of the biosphere, geosphere, or hydrosphere.
Thailand Voluntary Emission Reduction Program or “T-VER Project” and read as “tee-ver”	A greenhouse gas reduction project in Thailand that the project participant operates on a voluntary basis, aiming to reduce greenhouse gas emission according to Thailand’s standards.
Project Participant	A T-VER project operator and/or project co-operator, may at the same time be the project owner, who is responsible for the development of the T-VER project.
Project Owner	A project owner has an ownership of the project such as investors, factory owners, machine owners, and landlords.
Validation and Verification Body (VVB)	A juristic person accredited and received a VVB registration approval to systematically work as validator and verifier for the T-VER project with the TGO to conduct the validation and verification of a T-VER project.
Regulator	Thailand Greenhouse Gas Management Organization (Public Organization) or TGO is responsible for the registration of the T-VER project to certify greenhouse gas amount and the T-VER project management.



Terms	Definitions
Additionality	Demonstration of the project operations in addition to its normal operations or the Business as Usual (BAU) proving Additionality according to the criteria set by the TGO Board of Directors.
Positive List	A Positive List specified by the TGO for a T-VER project development.
Co-benefit	Benefits in other areas besides reducing greenhouse gas emissions such as reducing the impact on the environment, increasing jobs, and income for the community.
Baseline Emission	Business as Usual (BAU) emission or in case the T-VER project of that project has not yet been implemented.
Project Emission	The amount of greenhouse gas emissions from activities within the project scope.
Leakage Emission	The amount of greenhouse gas emissions that occur outside the scope of the project as a result of project activities.
Baseline Methodology	Standards, assumptions, processes, and other methods applied to calculate GHG emissions in the baseline case of the T-VER project.
Carbon Credit	The amount of greenhouse gases that can be reduced/stored from the project implementation and has been certified by the supervisory authority of that greenhouse gas reduction mechanism, such as TGO, which is the regulator of the mechanism.



Terms	Definitions
	T-VER, etc. Carbon credits can be exchanged or bought-sold, and the unit is “Ton Carbon Dioxide Equivalent (tCO ₂ eq)”.
Project Design Document (PDD)	A document used to submit a greenhouse gas reduction project for a T-VER project registration with the TGO, prepared by the project participant.
Co-benefits Report	A document used for proposing a greenhouse gas reduction project for a T-VER project registration to the TGO, prepared by the project participant. It is a document that shows information about co-benefits arising from the project in addition to reducing greenhouse gas emissions. Glass in 3 aspects: environment, society, and economy.
Sustainable Development (SD) & Safeguards Assessment Report	An assessment report that the project participant must prepare and submit to the TGO for consideration and approval before applying for project registration. The contents of the report consist of assessment results in support of the Sustainable Development Goals (SDGs), consideration of various rights (Rights) in accordance with national laws/regulations. and assessment and prevention of negative impacts (Safeguards) according to laws/regulations. by assessing the level of negative impacts of the project and proposing guidelines for managing impacts to prevent negative impacts (Do-no-net-harm) and must pass the inspection of TGO.

Terms	Definitions
Monitoring	An activity that the project participant performs on a regular basis to collect and manage greenhouse gas emissions data during the implementation of the T-VER project, both directly and indirectly.
Monitoring methodology	Standards, assumptions, processes, and other methods that are applied to collect and manage the data needed to monitor GHG emissions from the implementation of the T-VER project.
Monitoring Report (MR)	A document that the project participant must prepare after the T-VER project registration for use in certifying the amount of greenhouse gas reduced or stored.
T-VER Monitoring	TGO has set up a follow-up and evaluation of the T-VER project after project registration, with an annual follow-up and evaluation throughout the credit period of the project by the TGO officials or persons assigned by the TGO.
Uncertainty	The amount represents the magnitude of data fragmentation due to measuring instruments or measuring methods.
Error	The difference between the obtained value and the actual value.
Materiality	Data inconsistency that causes inaccuracy in the GHG assessment results and affects the user. In this specification, data inconsistency criteria are defined and should not exceed 5 percent.
Greenhouse Assertion	Presentation of greenhouse gas data.


Terms	Definitions
Stakeholder	An individual or organization that is affected by the development and the implementation of the T-VER project.
Intended User	An individual or organization identified as those who wish to use the results of the GHG assessment for decision-making. This person or organization may supervise the T-VER projects, supervisors, buyers, and sellers of greenhouse gases.
Responsible Party	A person or group responsible for presenting the amount of project emissions generated and providing support for the GHG data preparation.
Client	An organization or individual requests for validation or verification.
Validation and Verification Team	A person assigned by the VVB responsible for the validation and verification process of the T-VER project.
Validation	An independent and systematic process that is recorded in writing to verify the project feasibility and the project emission. The amount of project emission will be recorded in the project design document (PDD) according to the T-VER project validation criteria and in accordance with ISO 14064-3:2019.
Lead Validator	A person assigned by the VVB to lead, plan, and direct the validation process and supervise other validators' operations.
Validator	A person assigned by the VVB to inspect the validity of the T-VER project.



Terms	Definitions
Validation Report	A document issued by the VVB to the project participant after the completion of the validation process to certify the GHG reduction project according to the T-VER project development criteria specified by the TGO Board of Directors.
Verification	An independent and systematic process developed for assessing the greenhouse gas reduction from the T-VER project, that is recorded in writing, in the Monitoring Report (MR) according to the verification criteria of the T-VER project and in accordance with ISO 14064-3: 2019
Lead Verifier	A person assigned by the VVB to act as a leader, plan, control the verification process, and supervise the operations of the verifier.
Verifier	A person assigned by the VVB to verify the T-VER project.
Verification Report	A document issued by the VVB for the project participant after the completion of the verification process to certify the amount of greenhouse gas reduction from the T-VER project according to the T-VER project development criteria set by the TGO Board of Directors.
Technical Expert	A person assigned by the VVB to join the validator team and the verifier team in order to provide specific information to the teams.

Terms	Definitions
Technical Reviewer	Personnel assigned by outside assessors to review the correctness of validation and verification processes.
Level of Assurance	The confidence level of a statement used to define the depth of the data, to design and plan validation/verification by taking into account potential errors, omissions and inaccurate presentations.
Reasonable assurance	The level of accreditation at the audit scope designed to verify the data down to its source.
Reasonable validation/verification	The validation and verification process that certifies sufficient information in accordance with the criteria whether it meets validation or verification criteria. It is not an absolute validation/verification that guarantees all data and processes.
Statement	A formal written statement aiming for the target audiences to demonstrate the credibility of the GHG emissions amount of the person responsible for such report production.
Material Misstatement	Reporting inaccurate or incorrect GHG emissions data in project proposal documents and GHG emission monitoring reports that affect the materiality beyond the level specified by the TGO and could affect the decisions of the intended user.
Misstatement	GHG emission data reporting in project proposal documents and GHG emission monitoring reports are inaccurate or incorrect and affect the materiality but not exceeding the level specified by the TGO.

Terms	Definitions
Nonconformity	Any report or operation that does not comply with the guidelines, requirements of the T-VER project, and greenhouse gas reduction methodology the project participant chooses to use or inconsistent with the evidence found.

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3. Validation and Verification Body (VVB)

3.1 Validation and Verification Body (VVB)

The Validation and Verification Body (VVB) is an accredited legal entity (Accreditation) that systematically work and is registered as an external assessor, who can conduct validation and verification for the T-VER project under Thailand Greenhouse Gas Management Organization (TGO) (Public Organization).

3.2 Accreditation

Accreditation is a formal recognition that an agency has the ability to perform an accreditation an activity in Thailand. The formal recognition is approved and issued by the National Standardization Council (NSC) under Thai Industrial Standards Institutes (TISI), an accreditation body.

The accreditation of the environmental data validation and verification is a formal recognition that the accreditation body possesses working standards, required skills and abilities to carry out the environmental data validation and verification activity. Such environmental data includes the unit of greenhouse gas data collected and analyzed in conformity with the general principles and requirements for bodies validation and verifying environmental information (ISO 14065: 2020), the IAF MD6, and the general principles and requirements for validation and verification bodies (ISO 17029: 2019); and accredited by the National Standards Council. The accreditation of the greenhouse gas data validation and verification will be performed according to the National Standards Act B.E. 2551 and criteria, methods, and conditions for accreditation as specified by the Thai Industrial Standards Institute (TISI).

3.2.1 Accreditation Process

Steps for accreditation from the National Standards Council



Figure 3-1 Accreditation Process (Reference: <https://www.tisi.go.th/>)

Steps	Details
Application	An applicant submits an application and other supporting documents as specified by the Thai Industrial Standards Institute (TISI).
Reviewing	The officer verifies the accuracy of the request and its supporting documents.
Assessment team appointment	TISI appoints an assessment team.
Assessment	The assessment team reviews the documentation system and prepare the assessment plan.
	<p>Assessment Process</p> <p>Step 1: Assessing the establishment (Head Office)</p> <p>The assessment team conducts an inception meeting to introduce the assessment members, clarify details at the Head Office and the Branch offices</p>

Steps	Details
	<p>of the accreditation body as appropriate, and close the meeting to review deficiencies found during the assessment.</p> <p>Step 2: Witnessing</p> <p>The assessment team assesses the competence of the accreditation body members while performing their duties. The assessment team will monitor the accreditation body members' performance throughout the activities.</p> <p><i>Remark: The assessment in step 1 and 2 can be swapped.</i></p> <p>Assessment report</p> <p>The assessment team lead prepares an assessment report summarizing the results in step 1 and 2, and informs the accreditation body together with the submission of corrective actions with timeline for the accreditation body to implement.</p>
	<p>Assessment Report</p> <p>The monitoring team prepares an assessment report and submit it to Thai Industrial Standards Institute (TISI).</p>
Reviewing	Present to the accreditation body for reviewing
Decision making	Present to the accreditation body for certification consideration
Certificate issuing	Secretary General of the Thai Industrial Standards Institute signs the certificate.
Surveillance	After accreditation, the TISI will monitor the result at least once a year. The monitoring may be a full or partial as considered appropriate.
Reassessment	Thai Industrial Standards Institute (TISI) will conduct a re-assessment every 5 years by evaluating all systems.

3.2.2 Examples of the Accreditation System Structure

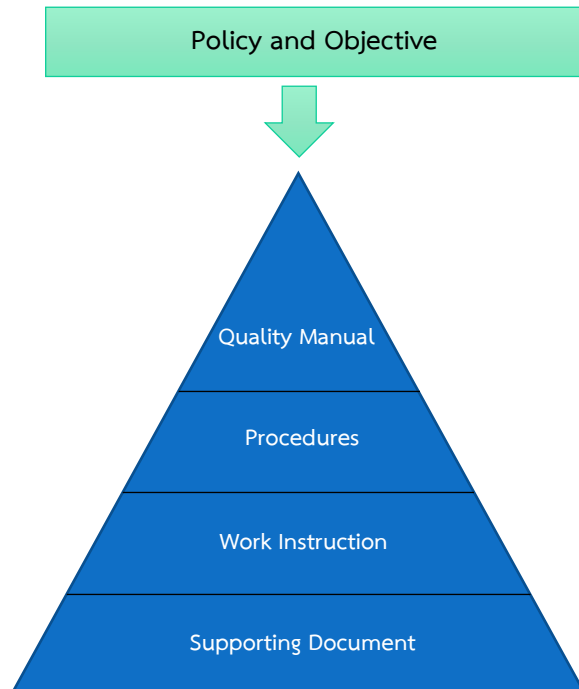


Figure 3-2 Examples of the Accreditation System Structure


Policy is a statement that indicates the intention and direction of an organization's quality system determined by its top management publicly shown to customers and personnel in that organization.

Quality objective is a Key Performance Indicator that indicates the achievement of the system. In most cases, it is consistent with the policy.

Quality manual is a document that provides an overview of the organization's quality system, which includes the scope of accreditation, the overview of organizational activities, and preliminary operating procedures. These procedures may refer to operating steps specified in the manual document. They reflect good image of the organization and make the customers impressed with the service.

Procedures is a document that describes workflow and steps from its start to final process. It describes who, what, where, when, and how with references to the relevant forms.

Work instruction is a document that describes the steps of a particular job from start to finish (step by step). It may be a separate description of the workflow from the workflow document for more detailed steps.

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Supporting documents are other documents used as guidelines or as references to support operations, such as the appointment of Executives, the statement of the Executives' impartiality.

