TECHNICAL GUIDANCE FOR GREENHOUSE GAS VERIFICATION AT REASONABLE LEVEL ASSURANCE

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Specified Gas Emitters Regulation

Government of Alberta

Alberta

Technical Guidance for Greenhouse Gas Verification at Reasonable Level Assurance
January, 2013

Disclaimer:

The information provided in this document is intended as guidance only. This document is not a substitute for the law. Please consult the Specified Gas Emitters Regulation and the legislation for all purposes of interpreting and applying the law. In the event that there is a difference between this document and the Specified Gas Emitters Regulation or legislation, the Specified Gas Emitters Regulation or the legislation prevails.

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Technical Guidance for Greenhouse Gas Verification at Reasonable Level Assurance

Differences between Reasonable and Limited Levels of Assurance

As of January 1, 2012, Alberta Environment and Sustainable Resource Development (AESRD) requires all verifications to be completed to a reasonable level of assurance. This higher level of assurance requires verifiers to perform additional tests and procedures beyond those required to reach a limited level of assurance to reach a positive finding on the accuracy and correctness of the greenhouse gas assertion. This means that project developers and regulated facilities have the same evidence available to support greenhouse gas assertion. What changes is the nature and extent of procedures applied by the verifier to assess the evidence and come to a conclusion.

> ***Note:*** *Limited and reasonable assurance reviews require the same evidence to support the underlying greenhouse gas assertion.*
>
> *The verifier must apply more extensive procedures at reasonable assurance than at limited assurance.*

Assurance can be provided at either limited (review or negative) or reasonable (audit or positive) assurance levels. At program inception, AESRD required verification done to a limited level review. AESRD recognized that greenhouse gas quantification and verification was in its infancy. Significant learning was required for facilities, offset project developers, and greenhouse gas verifiers to implement processes needed to support quantification and subsequent verifications to a high level of assurance.

Many of the requirements in limited and reasonable level of assurance are the same; however, the nature, level, and extent of the procedures differs. The recently approved CSAE 3410[1] provides a more explicit comparison between the two levels of assurance and should be consulted for a more detailed discussion on the differences between the two levels of assurance.

The following table summarized the differences and additional requirements for verification processes and procedures between reasonable and limited levels of assurance. Procedures common to both are not included. Further details on verification requirements for each category are discussed in this guidance document and are not restated here.

[1] Canadian Institute of Chartered Accountants, 2012, Canadian Standard on Assurance Engagements (CSAE) 3410, Assurance Engagements on Greenhouse Gas Statements

Summary of Differences between Reasonable and Limited Levels of Assurance

Theme	Reasonable Assurance	Limited Assurance
Gain and Understanding	Understand entity's risk assessment process (Section 3.2).	Inquire on the results of the entity's risk assessment process.
	Understand the control activities and monitoring of controls relevant to the assertion (Section 3.1).	Not specified.
	Evaluate the design of controls and determine whether they have been implemented (Section 3.1.2).	Not specified.
Risk Assessment	Conduct the risk assessment at the attribute level (Section 3.2.1.2).	Not specified.
	Evaluate inherent and control risks in designing the verification plan (Section 3.2.2, 3.2.3).	Not specified.
Test of Controls	Mandatory if the verification strategy will rely on controls (Section 3.6.1).	Not expected but allowed.
	Not sufficient by itself and require tests of detail or substantive analytical procedures to support the controls assessment. (Section 3.6.1).	Not specified.
Substantive Analytical Procedures	Conducted at the attribute level (Section 3.6.2).	Not specified.
	Develop expectations for procedure for anomalies (Section 3.6.3.7).	Not specified.
	Investigate anomalies (e.g., higher level of evidence than inquiry) (Section 3.6.3.7).	Inquire about anomalies.
Estimates	Verifier must test the estimates used (Section 3.6.7).	Verifier must evaluate the estimates used.
	Test effectiveness of controls surrounding the estimate process (Section 3.6.7).	Other procedures optional.

Theme	Reasonable Assurance	Limited Assurance
	Develop an independent estimate to determine whether the original estimate is within an expected range (Section 3.6.7).	Not specified.
Aggregation Process[2]	Verifier must examine any material adjustments made during the aggregation process.	Verification must inquire about any material adjustments made during the aggregation process.
Additional Procedures	Adjusted continuously based on evidence gathered (Section 3.6.2).	Procedures sufficient to conclude on negative assurance or material misstatement.
Site Visit	The number of facilities will ordinarily be greater .	The number of facilities will ordinarily be smaller.
	Includes a selection of facilities that are not significant facilities.	Selection of significant facilities only.

[2] Aggregation Process refers to the aggregation of data and information by the facility or project proponent and not to aggregated projects.

Terminology Differences

ISO 14064-3 and accounting standards including CICA 5025, CSAE 3000, and CSAE 3410 are the primary verification standards available for greenhouse gas verifications. These standards contain terms that are similar in concept, but different in wording. The following table describes the different terms and AESRD's preferred wording reflected in this guidance document.

Terminology Differences

Different Words but Similar Concept				
AESRD Preferred Terminology Term	ISO		Accounting	
	Term	Definition	Term	Definition
Attributes of the Assertion	No similar concept	n/a	Assertions in the assertions	Particular attributes that relate to quantification, presentation, and disclosure of greenhouse gas emissions and reductions.
Findings	Findings	Undefined; however, in general means material and immaterial discrepancies.	Observations	Undefined; however, in general means opportunities for improvement in controls and immaterial omissions and misstatements.
Greenhouse Gas Quality Control Management System	Greenhouse gas Information System	Policies, processes and procedures to establish, manage and maintain greenhouse gas information.	Control Activities	Policies and procedures that help ensure management directives are carried out, including those around the integrity of the greenhouse gas data and information.
Greenhouse Gas Assertion	Assertion	Declaration, or factual and objective statement made by the responsible party about the greenhouse gas emissions reductions and removals.	Greenhouse Gas Statement	A statement setting out the constituent elements and quantifying an entity's greenhouse gas emissions for a period and, where applicable, comparative information and explanatory notes including a summary of significant quantification and reporting policies.
Limited Assurance	Limited Assurance	Limited level assurance is distinguishable from reasonable level assurance in that there is less emphasis on detailed testing of greenhouse gas	Review/Limited Assurance Engagement	An engagement in which a practitioner expresses a conclusion designed to enhance the degree of confidence of the intended user

Different Words but Similar Concept				
AESRD Preferred Terminology Term	ISO Term	ISO Definition	Accounting Term	Accounting Definition
		data and information supplied to support the greenhouse gas assertion.		other than the responsible party about the outcome or measurement of a subject matter against criteria. The objective of a reasonable assurance engagement is a reduction of assurance engagement risk to an acceptably low level in the circumstances of the engagement as the basis for a positive form of expression of the practitioner's conclusion.
Misstatement	Discrepancy	Individual or the aggregate of actual errors, omissions and misrepresentations in the greenhouse gas assertion	Misstatement	The accidental or intentional untrue statement information due to fraud or error.
Peer Reviewer	No title but role specified	Competent personnel different from the validation or verification team that: a) confirm that all validation or verification activities have been completed, and b) conclude whether or not the greenhouse gas assertion is free from material discrepancy, and c) whether the verification or validation activities provide the level of assurance agreed to at the beginning of the validation or verification process in conformity with ISO 14064-3:2006, 4.8.	Engagement Quality Control Reviewer	A partner, other person in the firm, suitable qualified external person, or a team made up of such individuals, with sufficient and appropriate experience and authority to evaluate, before the report is issued, the significant judgments the engagement team made and the conclusions they reached in formulating the report.
Procedures[3]	Sampling Plan/Verification Activities	The sampling plan is the documentation of the verification activities for the collection of evidence to support the expected level of assurance.	Procedures	The methods and techniques used to gather and evaluate evidence.

[3]Although the concepts are the same, the emphasis is different because ISO places this in the Annex (which is guidance) and the types of procedures are slightly different.

Different Words but Similar Concept				
AESRD Preferred Terminology Term	ISO		Accounting	
	Term	Definition	Term	Definition
Program Criteria	Verification criteria	Policy, procedure or requirement used as a reference against which evidence is compared.	Criteria	The benchmarks used to evaluate the subject matter.
Reasonable Assurance	Reasonable Assurance	The verifier provides a reasonable, but not absolute, level of assurance that the responsible party's greenhouse gas assertion is materially correct.	Reasonable/Audit Assurance Engagement	An engagement in which a practitioner expresses a conclusion designed to enhance the degree of confidence of the intended user other than the responsible party about the outcome or measurement of a subject matter against criteria. The objective of a reasonable assurance engagement is a reduction of assurance engagement risk to an acceptably low level in the circumstances of the engagement as the basis for a positive form of expression of the practitioner's conclusion
Statement of Verification	Verification Statement	Formal written declaration to the intended user that provides assurance on the statements in the responsible party's assertion	Assurance Report/ Independent Auditor's Report/ Opinion	Formal means of communicating to interested parties a conclusion about the assured information.
Verification	Verification	Systematic, independent evaluation of a greenhouse gas assertion against agreed program criteria.	Assurance Engagement	A practitioner expresses a conclusion designed to enhance the degree of confidence the intended users can have about the evaluation or measurement of a subject matter against criteria.

Glossary

Term	Definition
/a	Per annum.
Adverse Opinion	Is a statement of verification that the verifier issues when the greenhouse gas assertion contains material misstatements that cannot be resolved.
AESRD	Alberta Environment and Sustainable Resource Development.
Aggregated Offset Projects	Is a collection of small offset projects using the same quantification methodology that have been bundled to create a larger volume offset project for marketing, verification, and registration purposes.
Aggregator	Is an entity acting as the offset project developer for aggregated offset projects.
Alberta Emissions Offset Registry (AEOR)	Is the web-based platform that stores, serializes and tracks offset credits in the Alberta Offset System.
Analytics/Analytical Procedures	Are evaluations of greenhouse gas information made by a study of plausible relationships among both greenhouse gas and non-greenhouse gas data.
Assertion	Are representations by the responsible party (e.g., baseline emissions intensity application, offset project report, specified gas compliance reports).
Attribute Level	Are potential misstatements or effects that affect a characteristic of the greenhouse gas assertion. Examples are improper cut-off for natural gas in December, incomplete continuous emissions monitoring (CEMs) data transfer, inaccurate electricity meter, etc. Attribute level is more detailed and narrow in scope than greenhouse gas statement level.
Attributes of the Assertion	Are inherent characteristics of the of greenhouse gas assertion.
Audit	Is an independent government review of the greenhouse gas assertion.
Auditor	Is a person meeting the requirements of Section 18 of the *Specified Gas Emitters Regulation* that is hired by Alberta Environment and Sustainable Resource Development to review a facility or offset project on behalf of the government.
Baseline	Is the reference case for greenhouse gas emissions reductions and/or removals achieved by an offset project or regulated facility.
Baseline Emissions Intensity (BEI)	For established facilities, is the average of that facility's annual emissions intensity for 2003, 2004 and 2005. For new facilities, the BEI is based on the third year of commercial operation. These definitions are in accordance with Part 4 of the *Specified Gas Emitters Regulation*.
Business as Usual (BAU)	Is the projection of normal operating conditions that would have occurred in the absence of incentives or regulatory changes.
Certifying Official	Is the person designated by the facility with signing authority for that facility.

Term	Definition
CH_4	Is methane.
Climate Change and Emissions Management Act	Is the enabling legislation passed in 2002 allowing Alberta Environment and Sustainable Resource Development to manage greenhouse gas emissions in the province.
Climate Change and Emissions Management Fund	Is the fund set up under the *Climate Change and Emissions Management Act* that will be used to support research, development and deployment of transformative technologies to reduce greenhouse gas emissions in Alberta.
CO_2	Is carbon dioxide.
CO_2e	Are carbon dioxide equivalents.
Confirmation	As a verification procedure, is a specific type of inquiry that obtains information directly from a third party. As a task to be completed by the verifier, is specific information (Section 5.4) that requires supporting evidence but cannot be compared to the criteria.
Conflict of Interest Form	Is a signed document identifying any real or perceived conflict of interest that may compromise the impartiality of the verifier.
Contribution Analysis	Is an analysis of the line-item contribution compared with the assertion or components of the assertion used to identify appropriate procedures for the verification plan.
Control Environment	Is a component of internal control that reflects the governance and management functions, and the attitudes, awareness and actions of those charged with governance and management on the internal controls for greenhouse gas evidence.
Control Risk	Is the risk that the responsible party's internal controls do not detect, prevent or correct a material misstatement in the greenhouse gas assertion.
Controls / Control Activity	Is a component of internal control that deals with policies and procedures that help ensure that the responsible party's directives are carried out.
Designated Signing Authority	Is an individual who has binding authority for the verification company. This person must meet the requirements of Section 18 of the Specified Gas Emitters Regulation. This person's signature is provided on behalf of the verification team on the statement of qualifications, statement of verification, and conflict of interest checklist.
Detection Risk	Is the risks that the verification procedures will not detect a misstatement that exists in a greenhouse gas assertion that could be material to the assertion.
Director	Is the Director appointed under the *Climate Change and Emissions Management Act.* This person is AESRD's representative who is charged with implementing the Act.
Disclaimer of Opinion	Occurs when a verifier is unable to complete the greenhouse gas verification because there is insufficient evidence to allow the verifier to assess the assertion against program criteria.

Term	Definition
Discrepancy	Is the divergence or disagreement, usually between facts and assertions.
Eligibility Criteria	Are minimum requirements an offset project must meet to be eligible for use in the Alberta Offset System.
Emission Offset	Is a reduction and/or removal in one or more specified gases (regulated greenhouse gas emissions) occurring at sites not covered by the *Specified Gas Emitters Regulation*. Additional information on Offsets is available at: http://environment.alberta.ca/02275.html.
Emission Reduction	Occurs when emissions released into the atmosphere by a source are decreased or eliminated.
Emission Removal	Occurs when emissions are removed from the atmosphere through sequestration processes.
Emphasis of Matter	Is a modification to the statement of verification that does not affect the verifier's opinion, but highlights to the intended user a matter affecting the greenhouse gas assertion.
Error	Is an unintended misstatement or disclosure in the greenhouse gas assertion.
Established Facility	Is a facility that completed its first year of commercial operation on or before January 1, 2000, or that has completed eight consecutive years of commercial operation.
Evidence	Is all of the information used by the verifier to arrive at the conclusion, which is expressed in the statement of verification.
Facility (Large Final Emitter)	Is any plant, structure or thing that sits on one or more contiguous or adjacent sites that are operated and function in an integrated fashion and includes all buildings, equipment, structures, machinery and vehicles that are an integral part of the activity.
Fraud	Is an intentional act by one or more individuals in the responsible party or third parties involving the use of deception to obtain an unjust or illegal advantage.
GHG	Are greenhouse gas(es).
GHG Inventory	Is the listing of sources and sinks of the facility or in the offset project's baseline and project.
Global Warming Potential (GWP)	Measures a greenhouse gas's relative warming effect on the earth's atmosphere compared with carbon dioxide and is expressed as a 100-year average. Alberta accepts the Intergovernmental Panel on Climate Change's warming potentials for the gases regulated under the *Specified Gas Emitters Regulation*.
Greenhouse Gas Assertion	For offset projects, is a document that identifies the greenhouse gas emission reductions and/or removals and offset credits being claimed by the offset project over a defined period of time. For facilities, is the information contained in the Baseline Emissions Intensity Application and Specified Gas Compliance Report.

Term	Definition
Greenhouse Gas Species	Is a category of greenhouse gas based on its chemical structure (e.g., chlorofluorocarbons).
Greenhouse Gas Statement Level	Are potential misstatements or effects that affect the entire greenhouse gas assertion. Examples are inappropriate tone at the top, incorrect GWPs, incomplete inventories, poor control environment, etc. Greenhouse gas statement level is less detailed and broader in scope than attribute level.
Incremental	Is an eligibility criteria that refers to a change in practice that results in additional emission reductions and/or removals beyond business as usual/sector common practice.
Independence	Is a surrogate measure for objectivity. It requires the verifier to be free from conflicts of interest that could alter, impact, or influence the verifier's opinion on the greenhouse gas assertion.
Inherent Risk	Is the susceptibility of an assertion to misstatements assuming that there are no internal related controls.
Inquiry	Is the action of seeking information from knowledgeable persons internal and external to the responsible party.
Inspection	Is the examination of records, documents and tangible assets.
Intended User	Is the person or persons for whom the verifier prepares the statement of verification.
Internal Control	Is the process designed and affected by the responsible party to provide assurance of the entity's achievement of objectives. These objectives include reliability of greenhouse gas reporting, effectiveness and efficiency of operations, and compliance with laws and regulations.
Lead Verifier	Is the individual leading the verification team. This person is responsible for coordinating the verification and ensuring that appropriate expertise is available to review all aspects of a regulated facility's or offset project's greenhouse gas assertion.
Level of Assurance	Identifies the amount of work required to reach a stated level of comfort with a regulated facility's or offset project's assertion.
Limited Assurance	Is a moderate (review) level of assurance, or negative assurance.
Line Item	Is a grouping of greenhouse gas sources and sinks that share the same inherent and control risks.
Management System	Is a framework of processes and procedures used to ensure that an organization can fulfill all tasks required to achieve its objectives.
Materiality	Omitted or misstated information that could influence the decisions of intended users taken on the basis of the greenhouse gas statement.
Misstatement	Is the accidental or intentional untrue statement information due to fraud or error.

Term	Definition
Modified Opinion	Is a statement of verification that is altered from the unqualified conclusion (i.e., emphasis of matter, qualified, or adverse).
n/a	Is not applicable.
N_2O	Is nitrous oxide.
neg.	Negligible.
Observation	Is watching processes and/or procedures performed by other qualified individuals.
Offset Credit	Is a tradable credit issued per tonne of greenhouse gas emissions reductions and/or removals expressed as units of CO_2e.
Offset Project	Is an activity implemented by an offset project developer in accordance with a government approved protocol that results in greenhouse gas emission reductions and/or removals.
Offset Project Plan	Is a report prepared by the offset project developer describing how the offset project will meet the criteria outlined in the quantification protocol.
Offset Project Report	Is a report prepared by the offset project developer prior to verification that describes how the offset project was implemented relative to the Offset Project Plan and quantification protocol.
Omission	Is missing information.
Opinion	Is the verifier's conclusion on the greenhouse gas assertion expressed in the statement of verification.
Peer Reviewer	Is an independent qualified professional who reviews the verification. This person cannot be the lead verifier.
Planning Analytics	Are analytical procedures employed at the beginning of a verification that helps direct the development of the verification plan.
Procedures	Are verification techniques used to gather evidence to substantiate the reliability of a greenhouse gas assertion.
Production	Is the end product(s) produced by a facility.
Program Criteria	Are the benchmarks used to evaluate or measure the greenhouse gas information.
Project Developer	Is a person who implements an offset project in accordance with a government approved protocol.
Qualified Opinion	Occurs when the greenhouse gas assertion contains omissions or misstatements that affect the assertion, but are not material enough to require an adverse or disclaimer of opinion.
Qualitative Materiality	Are misstatements of properties that are non-numerical (i.e., cannot be quantified using numbers), but that may influence the decisions of intended users based on the greenhouse gas statement.

Term	Definition
Quantification Protocol	Is a government approved methodology that outlines appropriate baseline conditions, eligible sources and sinks, and emission reduction and removal calculations for a specific emission reduction activity.
Quantitative Materiality	Are numerical misstatements that could influence the decisions of intended users based on the greenhouse gas statement.
Reasonable Assurance	Is a high level of assurance, or positive assurance.
Recalculations	Involves checking the mathematical accuracy of documents or records by recreating the calculations done by the responsible party.
Regulated Facility	Is a facility located in Alberta that emits over 100,000 tonnes CO_2e per year. The regulated facility may purchase Offset credits for compliance under the *Specified Gas Emitters Regulation*.
Regulation	Means the *Specified Gas Emitters Regulation*.
Re-performance	Means the verifier's independent execution of the responsible party's procedures or controls.
Reporter	Is the person designated by the facility responsible for completing the facility's Baseline Emissions Intensity Application form or annual Specified Gas Compliance Report.
Responsible Party	Is the person legally responsible for the greenhouse gas assertion. This person is the approval or registration holder for a facility regulated under the *Environmental Protection and Enhancement Act* or the legal owner for facilities not subject to *Environmental Protection and Enhancement Act* approval.
Risk Assessment	Are procedures performed to obtain an understanding of the entity and its environment, including internal control, to assess the risks of material misstatement at the greenhouse gas statement and attribute level. It evaluates inherent and control risks and determines the necessary detection risk to make the verification risk appropriate given the objectives of the verification.
SF_6	Is sulphur hexafluoride.
Significant Line Items	Are items that contribute 10 percent or more to the total emissions inventory for the facility or constitute 10 percent of the emission reductions in a project.
Sink	Is any process, activity or mechanism that removes greenhouse gas from the atmosphere.
Site Visit	Is a process whereby the verifier visits the site to gain familiarity with the facility by observing emissions sources, facility operations, and on-site records handling.
Source	Is any process or activity that releases greenhouse gases into the atmosphere.
Specified Gas Emitters Regulation	Is the regulation passed under the Climate Change and Emissions Management Act that regulates greenhouse gas emissions at large, industrial facilities and that enables the Alberta Offset System.

Term	Definition
Statement of Qualifications	Is a signed statement attesting to the qualifications of the of the verifier to undertake the verification.
Statement of Verification	Is a document prepared by the verifier expressing their opinion regarding the veracity of the greenhouse gas emissions or emission reductions and/or removals being asserted.
Subject Matter Expert	Is a person or firm possessing special skills, knowledge and experience in a particular field other than greenhouse gas verification.
Subsequent Events	Is the treatment of events that occur after the date of the greenhouse gas assertion.
Substantive Analytics/Substantive Analytical Procedures	Are analytical procedures performed at the attribute level.
Substantive Procedures/Testing	Are verification procedures performed to detect material misstatement at the attribute level. These include tests of detail and substantive analytical procedures.
Summary of Unadjusted Differences	Is a summary of omissions and misstatements in the greenhouse gas assertion that have not been corrected by the responsible party.
Tests of Control	Are tests performed to obtained evidence about the operating effectiveness of controls in preventing, or detecting and correcting, material misstatements at the attribute level.
Tests of Detail	Are tests for error or fraud at the source or sink/ transaction level or for items contained in the greenhouse gas inventory.
Tolerable Error	Is the misstatement allowed in a particular category (e.g., line item, greenhouse gas type, production, etc.) that would be acceptable to the verifier without requiring further assessment.
Tone at the Top	Is the Organization's general ethical climate, as established by its Board of Directors, audit committee, and senior management, also known as control environment.
Tracing	Is a procedure where the verifier will follow the greenhouse gas data along the audit trail in the direction from meter readings to final reporting and tests for understatements.
Uncertainty	Is a state of having limited knowledge where it is impossible to exactly describe the existing state, a future outcome, or more than one possible outcome.
Unqualified Opinion	Is an unaltered, clean statement of verification.
User Materiality	Are misstatements in a greenhouse gas assertion that exceed five per cent of reported values. Large facilities emitting over a 500,000 tonnes CO_2e per year have a two per cent materiality threshold for compliance reports.
Validation	Is a process that is used to assess an offset project condition including

Term	Definition
	quantification methodologies **before** the offset project is implemented. Validation is optional in the Alberta offset system.
Verification	Describes the process by which an objective third party examines or reviews an assertion such as the greenhouse gas assertion for an offset project and provides an opinion or conclusion on the assertion.
Verification Acceptance	Is an initial screening phases done by the verifier to assess the client to determine whether the verifier will undertake the verification.
Verification Plan	Is the documentation that details the nature, timing and extent of the procedures for the verification. The plan is updated throughout the execution phase of the verification as evidence is obtained and assessed.
Verification Risk	Is the risk that the verifier expresses an inappropriate conclusion when the greenhouse gas information is misstated.
Verification Sample Plan	Is a sub-component of the verification plan that details all sampling of records, documents, and controls.
Verification Strategy	Sets the general approach, the scope, timing and direction of the verification, and guides the development of a more detailed verification plan.
Verifier	Describes the person or persons that meet the requirements of Section 18 of the *Specified Gas Emitters Regulation* and undertake the independent, third party review of the greenhouse gas assertion.
Vouching	Is a procedures where the verifier will follow the greenhouse gas data along the audit trail in the direction from final reporting to meter readings and tests for overstatements.
Working Paper Files	Is the record of verification procedures performed, relevant verification evidence obtained, and conclusions that the verifier reached.

1 Introduction

Alberta's *Specified Gas Emitters Regulation* (the *Regulation*) requires all large, industrial facilities in Alberta emitting over 100,000 tonnes of carbon dioxide equivalent (CO_2e) per year to reduce their greenhouse gas emissions intensity by 12 per cent from their government approved baseline emission intensity. Compliance reports and facility true-up must be received by Alberta Environment and Sustainable Resource Development (AESRD) on or before March 31 for the previous year.

Facilities and sectors not subject to the *Regulation* that are able to reduce their greenhouse gas emissions according to a government approved protocol and that meet the requirements of Section 7 of the *Regulation* are eligible to generate offset credits where one tonne of CO_2e reduced is equal to one offset credit. These credits, once registered and serialized on the Alberta Emissions Offset Registry (the registry), become a tradable unit that can be bought and sold in the Alberta offset market.

As of January 1, 2012, AESRD requires reasonable assurance on facility baseline emission intensity applications, annual compliance submissions, and on all offset project assertions. From 2007 to 2011, Alberta accepted limited level assurance to reflect the fact that greenhouse gas quantification and reporting was new and evolving. Reasonable level assurance starting in 2012 will require a higher level of review of greenhouse gas assertions by large final emitters and offset project developers, and a move extensive review by third party verifiers to ensure compliance with the *Specified Gas Emitters Regulation*.

This document is intended to assist verification companies conducting reasonable assurance verifications of facility and offset project greenhouse gas assertions under the *Specified Gas Emitters Regulation*. It may also be used by facility reporters and offset project developers to prepare for reasonable level of assurance verifications.

The document is structured to provide an overview of best practices and minimum requirements for reasonable assurance greenhouse gas verifications. Illustrative examples have been provided throughout the document to help explain key concepts and procedures. These examples are for information purposes only.

Hints and supplemental information are provided in text boxes. Additional information on the differences between limited and reasonable assurance, and differences in terminology between accounting assurance standards (e.g., CICA 5025, ISAE 3000, etc.) and ISO 14064-3 (predominantly engineering and certification standard) are provided at the beginning of this document.

2 Overview of Verification

Verification is a process designed to allow a verifier to express a conclusion to enhance the degree of confidence to AESRD that the greenhouse gas assertion was made in accordance with the *Climate Change and Emissions Management Act*, the *Specified Gas Emitters Regulation*, appropriate technical guidance documents, and if applicable, quantification protocol(s).

> ***Note:*** *ISO 14064 uses the term verification, while accountants use the term assurance to describe the process of reviewing greenhouse gas assertions. Verification will be used throughout this document because of the prevalence of the use of the term verification in the climate change industry.*

It is important to note that validation and verification processes are different. Verification examines the historical performance of a facility or offset project but does **not** contemplate future estimates or extrapolations. Validation assesses the potential for future greenhouse gas emissions reductions and/or removals that will result from a project. Validation is optional in Alberta and can be done by project developers to assess assumptions, records, and project performance before the project is implemented. Validation and validation procedures are not discussed in this document.