3.3 Registration of T-VER Validation and Verification Body


3.3.1 Qualifications of the eligible applicants for the Validation and Verification Body's registration

An eligible applicant for the Validation and Verification Body's registration must possess qualifications specified in the regulation of the board of directors of Thailand Greenhouse Gas Management Organization re: criteria for considering the registration of validation and verification bodies, b.e. 2564.

3.3.2 Steps for the T-VER VVB registration

The registration of a T-VER Validation and Verification Body has steps and details shown in Figure 3-3 and as described below.

- 1) The applicant collects supporting documents for the T-VER VVB registration according to the forms specified by TGO. These forms can be downloaded from the T-VER project's website.
- 2) The applicant submits documents for registration to TGO through electronic mail (e-mail) to email: saraban_tgo@tgo.or.th
- 3) TGO receives the registration documents from the applicant and reviews their completeness and correctness in conformity with the the regulation of the board of directors of Thailand Greenhouse Gas Management Organization re: criteria for considering the registration of validation and verification bodies, b.e. 2564. When an information important for registration consideration is missing, the TGO will notify the applicant to correct it and submit the additional information to the TGO.

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4) TGO presents the details of the assessed applicant to the consideration of sub-committee for T-VER project and GHG reduction activities for reviewing, and further presents them to the TGO Board of Directors for reviewing and approving its application of VVB registration.

5) TGO informs the review results for the VVB registration to the applicant and issues a registration certificate to the T-VER VVB.

TGO determines the consideration timeframe to be within 60 working days. This consideration will be in accordance with the regulations of the Thailand Greenhouse Gas Management Organization (TGO) in relation to the criteria for considering the T-VER VVB B.E. 2564.

3.3.3 Renewal of the T-VER VVB registration

1) the VVB agency submits a renewal request and all supporting documents to the TGO at least 90 days prior to the expiry date of the registration (if the documents submitted to the TGO for consideration are complete and correct, with no essential information for the registration is missing or requires additional information, the agency may request TGO to use the submitted documents for approval).

2) The T-VER VVB certificate is valid for 3 years from the expiry date of the original certificate or the renewed certificate, depending on cases. The agency requesting for a renewal must not be under suspension or revocation of its current registration certificate.

3.3.5 Request for a change in the scope of validation and verification

When the VVB wishes to change the scope of accreditation, the VVB must submit a request and the following supporting documents to the TGO.

- 1) An application for the T-VER VVB registration application
- 2) A copy of the certificate or license from the accreditation body or a copy of a certificate or license for becoming a Designated Operational Entity (DOE) or a new copy of an ISO 14065 certificate issued by the accreditation body (in case of changing the scope of the accreditation system).



Figure 3-3 The Registration Procedures of a T-VER VVB

3.4 Role of the T-VER Validation and Verification Body (VVB)

The role and responsibilities of the T-VER VVB is to assign the validator and verifier team to provide independent opinions on the information described by the project participant in the project design document (PDD), monitoring report (MR), greenhouse gas effect, and other related documents; and to issue a statement confirming the validation and verification results of GHG emissions. The role and responsibilities of relevant agencies are shown in Figure 3-4.

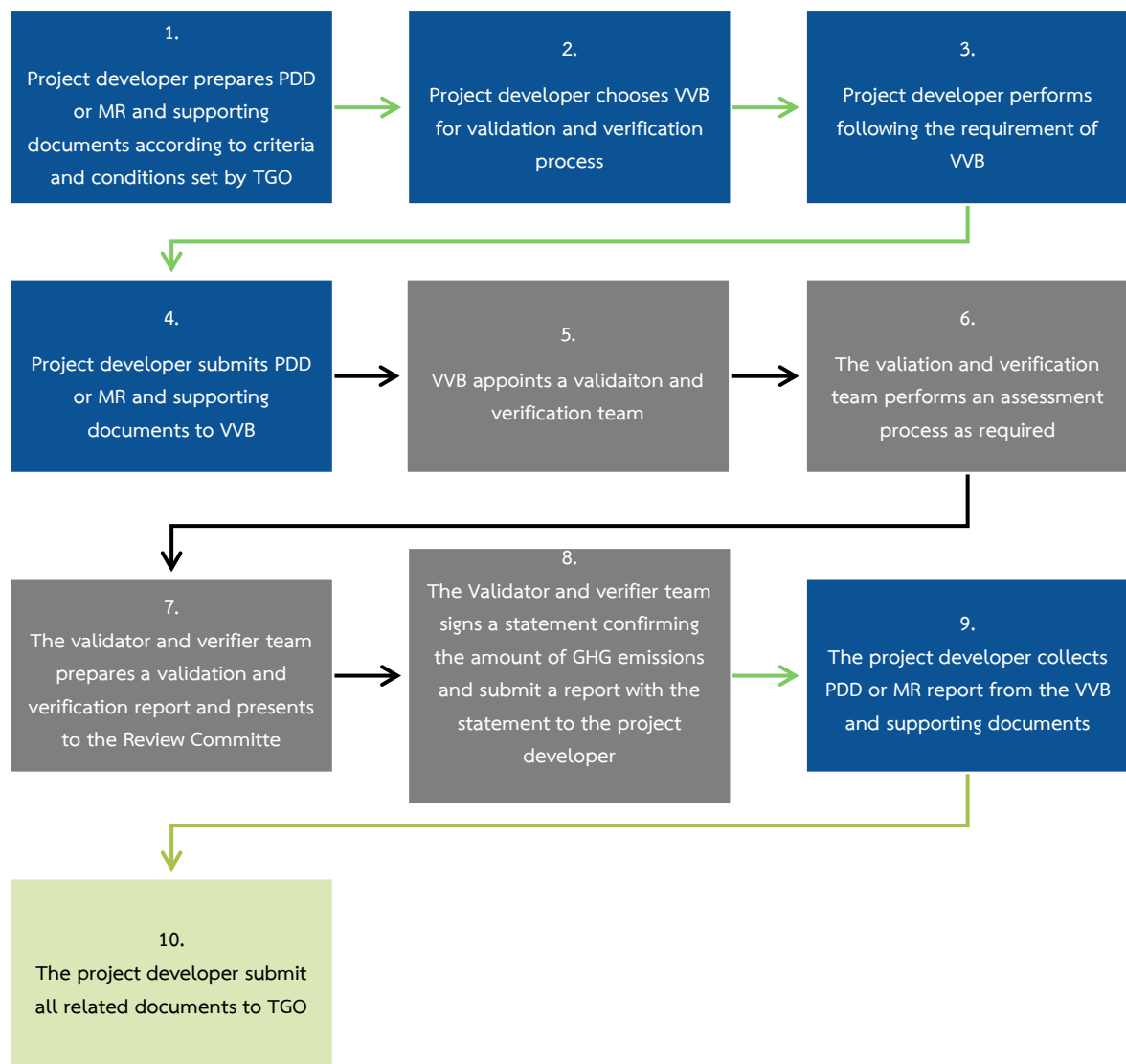


Figure 3-4 Role and Responsibilities of Relevant Agencies

Table showing role and responsibilities of relevant agencies

No.	Details
1	The project participant prepares a Project Design Document (PDD) for a T-VER project registration or prepares a Monitoring Report (MR) for carbon credit certification, and other documents according to the requirements of the TGO.
2	The project participant recruits the VVB members that have been registered with the TGO according to the scope corresponding to the project participant's greenhouse gas reduction activities in order to request for the validation and verification of the PDD as part of the T-VER project registration or the verification of the Monitoring Report for carbon credit application.
3	The project participant follows the process of obtaining services from the VVB. For example, the project participant clarifies the initial T-VER project information to assess the risk of impartiality in validation and verification, the competence and consistency of the scope of VVB registration, and the sufficiency of the work period of the validators and the verifiers, as well as making an agreement to receive validation and verification services.
4	The project participant submits the project design document or the first GHG assessment report, its supporting documents, and other relevant documents to the validator and verifier team to allow the VVB to conduct the preliminary review of the information for planning the validation and verification process.
5	The VVB appoints a validation, or a verifier team based on their competencies within the scope of validation and verification.
6	The validation and verifier team perform the assessment procedures required by the VVB to provide an independent opinion on the information described by the project participant in the project design document, the monitoring report, the assessment of greenhouse gas emissions, and other related documents according to the criteria and requirements set forth by the TGO.

No.	Details
7	The validation team prepares a validation report to summarize the validation results, confirm the amount of greenhouse gases expected for a reduction in the T-VER project registration, and prepare a verification report to summarize the verification results and confirmation of carbon credits for certification, as well as present those results to the review team for reviewing the entire validation and verification process.
8	The VVB authorized signatory signs a statement as required by the VVB to confirm the results of GHG assessment and submits a validation and verification report together with the statement to the project participant.
9	The project participant collects the project design documents or the monitoring report and related documents from the VVB according to the list specified by the TGO.
10	The project participant submits the project design document and the monitoring report to the TGO on schedule for T-VER project registration or carbon credit certification.

3.5 General principle for the Validation and Verification Body's Operations


The VVB must adhere to the following key fundamentals as defined in ISO14065:2020.

1) Impartiality

The VVB must design and perform validation to provide independent opinions while maintain impartiality without conflict of interests towards certification activity.

2) Competence

The VVB members are required to perform the validation and verification with sufficient professional knowledge, competence, experiences, and skills to validate or verify the project participant's GHG reduction activities.

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3) Confidentiality

The VVB must determine data management and confidentiality procedures for the project participants to follow during the validation and verification process. The VVB must ensure that an appropriate a retention and prevention process is established and always in place.

4) Openness

The VVB must perform the validation and verification, communication with the project participants and the stakeholders with openness, appropriateness, and truthfulness.

5) Responsibility

The VVB must be appropriately accountable for the results of its validation and verification process, the statement used in confirming the GHG forecasting results in the project design document, and the amount of carbon credits requesting for certification in the monitoring report, including the truthfulness of any findings.

6) Responsiveness to complaints


The VVB must deal with complaints that may arise from the validation and verification process of the interested parties and take corrective actions of such complaints as necessary to demonstrate the integrity and reliability of the results of the validation and verification.

7) Risk-based approach

The VVB must realize and take into account of the risks associated with the validation and verification process, and have mechanisms in place to prevent various risks that may arise.

8) Conservativeness

The VVB must use assumptions that are reasonable and must result in the calculation of appropriate GHG emissions incurred from the project. When VVB assess comparable alternatives, preference is given to the alternative that is cautiously moderate.

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9) Professional skepticism

The VVB should possess an observant attitude and mindset, not ignore of situations where there are potential risks of significant errors that may affect the presentation of the GHG emission reduction figures.

3.6 Validator and Verifier


3.6.1 Validator and Verifier Team

The validator and verifier team are those assigned by the VVB consisting of at least 1 validator or verifier to provide independent opinions to the information submitted by the project participant in the project design proposal or the monitoring report, and other relevant documents.

3.6.2 Basic skills for the validator and verifier Team


The validation or verification team must have at least knowledge, understanding, experiences related to the T-VER project, for example:

- 1) Criteria, conditions, requirements, and methods related to the T-VER project development
- 2) Skills and expertise in technology related to assigned greenhouse gas reduction activities such as
 - Identification of the source of GHG emissions and sink
 - Consideration of project scope, baseline emission, project emission, and leakage emission
 - GHG emission principles and calculation techniques
 - Guidelines, methodologies, and tools used for monitoring GHG emission reduction from the project operations.
 - Reviewing greenhouse gas emission reductions or removal report

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- 3) Validation and verification skills in providing opinions towards findings, summarizing the truthful results based on findings such as the risk assessment from data received and sampling planning.
- 4) The validator and verification team leader must possess team management skills.

In case that the validation or verification team does not have experience or expertise in technology related to greenhouse gas reduction activities from the T-VER project requiring the validation and verification activities, the team shall recruit experts with knowledge and experience related to such technology to join the team to provide specific advice related to the GHG reduction activities from the T-VER project.

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4. General Principles and Relevant Requirements

4.1 General principles for the project development

TGO requires the project participants to develop project based on specifications provided under the guidance at the project level for quantification, monitoring, and reporting of GHG emission reduction or removal enhancement (ISO 14064-2: 2019) and other criteria, methods and conditions as specified by the TGO. The key fundamental principles for T-VER project development according to ISO 14064-2: 2019 are as follows:

1) Relevance

The selection of appropriate GHG emission source, storage, activity information, and regulations, as well as the GHG collected or assessed must reflect the actual GHG emission reduction incurred in the activities of the project participants' project operations.