Verification is a process that requires an independent third party (the verifier) to review[4] an assertion made by a responsible party (large final emitter or offset project developer) for an intended user (AESRD) based on relevant program criteria (AESRD's *Act*, regulations, and guidance). These program criteria are available on AESRD's website at http://environment.alberta.ca/0918.html.

> ***Validation vs. Verification***
>
> ***Validation*** *applies to offset projects and occurs before the offset project begins (ex ante). It focuses on:*
>
> - Future data;
> - The appropriateness of the baseline and offset project conditions; and
> - The applicability and reasonableness of the quantification methodology and estimated, emission reductions.
>
> ***Verification*** *applies to facilities and offset projects and occurs after emissions/emission reductions have occurred (ex post). It focuses on:*
>
> - Historical data;
> - Data completeness, accuracy, and integrity;
> - Consistency with the criteria; and
> - Whether there is sufficient and appropriate evidence to support the assertion.

Verifiers are required to use the ISO 14064-3 verification standard and any other additional standards that the respective professions may require[5]. Both ISO 14064-3 and the accounting standards have been designed to accomplish the same goal – the ability to provide assurance on greenhouse gas information. The verification process described below is a composite of these verification standards and reflects industry best practices. It provides minimum requirements for verification practitioners in Alberta. Verifiers may undertake additional procedures based on professional judgment or if mandated by professional standards.

AESRD also requires that verifiers confirm certain information such as facility contact information and

[4]Review in this document refers to the common definition and not the specialized financial assurance definition with the exception of definitions provided at the beginning of this guidance.

[5]Professional Accountants may have to comply with additional standards such as CSAE 3000, CICA 5025, and CSAE 3410.

operating approval information that is included in the greenhouse gas assertion. Processes and procedures described in this document related to confirming information use the term "confirmation"[6] rather than "verification" and must be completed before the verifier issues an assurance statement. See Section 5.4 for more information.

Note: This guidance applies to any greenhouse gas reporting to AESRD and new baselines or baseline restatements for the 2012 year and forward.

Verification is iterative in nature and not necessarily performed in a linear sequence; however, the verification process has been represented in a linear fashion with a verification acceptance phase undertaken before the greenhouse gas verification is undertaken, and three verification phases--planning, execution, and completion—as shown in Figure 1 below. This is a linear representation of an inherently non-linear process and the feedback loop in Figure 1 is used to describe this iterative nature.

Verifiers are required to complete all mandatory requirements stated in this document including the verification acceptance review, and must be clearly documented in the verifier's working files. Mandatory requirements are indicated with **"must" or "requirement", and bold lettering**.

Greenhouse gas verifications at reasonable level of assurance must assess the attributes of the greenhouse gas assertion. These attributes are occurrence and responsibility, completeness, accuracy and quantification, cut-off, classification and understandability, and consistency[7].

- Occurrence and responsibility: the emissions or the emission reductions and/or removal enhancements do exist and are the responsibility or are under the authority of the reporter. These emissions or emission reductions and/or removal enhancements and pertinent matters have been disclosed. This attribute aligns closely with the ISO 14064-1 reporting principle of relevance and transparency.
- Completeness: All emissions that should have been recorded have been recorded and appropriately disclosed. This attribute aligns closely with the ISO 14064-1 reporting principle of completeness and transparency.
- Accuracy and quantification: The quantification of emissions, that is the measurement and calculation or estimate, has been recorded and appropriately disclosed. This attribute aligns closely with the ISO 14064-1 reporting principle of accuracy and transparency. In Alberta, uncertainty in the greenhouse gas quantification is addressed by AESRD approving the quantification methodology. This results in consistent reporting that can be used for year-

[6] Confirmation in this context does not mean obtaining representation of information of a condition from a third party but rather confirmation is the general sense of conducting procedures to collect sufficient and appropriate evidence that the representations are true and accurate.

[7] Note that the attributes of the assertion are characteristics that are embodied in the greenhouse gas reporting and are similar, but not identical to, the underlying principles of reporting in ISO 14064-1 of relevance, completeness, consistency, accuracy and transparency.

over-year and baseline comparisons. Estimates are used when measurements are unavailable or less reliable, and are appropriately disclosed.

- Cut-off: The emissions have been recorded and disclosed in the correct time period.
- Classification and understandability: The emissions have been recorded as the appropriate type and are appropriately presented, described and clearly expressed. This attribute aligns closely with the ISO 14064-1 reporting principle of transparency.
- Consistency: Quantification of emissions are consistent with those applied in comparable periods, or changes are justified, properly applied, adequately disclosed and comparative information, if any, has been appropriately restated. This attribute aligns closely with the ISO 14064-1 reporting principle of consistency and transparency. Consistency is of key importance to AESRD when examining comparative information from a facility or a project and of less importance when examining comparative information within an industry.

Greenhouse gas quantification and verification is relatively new compared to more established systems like financial accountings systems, which have had more than 50 years of standardization and auditing. This necessitates a different emphasis for greenhouse gas verifications compared to audits of these other, more mature systems. Greater requirements for disclosure on measurement capabilities and scientific understanding used to compile the greenhouse gas assertion and consistency in reporting are required. Disclosure requirements are discussed in more detail in Sections 3.6.6 and 5.1.5.2.1.

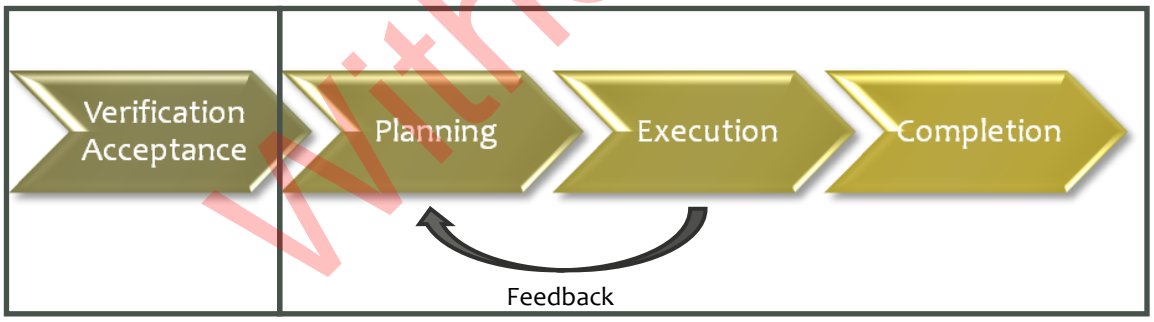

Figure 1: Verification Process

2.1 Three Party Relationship

Verifications involve three parties: the responsible party (large final emitter or offset project developer), the intended user (AESRD), and the verifier. See Figure 2 below.

The responsible party is the entity that is making the greenhouse gas assertion[8]. The responsible party is responsible for the information used to compile the assertion and to report the information to the intended user.

In Alberta, the responsible party is the facility making a declaration of their greenhouse gas inventory or the offset project developer (or aggregator) making the declaration of greenhouse gas emission reductions and/or removals achieved by the offset project.

The intended user is the entity that receives the greenhouse gas assertion from the responsible party. In Alberta, the intended user is the Director appointed under the *Climate Change and Emissions Management Act*.

The verifier is an independent third party that provides assurance on the greenhouse gas assertion. The verifier has skills and expertise that allow them to evaluate the integrity of the assertion to ensure conformance with program criteria.

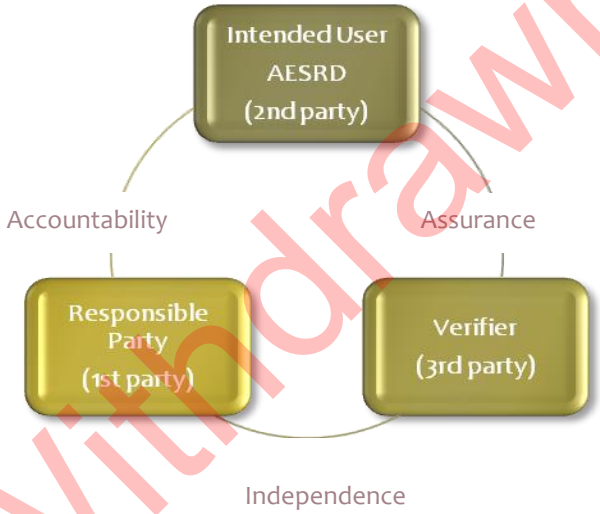

Figure 2: Three Party Relationship[9]

In some situations, such as during offset credit transactions, a buyer (i.e., the company purchasing offset credits) may decide to engage a professional services company to perform a quality review of the offset credits as part of the purchase decision. This service is part of a due diligence process for the buyer. While this quality review may have some characteristics of verification, it is typically not done to the same level of detail as verification, and does not provide assurance to AESRD. Rather, it is used to inform the buyer's position during the purchase.

[8] In most cases, the responsible party is also the client of the verifier and pays for the verification. In some cases, the responsible party may contract with a third party to compile the greenhouse gas assertion; however, final legal responsibility for the assertion remains with the responsible party.

[9] Derived from Canadian Institute of Chartered Accountants, Standards for Assurance Engagements Other Than Audits of Financial Statements and Other Historical Financial Information, Section 5025

2.2 Verification Acceptance[10]

The purpose of the verification acceptance phase is to ensure that, with the knowledge known or easily obtained before the verification, the verification can be successfully completed without undue risk to either the verifier or the client. Verification acceptance can occur before, during or after the proposal process and is conducted prior to signing the contract.

The key aspects of verification acceptance include:

- Verifier independence evaluation;
- Client evaluation;
- Verification evaluation; and
- Team evaluation.

2.2.1 Verifier Independence Evaluation

Independence is a surrogate indicator of objectivity. Independence is evaluated based on five threats to independence at both the verification body and individual verifier level. These threats are: self- interest, self-review, advocacy, familiarity, and intimidation or economic dependency. Each threat is discussed in more detail below.

Consulting vs. Verification

Verification and consulting are similar, but different processes.

- **Consulting** is the use of professional knowledge to make recommendations for a future event or a procedure such as the design of an information system or control system.
- **Verification** is used to test the validity of past data. The verifier may provide observations on areas for improvement, but cannot provide specific corrective actions.

The same company cannot provide both services for the same greenhouse gas assertion.

The verifier must complete an internal conflict of interest assessment to evaluate each of the threats listed below. This assessment must be documented in the verifier's working files.

If the verifier is satisfied that no real or perceived conflicts exist, the verifier may continue with the verification acceptance review.

Independence must be monitored throughout the verification, and documented in AESRD's conflict of interest form (large final emitters)/conflict of interest checklist (offset projects), which are included as part of the facility's compliance submission/offset project documentation**. If a conflict of interests develops during the course of the verification, the verifier must notify AESRD to determine mitigative actions.**

[10]The CSAE 3000 requires the verification acceptance phase. The ISO standard has portions of the verification acceptance stage in ISO 14064-3 and ISO 14065 (e.g., independence and team composition), but not all components are represented nor are they required before the contract is signed.

2.2.1.1 *Independence Threats*

The independence threats are[11]:

Self-interest
This occurs when the verifier or a member of the verification team or a person in the chain of command for the verification can directly benefit from a financial interest in the verification client, or when there is any other self-interest conflict with respect to the verification client. For example:

- Owning shares of the verification client;
- Having a close business relationship with the client;
- Contingent fees relating to the results of the verification; or
- Potential employment with the client.

Self-review
This occurs when a member of the verification team could be in a position of reviewing his or her own work. For example:

- Involvement of the verification organization in the compilation of the data contained in the assertion, including documentation;
- A verification organization member performing non-verification services (e.g., consulting) that directly impinge on the client's assertion, such as implementing the facility's greenhouse gas or production data management systems; or
- A member of the verification team having previously been a greenhouse gas or production data compiler of the verification client or who was employed by the verification client in a position to exert direct and significant influence over the client's assertion being reviewed.

Advocacy
This occurs when a verifying organization or a member of the verification team or a person in the chain of command for the verification promotes, or may be perceived to promote, a client's position or opinion to the point that objectivity may, or may be perceived to be, compromised. For example:

- Dealing in, or being a promoter of, emission performance credits on behalf of a client;
- Advocating on behalf of the client to advance a particular position or point of view on an issue that directly affects the greenhouse gas assertion; and
- Acting as an advocate on behalf of the client in litigation or in resolving disputes with third parties over offset values.

Familiarity
This occurs when, by virtue of a close relationship with a client, its directors, officer or employees, the firm or a member of a verification team becomes too sympathetic to the client's interests. For example:

[11] Alberta Environment, 2012, Technical Guidance for Offset Project Developers, Version 3.0, Section 6.1.4.

- A person on the verification team has a close personal relationship with a person who is in a critical greenhouse gas or production compilation role at the client; or
- Acceptance of significant gifts or hospitality from the client.

Intimidation or Economic Implications
This occurs when a member of the verification team or a person in the chain of command is deterred from acting objectively and exercising professional skepticism by threats, actual or perceived, from the directors, officers or employees of the client. For example:

- The threat of being replaced as verifier due to a disagreement with the application of greenhouse gas quantification methodology;
- Fees from the client represent a large percentage of the overall revenues of the verifier;
- The application of pressure to inappropriately reduce the extent of work performed in order to reduce or limit fees; or
- Threats arising from litigation with a client.

If it is determined there is a conflict of interest and both parties wish to pursue the verification, written evidence must be provided to AESRD prior to the verification describing the actions that will be taken to mitigate the conflict in order to preserve actual and perceived independence. AESRD will assess all conflict of interest cases. In cases where it determined that a conflict of interest cannot be effectively managed, facilities and offset projects will be required to select an alternate verifier.

2.2.1.2 *AESRD Independence Limitations*

AESRD recognizes that some familiarity with a facility/offset project and its processes is helpful in reviewing the greenhouse gas assertion; however, AESRD also recognizes that a close relationship between the facility/offset project and verifier can compromise the verifier's impartiality over the long term. Consequently, AESRD has implemented the following limitations:

- Verifiers (company and lead verifier) can complete a maximum of **five** consecutive verifications for a facility or offset project. A mandatory two year break is required before the verifier (company and/or lead verifier) can undertake additional verifications for the facility/offset project.
    - The facility's initial baseline emissions intensity application is considered a compliance cycle. Resubmission of a previous compliance report or baseline emissions intensity application is **not** considered an additional compliance cycle.
    - If a facility undergoes multiple restatements, or if government audit identifies issues with a facility compliance submission that undermine AESRD's confidence in the compliance submission or verification, AESRD may require the facility to change verifiers.
- Aggregation companies that submit several aggregated offset projects per year may utilize the same verifier for a maximum of eight consecutive verifications. A minimum **two year**

break is required before the verification company/lead verifier can be rehired. Aggregated projects completing one verification per year must adhere to the same requirements as other project types, and must rotate verifiers every **five** years.

2.2.2 Client Evaluation

Client evaluation is used to reduce the threat of litigation against the verifier and helps ensure quality control during the verification. The following factors stated in Table 1 below are used to assess the integrity of the client:

Table 1: Client Evaluation Factors

Factors	Examples of When Client Acceptance Is Not Likely Appropriate
The business reputation of the client's principal owners, key management, related parties and those charged with the greenhouse gas emission assertion.	Client is known for selling the same greenhouse gas offsets/credits in multiple markets.
The attitudes of the client's principle owners, key management, related parties and those charged with the greenhouse gas emission assertion.	Client is known for understating greenhouse gas emissions because of shareholder concerns.
The nature of the client's operations, including its business practices.	Client's business is has expanded into an area where they have little expertise or experience.
Whether the client is aggressively concerned with maintaining the verification costs as low as possible.	Client is insisting on a fee structure that is below the verifier's recovery costs.
Client seeks to impose inappropriate limitations on the scope of work.	Client would like verification done without a site visit.
Indications that the client might be involved in criminal activities.	Client has prior misreporting that resulted in legal action.
Reasons for the selection of the current verifier and the non-selection of the previous verifier.	Non-selection of previous verifier was based on a modified or adverse opinion.
Other relevant factors	

The verifier must assess the relevant factors to decide whether to enter into a contract to provide verification services. If issues are identified and the verifier and client wish to proceed with the verification, the verifier must document these issues and any steps taken to mitigate or resolve the issues in the verifier's working papers.

2.2.3 Verification Evaluation

The verifier evaluates whether the fundamental elements necessary to perform verification are present. These include:

- Program criteria;
- Appropriate subject matter; and

- Sufficient and appropriate evidence.

2.2.3.1 *Program Criteria*

Program criteria are the benchmarks used to evaluate the subject matter. These criteria establish the methods used to quantify the greenhouse gas emissions and the manner in which the emissions are reported to the intended user (AESRD). In other words, they provide the accounting methods, and presentation and disclosure requirements for the greenhouse gas assertion. In Alberta, the program criteria are set by government regulations and technical guidance documents (See page iv).

Offset projects have additional criteria, which include the government approved quantification protocol(s), and the offset project plan developed by the project developer. These documents provide the methods and quantification approaches used by the offset project developer to quantify greenhouse gas emissions reductions and/or removals achieved by the project, and serve as a reference point for verifiers to determine whether assurance can be provided for the offset project.

Program criteria are evaluated using the characteristics described in Table 2. The program criteria and characteristics used to evaluate the criteria need to be documented in the verification report to allow AESRD to understand how the assertion was evaluated/measured. Additional disclosure may be needed on areas where there are several different options for quantifying greenhouse gas emissions.

Note: the verifier's expectations, judgments, and experience inform the verification approach and plan, but are not considered to be program criteria for the purposes of assessing the greenhouse gas assertion.

Table 2: Characteristics of Program Criteria

Characteristics	Definition	Comments
Relevance	• Contributes to the conclusions and assists with decision making of the intended user	• The quantification methods are applicable to the source and its operating conditions.
Completeness	• There are no relevant factors, including presentation and disclosure that have been omitted that would affect the conclusions of the intended user.	• The quantification methods include all material sources and sinks at the facility or offset project.
Reliability	• Allows for the consistent evaluation of the subject matter[12] by other similarly qualified personnel.	• The quantification techniques are specific to the equipment and can be duplicated with similar results by qualified personnel.
Neutrality	• Values are not overstated or understated, and no bias has been introduced into the reporting.	• Over stating or understating emissions introduces bias in Alberta's greenhouse gas reporting system and are to be avoided. • Reporting entities and verifiers disclose assumptions that affect the accuracy of

[12] Subject matter includes all relevant information used to develop the greenhouse gas assertion. It is discussed in more detail in Section 2.2.3.2.

Characteristics	Definition	Comments
		reported emissions.
Understandability	• Allows for clear, comprehensive presentation of the subject matter to support consistent interpretation of the information by qualified personnel.	• Supports consistent interpretation of information being presented in the greenhouse gas assertion.

2.2.3.2 *Appropriate Subject Matter*

The subject matter for a facility is the greenhouse gas emissions and production from the facility, which includes the total greenhouse gas emissions, production, and any information (e.g., line items) that can be appropriately evaluated against the program criteria. The subject matter for an offset project is the greenhouse gas emissions from the offset project and baseline, including the total greenhouse gas emission reduction and/or removals achieved by the offset project that can be evaluated against program criteria.

The subject matter does not include confirmed information (see Section 5.4) because it cannot be evaluated against program criteria.

Verifiers must assess the appropriateness of the subject matter being evaluated against the program criteria. If the subject matter is not appropriate given the program criteria, the verifier should not proceed with the verification. Examples of inappropriate subject matter include: reliance on attestations without supporting records and or effective controls, use of outdated methodologies, and the use of generic quantification methodologies where site specific information is available[13].

2.2.3.3 *Sufficient and Appropriate Evidence*

Verifiers must assess whether sufficient and appropriate evidence has been collected and is available to support the greenhouse gas assertion and verification. A verifier should not proceed with verification if they do not believe there is sufficient and appropriate evidence to support the responsible party's greenhouse gas assertion.

Obtaining information on the responsible party's data management systems and extent of records available to support the assertion can be done through interviews, questionnaires, and preliminary documentation review. Many verifiers have standardized this process through forms which are filled out by the responsible party and provide the verifier with a general sense of information available, including potential weaknesses in the available evidence.

This initial assessment of the responsible party's data management systems and records also helps to set the scope and cost for the verification. Data management systems with larger data sources/higher complexity or higher reliance on manual data processes will likely take more time to assess and have higher verification costs than simpler or more automated systems.

[13] AESRD prefers the use of more accurate methodologies than generic emission factors unless it can be substantiated that the generic emission factors are more accurate than other methods.

Some considerations for the responsible party's data management system review are:

- Degree of automation: data management systems that are automated are usually of higher quality and repeatability than those that are heavily reliant on manual components.
- Use of database features: data management systems that are based on data warehouses or databases are usually of higher quality and quantity than those that are based on spreadsheets or hard copy.
- Length of operation: data management systems that have been operational for several years are usually of higher quality that those that have just been implemented.
- Linkage to other systems: data management systems that are linked in with operational systems or financial systems are usually of higher quality than those that are stand-alone.
- Standardization within an organization: data management systems that are consistently applied throughout the organization are usually of higher quality than those that have multiple platforms.
- Transparency of calculations: data management systems with easy access to calculations rather than embedded in libraries and scripts are easier to review than "black box" systems.

Considerations for records evaluation are:

- Automation: records tied to automated processes are usually of higher quality and quantity than records that made through manual processes.
- Frequency: records that are recorded at higher frequency (e.g., monthly) are usually of higher quality and quantity than records that are recorded at a lower frequency (e.g., annually).
- Connection to other programs: records that feed into performance reward/compensation systems/programs may have positive or negative impacts on data quality depending on the degree of security around these systems.
- Connections to financial transactions: records that feed into financial systems are usually of higher quality than those that do not.
- Connections to other processes: records that are relied upon for operational processes are usually of higher quality than those that are not.

2.2.4 Team Composition

Verification teams must include all of the roles listed below:

- **Designated signing authority;**
- **Lead verifier;**
- **Peer reviewer; and**
- **Subject matter experts (as required).**

> ***Hint**: Professional engineers and accountants tend to have different expertise and emphasis in their approach to verification. Verification teams are strongly encouraged to use a team approach that blends both these skills sets to ensure a comprehensive approach to greenhouse gas verification.*

2.2.4.1 *Designated Signing Authority*

The designated signing authority must be a chartered accountant or professional engineer that meets the requirements of Section 18 of the *Specified Gas Emitters Regulation*. This individual is bound by legal responsibility and the professional code of conduct of their respective associations. The signing authority is responsible for:

- Ensuring the verification acceptance requirements have been met. If concerns are identified, the designated signing authority will ensure appropriate mitigation measures are put in place and documented;
- Ensuring the verification was conducted according to the appropriate standards and that the verifier's management system for quality and independence has been applied during the verification;
- Ensuring that the verification was conducted in a professional manner; and
- Signing the statement of verification.

In order to accomplish these responsibilities, the designated signing authority must have the following competencies and attributes:

  - **Is a professional engineer under the *Engineering and Geoscience Professions Act*, or a chartered accountant under the *Regulated Accounting Profession Act*, or a member of a profession that has substantially similar competencies and practice requirements as a professional engineer or chartered accountant in a province or territory of Canada, or if a jurisdiction outside of Canada[14], approved by the Director;**
  - **Legal right to work in Canada[15];**
  - **Legal authority to sign the statement of verification on behalf of the verification company;**
- **General knowledge of the subject matter (e.g., basic understanding of the regulatory framework and science underlying the submission); and**
- **Training in the appropriate verification standard (audit practices).**

The designated signing authority and lead verifier can be the same person.

2.2.4.2 *Lead Verifier*

The lead verifier is responsible for:

- Managing the verification;

[14] Alberta Environment and Sustainable Resource Development, 2007, *Specified Emitters Gas Regulation*, Section 18.1.a.i.

[15] The Director may approve the use of a verifier from a jurisdiction outside of Canada if the verifier can demonstrate equivalent competencies.

- Ensuring the team has the appropriate competencies for the verification;
- Communicating to key members of the responsible party the objectives and the results of the verification; and
- Has sufficient knowledge of the subject matter to know when to include a subject matter expert.

In order to accomplish these responsibilities, **the lead verifier must have project management skills, detailed knowledge of the verification process, and knowledge of the verifier's quality control mechanisms needed to manage the verification.**

The designated signing authority and lead verifier can be the same person.

2.2.4.3 Peer Reviewer

The peer reviewer provides guidance and an objective assessment of the verification prior to the issuance of the final statement of verification and final verification report. **The peer reviewer** does not need to be a professional as specified in the *Specified Gas Emitters Regulation*, but **must have the competencies necessary to conduct an informed technical review of the verification.**

The peer reviewer is responsible for assessing:

- **That the independence of the firm and the verification team members in relation to the specific verification has been adequately conducted;**
- **The planning process, including the analysis of the key components of verification risk and the adequacy of the responses to those risks including the assurance team's assessment of and response to the risk of fraud (see Section 3.6.9 for more information on fraud);**
- **The results of the verification and the appropriateness of the key judgments made, particularly in high-risk areas;**
- **Whether appropriate consultation has taken place on difficult or contentious issues and is appropriately documented;**
- **The presentation of the greenhouse gas assertion covered by the verifier's statement of verification;**
- **The significance of any misstatements that the responsible party has declined to correct;**
- **Whether the verification team has appropriately communicated key issues to the responsible party during the course of the verification;**
- **The appropriateness of the verifier's report; and**
- **Whether the documentation reviewed supported the conclusions reached and stated in the verifier's statement of verification and report.**

The competencies of the peer reviewer will change depending on the subject matter (e.g., sector or offset project type) being reviewed. At a minimum, **the peer reviewer must be able to demonstrate sufficient competencies to complete the functions above**.

Note: **the peer reviewer must maintain a degree of independence during the verification.** The peer reviewer cannot be extensively[16] involved in the verification and cannot sign the statement of verification as this could compromise the peer reviewer's objectivity.

2.2.4.4 *Team Competencies*

Verifications typically require a range of skills and competencies that are unlikely to be held by a single individual. AESRD strongly encourages the use of a team approach to verifications to ensure correct competencies are available to support the verification. **Teams must include, at a minimum two individuals,** and may include more depending on the skills needed for the specific verification. **Table 3 sets out the basic technical competencies that the verification team must possess.**

Table 3: Verification Team Competencies

Category Competency	Basic Competencies
Greenhouse gas program requirements	• The legal rules under which the verification is being undertaken (e.g., the Act, regulations, guidance documents, quantification protocols, and other related documents). • Any specific principles or requirements of the relevant standards that fall within the scope of the verification.
Greenhouse gas science	• The processes that generate greenhouse gas emissions and removals • Technical knowledge of the specified gas emission quantification methodologies[17], including technical issues associated with their quantification (e.g., emission factors, emission inventories, production, etc.), monitoring, and reporting. • Applicability and limits of quantification methodologies. • The sources and types of greenhouse gas sources and sinks associated with technologies and industries.

[16] The peer reviewer may be consulted by the verification team during the verification; however, they cannot be involved in the execution of any of the procedures.

[17] Alberta Environment and Sustainable Resource Development, 2007, *Specified Emitters Gas Regulation*, Section 18.1.b.i

Category Competency	Basic Competencies
Verification methodologies	• Concepts of verifying data and information, including roles and responsibilities, level of assurance, materiality, and program criteria. • Technical knowledge regarding audit practices[18]. • Process of verifying data and information, including review planning, data sampling, risk assessment methodologies, uncertainty assessment techniques, and sensitivity analysis. • Application of data and information assurance to the greenhouse gas verification. • The activities required to identify failures in greenhouse gas reporting systems and any potential impacts on the greenhouse gas assertion. • The types of statements of verification, including acceptable reservations in the statement. • Reporting on the verification. • Presentation and disclosure, including qualitative components and the principle of conservativeness.
Technical expertise on the subject matter	• Technical competence in the industry, sector and the specific technology. • An understanding of the greenhouse gas sources and sinks common to the industry, sector and technology. • Greenhouse gas emission and/or removals quantification, monitoring and reporting methodologies used, including inherent uncertainties in the quantification process (e.g., measurements and calculations). • Understanding of the operational processes and production.
Offset project specific requirements	• Baseline selection and evaluation process, including the principle of conservativeness in estimating emission reductions and/or removals. • Functional equivalence[19] and the establishment of offset project boundaries. • Uncertainty in offset projects.