2) Completeness


Reporting of greenhouse gas emissions and greenhouse gas storages of project participants must include all project activities, complete, and contain relevant information used to meet required list of criteria and complete process.

3) Consistency

Information collected related to the greenhouse gas reductions must come from the operations of the same principles, in the same direction or use a consistent method throughout the reporting, including presenting information in project design proposals and monitoring reports.

4) Accuracy

The selection of a valid, reliable, and acceptable method of GHG emission collection and calculation must reduce bias and uncertainty as much as possible.

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5) Transparency

The disclosure of information related to the collection or calculation of GHG emissions reduction data that is sufficient and appropriate, can be verified, has sufficient reliable sources, references or supporting evidence.

6) Conservativeness

The use of assumptions, figures and processes that make the assessment of the amount of greenhouse gas reductions generated by the project is not more than realistic. When using calculation assumptions or an estimate of the data project participants shall take into account the comparison of different methods and consider the selection of data that results in the amount of GHG reductions not being excessive.


However, the validator and verifier team is responsible for appointing a team of validators and a team of verifiers to assess whether the project participant is following the basic principles for the T-VER project development.

4.2 General principles for the Validation and Verification Process

Validator and verifier team responsible for validating and verifying the operations of the T-VER project participant whether the project participant does it according to the general principles of ISO 14064-2: 2019 requirements and other criteria, methods, and conditions specified by the TGO. The general principles for validation and verification process are based on ISO 14064-3: 2019 requirements as shown below:

1) Impartiality

The validation or verification team shall design and implement validation activities to provide independent opinions while maintaining impartiality with no conflict of interest in certification activities.

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2) Evidence-based approach to decision making

The validation or verification team must carry out the validation and verification activities using reasonable methods of information gathering, concluding reasonable and validation and verification results based on sufficient and appropriate reference evidence.

3) Fair Presentation

The validator and verifier team must be confident that the findings, comments, and the results of assessed activities are correct and truthful. Significant obstacles found and unsolved, various comments, and different opinions from the validators and verifiers must be reported.

4) Documentation


The validation and verification process shall record the validation and verification results and related evidence in order to confirm that the conclusions are consistent from validation activities and verification of various information related to the project according to the various criteria set by the TGO by storing that record, the method can be used. appropriate and convenient for the operation of the team.

5) Conservativeness

Decision of the validator and verifier team must confirm the results of the GHG reduction result from the project implementation. It must be assured that the greenhouse gas reduction results proposed by the project participant are not exaggerated. It must take into account the assumptions, figures and processes used for the assessment of greenhouse gas reductions generated from the project.

4.3 Level of Assurance

The level of assurance is an indicator of the level of confidence that the validator and verifier team use in determining the nature and context of a project in order to appropriately assess evidence, and verifying the facts of the project. It is an important guideline for validation

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and verification conclusions during validation and verification operations. The level of assurance cannot be changed during the validation and verification process.


TGO determines the level of assurance for validation and verification of the T-VER project at a reasonable level of assurance by evaluating both qualitative and quantitative GHG data of the project. Quantitative shall be free from errors, omissions, and distortions of any significance and at the specified materiality level. The validator and verifier team shall be equipped with relevant information and evidence of sufficient and appropriate credibility to ensure that the project design document and the monitoring report are accurate and reliable.

4.4 Objective

The validator and verifier team and the project participant must agree and set objectives with the project participant from the start of the validation or verification process, including guidelines for using the validity result requested for service.

The validation is a detailed assessment of the project implementation and various operational procedures of the project participant. The purpose of validation is to assess the probability of implementing greenhouse gas reduction activities. The operation is in line with the criteria of the T-VER project and the chosen GHG reduction methodology applied for T-VER project registration with the TGO.

The verification will be carried out after the T-VER project has been registered and commenced GHG reduction activities. It is to verify what happened, details and various information that the project participant has already taken and specify the results of reducing greenhouse gas emissions in the monitoring report of greenhouse gas emissions. The purpose of verification is to confirm that the project is implemented in accordance with methods, procedures, and monitoring plans. This is specified in the project proposal document that has been registered with the TGO and has a greenhouse gas assessment, including details and operations that the project participant specified in the monitoring report on gas emissions.

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The greenhouse gases are accurate and appropriate as specified by the TGO and the results of the assessment of greenhouse gas emissions are at the material level specified by the TGO to certify the amount of carbon credits with the TGO.

4.5 Criteria used in the validation and verification process

The validator and verifier team and the project participant must agree in various criteria to be used for validation and verification at the beginning of the validation and verification process. This is to confirm that the project participant will implement the T-VER project in consistent, correct, and complete manner according to the aforementioned criteria and in accordance with the TGO regulations.


TGO determines various criteria related to the T-VER project development, the validation and verification process as follows.

4.5.1 Criteria for Standard T-VER

- Regulation of the board of directors of thailand greenhouse gas management organization re: rules, procedures, and conditions for considering thailand voluntary emission reduction (t-ver) projects
- Guidelines for the development of T-VER project according to Thailand standards
- T-VER Methodology
- Manual for Validation and Verification of T-VER Project according to Thailand Standards
- Others as specified by the TGO

4.5.2 Criteria for Premium T-VER

- Regulation of the board of directors of thailand greenhouse gas management organization re: rules, procedures, and conditions for considering thailand voluntary emission reduction (t-ver) projects


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- Guidelines for the development of T-VER projects according to Thailand standards
- T-VER Methodology
- Manual for Validation and Verification of T-VER Projects according to Thailand Standards
- Announcement of the Board of Thailand Greenhouse Gas Management Organization on the additionality criteria of Thailand's T-VER project according to premium T-VER standards
- Announcement of the Thailand Greenhouse Gas Management Organization (Public Organization) regarding reserve credit management, monitoring and the risk assessment of carbon sink from the forestry and agriculture projects of Thailand's premium T-VER standards.
- Others as specified by the TGO.

In this regard, the validator and verifier team can follow the relevant validation and verification criteria from the T-VER project presented on its website.

4.6 Scope

The validator and verifier team and the project participant must agree on the scope of validation or verification at the beginning of the validation and verification process. As for the scope of the T-VER project, it should consist of project boundary, equipment, technology used in project implementation, related greenhouse gas reduction activities. The validator and verifier team must be able to specify the scope of the T-VER project development and related details written in the agreement or other documents required according to the general principles of the operational regulations for the validation and verification team. This process is to confirm the scope for joint assessment between the project participant and the validator and verifier team such as specifying representative images, describing the nature of the project participant's operations.

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Determining the project scope, including determining the credit period in the validation and verification process, TGO determines the credit period according to the credit period of each type of project in the verification process and the project participant determines the credit period for the verification process of the T-VER project.


4.6 Materiality threshold

The validator and verifier team and the project participant shall mutually agree on the level of materiality of validation and verification process from the beginning of the validation and verification process.

Materiality in the context of the T-VER project is any errors, omissions or misrepresentations that may have a consequential effect on the decision making of the target audiences. The TGO has set a materiality threshold for the T-VER project, data inconsistencies result in inaccurate GHG estimates and affect decision-making by data users. The materiality must not be more than 5% of the total GHG reduction amount.

Materiality can be considered from both qualitatively and quantitative perspectives. Assessing materiality in terms of quality, the validator and verifier team must consider whether the project complies with T-VER project requirements and GHG reduction protocol. The conflicts of qualitative data such as characteristics of eligible projects must be identified as a material non-conformity. Qualitative discrepancies may not be evident, such as quantitative discrepancies.

To assess the quantitative magnitude of the errors, omissions or misrepresentation of information, the validation and verification teams must assess materiality at the total amount of greenhouse gas emission reduction.

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5. Validation and Verification Process

The validator and verifier team Implements the general principles for project development and the general principles for GHG validation and verification processes in conjunction with the use of team's professional judgment in making decisions related to the validation and verification process at each stage is as follows:


1. Pre-engagement
2. Engagement
3. Validation and Verification Process
4. Validation and Verification Review
5. Decision and issue of the Validation and Verification Statement

5.1 Pre-engagement

When the Validation and Verification Body (VVB) is contacted by the project participant, before starting the validation and verification process, the VVB gathers information relevant to the T-VER project and necessary for validation or verification process. This information will be used for mutual consideration and agreement with the project participant, and assessment on the feasibility of validation and verification services. This is to ensure that the team will be able to express their independent opinions on the T-VER project, possess sufficient and competencies in validation and verification process, including having adequate time for such implementation. The important information that is useful for consideration in various issues consists of the objectives of the operation, project details, scope of work, project location, level of assurance, and materiality.

5.2 Engagement

The validator and verifier team and the project participant must establish a written contract or agreement that is legally enforceable and covers the activities of validation or

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verification services. The duties and responsibilities are shared among the validator and verifier team as well as the project participants as follows:


- The project participant is responsible for implementing the criteria and requirements of the T-VER project as specified by the TGO.
- The project participant is responsible for implementing procedures for validation or verification of external assessment agencies.
- The project participant must provide all necessary preparations and requirements for the validation or verification process, such as access to the project area. related information and processes personnel access Related documents and records
- The project participant must agree to have an observer from an external assessment agency. To participate in a validation or verification process (if applicable).
- Determination of the objectives of the operation Project details and scope project location The level of accreditation includes materiality.
- Various criteria according to the requirements of the TGO that are used as a reference for validation and verification.
- The time frame used for validation and verification.

The validator and verifier team shall be responsible for all information received during validation or verification process. This includes maintaining the confidentiality of all project participant information that occurs during validation or verification process, except the information TGO required disclosure to the public or related persons.

Further details on the specific requirements for the agreement preparation process can be found in ISO 17029: 2019 (9.3)

5.3. Validation and Verification Process

For the T-VER project development, TGO has set two levels of project development standards: “Standard T-VER Project” and “Premium T-VER Project”. Both project types

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possess similar principles for the validation and verification process. Consideration must be given to the requirements related to project development at both levels. The development of the premium T-VER project, TGO prescribes additional criteria and conditions at some stages. For example, the project participant must hold a meeting to hear opinions on the project activities before the project development begins, reserve credit management and carbon loss risk monitoring for forestry and agriculture projects. In the process of applying for carbon credit certification, the validator and verifier team must consider various relevant criteria as specified by the TGO in each step.

TGO specifies the characteristics of the T-VER project development of both levels. The project development can be carried out in 3 forms:

1) Single Project

Projects that carry out greenhouse gas reduction activities in one location.


2) Bundling Projects

Projects that carry out the same type of greenhouse gas reduction activities in several locations and have the same credit period. The project participant can use a single project design document to apply for the project registration.

3) Programme of Activities (PoA)

The programme of activities (PoA) is a project for reduce greenhouse gas emissions reduction with a framework. It has a group of sub-projects implementing in multiple locations under the same project type and can set different credit period for each sub-project group.

For validation or verification process, individual projects and combined projects with a validator or verifier team can be implemented using the same principles and methodologies. For the PoA project, TGO requires the project participant to prepare the project plan framework (T-VER PoA) together with the sub-project group (Component Project Activities: CPA) at 1, the validation team is responsible for checking the validity of the project plan framework (T-VER PoA) whether the project participant complies with the details of the T-VER project development criteria, and validate the T-VER Program of Activities Design Document (T-VER-

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PoA-DD) of sub-project group 1, using the same principles and methodologies as for individual projects and combined projects. together


5.3.1 Team formation process

After the VVB engaged an agreement with the project participant, the VVB will establish a team to carry out validation or verification activities and assign a team leader. The validator and verifier team must have skills in validation or verification, sufficient knowledge and competencies that are consistent with the requirements of GHG reduction activities related to the T-VER project. The VVB must notify the project participant of the list of names, positions, duties of the team, and give the project participant an opportunity to accept or reject the list of teams. Notifying the team can be done with an agreement with the project participant or after completing the agreement.

In the event that the validator and verifier team does not have sufficient experience or expertise in technology related to greenhouse gas reduction activities under the T-VER project, the team must perform validation or verification. The validator and verifier team shall recruit experts with knowledge and experience related to such technology to join the team to provide specific advice related to the GHG reduction activities from the T-VER project.

5.3.2 Steps for planning and preparing the validation

Planning for the validation process and the desk review, the validator team must carry out the review on details and activities specified by the project participant in the project proposal document, assess compliance with the greenhouse gas reduction methodology that the project participant chooses to use and other criteria set by the TGO. The team gathers project details, relevant greenhouse gas emission reduction activities, project location, the scope of the validation process (e.g., the type of project, project development scope, related technology activities, related greenhouse gases, physical appearance, assessment of greenhouse gas emissions from the greenhouse gas reduction methodology that the project participant chooses to use to prepare reports, various information related to the development of the T-VER project), conduct strategic analysis, techniques used for validation, conduct the Risk Assessment of the data to determine the amount of sampling.

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5.3.2.1 Review of project design document

The validator team conducts an assessment to confirm that the project participant has used the latest Project Design Document (PDD) form required by the TGO or the version that is still in effect, and reports all topics that are completed, examine the specific characteristics and consistency of project activities related to the development of the T-VER project such as


1) The ownership of the T-VER project owner and the project participant

The validator team performs a review of the relationship between the project participant and the project owner. In case the project owner and project participant are not the same person or juristic person; or the project owner and project participant have more than one person, the validator team must verify the legal status of the project development, verify the ownership of carbon credits, ways to share carbon credits, the contract or agreement between the owners of carbon credits, and the timeframe of the contract covering the implementation of T-VER project activities of each type of project.

2) Project details

The validator team conducts an assessment to verify that the project participant reports project details presented in the project design document in an accurate, complete, and sufficient manner. The project participant must understand the project and the content is consistent with reality. The report must cover the appropriate and adequate project activity details, technology and equipment installed in the project, project status, iterations, reliable data, or documentation.

- The project participant's T-VER project naming should reflect activities undertaken, location and project participant including corresponding Thai and English names.
- The project participant must accurately report project types in accordance with the greenhouse gas reduction methodology. that the project participant chooses to use. In case the project participant chooses to use more than one GHG reduction methodology, the validator and verifier team must verify to confirm that the project participant has identified

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the relevant project types completely and correctly according to the GHG reduction methodology selected.

- The project participant must provide complete and accurate project location reports. In case the project has multiple locations, the validator team must verify that the project participant has all locations identified.

- The project participant must report project location coordinates using the Geographic Coordinate System completely consistent with the project location.

- The project participant must report project start date, assess supporting evidence to confirm that the project develop initiates the project in accordance with the GHG reduction methodology.


- The project participant must report the credit period of the project in accordance with the type of project. Validator team must check to confirm that the project participant specifying the credit start date with TGO requirements.

- The project participant must correctly report raw materials, sources, amount of electricity and fuel used, the number of days for the GHG reduction implementation of the project.

- For the projects related to GHG reduction, absorption and sink from the forestry sector, planting plan, plant species and duration of the project must be reported correctly together with the forest area changes in the past. The project management is in line with the GHG reduction method set forth.

- For agricultural project, the project participant must provide historical project information such as historical fertilizer/soil improvement information, academic reference, plantation management plan.

- The project participant must report on technology and main equipment, details of installed capacity and number installed in the project in its entirety and in accordance with the supporting evidence.

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- The project participant must clarify registration information with other GHG standards to confirm the non-recurrence during the request for accreditation with other standards.
- The project participant must check the implementation of the relevant laws.
- Others as specified by TGO

3) Demonstration of Additionality


The validator team determines the additionality of T-VER project according to the criteria for the validation and verification of additionality demonstration of the standard T-VER project and the premium T-VER project.

4) Checking of the GHG reduction in consistency according to the T-VER methodology

The validator team conducts a review to confirm that the T-VER methodology the project participant chooses to use in calculating GHG reduction is the latest version as specified by the TGO or an effective version on the date of project registration submission. The selection of a GHG reduction methodology must conform to the model of the development T-VER standard project and premium T-VER project. Their operations must be consistent with project types, project nature, characteristics of the activities involved, conditions of project activities, and specify the name, code, and version of the GHG reduction methodology used in the project proposal document completely, including specifying the name, code and version of the calculation tool used completely (if any). In case the project participant uses more than one GHG reduction methodology, the validator and verifier team must verify to confirm its compliance with all methodologies. The validator team must review the project participant's statement and the documentation to support such statement.

4.1) Scope of the project

The validator team must verify that the project participant correctly and consistently represents the relevant activities and covers the extraction, emission, and reservoir associated with the T-VER project in the project design document in fact and in

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accordance with the T-VER methodology that the project participant chooses to use. The project participant must show pictures that represent the scope of the project in a correct, complete, and appropriate manner.


4.2) Sources of GHG gases and relevant GHG gases within the project scope

The validator team conducts a validation of the consistency and validity of the relevant GHG emission sources in the project scope, both from the base case, project implementation, and outside the project scope whether they are appropriate, accurate and reliable. The validator team must examine the nature of the project operations prior to the T-VER project implementation as required by the TGO's T-VER methodology, and relevant details that affect the GHG calculation according to TGO. The information that the project participant clarifies and states in the project design document is correct and in accordance with the T-VER methodology that the project participant chooses to use. In case, more than one GHG reduction methodologies is used, all methodologies must be verified to confirm compliance. In the event that the project participant indicates that the source of greenhouse gases and greenhouse gases are not involved in the project operations, the validator team must verify that the GHG source and GHG emissions are not relevant to the actual project implementation.

5) Assessment approach for project performance monitoring and data management

The validator team conduct a detailed review, an assessment of the project performance monitoring plan, an assessment of the information management approach relevant to project development, a feasibility of measurement, and monitoring in the requesting certification process at least as follows:

- The project participant should define the authority to be responsible for the information related to the activity including providing personnel with knowledge and understanding of the procedures, methods and frequencies used to collect data according to the T-VER methodology.

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- The project participant must specify the monitoring parameters, monitoring method, its frequency, and data collection that is consistent with the selected activities and methodology for greenhouse gas emissions reduction, including complete and accurate calculation tools.
- The project participant must identify information risk management guidelines. For example, a guide to the calibration of a measurement instrument used for data monitoring.
- The project participant should set guidelines for data quality control, define data flow, backup guidelines related to project implementation.
- The project participant should clearly define a data flow chart showing the measurement points of the parameters that must be monitored. The measurement points may be shown in the project diagram.

6) Accuracy assessment of the GHG emissions projection and calculation

The validator team performed a validation of the GHG reduction calculation from the base case. project implementation and outside the project scope and consistent with the evidence obtained. However, the data used in the calculation for the validation process can refer to the design of the actual system to be installed or the maximum installed capacity of the machine, research data, academic articles or information specified in the TVER methodology or can use historical data to forecast the amount of greenhouse gas reduction. (If the project has already been implemented) In case more than one TVER methodology is used, the validator and verifier team must check each methodology separately.

The validator team must verify the choice of emission factor and constant in the calculation. Validation teams must verify that coefficients and constants are used in their calculations. correct and appropriate Corresponds to the reference source and is accepted according to the GHG reduction method chosen or as specified by the TGO.

The validator team must verify the choice of emission factor and constant used in the calculation. The team must verify that coefficients and constants are correctly and

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appropriately used in their calculations, corresponding to the reference source, and is accepted according to the T-VER methodology chosen or as specified by the TGO.

The validator team must assess the accuracy and appropriateness of the GHG forecast according to the conditions specified by the T-VER methodology, verifying the accuracy of the calculations, parameters and details specified by TGO.

The validator team must assess the uncertainty and the error of the GHG assessment data in order for the information to be accurate and correct at the level of materiality as specified by the TGO.


The calculation and estimation, or the use of mathematical models (Model), in case of T-VER methodology, allows the project participant to choose a methodology, calculation or reference to estimate or a mathematical model to calculate for relevant activity data. The validator team must verify the rationale and appropriateness of the methodology, assess uncertainty and discrepancy of data sources, credibility, reference sources to the reported calculation details and the estimation or the use of mathematical models in project design documents in full.

7) Appropriateness assessment of the public hearing

In case of a premium T-VER project, the TGO requires project participants to hold a meeting to hear opinions from stakeholders before the project start date. The validator team is responsible for verifying the suitability of the meeting guidelines and processes related to organizing meetings, including the results of the public hearing and guidelines for improving the project or the explanation of the project participant upon receiving comments from stakeholders.

8) Conformity assessment guidelines for T-VER PoA

The validator team must verify that the project participant has used the project design document form for the T-VER Programme of Activities (T-VER-PoA-DD) and the latest version of the project design documents of the component of project activities (T-VER-CPA-DD) as

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specified by the TGO and reports on all topics, examine the specific characteristics of the activities related to the development of the T-VER Project type of programme of activities (T-VER PoA) as follows:

8.1) Clarity of T-VER programme of activities framework (T-VER PoA)

Clarity in the identification of the T-VER programme of activities (T-VER PoA) and the use of the T-VER Methodology must be consistent with project activities. It is possible to add component project activities within the framework of the project. The validator team must verify that the project is feasible to develop into a T-VER project and that the CPA credit start date is consistent with the same criteria as that of a single project.


8.2) Ownership of the project owner and the T-VER project participant

The validator team must verify the relationship between the project participant and the project owner. In case the project owner and project participant are not the same person or juristic person, or the project owner and project participant have more than one person, the validator team must verify the legal status of the project development, verify the ownership of carbon credits, including ways to share carbon credits, contracts, or agreements between the owners of carbon credits, as well as single and bundling projects.

8.3) Details of component project activities

The validator team must verify the details of Component Project Activities (CPA 1) specified in the project design document, using the same criteria as for the validation of a T-VER project in the category of a single project or a bundling project in order to examine the feasibility of a T-VER project development.

However, the TGO requires that the sub-projects under the work plan framework must be very small projects (Micro scale) only. When including all sub-projects under the work plan project (T-VER PoA), the amount of greenhouse gases expected to be Reduce/store up to 60,000 tons of carbon dioxide equivalent per year There are actions that are consistent with those specified in the framework. Project participants can add sub-project groups 2, 3, 4,...n by preparing project proposal documents as specified by the TAO and submitting them to the

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TAO for registration of additional sub-project groups. Without having to pass validation (Validation) from an external assessment unit. Project participants can continuously add sub-project groups within the life of the work plan framework specified by the TGO, and each sub-project group has a different credit period.

5.3.2.2 Strategic analysis


The validator team gains insights into the activity and complexity of the T-VER project, assesses key issues such as emission sources that are significant for quantifying GHG reductions, provides evidence references to each greenhouse gas emission source, project development requirements and carbon credit certification, data collection and data quality control, for example. The team must review data to find any errors, omissions or distortions that could materially affect the numerical materiality of GHGs (Material misstatement). The team can perform a strategic analysis step in conjunction with a desk review step.

When a validator team is assigned by the VVB, the validator team will be responsible for planning activities, using the level of assurance required by the TGO to design the depth of information required for validation, project design document, and summarize the results of validation in the form of a validation report and a statement for the project participant to use as a supporting document for T-VER project registration.

More details about the steps of strategic analysis can be found in ISO 14064-3: 2019 (7.1.1).

5.3.2.3 Risk Assessment

Risk assessment is the process of identifying the level of severity, importance of risk factors and affect the assessment of greenhouse gas emissions considering the nature of the data source of information, data transmission and quality control for use in designing a sampling method to close the possibility of risks and reduce the impact from various events.

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Classification of risks

Risk in the validation and verification is the risk that a validation or verification result will be inaccurate. Any omission or misrepresentation that would affect the materiality of the T-VER project's GHG data presentation. The risk assessment process must be undertaken both in the validation phase and in the future. The classification of risks can be classified into 3 types as follows:

Inherent risk

The inherent risk of information is the sensitivity of parameters affecting GHG emission reduction assessments., data size, data flow, complexity of information management systems, data collection and measurement such as incomplete or incomprehensive data collection, errors, copying data, conflict of methodologies used to collect data.


Control risk

Control risk is a risk arising from the lack of data quality control to prevent data collection errors in the project and to mitigate the inherent risks of the data. These risks can happen from the lack of internal auditing, the lack of calibration of measuring instruments, the lack of person directly responsible for collecting data, the lack of clear data collection practices.

Detection risk

Detection risk is the risk that the validator and verifier team cannot find errors or misstatements. This may arise from the effects of inherent risks and risks arising from controls such as access to documented information, including the expertise in T-VER technology of the validation and verification team, affecting the degree of acceptance of validation and verification results.