2.2.4.4.1 Subject Matter Experts

> ***Hint**: Agriculture offset projects may benefit from the addition of a Professional Agrologist with relevant expertise to the verification team.*

Situations may arise where the verification team does not contain all the necessary expertise in house that is needed to complete the verification. In these situations, **the verifier must engage subject matter experts to address the specific competencies or skill sets needed to complete the verification.**

The lead verifier must ensure they have fully evaluated and documented the need for a subject matter expert, the role the expert will play, and their competencies in supporting the verification. This must be documented in the final verification report.

[18] Alberta Environment and Sustainable Resource Development, 2007, *Specified Emitters Gas Regulation*, Section 18.1.b.ii.

[19] Functional equivalence is the ability to compare project emissions to baseline emissions to quantify a change in emissions resulting from the offset project. More information on functional equivalence is provided in Alberta's Technical Guidance for Offset Protocol Developers.

The lead verifier must communicate the following to the subject matter expert:

- **The objective and scope of the subject matter expert's work in the context of the verification;**
- **The form and general content of the subject matter expert's advice, including what may be disclosed in the final verification report;**
- **The intended use of the subject matter expert's work;**
- **The extent of access to the subject matter expert's working files required by the verifier;**
- **Any follow-up access to the subject matter expert's work that may be required by the intended user; and**
- **Information regarding assumptions and methods intended to be used by the subject matter and their consistency with those used in prior periods.**

In evaluating the subject matter expert's work, **the verifier must consider the appropriateness of the work as verification evidence to support a conclusion on the greenhouse gas assertion**. This may include evaluating the source data used and the assumptions and methods used by the subject matter expert. Additional follow-up may be required by the verification team if the subject matter expert's work does not provide sufficient and appropriate evidence, or is not consistent with other verification evidence.

3 Planning

Verification planning is depicted in Figure 3 below. It is a strategic, risk-based exercise that involves collecting existing and easily obtained information to determine what procedures will be applied during the execution phase.

> ***Note**: The term "procedures" is a generic term used for the collection and evaluation of evidence. This term originates from financial auditing. The ISO equivalent terms are sampling and verification/ planning activities. This document will be using the term procedures to mean the activities conducted to collect and evaluate evidence.*

The planning process examines the risks of misreporting the assertion. Procedures are then designed to address these risks. In order to do this, the **verifier must gain an understanding of the subject, including an understanding of the processes, internal control, and availability of information** (See Section 3.1 - Gain an Understanding). This information is then used to evaluate the inherent, control and detection risks associated with the assertion (See Section 3.2 - Verification Risk Assessment).

Once the risk assessment is done, planning analytical testing is generally conducted to identify areas of risk in the assertion[20] (See Section 3.3 - Planning Analytics). During planning, the verifier will examine the relative contribution of each line item (a grouping of greenhouse gas sources and sinks that share the same inherent and control risks) in the inventory and how it influences the assertion to determine the potential magnitude of misreporting (See Section 3.4 - Contribution Analysis). A materiality analysis is used to determine the magnitude and significance of misreporting (See Section 3.5 - Materiality Assessment). Once the significant areas for investigation have been identified, appropriate procedures can be designed.

> ***Note:*** *Analytical testing is the analysis of relationships between independently measured variables. Planning analytical testing is conducted at the planning phase and is usually limited to high level tests. More detailed analytical testing can also be used as a substantive procedure during the execution phase and as a confirmation procedure during the completion phase.*

Figure 3: Process of Verification Planning

3.1 Gain an Understanding

Gaining an understanding is achieved through inquiry, observation, and inspection procedures. It is used to allow the verifier to obtain sufficient knowledge of the facility or offset project's operations to understand events, emission and removals, and management practices that affect the greenhouse gas assertion. This understanding provides a framework for planning the overall verification approach tailored to the unique characteristics of the facility or offset project.

For initial verifications, this process requires a significant portion of time as the verifier collects and evaluates aspects of the operations, data, and responsible party's data management systems used to develop the greenhouse gas assertion.

[20] Planning analytics are performed when the procedure yields useful information in an efficient manner. It is not a mandatory step.

3.1.1 Operations

Verifiers must gain an understanding of the entity's technical operations and processes to develop an effective and efficient verification. This includes understanding:

- **The greenhouse gas sources and sinks in the inventory;**
- **Controls used to capture and process relevant data; and**
- **Influences, such as reward systems (e.g., bonuses tied to operation metrics), on the behaviour of management and other key personnel that might affect the risk of misstatement in reported greenhouse gas emissions.**

Verifiers normally use the following procedures, tailored as appropriate, to gain an understanding of the facility/project's operations:

1. Requests for information from the entity including a process flow diagram or simplified block diagram of the operation to:
    - Identify sources and sinks that should appear in the inventory;
    - Identify variables that may be related to one another;
    - Understand what measurements related to the greenhouse gas emissions, and as appropriate, production may be available;
    - Understand the boundaries of the verification; and
    - Identify sources and sinks so their corresponding quantification methodology can be identified.
2. Develop a historical graph of key variables over prior periods to understand the pattern of operation. Key variables may include, for example, greenhouse gas emissions, fuel consumption, production, etc.
3. Interview key operations personnel to obtain an understanding of:
    - Normal operations;
    - Relationships between variables;
    - Availability of measurements and records;
    - Common performance metrics from an operational perspective and a reward perspective;
    - Significant operational events (e.g., shutdowns, changes in operations, emergencies, retrofits, etc.) that occurred during the assertion period; and
    - The risk assessment process used to assess the risk of misreporting.
4. Perform an information search to determine if there are any:
    - Impending regulations that affect operations or the assertion; and
    - Significant event that affect the greenhouse gas assertion.

5. Review the results of prior verifications to determine:
    - Areas of control weakness that should be examined in this verification;
    - Uncorrected misstatements that may be material in this verification; and
    - Presentation and disclosure issues that are pertinent in this verification.

3.1.2 Data Management

Greenhouse gas data management systems are the procedures and systems (e.g., paper, electronic, databases, etc.) that the responsible party uses to measure, manage, store, and report data and information. **Verifiers must have sufficient understanding of the greenhouse gas data management system to develop the verification strategy and plan the verification.** The data management system is often a composition of data platforms including the financial accounting system, the operation control system, manual records, etc.

Data flow is used to understand:

- Measurements used;
- Information transfer processes from one part of the data management system to another (e.g., measurement records entered into a spreadsheet);
- Different data management systems involved in creating the greenhouse gas assertion;
- Calculations performed;
- Greenhouse gas reporting; and
- Information storage.

Controls are activities and processes that an organization implements to reduce the potential for misreporting. Controls can be endemic (e.g., the tone at the top), or specific (e.g., reconciliation of fuel purchase between invoices and meters). Controls can be specific to the data flow (e.g., record counts), or embedded in the organization (e.g., training). Assessing data controls requires the verifier to understand:

- The control and its location in the data flow;
- The control objective;
- The importance of the control;
- Who operates the control;
- The frequency of operation of the control;
- The control type;
- The control method (e.g., automated, manual, etc.); and
- The implementation of the control.

Verifiers must document their understanding of the responsible party's data management system including the data flow and controls used in the verifier's working papers.

3.2 Verification Risk Assessment

Verification risk is the risk the greenhouse gas assertion is misstated. It is assessed at both the greenhouse gas statement and attribute level where the attribute level refers to the inherent characteristics of the greenhouse gas assertion (e.g., completeness, accuracy, etc.). Attributes are discussed in more detail in Section 3.2.1.2 below.

For facilities, the greenhouse gas statement level is the high level statement made by the facility of its overall emissions and that it is in compliance with its approved baseline emissions intensity limit. For offset projects, the greenhouse gas statement level is the greenhouse gas emissions reductions and/or removals achieved by the offset project for a defined period of time.

The relationship between the statement and attributes levels is depicted in Figure 4 below.

Reasonable assurance requires that the verifier have a higher confidence in the greenhouse gas assertion than was needed under a limited level of assurance. This means **the verifier must develop procedures that lower the verification risk** and hence the chance of having a misstatement in the greenhouse gas assertion. Verifiers reduce the verification risk by identifying areas of risk and designing an appropriate verification strategy, verification plan, and testing procedures to assess these risks.

Verification risk is assessed based on inherent, control, and detection risk in the greenhouse gas assertion and line items comprising the broader assertion[21]. These risks are discussed in more detail in Sections 3.2.2 to 3.2.4.

Greenhouse Gas Assertion, Greenhouse Gas Statement and Attributes

The greenhouse gas assertion refers to representations, explicit or otherwise that are embodied in the Baseline Emissions Intensity Application, Specified Gas Compliance Report or Offset Project Report.

Examining the greenhouse gas assertion from the greenhouse gas statement level perspective means that the verifier is looking for risks that can change the assertion but may not be identified with a particular source or data flow and result from a lack of general internal control.

Examining the greenhouse gas assertion from the attribute level perspective means that the verifier is looking for risks that change the assertion associated with a line-item.

3.2.1.1 Greenhouse Gas Statement Level

Misstatement at the greenhouse gas statement level can adversely affect the greenhouse gas assertion as a whole. Risks of this nature are not necessarily risks identifiable with a specific type of emission or disclosure level. Rather, they represent circumstances that may increase the risks of misstatement more generally.

Risks of misstatement at the greenhouse gas statement level may include, for example:

- The ability for management to override internal controls;
- Inadequate, poorly controlled and/or poorly documented mechanisms for collecting data, quantifying emissions, and preparing the greenhouse gas assertion including quality checks;

[21] International Audit and Assurance Standards Board, June 2012, *International Standard on Assurance Engagements*, ISAE 3410, Assurance Engagements on Greenhouse Gas Statements, A79-A82

- Lack of staff competency in collecting data, quantifying emissions and preparing greenhouse gas assertion;
- Lack of management involvement in quantifying emissions and preparing the greenhouse gas assertion;
- Failure to identify accurately all the greenhouse gas sources;
- Risk of fraud, for example, in connection with emissions trading markets;
- Presenting information covering prior periods that is not prepared on a consistent basis, for example, because of changes in boundaries or measurement methodologies;
- Misleading presentation of information in the greenhouse gas assertion;
- Inconsistent quantification methods and reporting policies;
- Errors in unit conversion when consolidating information; and
- Inadequate disclosure of material scientific uncertainties and key assumptions in relation to estimates.

These types of risks must be considered when the verifier assesses the risk of misstatements and fraud in reported information.

Line Items vs. Attributes

Line items *are groups of sources or sinks that have similar control and inherent risks. Controls can prevent, detect and correct misstatements whether they are about the quantification or presentation and disclosure of the greenhouse gas assertion.*

The objective of the control (e.g., to prevent a misstatement on the completeness of the inventory) can be classified into an ***attribute****.*

3.2.1.2 Attributes of the Assertion

The concept of attributes of the assertion is used by verifiers to explain the different types of potential misstatements that can occur.

The greenhouse gas assertion has attributes that relate to quantification, presentation, and disclosure of greenhouse gas emissions and reductions and/or removals. These attributes fall into the following categories and may take the following forms:

(a) Attributes of quantification:

- Occurrence: emissions and reductions and/or removals that have been recorded have occurred and pertain to the facility or offset project;
- Completeness: all emissions and reductions and/or removals that should have been recorded have been recorded;
- Accuracy: emissions and reductions and/or removals quantification has been recorded appropriately;
- Cut-off: emissions and reductions and/or removals have been recorded in the correct reporting period; and

- Classification: emissions and reductions and/or removals have been recorded in the appropriate category.

(b) Attributes of presentation and disclosure:

- Occurrence and responsibility: disclosed emissions and reductions and/or removals have occurred and pertain to the facility or offset project;
- Completeness: all disclosures that should have been included in the greenhouse gas assertion have been included;

> ***Note:*** *the risk assessment for presentation and disclosure attributes of the assertion cannot be done during the planning phase because the verifier lacks sufficient information at this point to assess these risks. This work must be done during the execution phase.*

- Classification and understandability: emissions, production, and reductions and/or removals information is appropriately presented and described, and disclosures are clearly documented;
- Accuracy and quantification: emissions and reductions and/or removals quantification, and related information included in the greenhouse gas assertion are appropriately disclosed; and
    - Consistency: quantification methodologies are consistent with those applied in the prior period and baseline. If changes have been made, sufficient justification should be provided. Substantive changes may require approval from AESRD. Any restatements in prior periods should be clearly documented and any impacts to past assertions should be documented.

Figure 4: Statement and Attributes Levels of the Greenhouse Gas Assertion

3.2.2 Inherent Risk

Inherent risk is the risk that a greenhouse gas assertion may be misstated because of inherent challenges in the subject matter. Inherent risk does not consider internal controls which are addressed in control risk assessment. Inherent risk changes with the industry, number and type of sources and sinks, number of data streams, complexity of calculations, uncertainty in measurements, inventory or offset project assertion, and the greenhouse gas category. Verifiers and responsible parties cannot change inherent risk of the subject matter.

Offset projects typically have higher inherent risk because the differential calculation between the baseline and the offset project conditions creates a degree of imprecision in the assertion that is higher than what is typically seen in an inventory (facility) assertion. Likewise, aggregated offset projects have higher complexity and higher inherent risk than non-aggregated offset projects.