The team must assess the overall risk to plan and design the required validation or verification activities in order to obtain an appropriate level of confidence to reduce the risk of validation or verification, using the knowledge and understanding gained from strategic analysis, taking into account emissions, absorbers and reservoirs related to the T-VER project, project scope, management, data transfer, and quality control of information related to the T-VER project.

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In the case of a T-VER project, the TGO standard requires that projects that have been implemented in the past not more than 3 years from the date the project design document has been verified by the validity inspector. Implemented projects may use historical data to forecast GHG reductions. Therefore, validators should consider the origin, risks and appropriateness of information used in forecasts. The guidelines and procedures for risk assessment are described in the next chapter.

5.3.2.4 Evidence-gathering activities or Sampling Plan for validation process

Evidence-gathering activities is an activity where the results obtained from risk assessment are used to determine the appropriate sampling methods and amount of sampling is used and representative of the data. How many sampling sizes should be used? and how the selection should be performed and tested? Larger sample sizes provide more assurance that there are no misstatements. The determination of sampling plans should be based on guidelines or theories, in conjunction with professional judgment of the validator and verifier team. For example, a widely used statistical theories for sampling appears in Annex A. The validator team determines sampling data for sampling exercise and determine the validation plan to communicate to project participants.

An example of using risk assessment results to determine the number of samples to be randomized is, for example, in the case where the project participant collects data on the amount of electricity generated from solar cells with a quality meter and calibrated with the correct method and at appropriate frequency. The accuracy of the data is collected and assessed by the plant's electrical engineer. There is a small risk of error in the case where the project participant has to store the amount of electricity generated from solar cells by means of daily recording from the meter by the daily hired employee, and without verifying the loud data and without calibrating the meter is very risky. When the validator team find that data less risky, the validator and verifier team can assign a smaller sample volume. If the data is

found very risky, the validator and verifier team should consider increasing the sampling volume to ensure the information is correct.

Examples of Information Risk Assessment Guidelines

Parameters required monitoring	Risk assessment results			Sampling size
	Inherent Risk	Control Risk	Detection Risk	
<i>Electricity generated (EG_{P,j,y})</i>	<i>Low</i>	<i>Low</i>	<i>High</i>	<i>4 months</i>

5.3.2.5 Preparation of a validation plan


After the validator team reviews the information from the project design document, determines the strategy and techniques used in the validation process. The validation team prepares a validation plan by providing complete information as follows:

- The scope and purpose of the validation and verification process.
- Criteria used for the validation and verification process.
- List of teams and responsibilities of the validation/verification team.
- Details of project participants and related parties
- Activities that require verification
- Level of Assurance Materiality (Materiality)
- Schedule for visiting the area (if any)

For validation, the TGO does not require a site visit to the project, except the projects in the category of GHG reduction, absorption and storage from the forestry and agriculture sectors are required to inspect the project area. However, if the validator and verifier team find that the documented information is insufficient for validation to support the facts of the project and affect the materiality. The validator team can make an agreement with the project participant to make a site visit for validation and verification as appropriate.

5.3.3 Planning and preparation stages for verification

The verification planning and the desk review specified by the project participant in the GHG Assessment Report shall assess the project compliance and the T-VER methodology

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the project participant chooses to use, including various criteria set by the TGO, according to project design document that have been registered.

The verifier team gathers project details, relevant greenhouse gas emission reduction activities, project locations, relevant scope, such as project type, project development scope related technology activities, related greenhouse gases, physical appearance, assessment of greenhouse gas emissions from the T-VER methodology that the project participant chooses to use to prepare various reports related to project development.

T-VER defines strategies (Strategic Analysis), techniques and methods used for verification, and risk assessment of the data to determine the amount of sampling.

5.3.3.1 Review of GHG monitoring report

The verifier team must verify to confirm that the project participant has chosen to use the latest GHG assessment report as required by the TGO or is still in effect, and reported on all topics, including verifying the specific characteristics of activities related to the registered T-VER project. The preliminary information that the verifier team must conduct a review, such as

1) Project implementation status

The verifier team must verify the information if the project participant reports the actual project implementation status and up-to-date activity detail in accordance with the project design document such as registration date, start date, date of change of project implementation details, complete changes to various equipment, and reliable supporting documents.

The verifier team must verify the information in the GHG assessment report against the information in the project design document used for registration with the TGO, the project development or information in the previous GHG assessment report, and verification report (if any). To examine whether the risks or are likely to affect the materiality of the GHG reduction results, the verification team must consider these issues in order to additionally prepare a verification plan in the verification process.

2) Change in detail after project registration

After the project has been registered, if there is a change in the details of the activities that differ from those specified in the project design document, the project participant must notify the TGO before submitting an application for GHG emissions certification to the TGO and the classification of changes that occur after the project has been registered.

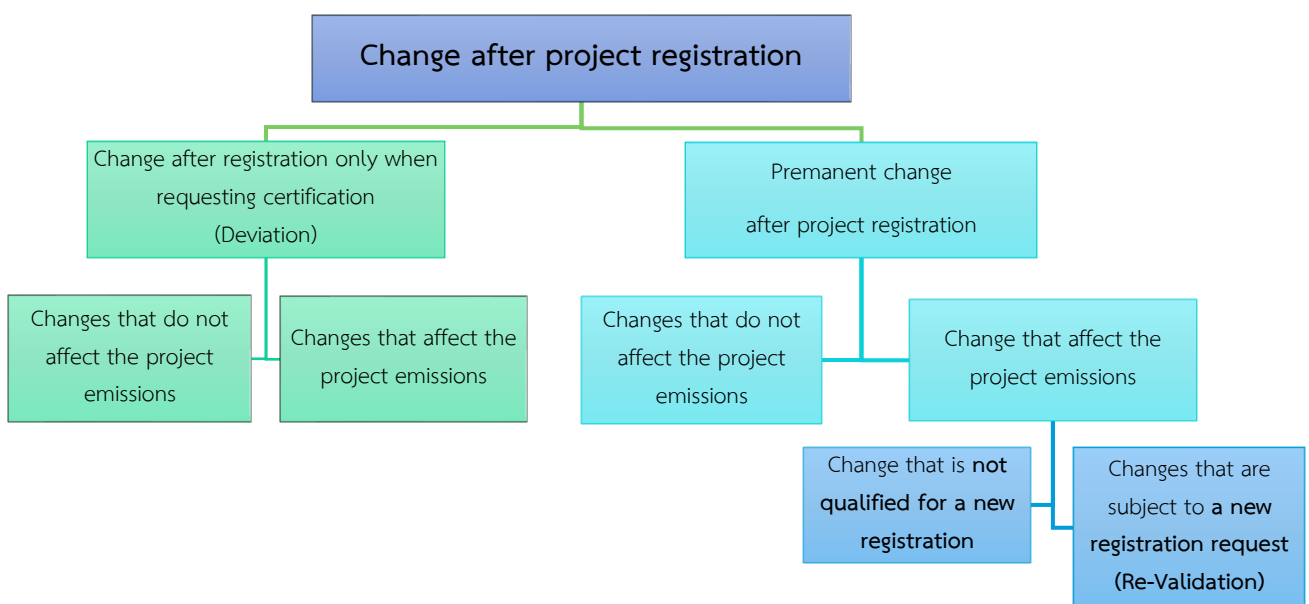



Figure 5.1 Classification of changes after T-VER project registration

2.1) Deviation

Whether changes in the project activity details that differ from those specified in the project design document submitted for certification may create changes affecting the amount of GHG reduction or not, the project participant must inform such changes to the TGO for consideration and opinions before the completion of the review process. The result of such changes must be reported in the corresponding monitoring report. Such changes include:

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- Changes in the methodology of parameters monitored for certification. The project participant may not apply the methodology outlined in the project design document.
- Changes in the parameters not required monitoring
- Changes in the equation used in the calculation
- Changes in the constants used in the calculation

2.2) Change after permanent registration

Changes in the activity details that differ from those specified in the project design documents can be divided into 2 cases:

(1) Changes that do not affect the project emissions such as

- Change of the project participant
- Change of the project owner
- Change of the coordinator
- Change of the credit period


(2) Changes that affect the project emission can be divided into 2 cases:

Case 1 Changes affecting the amount of GHG reductions and leading to re-validation

Permanent changes affect the amount of GHG reduction after the change of more than 60,000 tCO₂eq incurred or an increase of more than 15%, for example

- Request to change the version of the T-VER methodology or adding methods to reduce greenhouse gas emissions in the calculation because project activities other than those specified in the project design document are added to the project.
- Other types of project activities have been added in addition to those specified in the project design document.
- Project has installed some additional equipment
- The project has changed the monitoring method for tracking the parameters

Case 2 Changes that affect the amount of GHG reduction, but not leading to re-validation, such as

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- Request to change the equipment used in the project other than the original size specified in the project design document.
- The measurement equipment in the project has been changed.
- Changes in the calculation method or the monitoring method for tracking parameters required follow-up.

The verifier team must verify that the project participant has clarified any changes that occur after registration. The TGO must be aware of such issues before the validation and verification process for that particular round is completed. The team must verify that the project participant has reported such changes in the corresponding GHG monitoring report. Methods for notifying changes made by the project participant to the TGO may be notified by letter, e-mail or other channels as specified by the TGO at the T-VER project website.

3) Project monitoring

The verifier team must verify the details, the method of monitoring GHG emission reduction from project implementation (Monitoring) to confirm that the project participant is following up GHG emission reduction, whether the information is correct and consistent with the information in the project design document that has been registered with the TGO or not, including specifying details of project implementation results in accurate and complete GHG monitoring report, as well as providing evidences to support relevant and credible actions.

This information includes the structure of agencies involved in monitoring results and responsible persons' flowchart showing the process of data collection, related records, reports, guidelines for data quality control and calculation, while identifying measurement points or sample conversion Information or parameters for monitoring in the report of the complete assessment of the amount of greenhouse gas emissions. The information must be accurate and consistent with the information in the project design document and the actual implementation. Related parameters must also be reported, both parameters required and not required monitoring in accordance with the chosen GHG reduction methodology, and the relevant calculation tools. Activity data must be strictly stored strictly according to the assessment plan specified in the project design document. Supporting evidence must be provided in appropriate and sufficient manner.

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In case the project participant uses measurement equipment, verification team must be carried out to confirm that the equipment used for measuring and collecting data has been calibrated correctly and has been calibrated at an appropriate frequency. The equipment is in perfect condition and ready to use. And in accordance with the follow-up plan specified in the project proposal documents or as specified by the GHG reduction methodology. or the organization performing the calibration is unreliable or do not calibrate for a specified period of time. The verifier team must consider ways to adjust the parameters to be monitored to confirm that the GHG reduction results from the T-VER project are in line with conservation principles over the range of uncalibrated data, and the data is still at the level of significance as specified by the TGO. The approach for adjusting parameter values during the period where the measuring equipment lacks calibration may involve a method of adjusting values by multiplying the percentage of measurement error or other methods that comply with the academic principles and professional judgement of the verifier team.

4) GHG reduction calculation

For the GHG reduction calculation, the verifier team must review and confirm that the project participant has correctly and completely identified the relevant activity information, the choice of emission factor and constant value in the calculation to confirm that the coefficients and constants used in the calculations are correct and appropriate, consistent with the monitoring guidelines outlined in the project design document. The calculation must be in accordance with the selected T-VER methodology or as specified by the TGO.

The verifier team must review the accuracy of the GHG reduction calculation from the base case, project implementation, and that outside the project scope by considering credibility, accuracy, completeness, conservativeness, and consistency with the evidence obtained and summarized the calculation of GHG reduction for each calendar year.

In case the project participant uses more than one mitigation methodology, the verifier team must verify that the project participant specifies the calculation of GHG reduction separately for each calendar year and for each methodology used.

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5) Comparison of certified and projected GHG reduction amount

The verifier team must assess that the project participant has compared the GHG reductions during the monitoring period with the GHG reductions projected in the project design documents, and provide explanations and supporting reasons, including the various observations of the differences occurred that are reasonable and consistent with the calculation results and actual operations in a relevant and reliable supporting evidence.


6) Reserve credit management and monitoring of credit risk assessment

TGO requires the project participants developing premium T-VER projects in the category of GHG reduction from the forestry and agriculture sectors, prepare and submit a monitoring report on the risk of carbon loss from project non-permanence. (Non-permanence Risk Report) within five years from the project start, and monitoring reports on the amount of greenhouse gases, the risk of carbon loss from the non-permanence of the project (Non-permanence Risk Report). The next issue of the report must be prepared and submitted to the TGO every 5 years throughout the project life for use in consideration of withdrawal of reserve credit or cancellation of reserve credit or withholding reserve credit.