Hint: If there have been changes from the prior submission (e.g., ownership, merger or acquisition, facility equipment, methodology, baseline, turnover of key staff, etc.) this increases the risk ranking for the line item

3.2.3 Control Risk

Control risk is the risk that a misstatement in the greenhouse gas assertion has occurred and has not been detected and corrected by the facility or offset project's internal controls. It is assessed as high, medium, or low risk. Control risk is determined based on design of the responsible party's data management system and how the data is managed.

Controls need to be designed to control inherent risk; the higher the inherent risk the more extensive the controls.

Understanding of controls and control risk is critical to designing a verification strategy. For example, production data is usually contained in one data management system allowing the control risk for that group of data to be assessed together. High control risk would mean controls were either not appropriately designed, not operating effectively, or both.

***Hint**: The responsible party is responsible for designing, implementing, and monitoring internal controls. Verifiers can provide comments on missing or ineffective controls that they encounter during the verification, but cannot force management to address deficiencies as this could place them in position of reviewing their own work and compromise their independence.*

3.2.4 Detection Risk

Detection risk is the risk that the procedures that the verifier applied do not detect a misstatement in the greenhouse gas assertion (e.g., the misstatement occurred and was not identified and corrected). The verifier's assessment of the risk of misstatement (i.e., the verifier's combined assessments of inherent risk and control risk) will affect the nature, timing and extent of the procedures performed for a particular assertion. Table 5 below provides an illustrative example of acceptable qualitative methods. **The verifier must design procedures to balance the inherent and control risk in the data.** The higher the combined inherent and control risk, the lower the detection risk must be to reach an acceptable verification risk.

3.2.5 Risk Assessment

The verifier must assess the inherent and control risk based on information collected to date. The verifier then designs appropriate procedures based on these risks that manage the verification risk (see Figure 5).

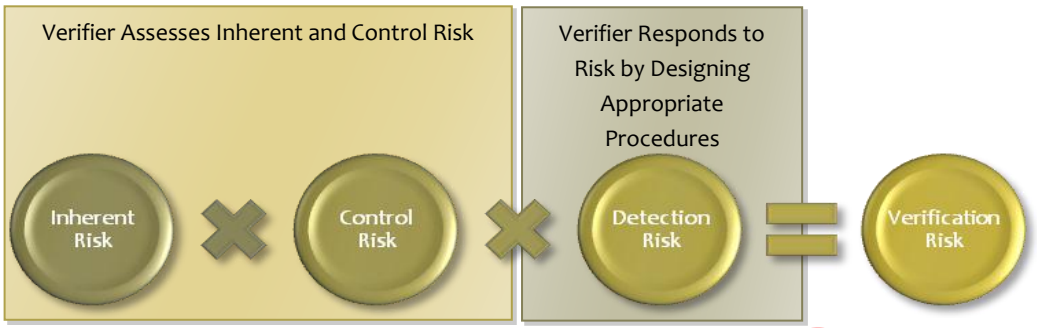

Figure 5: Verification Risk Model

There is an inverse relationship between the inherent and control risks, and the detection risk. If the inherent and control risks are high, **the verifier must design and perform procedures that result in a low detection risk so that the overall verification risk is low**. In some situations, the inherent and control risk may be so high that it would be impractical or cost prohibitive to design and perform verification procedures to achieve the desired low level of verification risk. An example would be an offset project that relies exclusively on manual data management processes and hard copy records.

Table 4: Design of Detection Risk

		Verifier's Assessment of Control Risk		
		High	**Medium**	**Low**
Verifier's Assessment of Inherent Risk	**High**	Lowest	Lower	Medium
	Medium	Lower	Medium	Higher
	Low	Medium	Higher	Highest

3.2.5.1 *Line-Items*

The assessment of inherent and control risks does not need to be conducted for every greenhouse gas source or sink; it can be done on a line item basis where a line item is a grouping of greenhouse gas sources and sinks that share the same inherent and control risks. Line items do not necessarily correlate to greenhouse gas reporting categories. For example, the stationary combustion emission category may include natural gas consumption for several engines and turbines and a diesel backup engine. The natural gas consumption is measured by a meter through the operational control system at a single location with specific frequency readings. The diesel backup engine is measured by tank dip methods recorded manually and is measured annually. The inherent and control risks are significantly

different for these two sources in the stationary combustion category and therefore, need to be assessed as separate line items. However, all the natural gas engines and turbines have similar inherent and control risks and can be evaluated as one line item.

The concept of line items can also be applied to production data. Refineries, sour gas plants, and cogeneration facilities have multiple products that can be assessed on a line item basis.

Conducting a risk assessment in practice requires verifier judgment on whether the risks are being appropriately isolated and identified. The underlying principle is that the risk assessment should be able to identify risks at the appropriate level of detail.

Table 5 and Table 6 provide examples of how a risk assessment at the attribute level might be done for a facility and project.

Table 5: Example of a Qualitative Risk Assessment Table for an Electricity Generation Facility

Line Item	Attribute	Inherent Risk	Control Risk	Detection Risk Design	Considerations for Procedures
Greenhouse Gas Statement level (e.g., Entire Inventory)	Occurrence Completeness	Medium – sources and sinks well known for this type of operation; however, many sources can exist and there can be several variations of configuration for this type of operation	High – no controls in place	Lower	Site can be toured in less than a day and all operations are visible
Fuel Consumption	Occurrence Completeness	Low – one fuel type and one device	Low – meter is revenue meter, tied into operational process management, records maintained in operations database	Highest	Observation and analytical procedures would be able to detect
	Accuracy	Low – meter type is very accurate	Low – revenue meter has strict calibration requirements	Highest	Cannot re-perform calibration but can examine controls
	Cutoff	Low	Low – invoices are part of financial system	Highest	Meter frequency is sufficient to detect cut-off and records exist
	Classification	Low – obvious classification	High – no controls around classification	Medium	Some categories can subject to interpretation
Mobile Sources	Occurrence	Medium – multiple pieces of equipment and fuels (diesel, gas, and propane) – no significant storage onsite	Low – all purchases of fuel are processed through financial controls	Higher	Fuel records are available but distances travelled for fuel consumed are not
	Completeness	High – many mobile sources onsite		Medium	Automated records available but good analytics not available
	Accuracy	Medium – only a few different types of vehicles with similar ages and configurations		Higher	Automated records available but no distinction on type of onsite vehicle
	Cutoff	Low – year ends are clear and operations close out daily		Highest	Automated records available but good analytics not available
	Classification	Medium – Clear distinction between onsite and offsite vehicles – potential for contract use of fuel		Higher	Automated records available with distinctions between onsite and offsite vehicle
SF_6	Occurrence	Medium – fugitive release,	High – cannot use financial	Lower	Limited ability to do analytical testing

Line Item	Attribute	Inherent Risk	Control Risk	Detection Risk Design	Considerations for Procedures
	Completeness	storage onsite	system to control information because of storage, maintenance system manages records		
	Accuracy				
	Cutoff	High – indeterminate release dates, only fill dates		Lowest	Limited analytical testing and evidence is based on fill dates not release dates
	Classification	Low – clear classification and one source		Medium	Evidence is clearly identified as SF_6 and few uses for it exist onsite
Production	Occurrence	Low – one measurement onto the grid – only concern is ensuring parasitic power is not included	Low – standard financial controls in place	Highest	Good analytical testing exists, measurements at the appropriate frequency, good records
	Completeness	Low – one measurement out to the main distribution pipeline			
	Accuracy	Medium – revenue meter, but there is shrinkage, flaring and fuel consumption to consider		Higher	Values used on production reporting are calculated and not measured
	Cutoff	Low – measurements are dated		Highest	Measurements and reporting ate dated and measured on a daily basis
	Classification	Medium – some internal fuel is consumed on site		Higher	Values used in production reporting are calculated not measured

Table 6: Example of a Qualitative Risk Assessment Table for a Fuel Switching Offset Project

Item	Attribute	Inherent Risk	Control Risk	Detection Risk Design	Considerations for Procedures
Baseline – Direct fuel related emissions	Occurrence	Medium – one measurement point but multiple sources, no storage onsite except for diesel backup generator tank	Low – invoices and fuel amounts are tracked through financial systems	Higher	Good analytical testing exists, measurements at the appropriate frequency, good records for fuel combustion; however, high risk for tank dipping records as they have no analytical tests and infrequent measurements
	Completeness				
	Accuracy	Low- most measurements are with very accurate meters; however some smaller line items are conducted less accurate methods such as tank dipping		Highest	
	Cut-off	Low – regular dated measurements except for smaller line items which are dipped and have small amounts of storage on site			
	Classification	Low – fuel is used for combustion processes	Low – most invoices are marked with the type of fuel but do not state where and how in the process the fuel is used.		Fuel is marked and used for combustion only
Baseline – Indirect emissions	Occurrence	Low – electricity only one meter	Low – invoices and electricity consumption are tracked through financial systems	Highest	Measurements at the appropriate frequency, good records
	Completeness				
	Accuracy				
	Cut-off				
	Classification				
Baseline - other	Occurrence	High – multiple small sources with a variety of measurements	High – manually tracked on spreadsheet and entered and reported by same person	Lowest	Limited high quality procedures can be performed
	Completeness				
	Accuracy				
	Cut-off	Medium – no storage on site but measurements can be infrequent		Lower	
	Classification	Medium – various classifications			
Project – Direct fuel related	Occurrence	High – several measurements of different fuels and multiple sources, biomass fuels have	Medium – invoices and some directly used fuels can be tracked through financial	Lower	Good analytical testing exists, measurements at the appropriate frequency, good records, can inspect site
	Completeness				

Item	Attribute	Inherent Risk	Control Risk	Detection Risk Design	Considerations for Procedures
emissions		storage on site. Meters used are fairly accurate with the exception of fuels that are weighed.	systems, others fuels use standalone systems		for meters
	Accuracy		Medium – most meters for fuels have a maintenance program associated with them		Calibration maintenance and records exist in maintenance database – frequency of maintenance is unknown at this time
	Cut-off	Medium – in some instances frequency of measurement and storage could be a risk	Medium – invoices and some directly used fuels can be tracked through financial systems, others fuels use standalone systems	Medium	Good analytical testing exists, measurements at the appropriate frequency, good records, can inspect site for meters
	Classification	Medium – biofuel classification needs to be considered			
Project – Indirect emissions	Occurrence	Low – electricity only with one meter	Low – invoices and electricity consumption are tracked through financial systems	Highest	Measurements at the appropriate frequency, good records
	Completeness				
	Accuracy				
	Cut-off				
	Classification				
Project - other	Occurrence	High – multiple small sources with a variety of measurements	High – manually tracked on spreadsheet and entered and reported by same person	Lowest	Limited high quality procedures can be performed
	Completeness				
	Accuracy				
	Cut-off	High – frequency of measurement is low			Frequency of measurement is low
	Classification	High – multiple small sources with a variety of measurements			Multiple small sources with a variety of measurements

3.3 Planning Analytics

Planning analytics is an initial evaluation of records and data prior to initiating the verification. It is used to identify areas of concern in the data at the planning stage. It requires that the responsible party release supporting information requested by the verifier before the site visit. Types of data requested typically include: emissions, fuel consumption, production, energy consumption, etc. Data collected during this planning phase is used to inform the verification and sampling plan. Additional data requests will be developed during the verification to enable the verifiers to form a conclusion on the greenhouse gas assertion.

If sufficient data exists, planning analytics can be used to identify areas of concern that allow the verifier to focus the verification to appropriate risk areas. **The verifier must have sufficient experience and knowledge to develop analytics appropriate to the facility or offset project. Analytics used must be sufficiently sensitive to detect areas of concern. Results from the analytical testing, including any anomalies identified must be documented in the verifier's working papers.**

Analytics fall into two categories: comparison and relationship. Comparative analytics typically includes comparing evidence to:

- Similar operating periods;
- Anticipated results;
- Similar industry information; and
- Other, similar operations.

Relationship analytics assumes there is a relationship between two independently measured variables (e.g., fuel consumption for a turbine and energy produced by the turbine). Relationship analytics typically includes:

- Correlations; and
- Efficiencies.

3.4 Contribution Analysis

Contribution analysis is used to assess the relative contribution of the line item to the overall assertion and to compare a line item, or sources/sinks to materiality. This analysis is usually done for both the line item/source-sink and for greenhouse gas species reported in the assertion.

For facilities, the relative contribution of an item to the whole is the value of the line item divided by the total emissions, expressed as a percentage. Note that the contribution calculation is performed in units of CO_2e.

Production must also be verified and the contribution analysis for production uses the same approach as emissions analysis. The relative contribution of an item to the whole is the value of the line item divided by the total production, expressed as a percentage. Note the contribution analysis for production is performed in consistent units; however, the units will vary with the product type. For example, the summation of various hydrocarbon productions may need to be conducted on oil equivalents, whereby the contribution analysis is done on energy rather than volume.

For offset projects, the relative contribution of a line item to the whole is the value of the line item divided by the emission reductions, expressed as a percentage. Note that the contribution calculation is performed in units of CO_2e.

Table 7: Example of an Inventory Contribution Analysis

Greenhouse Gas Category	Source/Sink	CO_2	CH_4	N_2O	SF_6	Emissions	Contribution
		(tonne CO_2e/a)					
Stationary Fuel Combustion	Engine	170,000	10,000	900	0	180,900	54%
	Boiler	120,000	8,000	500	0	128,500	
On-site Transportation	On-site Vehicles	25,000	1,200	300	0	26,500	5%
Flaring		30,000	2,500	300	0	32,800	6%
Fugitive		1,000	50,000	250	25,000	76,250	13%
Industrial Process		0	125,000	0	0	125,000	22%
TOTAL		346,000	196,700	2,250	25,000	569,950	
Greenhouse Gas Contribution		61%	35%	0%	4%		
Production Category						Volume (m^3/yr)	Contribution
Pentane						88,439	33%
Butane						99,893	38%
Propane						76,675	29%
TOTAL						265,007	

Table 8: Example of an Offset Project Contribution Analysis

Category	Source/Sink	CO_2	CH_4	N_2O	SF_6	Emissions	Contribution
		(tonne CO_2e/a)					
Project							
Stationary Fuel Combustion	Engine	50,000	1,250	100	0	51,350	66%
On-site Transportation	On-site Vehicles	10,000	250	50	0	10,300	13%
Indirect	Electricity Consumption	67,000	1,500	120	25	68,645	88%
Mobile	Off-site Vehicles	3,000	700	50	0	3,750	4.8%
Project Total		130,000	3,700	320	25	134,045	
Contribution		167%	4.7%	neg.	neg.		
Baseline							
Stationary Fuel Combustion	Engine	100,000	5,000	200	0	105,200	135%
On-site Transportation	On-site Vehicles	10,000	250	50	0	10,300	13%
Indirect	Electricity Consumption	90,000	2,250	200	60	92,510	119%
Mobile	Off-site Vehicles	3,000	700	50	0	3,750	4.8%
Baseline Total		203,000	8,200	500	60	211,760	
Greenhouse Gas Contribution		261%	11%	0.1%	neg.		
Emission Reduction						77,715	

3.5 Materiality Assessment

The term *materiality* is used to distinguish between misstatements that are significant and those that are not. The technical definition of materiality is:

> *Information is material if its omission or misstatement could influence the decisions of intended users taken on the basis of the greenhouse gas assertion.*

Materiality is assessed during the planning phase and again during the completion phase of the verification. During the planning stage, materiality is used to help design appropriate procedures. Materiality during the completion phase is used to evaluate misstatements (See Section 5.1.5 for information on completion materiality).

AESRD has defined end user materiality for the program based on reporting entity emissions as shown in Table 9.

Table 9: User Materiality for Inventories

Total Annual Emissions (ktonne CO_2e)	User Materiality (% of Total Annual Emissions or Total Annual Production)
≤ 500	5
> 500	2

Offset projects use a 5 percent of the emission reductions or removals for a materiality threshold.

3.5.1 Materiality Categories

Materiality can be thought of in qualitative and quantitative terms. Quantitative materiality is an assessment of errors in reported values resulting from actual misstatements, incomplete inventories or misclassified greenhouse gas emissions, quantifiable errors, and variability in estimates.

Hint: *Examples of qualitative material errors in the assertion could include high uncertainty in the assertion, poor controls over the significant portions of the data, and significant personnel turnover.*

Qualitative materiality refers to intangible issues that affect the greenhouse gas assertion and may affect the verifier's confidence in the reported data. Qualitative errors are based on the professional judgement of the verifier. Examples include:

- Control issues that errode the verifier's confidence in the reported data;
- Poorly managed files;
- Difficulty in locating requested information;
- Reluctance to provide information; or
- Similar issues that call into question the robustness of the greenhose gas assertion.

In general,

- Quantitative materiality (size of the item or error) is judged in the particular circumstances of the omission or misstatement.
- Qualitative materiality (usefulness of the information) is also judged in the particular circumstances of the ommission or misstatement, but provides context for the errors rather than thresholds for further work.

Materiality and uncertainty are distinct concepts that are interrelated in that, if a greenhouse gas assertion has high uncertainty, this affects the usefulness of the information and hence become a

material qualitative issue that may require further disclosure. There is a point where uncertainty in the greenhouse gas assertion is significant to the point where the assertion is questionable (e.g., when the emission reduction claim has ±100 percent uncertainty) at which point the verifier should consider alternatives to an unmodified statement of verification (Refer to Figure 11).

3.5.2 Tolerable Error

Verifiers must design the verification plan using an appropriate materiality level to detect quantitative misstatements in the assertion. This is commonly referred to as tolerable error. Tolerable error is the misstatement allowed in a particular category (e.g., line item, greenhouse gas type, production, etc.) that would be acceptable to the verifier without needing additional assessment. It is usually set lower than the evaluation/intended user materiality to allow the verifier to detect individually immaterial misstatements that may aggregate to a material error. Tolerable error is applied to the total emissions and to individual line items and greenhouse gas species. As such, it is rarely a single value and should be assessed in the context of the item being assessed.

For example, AESRD has set the evaluation/intended user materiality at 5 per cent for a facility emitting under 500,000 tonnes CO_2e per year. Tolerable error for this facility could be set at the total assertion level, by line-item level, and/or by greenhouse gas species although it is not typically necessary to assess materiality at each of these levels to identify material errors in the assertion. Instead, verifiers would set tolerable error at the total assertion and for line items that pose higher risks to the assertion (e.g., SF_6 gas species category).

Table 10 below provides an illustrative example of tolerable error assessment. Note that the tolerable error for the total emissions is calculated using the line item tolerable error and standard general equation for error propagation[22] for sums and differences.

[22] $\delta q = \sqrt{(\delta x)^2 + (\delta y)^2 + \cdots + (\delta z)^2}$

Table 10: Example of Tolerable Error

Category	Source/Sink	CO_2	CH_4	N_2O	SF_6	Emissions	Tolerable Error
		(tonne CO_2e/a)					
Stationary Fuel Combustion	Engine	170,000	10,000	900	0	180,900	10% (18,000)
	Boiler	120,000	8,000	500	0	128,500	8% (10,000)
On-site Transportation	On-site Vehicles	25,000	1,200	300	0	26,500	11% (3,000)
Flaring		30,000	2,500	300	0	32,800	9% (3,000)
Fugitive		1,000	50,000	250	25,000	76,250	20% (15,000)
Industrial Process		0	125,000	0	0	125,000	8% (10,000)
TOTAL		346,000	196,700	2,250	25,000	569,950	5% (27,500)
Tolerable Error		8% (27,000)	4% (7000)	100% (2,250)	20% (5,000)		5% (28,500)

Production						Volume (m^3/yr)	Tolerable Error
Pentane						88,439	9% (7,500)
Butane						99,893	8% (8,000)
Propane						76,675	9% (7,000)
TOTAL						265,007	5% (13,000)

3.5.3 Using the Work of Other Auditors/Verifiers

There are situations in which it may be more efficient or effective to use the work of another auditor/verifier because the work has already been completed or the other auditor has specialized skills. **Verifier's must take care when using the work of other auditors/verifiers and must use professional judgment as to how much reliance may be placed on this evidence given the context of the verification and the following conditions:**

- The nature and scope of the procedures performed by the other auditor/verifier align with areas of the verification plan (e.g., production audits can overlap in nature and scope with the production values included in a greenhouse gas verification of a facility);
- The objectives of the other audit/verification, in the context of materiality and risk, align with areas of the verification plan (e.g., materiality for the production audit roughly corresponds to the materiality values for production in the greenhouse gas verification plan);
- The technical standards used to perform the other audit/verification meet or exceed the standards for the greenhouse gas verification (e.g., the audit of revenue meters for calibration is performed to a technical standard appropriate for greenhouse gas verification);
- The criteria used in the other audit/verification is consistent with the criteria for the greenhouse gas verification;
- The period addressed by the other audit/verification includes the period for the greenhouse gas verification;

> ***Hint:*** *Areas where it might be appropriate to rely on other auditors/verifiers include:*
>
> - CEMS calibration and testing;
> - revenue or custody transfer meters; and
> - production accounting.

- The conclusion of the other auditor/verifier is clean, or if corrections were required, these modifications do not have relevance to the greenhouse gas verification; and
- The other audit/verification was performed by a competent auditor/verifier with appropriate expertise, skill and care; and
- The other audit was conducted by an independent, external auditor/verifier (i.e., met the independence requirements for greenhouse gas verifications).

The verifier retains responsibility for the greenhouse gas verification and must ensure that work by other auditors/verifiers that is being relied upon for the greenhouse gas verification is sufficient and appropriate in the context of the greenhouse gas verification.

3.5.3.1 Internal Audit

The purpose of an internal audit is to evaluate the effectiveness and improve on the risk management, controls, and governance processes within the organization. These internal audits primarily assess internal controls, but occasionally evaluate risk management and control processes for greenhouse gas information. The verifier could consider the results of internal audits if objectivity, scope of the work, technical competence, and due professional care can be established.

3.6 Designing the Verification

The verification strategy, verification plan and sample plan are distinct but interrelated components of the verification. Figure 6 illustrates the general relationship between the verification strategy, verification plan, and sample plan. Conceptually, the verification strategy informs the verification plan, which in turn informs the sample plan. It is important to note that the verification strategy, verification plan, and sample plan are iterative documents that can be modified over the course of the verification based on the results of evidence collected.

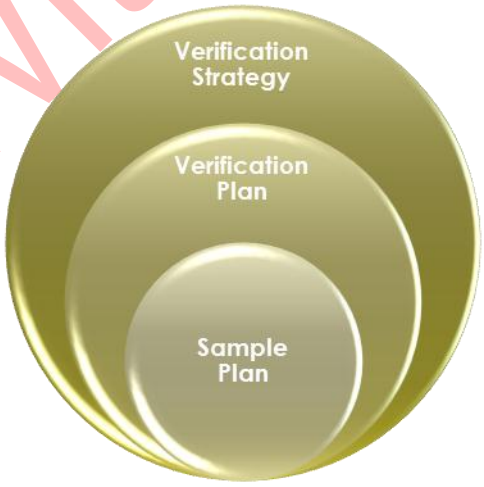

Figure 6: Relationship between Verification Strategy, Verification Plan, and Sample Plan

3.6.1 Verification Strategy

The verification strategy is the general approach used for the verification. It determines the expected scope and approach used to develop the verification plan. The verification strategy is iterative and will evolve as the verification progresses; however, experienced verifiers will generally have a good idea as to the direction the strategy should take before evidence is requested. **The verification strategy must be documented in the verifier's working paper files and in the verification report.**

Verification strategies span a spectrum between controls reliance and substantive testing, with most verification approaches falling somewhere in between (see Figure 7). At one end of the spectrum is an approach that relies almost exclusively on substantive procedures as the basis for the verifier's conclusion. Substantive procedures are verification procedures that are performed at the attribute level or on more granular information (e.g., raw data and evidence). Substantive procedures consist of analytical tests and test of detail.

Controls reliance tests the controls that were used to manage the data and generate the greenhouse gas assertion. Controls reliance can only be used in a relatively robust and mature greenhouse gas data management system. The preliminary risk assessment in a controls reliance approach identifies the controls along the data trail, and develops tests to analyze the design effectiveness of the controls. **If the verifier is going to rely on controls, the verifier must test the operational effectiveness of the controls and the data that the control is processing.** Data testing is done to a lesser extent in controls reliance verifications than in substantive procedures.

Figure 7: Verification Strategy

In most cases, significant controls reliance will not be feasible or appropriate owing to the immaturity of greenhouse gas data management systems. As such, **Alberta requires that verification strategies be designed such that much of the evidence required to support the verifier's conclusion results from substantive procedures.**

AESRD will not accept verifications based solely on controls reliance without supporting substantive testing. In all cases, verifiers must assess underlying data to confirm that data is being reported correctly and that responsible party's data management systems being used are performing as intended.

The verification strategy needs to be tailored to the specific data streams, controls, and evidence available for the facility or offset project. For example a controls approach is used for data tied into the operating systems and a substantive approach is used for data that relies on spreadsheets and manual entries. In cases with small or limited numbers of data points, such as monthly invoices for a calendar year, substantive testing is generally a more efficient and cheaper audit approach.

Note: *the maturity of greenhouse gas data management systems is approximately a decade old compared to the 40 to 60 years that financial data management systems have had to mature and be tested. As a result, controls reliance in greenhouse gas verification should be undertaken very carefully. The role of control reliance should be reassessed as greenhouse gas data management systems mature.*

Controls reliance is appropriate in situations where there are extensive operational controls that are operating effectively, and where there is a large amount of data in which sampling alone and other substantive procedures are unlikely to yield sufficient and appropriate evidence to support the verifier's conclusion. For example, readings from a continuous emissions monitor (CEMs) meter are conducted at a high frequency that yields too much data to be tested using substantive testing methods (cannot be economically or efficiently sampled). A controls approach and the use of other auditors work is required to assess this type of evidence.

Table 11: Examples of Tests of the Effectiveness of Controls

Potential Misstatement (Greenhouse Gas Assertion)	Control	Test of Operating Effectiveness
A greenhouse gas source may be excluded from the inventory (occurrence, completeness)	Control for authorization of the greenhouse gas inventory and changes to the inventory	Examine source documents for approvals
A greenhouse gas source may be counted twice in the inventory (validity)	Control for totals and double entries in greenhouse gas inventory	Examine totals reconciliation Observe data verification procedures for double entries
A greenhouse gas source may be calculated in the wrong units (accuracy)	Limit and reasonableness checks	Examine evidence of test data
CEMS unit malfunction (accuracy)	Error codes	Examine evidence of error codes, re-perform conditions of error
A natural gas consumption source may be missing a month in a year (accuracy)	Control for total invoice counts	Examine natural gas invoice totals reconciliation

Production accounting inaccuracies	Production accounting balances	Recalculate the monthly balance and reconcile Examine the methods used to balance and compare to criteria

In cases where there is a high control risk and the verifier has little or no confidence in the design or the operation of controls, the verifier must use a substantive approach to assess the evidence.

Table 12: Example of Substantive Procedures

Potential Misstatement (Greenhouse Gas Assertion)	Substantive Procedure
A greenhouse gas source may be excluded from the inventory (occurrence, completeness)	Conduct a site tour to determine sources and compare with inventory.
A greenhouse gas source may be counted twice in the inventory (validity)	Inspect the inventory for double entries of sources
A greenhouse gas source may be calculated in the wrong units (accuracy)	Recalculate the emissions
CEMS unit malfunction (accuracy)	Inspect the continuous emissions monitor (CEMs) records for error codes
A natural gas consumption source may be missing a month in a year (accuracy)	Inspect all invoices to determine whether all months are represented
Production accounting inaccuracies	Inspect a sample of production accounting records and reconcile entries with meter records

In summary,

1) It is not necessary to use a controls approach; a substantive testing only approach can be effective and efficient;
2) **Complete reliance on controls is not permitted and any approach must include some substantive procedures on the data;**
3) **If any reliance is going to be placed on controls, these controls must be tested (operating effectiveness and design effectiveness);** and
4) Verifiers can, under the circumstances described in Section 3.5.3, use the results of the work of other auditors/verifiers, including the results of control testing.