The verifier team verifies the consistency of the said report according to the Notification of the Thailand Greenhouse Gas Management Organization on reserve credit management, monitoring and assessing the risk of carbon loss from forestry and agriculture projects of Thailand's Voluntary Greenhouse Gas Reduction Program (T-VER), Premium T-VER.

5.3.3.2 Strategic Analysis

The verifier team understands the activity and complexity of the T-VER project, evaluating key issues such as GHG emission sources that are significant for the GHG reduction quantification, evidence referring to each source of greenhouse gas emissions, data collection and data quality control, for example. The team must review and find data and errors, omissions or distortions that could materially affect the numerical materiality of GHGs (Material misstatement). The team can perform a strategic analysis step in conjunction with a desk review step.

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The verifier team must verify the details of activities specified by the project participant in the Monitoring Report (MR) to assess compliance with the project design documents registered by the TGO, including T-VER that the project participant chooses to use, and various criteria set by the TGO. The team also verifies the suitability and accuracy of the numerical data used for calculating the amount of greenhouse gas reduction, including various changes that occur after the T-VER project has been registered, determine the strategy (Strategic Analysis), techniques used for verification and summarize the verification results in the form of a verification report, and statements for project participants to use as supporting documents for GHG emission certification (carbon credit).

More details about the fundamentals of strategic analysis can be found in ISO 14064-3: 2019 (6.1.1.1).


5.3.3.3 Risk Assessment

The risk in the verification process is the risk of making mistakes from any omissions or misrepresentations that would affect the T-VER project's GHG data representation. The verifier team must perform risk assessments in order to plan and design the required verification activities in order to obtain an appropriate level of confidence, to reduce the risk of verification. This can be done by using the knowledge and understanding gained from strategic analysis, taking into account emissions, absorbers and reservoirs related to the T-VER project, project scope, management, data transfer, and data quality control related to the T-VER project. The risk assessment guidelines and procedures are described in the next chapter.

More details on risk assessment procedures for verification (Risk Assessment) can be found in ISO 14064-3: 2019 (6.1.2).

5.3.3.4 Evidence-gathering activities or Sampling Plan for verification process

Evidence-gathering activities or Sampling Plan for verification activities is performed in the same way as validation. That is, the verification team must take the results from the risk assessment into consideration when formulating a sampling plan and the appropriate sampling

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methods and amount of sampling are reasonable and representative of the data. How many sampling sizes should be used? and how the selection should be performed and tested? Larger sample sizes provide more assurance that there are no misstatements. The sampling plan should be based on different approaches or theories, along with discretionary decisions by the verifier team (Professional Judgment) for examples of statistical theory widely used for random sampling as appear in Annex A.


When the team of verifiers, the amount of representative data that they want to randomize. The verifier team determines the verification plan to communicate to the project participant.

5.3.3.5 Verification Plan

The verification team uses the results obtained from the sampling plan to determine the activities that require data accuracy and GHG assessment results. The verification plan summary will be communicated to the project participant and relevant parties about the schedule prior to the operations or field visits or remote inspections, as the case may be. The verification plan should contain at least the following topics and details:

- Scope and objectives of verification
- Criteria used for the verification process.
- List of teams and responsibilities of the verifier team
- Details of project participants and related parties
- activities that require verification
- Level of assurance Materiality (Materiality)
- Schedule for area visit (if any)

For the verification process, the TGO requires the verification team to visit all types of project areas. This may be done through field visits or remote verification, depending on the case, as appropriate and mutually agreed between the team and the project participant. The team must take into account the risk assessment of the information. For projects in the

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category of GHG reduction, absorption, and storage from the forestry and agriculture sectors, the TGO recommends that the team must visit the area to inspect the project implementation area. This includes area and suitability of the sample plots, physical characteristics of vegetation, information on plant species, and others as specified by the T-VER methodology.

Recommendations for project activities where the team should go on site to verify the project participant's performance e.g., as the first verification activity of the project. The verification team conducted the verification of the project for the first time. There is a change related to the scope of the project implementation or there is a significant change that may affect its materiality.

5.3.4 Execution of the validation and verification process

5.3.4.1 Validation and verification activities in the field


1) Meeting

Before starting the validation and verification process in the area, the team leader conducts a meeting to clarify details and criteria to confirm the preliminary agreement between the validation and verification team and the project participant, introduce the team and related responsibilities, clarify guidelines for concluding comments and findings after completing the validation and verification process, including clarifying the right of the project participant to process appeals and complaints arising after the review process.

2) Validation and verification process


The team implements the plan communicated to the project participant to validate and verify the issues identified by the project participant in the project design document and the GHG Assessment Report. The process for data collection and review can be used as follows:

- Review of relevant documentation to confirm the alignment of the project design documents and the GHG Assessment Report with the source of the data, legality, and the requirements of the TGO.

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- Evidence-gathering activities, in general, consists of three types of evidence: physical evidence such as measuring instruments and measuring devices; documentary evidence such as paper or electronic records, and testimonial evidence such as interviews with relevant people or project staff on the implementation of the project according to the monitoring plan specified in the project design document.
- Monitoring operations and activities related to greenhouse gas reduction, and physical evidence related to the implementation of the project.
- Guidelines for information management of the project, data quality control system, guidelines for preventing and correcting any errors, omissions and misrepresentations that may affect the presentation of greenhouse gas reduction and related information.
- Review of the location, machinery or equipment installed in the project area and the information specified by the project participant in the project design document, and the GHG Assessment Report (able to visit the area for inspection / remote inspection / document inspection, depending on the case).
- Review the project participant's scope of project as specified in the project design document, including measurement points as specified in the project scope (able to visit in the area for inspection / document inspection, depending on the case).
- Examine the guidelines and methodology used to monitor the results of the T-VER project, methodology used for data acquisition, and data transfer.

The validator or verifier team should pay attention to record keeping, evidence found, data sampling results according to the validation and verification plan. This includes situations that arise during validation and verification in order to record the reasons for the decision at the time of validation or verification.

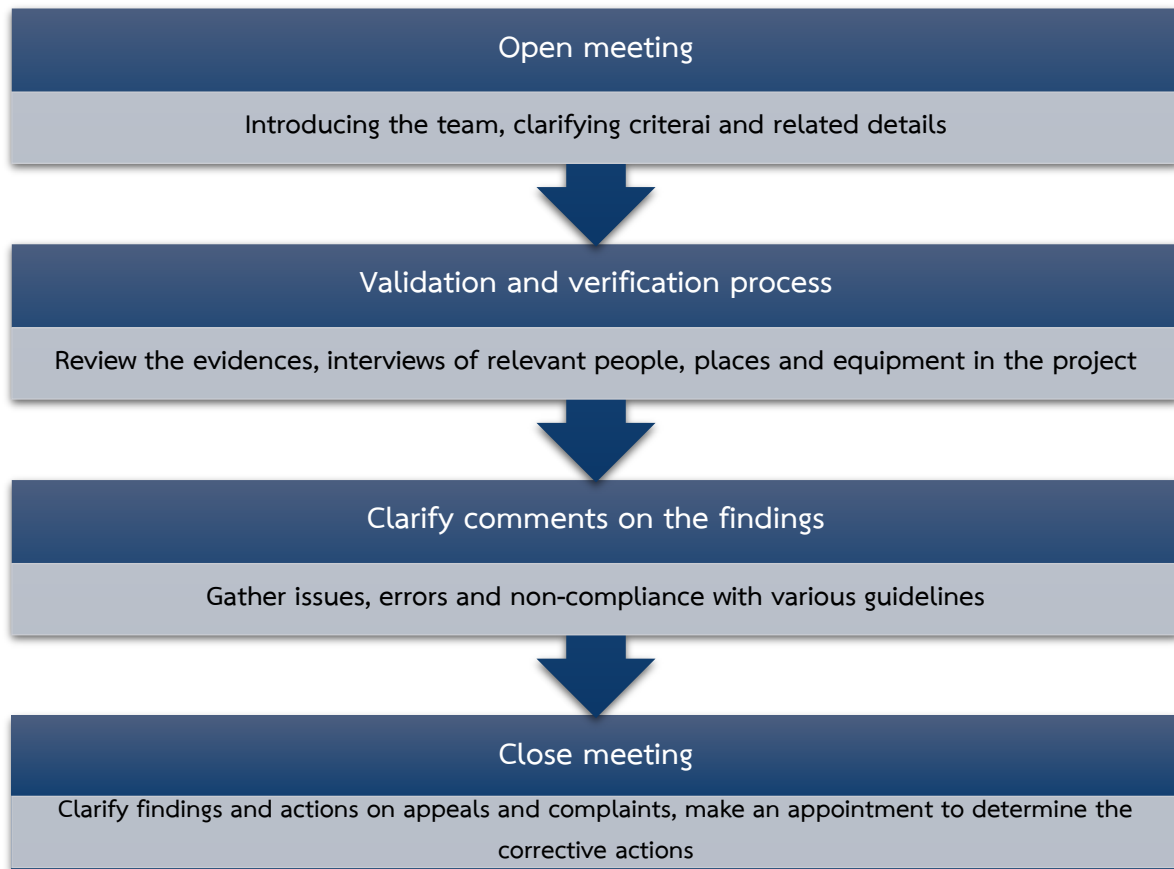
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3) Response to comments and findings

During the validation and verification process of the project, or when the validation and verification process has been completed, the team meets to discuss issues, errors or not comply with the various criteria set by the TGO that have been found in order to summarize the issues to clarify to the project participant after the completion of the process.

4) Meeting adjournment

The team leader informs the project participant of the conclusions, comments, and findings after completing the validation and verification process, including clarifying the right of the project participant to process appeals and complaints arising after the review process. Before clarifying the issues of errors or inconsistencies with the various criteria that have been found, the project participant will be given an opportunity to clarify or discuss issues together, if the project participant has no objections. After the team leader summarizing the validation and verification actions that have been completed, the team leader should set a timeline for corrective actions or clarifications of additional information according to the issues. Differences that the team has detected, and appropriate communication channels should be identified among the validation/verification team as well as the project participants for making an appointment as the next step.




5.3.5 Classification of the validation and verification results

Material Misstatement

The validator and verifier team issues material misstatement when it is found that information related to GHG figures in project design documents, and GHG emission monitoring reports are misrepresented and affect the materiality reported in regard to the amount of greenhouse gas reduction but exceeding 5 percent as specified by the TGO and affecting the decision of the intended users.

Misstatement

The verification and verification team issues a misstatement when it is found that information related to GHG figures in project design documents and GHG emission monitoring

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reports are inaccurate and affects the materiality reported in regard to the amount of greenhouse gas reduction but exceeding 5 percent as specified by the TGO.

Non-conformity

The validator and verifier team issues nonconformity, when it is found that the information reported in the project design documents and the monitoring reports on greenhouse gas emissions with actions or evidence of incompliance found against the criteria and requirements of the T-VER project including T-VER methodology that the project participant chooses to use.

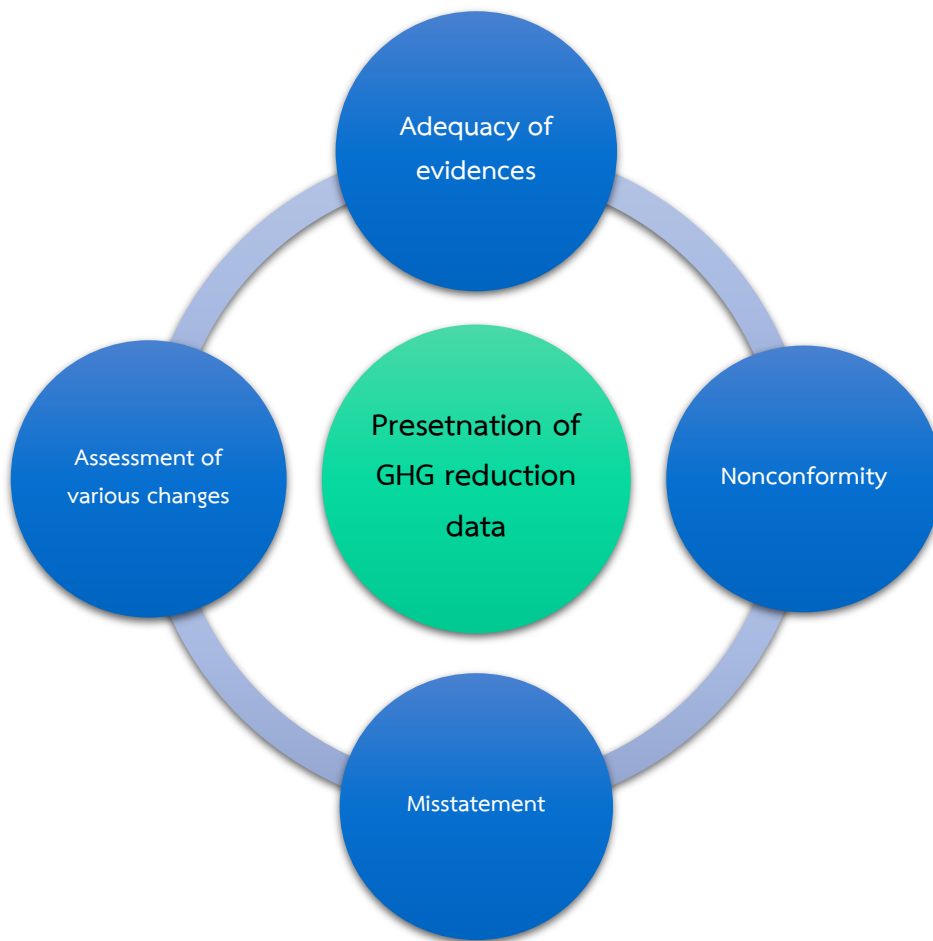
5.3.6 Conclusion of the validation and verification results

For validation cases, the validation team must conclude validation results from adequate and appropriate assessment of the evidence and ensure that it is consistent with the project development guidelines. The project participant must correct material misstatements and nonconformity. In the event that the project participant does not correct the material misstatement and nonconformity, the validator team cannot certify the possibility of development. It is a T-VER project.

For verification cases, the verifier team must conclude verification results from adequate and appropriate assessment of the evidence and ensure that it is consistent with the project design document that registered by TGO. The project participant must correct material misstatements and nonconformity. In the event that the project participant does not correct the material misstatement and nonconformity, the verifier team cannot certify carbon credit.


The validator and verifier team must examine the results of correcting material misstatements and nonconformities, clarify the details of the closure of various issues along with supporting reasons, including suggestions or additional comments (if any) to confirm that the project participant has prepared a project design document and a monitoring report on

greenhouse gas emissions. This is consistent with the conditions of the T-VER project implementation, including the results of the project participant's GHG reduction assessment in the monitoring cycle at the materiality level specified by the TGO and at the level of reasonable certification.



5.3.7 Validation and verification reports

When the project participant completes the revision of the project design document and the GHG Assessment Report, the validator team prepares (draft) a validation report for summarizing the validation results according to the form TGO sets and the ISO 14064-3: 2019 (7.3.3) requirements. This is to confirm that the project participant prepares project design

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documents appropriately and the information is consistent with the conditions of the T-VER project and the GHG emission results according to the T-VER methodology selected and at the level of materiality specified by the TGO, at the level of reasonable certification.

When the project participant completes the revision of the monitoring report, the verifier team prepares (draft) a verification report for summarizing the verification results according to the form TGO sets and the ISO 14064-3: 2019 (6.3.3) requirements. This is to confirm that the project participant prepares monitoring report appropriately and the information is consistent with the conditions of the T-VER project and the GHG emission results according to the T-VER methodology selected and at the level of materiality specified by the TGO, at the level of reasonable certification.

The validator and verifier team shall prepare a validation report and verification report respectively, including (draft) a summary of opinions and statements from the validation and verification process according to the form specified by the TGO and the latest version of the form used or still effective according to the announcement of TGO, including confirming the date and version of the report. The team must report on all topics in comprehensive and complete manner and send the (draft) validation report and (draft) verification report to the reviewer.

5.4 Review of the validation and verification process

The validator and verifier team must determine quality control procedures for the validation and verification process of the validator and verifier team in order to ensure that the validation and verification results of the T-VER project are accurate and reliable. Reviewers of the validation and verification process must be independent in the validation and verification process, have the ability and performance equivalent to a validator team leader or a verifier team leader, as the case may be. The reviewers must act in an ethical and professional manner, presenting the results of a factual review.

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The reviewers are responsible for reviewing activities related to validation and verification activities for all activities specified in the agreement (Engagement), reviewing the sufficiency and appropriateness of relevant documents and evidence to confirm that the documented evidences found are sufficient to support a validation and verification decision, including reviewing the details of errors and inconsistencies that the validator and verifier team detected during the validation or verification process. This includes the role of reviewers in giving opinions on validation and verification results, solving various issues of the project participant, and closing the issue of the team. The reviewer must notify the team of any concerns or information to be further substantiated about the validation and verification process, if any, and document the results of the review in writing.


5.5 Decision and issue of the validation and verification statement

5.5.1 Judgement form and summary of the validation and verification results

The validator and verifier team review data and results of validation or verification issues detected during the operations on the basis of the evidence and facts found, summarize opinions and make decisions related to validation or verification. The validation or verification results can be classified into 3 types as follows:

1) Certify

The validator and verification team summarizes qualified comments, when it is found that the project participant correct the material misstatement and Nonconformity informed from the results of validation of the information in the project design documents and the monitoring report of the greenhouse gas emissions. The data is consistent with various criteria and requirements, including the GHG assessment results are accurate and complete. There is sufficient and reasonable evidence to support it.

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2) Certify with comment

The validator and verification team summed up the comments to confirm with additional observations. When it is found that the project participant can correct the material misstatement and nonconformity, but the project participant cannot correct the misstatement in which the GHG assessment results are inaccurate and affect materiality, but not more than 5 percent as determined by the TGO, where the validator and verifier team summarizes the reasons for the observation or the causes of such effects to be used as supporting information for the next verification.

3) Not Certify

The validator and verifier team can conclude unconfirmed opinions, when it is found that the project participant failed to correct or close material misstatements and nonconformities from the results of validation of the information in the project design documents or the verification results in the GHG monitoring report. As a result, the GHG assessment results are inaccurate and complete; or the evidence found may not be sufficient to provide certification. The project participant cannot by the validator and verifier team summarize the reasons for the non-conformance and the reasons for the non-certification.

5.5.2 Statement

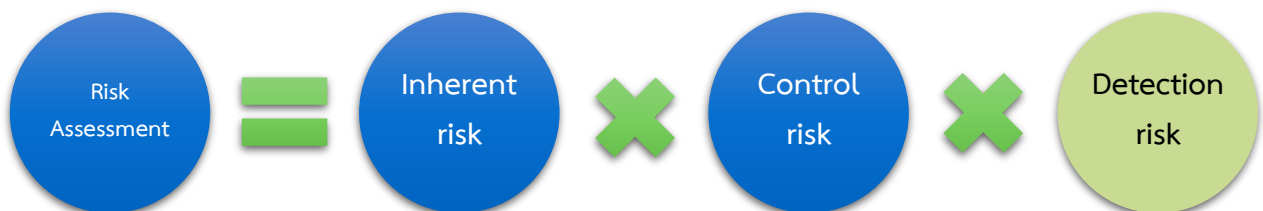
Decisions for validation and verification by the VVB for the T-VER projects must be made on an evidence-based basis. The agency shall ensure that its validation and verification results are supported by sufficient and appropriate evidence.

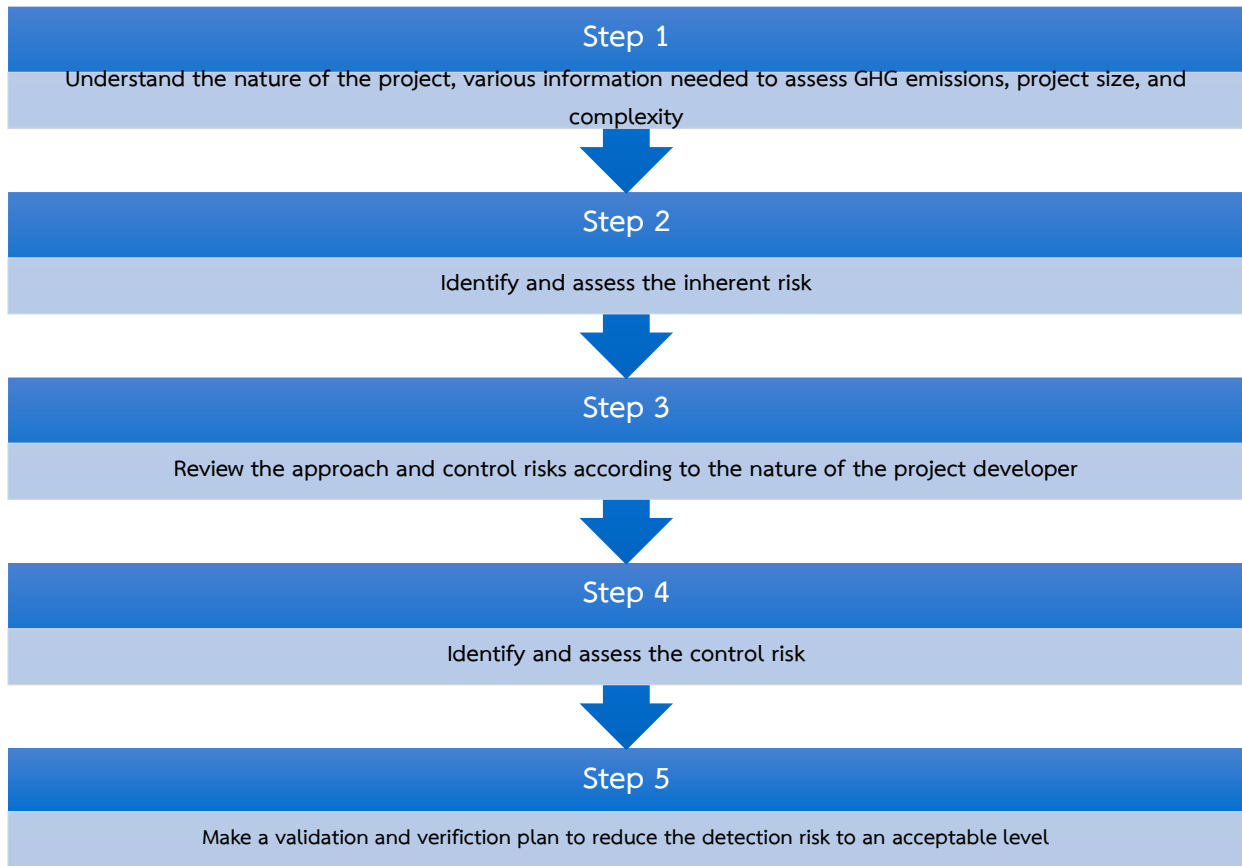
The person who judges the validation and verification process and signs the validation and verification report. The person must be the authorized signatory of the VVB or the person assigned to issue a statement of validation and verification results.

6. Examples of Risk Assessment Guidelines and Procedures

The validation or verification risk is the risk of making mistakes, any omissions or misrepresentations that will affect the presentation of T-VER project's GHG data. The risk assessment team will need to plan and design the necessary validation and verification activities to obtain an appropriate level of confidence to reduce the risk of validation and verification, using the knowledge and understanding gained from strategic assessments, taking into account emissions, absorbers and reservoirs related to the T-VER project, project scope, management, data transfer, and quality control of information related to the T-VER project.

The risk assessment of validation or verification shall be performed on an overall risk assessment. According to the type of risk in each type, both inherent risk, control risk, and detection risk, the relationship between each type of risk and its components. The risks are shown as follows:






The verification team and the verification team can use the sequence of risk assessment steps as follows:

Step 1

The validator and verifier team reviews the data to understand the project activities, T-VER complexity and data source.

Step 2

The validator and verifier team identifies the inherent risks of the data. The inherent risk refers to the sensitivity of the parameters in the misstatement of GHG estimates. The inherent risk is size related to the nature of information including methods used to follow up on the results of project participants. The validator and verifier team may consider the parameters set out in the GHG Mitigation Protocol. The validator and verifier team must assess the inherent risks and rank them.

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Step 3

If there is an inherent risk affecting the GHG indication, the validator and verifier team shall determine the appropriateness and adequacy of the quality control activities for the particular risk issues undertaken by the project participant and identified in the project design document and the monitoring report and reduce the impact of such risks. A quality control activity is any activity or measure undertaken by the project participant to prevent correct mistakes during the project implementation to reduce inherent risks in a timely manner such as using knowledgeable staff to collect relevant data. The project participant uses quality measuring equipment and conducts regular calibration of the measuring equipment in an appropriate way.

Step 4

The validator and verifier team assesses the size and level of risk of each control based on its ability to prevent data loss or errors whether the project participant does not have procedures related to the verification. The quality control over information may require that the risks arising from controls remain high, for example.

Step 5


The validator and verifier team ranks the inherent risk and the control risk to reflect detection risk at high control. The validator and verifier team must use more detailed and rigorous audit activities and increase the sample size to reduce the undetectable risk to a very low level. However, if both inherent risk and control risk are low, the validation and verification activities may be less comprehensive and complex. This means that teams can take higher unchecked risks. Likewise, the inherent risks and control risks are moderate. Teams can set audit activities at moderate levels. Therefore, moderate risks are accepted.

Examples of guidelines for determining the relationship of each risk type

Inherent Risk	Control Risk	Detection Risk	Acceptable Validation & Verification Risk	Evidence- gathering
Low risk	Low risk	Very high	Very highly acceptable	Low quantity
Low risk	High risk	High	Highly acceptable	Low quantity
Moderate risk	Moderate risk	Moderate	Moderately acceptable	Moderate quantity
High risk	Low risk	Low	Low acceptable	High quantity
High risk	Low risk	Very low	Lower acceptable	High quantity

More details about the basics of risk assessment can be found from ISO 14064-3: 2019 (6.1.2).


Risk assessments in the validation and verification process shall take into account the materiality of each information item. This may be considered by the type of information because the information in each type of the project may have different materiality for the assessment of greenhouse gas emissions, for example, which parameters should be prioritized in assessing inherent risks or control risks. Consideration of such issues requires professional judgment and expertise of the validator and verifier team in consideration. A risk assessment should be performed during the validation planning phase to help guide the determination of validation or verification methodology that are appropriate for each type of project.

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7. Facts Discovered after the Validation and Verification

In the event that additional facts or information are found after the validation and verification process has been completed, such findings may be found by the VVB, the project participant, TGO or stakeholders and that information affects the validation report. The validation and verification report, statement, and the VVB should consider and take steps as follows:

1. The VVB reviews any fact or additional information found or notified after the validation and verification process completed, and considers the effects or errors arising from such information;
2. The VVB must undertake the following steps in each case:
 - 2.1 In case the VVB found errors or mistakes.
 - 1) The VVB informs the project participant and the TGO regarding the errors and mistakes
 - 2) TGO considers information and facts informed by the VVB, and the impact of such information, including establishing operational guidelines for resolving various issues
 - 3) TGO informs the results of consideration, including solutions to the VVB, stakeholders from the event as appropriate
 - 4) The VVB monitors the results of the TGO's consideration.
 - 5) The VVB informs the results of the operations to the project participant and the TGO, while submitting a validation and verification report, and their statement (new version) to the TGO (in the event that the information in the validation and verification report must be changed).
 - 2.2 In case of the VVB notified by the project participant about the facts or errors occurred.
 - 1) The VVB notifies the TGO about the detected data.
 - 2) TGO considers information and facts informed by outside assessors, the impact of such information, including establishing operational guidelines for resolving various issues.
 - 3) The TGO informs the results of consideration, including solutions to external assessors. including stakeholders from the event as appropriate.
 - 4) The VVB monitors the results of the consideration of the TGO.


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- 5) The VVB informs the results of the operations to the project participant and the TGO, together with submitting a validation report and their statements (new version) to the TGO (in the event that the information in the verification and verification report must be changed).

2.3 In the event that the TGO finds facts or errors.

- 1) TGO considers information, facts and impacts arising from such information, including establishing operational guidelines for resolving various issues.
- 2) The TGO informs the results of consideration, including solutions to the validation and verification, including stakeholders from the event as appropriate
- 3) The VVB monitors the results of the consideration of the TGO.
- 4) The VVB notifies the results of the operations to the project participant and the TGO, along with submitting a validation and verification report, and their statements (new version) to the TGO (in the event that the information in the validation and verification report must be changed).

Remarks: In the case of the VVB does not correct the error that has occurred, the TGO will consider suspending or revoking the certificate of the VVB. It depends on the case and at the discretion of the TGO.

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8. Records

Upon completion of the validation or verification process, the VVB must pay attention to confidentiality of the stored records and information received during the validation and verification activities. There must be a data storage system that is a safe and prevent data loss except the information TGO prescribes for public disclosure, such as the validation report, T-VER project verification report. The records of information and documentation relevant to validation and verification process must be well maintained in hard copy or compiled into electronic files as appropriate.

8.1 Life of record storage

8.1.1 Single Projects and Bundling Projects


Records and documents related to the validation and verification process must be maintained by the VVB as follows:

1. Validation process: Not less than 3 years after the end of the project credit period of the validated version of the project design document.
2. Verification process:
 - 2.1 Not less than 3 years after the end of the project credit period and
 - 2.2 Not less than 3 years after completion of the verification process.

8.1.2 Programme of Activities (PoA)

Records and documents related to the validation and verification process of the project scope must be maintained by the VVB as follows:

1. Validation process: Not less than 3 years after the expiration of the project scope.
2. Verification process:
 - 2.1 Not less than 3 years after the end of the credit period of the component project activities (CPA) and
 - 2.2 Not less than 3 years after completion of the verification process

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Annex

Examples of Sampling Theory

1. Taro Yamane (1973)

To calculate the appropriate sample size for use to determine the required sample volume for validation and verification, the validator and verifier team must know the total amount of data used in the calculation, and can be calculated from the below equation:

$$n = \frac{N}{1 + Ne^2}$$

Where n = Calculated sample size

N = Amount of information to know

e = Value of allowable error

The sample size was determined by using Yamane's Success Table as a table used to determine the required sample volume for validation and verification. The validator and verifier team must know the total amount of data and determine the tolerance to determine the minimum sample quantity to be randomly checked.

Determining the required sample volume as per Yamane's theory is suitable for data sets, in which the validator and verifier team know the total number of data sets. There are many data sets, which may have more than 500 data sets, such as validation and verification of the T-VER project, forest type, that has the number of tree height data in the sample plots that the validator and verifier team must perform random operations to verify the data.



Taro Yamane Table

Population Size	Sample size at the size tolerance (e)					
	$\pm 1\%$	$\pm 2\%$	$\pm 3\%$	$\pm 4\%$	$\pm 5\%$	$\pm 10\%$
500	*	*	*	*	222	83
1,000	*	*	*	385	286	91
1,500	*	*	638	441	316	94
2,000	*	*	714	476	333	95
2,500	*	1250	769	500	345	96
3,000	*	1364	811	517	353	97
3,500	*	1458	843	530	359	97
4,000	*	1538	870	541	364	98
4,500	*	1607	891	549	367	98
5,000	*	1667	909	556	370	98
6,000	*	1765	938	566	375	98
7,000	*	1842	959	574	378	99
8,000	*	1905	976	580	381	99
9,000	*	1957	989	584	383	99
10,000	5000	2000	1000	588	385	99
15,000	6000	2143	1034	600	390	99
20,000	6667	2222	1053	606	392	100
25,000	7143	2273	1064	610	394	100
50,000	8333	2381	1087	617	397	100
100,000	9091	2439	1099	621	398	100
∞	10000	2500	1111	625	400	100

* Means the sample size is not suitable for assuming a normal distribution, so the formula for calculating the sample size cannot be used.

2. Sampling patterns specified by the Accepted Quality Limits (AQLs) for inspection

Validator and verifier teams can apply a method to determine the minimum number of samples to be randomly validated from the AQL table. Validator and verifier teams need to know the total number of data sets. And determine the tolerance to determine the minimum sample quantity to be randomly checked. For the T-VER project, the general inspection levels of Level I, Level II and Level III can be used as shown in Table 1. The sampling level is selected based on the risk assessment of the data. After obtaining the sample size code letter Take the aforementioned letters to select the minimum number of samples to be inspected from Table 2, using the percentage of materiality specified by the TGO of 5% in determining the number of samples.

Example: Company A's T-VER project has data from receipts from electricity sales into the PEA transmission line system from January 2019 - December 2021 (3 years = 36 data sets of samples). Table 1 The number of samples, 36 data sets, were in the lot size between 26 to 50, using the level of general inspection level III, found that the sample size code was E. When taking the letter code to check the sample size in Table 2, it was found that the number The minimum that should be randomized is 13 data sets.

Table 1 Sample Size Code

Lot size	Special inspection levels				General inspection levels		
	S-1	S-2	S-3	S-4	I	II	III
2 to 8	A	A	A	A	A	A	B
9 to 15	A	A	A	A	A	B	C
16 to 25	A	A	B	B	B	C	D
26 to 50	A	B	B	C	C	D	E
51 to 90	B	B	C	C	C	E	F
91 to 150	B	B	C	D	D	F	G
151 to 280	B	C	D	E	E	G	H
281 to 500	B	C	D	E	F	H	J
501 to 1 200	C	C	E	F	G	J	K
1 201 to 3 200	C	D	E	G	H	K	L
3 201 to 10 000	C	D	F	G	J	L	M
10 001 to 35 000	C	D	F	H	K	M	N
35 001 to 150 000	D	E	G	J	L	N	P
150 001 to 500 000	D	E	G	J	M	P	Q
500 001 and over	D	E	H	K	N	Q	R



Table 2 Single sampling plan for regular inspection (main table)

Sample size code letter	Sample size	Acceptance quality limit, AQL, in percent nonconforming items and nonconformities per 100 items (normal inspection)																											
		0,010	0,015	0,025	0,040	0,065	0,10	0,15	0,25	0,40	0,65	1,0	1,5	2,5	4,0	6,5	10	15	25	40	65	100	150	250	400	650	1 000		
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	
A	2																												
B	3																												
C	5																												
D	8																												
E	13																												
F	20																												
G	32																												
H	50																												
J	80																												
K	125																												
L	200																												
M	315																												
N	500																												
P	800																												
Q	1 250																												
R	2 000																												

↓ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 % inspection.

↑ = Use the first sampling plan above the arrow.

Ac = Acceptance number

Re = Rejection number


Reference: Notification of the Ministry of Industry No. 4398 (B.E. 2555) issued under the Industrial Product Standards Act B.E. Thai Industrial Standards on Sampling Methods for Validating Qualitative Characteristics, Part 1. Sampling schemes specified by Accepted Quality Limits (AQLs) to verify lot by lot.

3. Probabilistic random sampling

In selecting samples from the total amount of data, the validator and verifier team can use the team's discretions and the data risk assessment result to choose a statistical sampling method. The sampling pattern can be divided into 4 sub-principles as follow:

3.1 Simple Random Sampling

Simple random sampling is the selection of a sample by giving an equal chance of being selected for the entire population. The validator team or the verifier team can freely determine the data items to be randomized.

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3.2 Systematic Sampling

Systematic sampling is the use of sampling methods and dividing the data into equal ranges. and the data set that requires randomization of each data group, such as sorting data in 10 data rows and selecting from the 10th data of each row.

3.3 Stratified Sampling

Stratified sampling is a random sampling from the population. It starts by dividing the population into subgroups. Each group has some characteristics that are similar to the specification. Then do simple randomization. to select samples from the population in each group out.

3.4 Cluster Sampling

Cluster sampling is used when there is a large amount of data. by dividing the data into subgroups May be divided by areas or groups that are already divided. The studies are then stratified according to the specific population, but stratified random sampling also needs to be taken into account for differences in stratification, no matter the size of the group, population differences in each group, and size of the selected sample group.

Record of the Revisions of the Validation and Verification Manual
Thailand's Voluntary Greenhouse Gas Reduction (T-VER) Project

No.	Revisions	Effective Date	Expiry Date	Correction Details
01	0	May 2017	11 September 2023	-
02	1	15 March 2023	-	<ul style="list-style-type: none"> - Cancellation of the Guideline for T-VER Validation & Verification Version 1 of the Thailand Voluntary GHG Reduction Project Guidelines and the Guideline for Validation and Verification of GHG Reduction Projects. Voluntary Greenhouse Gas Emissions according to Thailand Standards No. 1 (May 2017) - Update of the content and the reference requirements ISO 14064-3: 2019 and ISO 14065: 2020.