3.6.2 Verification Plan

The verification plan is more detailed than the verification strategy and documents the nature, extent and timing of verification procedures. It is used by the verification team, the responsible party, and the peer reviewer, and is included in the final verification report. **The verification plan includes:**

- **The verification objective, scope and level of assurance being provided;**

- **The preliminary greenhouse gas assertion, baseline assertion, and previous assertions, if applicable;**
- **The program criteria highlighting any specific requirements that are reviewed;**
- **The assurance standard being used by the verification team (i.e., ISO 14064-3 and other applicable standards such as CSAE 3000 or CSAE 3410);**
- **Documents any changes to operations, and organizational or operational boundaries since the prior verification;**
- **The greenhouse gas subject matter or a reference to the greenhouse gas subject matter associated with the assertion;**
- **A description of the responsible party's data management system(s);**
- **A description of the control environment;**
- **Materiality and tolerable error thresholds being used;**
- **If applicable, reference to prior verification reports and findings;**
- **Members of the verification team including the peer reviewer and designated signing authority;**
- **If applicable, language(s) that the site visit and verification are to be conducted in;**
- **Safety requirements needed to complete the site visit; and**
- **A description of the verification procedures (nature, timing, and extent) that will be applied to address risks identified at the assertion level for each material line item in the inventory/offset project. Note that the procedures will evolve as the verification evidence is collected and reviewed.**

The description of verification procedures will drive the evidence collection in the field. Consequently, it is essential that the risks be identified properly during the planning phase to ensure the verification is designed appropriately. **For every risk identified, there must be appropriate procedures to ensure that the verification risk is acceptable.** See Sections 3.2.2 to 3.2.4 for more information on risks.

Table 13: Examples of Procedures in a Verification Plan

Category/Line-Item	Verification Objective	Risk/Concern Identified	Period	Type of Procedure (analytical test, test of detail, test of controls)	Description of Procedures (nature, timing, and extent)
Greenhouse Gas Assertion	Existence/Completeness	Incompleteness of inventory	n/a	Test of detail - inspection	Conduct a site tour to determine sources and compare with inventory
Stationary Fuel Combustion	Completeness	Improper measurement of natural gas on site due to multiple meters	n/a	Test of detail – inspection, reconciliation, tracing	Conduct a site tour to determine meter location and identification numbers Reconcile meter identification numbers with meters identified on natural gas invoices (one month sample) Trace meter records to emissions calculations
Flaring	Accuracy	CEMS inaccuracy	n/a	Test of detail – inspection Test of control	Inspect RATA and CGA tests for sensor accuracy Inspect onsite maintenance records for CEMS records Observe zero span testing
Stationary Fuel Combustion	Accuracy	Planning Analytics Concern – energy efficiency ratio is 10% higher than industry comparatives for the main piece of equipment	Average of year for 2011	Test of detail - Inspection of documents, Inquiry	Inspect manufacturer's specs as to the normal operating efficiency Inquire of maintenance personnel as to overhauls. And improvements made to specific piece of equipment
Stationary Fuel Combustion	Accuracy	Planning Analytics Concern-production and emissions trend in	June, Sept – 2011	Test of detail – Inquiry, Inspection of	Inquire of operators as to any production anomalies in June and September Sample daily data for the months of June and September

		opposite directions		Records Analytical test – correlation, profile	Run correlation and profile analytical tests for daily data for June and September Inspect maintenance records for June and September
Indirect	Cut-off	Improper billing dates for electricity		Tests of detail - inspection	Inspect records for electricity invoices for Jan – Dec 2010 and Jan – Dec 2011
Industrial Process	Classification	Misclassification of process emissions		Test of detail - inspection	Inspect inventory and compare classification with program criteria
Production	Classification	Improper classification of shrinkage		Test of detail - inspection	Inspect production accounting records and determine methods of allocating shrinkage
	Accuracy	Inaccurate measurement of production		Test of control	Inspect all calibration records Observe locations of meters and determine whether they measure the appropriate production
	Cut-off	Improper dates of recording production		Tests of detail - inspection	Inspect the dates of entry into production records for Jan –Dec 2010 and Jan-Dec 2011
	Validity	Production used as fuel used on site		Analytical test – efficiency ratio Test of detail – inspection Test of control - observation	Run efficiency ratios for equipment to determine if fuel consumed is appropriate Inspect production records and invoices to locate the source of the fuel for the equipment Inspect site to determine if there is appropriate piping and meters for measuring production that is used as fuel onsite

Table 13 above provides an illustrative example of verification procedures in a verification plan.

The verifier is required to provide the responsible party with a high-level verification plan that will help the responsible party prepare for the verification. The detailed verification plan, including the specific sampling plan, is **not** released to the responsible party as this could compromise the objectivity of the verification. The verifier needs to perform the verification procedures such that the responsible party not anticipating or biasing information provided. This helps to ensure that the objectivity in the verification is maintained.

> ***Reminder:*** *it is the responsibility of the verifier to design and execute the verification plan according to verification standards and professional judgment. Consideration may be given to the responsible party's operations and abilities, but the responsible party does not approve verification plan or have input on how the plan is structured and implemented.*

The following must be communicated to the responsible party as part of the verification, and where possible, prior to the site visit:

- The verification objective, scope and level of assurance being used;
- The preliminary greenhouse gas assertion;
- The program criteria being used;
- The assurance standard being used;
- Members of the verification team;
- A description of the general process that will be used;
- A list of requested documents and records;
- A preliminary schedule of activities for the verification; and
- A request for resources.

Note that the verifier is assessing the greenhouse gas assertion as it was compiled based on the records used to create the assertion. It is not appropriate for responsible party to start creating records to address questions raised by the verifier. If facility/offset project lacks sufficient and appropriate evidence, the verifier will not be able to complete the verification. Termination of verifications and issuance of adverse opinions are discussed in Section 5.1.5.2.

If situations arise at a facility that result in a verifier not being able to issue a statement of verification, or if significant time is required to correct misstatements and the facility is at risk of not meeting its compliance deadline, the verification body is required to prompt the responsible party to contact AESRD to determine an appropriate course of action**. If this occurs at an offset project, the responsible party must address the issues before the greenhouse gas emissions reductions and/or removals can be verified and submitted to the Alberta Emissions Offset Registry.**

3.6.3 Procedures

Procedures are activities that the verifier uses to collect evidence. Verification procedures include inspection, observation, inquiry, confirmation, recalculations, re-performance, and analytical procedures. These are described in more detail below.

3.6.3.1 *Inspection*

Inspection is a visual review done to assess the presence of objects and documents[23]. Verifiers will typically do a site tour to identify the completeness of emissions sources, meters (objects), and records; and to gain a general understanding of the facility operations. The verifier may ask to see operational or maintenance records, calibration records, and similar types of documents maintained on site.

Verifiers will use a variety of tools to support the inspection including a walk-through, digital photographs, satellite imagery, etc. Information collected at this stage supports inventory completeness and the existence of evidence needed to support the verification.

Inspection can also involve tracing and vouching of the data (Figure 8). Tracing involves identifying the source document and following the information in the source document through to the reporting phase. Tracing follows data from individual data sources to more aggregate forms such as monthly summaries. It assists in establishing an understanding of the completeness of the data. It is used to test for understatements in the greenhouse gas assertion.

Vouching moves in the opposite direction along the data trail. Aggregated data will be followed through the process to its source data points. Vouching helps to assess the existence of records and is used to test for overstatements in the greenhouse gas assertion.

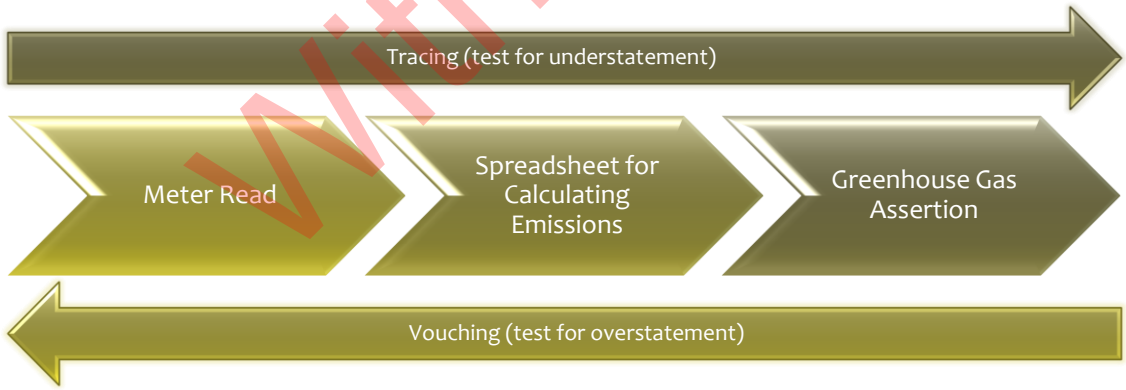

Figure 8: Tracing and Vouching

3.6.3.2 *Observation*

Observation involves witnessing an activity or process. Observation can be used to confirm that procedures are being performed (e.g., site backups, meter calibrations, measurements of fluid levels

[23]Documents in this context refer to both living documents, such as standard operating procedures and historical records, such as meter readings.

in tanks, etc.). Observation needs to be done without notice during the site visit to ensure it accurately reflects people's behaviours. This maintains objectivity as people can modify their behavior if they know they are being watched.

3.6.3.3 Inquiry

Inquiry involves collecting oral evidence from the responsible party and/or independent third parties. Oral evidence is summarized in a written statement that is reviewed and approved by the interviewee to ensure accuracy.

Inquiry is generally considered to be a weaker form of evidence. It is not used as stand-alone proof of practice to substantiate an assertion; however, consistent responses from independent interviewees can increase the strength of the inquiry evidence.

3.6.3.4 Confirmation

Confirmation[24] requires the verifier to obtain evidence directly from a third party. For example, electricity exported to the grid can be confirmed by the Alberta Electric System Operator (AESO) and should match information provided by the responsible party.

Production data from pipeline operators, custody transfer meters, and sales invoices are other examples of types of evidence that can be assessed through confirmation.

3.6.3.5 Recalculations

Recalculation requires the verifier to do independent calculations to recalculate data reported by the responsible party. The verifier should be able to come to the same values as reported in the greenhouse gas assertion.

Recalculations are a higher form of evidence that assess the mathematical accuracy of the assertion. Verifiers cannot rely solely on recalculations because this creates a situation where the verifier has independently recreated the greenhouse gas assertion, but has not examined the responsible party's systems for generating the greenhouse gas assertion. Overuse of recalculation would result in the verifier moving from an assurance role to a compilation function that would not achieve the verification objectives. Consequently, **recalculation, while important, must be used in conjunction with other verification procedures.**

3.6.3.6 Re-performance

During a re-performance procedure, the verifier will execute the responsible party's procedures to assess the effectiveness of these procedures and controls. Re-performance is only used occasionally in greenhouse gas verification.

3.6.3.7 Analytics

Analytics are used initially in the planning phase to determine which procedures to apply. See Section 3.3 for more information on planning analytics.

[24] Please note that this section refers to confirmations as verification procedures. AESRD also required the verifier to confirm certain information in the greenhouse gas assertion, see Section 5.4.

In substantive testing, analytical procedures are designed to test the greenhouse gas assertion for existence, completeness, accuracy, cut-off, and classification. These procedures are conducted on a data sample identified during the preliminary analytical testing (e.g., examine the daily transaction during the period June 5-June10). **Analytic design must take into account the following:**

1) **The variables used to conduct the analytical testing must be independent of one another;**
2) **There is an underlying physical phenomena that creates the relationship between the variables (e.g., fuel consumption and electricity generation are related through an energy balance);**
3) **Tests are sensitive enough to detect material errors and omissions; and**
4) **Expectations on the variables' performance are pre-determined based on the verifier's knowledge and experience.**

Tests that show relationships beyond the verifier's expectations must be investigated. The relationships, expectations, and results of the analytics and other procedures undertaken during the verification must be document in the verifier's working papers.

3.6.4 Sufficient and Appropriate Evidence

Verification procedures must be designed to collect sufficient and appropriate evidence to assess the greenhouse gas assertion based on the risk of misstatement. Different combinations of procedures will be required based on the level of risk and nature of the line item being assessed. In other words, **the higher the risk the more persuasive the evidence must be for the verifier to reach a conclusion.**

> ***Note:*** *very poor quality evidence may not be appropriate regardless of the evidence available. An example of poor quality evidence would be attestations without any form of supporting documentation.*

Sufficient evidence answers the question of whether enough evidence has been collected (quantity). Appropriate evidence answers the questions of whether the evidence is reliable and relevant (quality). When evidence is appropriate, less of it is required; more evidence is required for less appropriate evidence (Figure 9). A common analogy is that if there is a car accident, one traffic camera that recorded the incident would be considered strong evidence; however, multiple consistent eye-witnesses would be required to approach the strength of evidence of the camera.

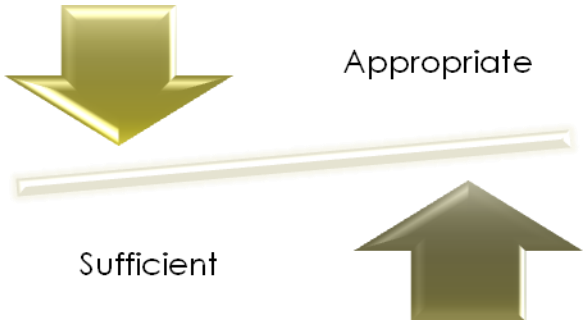

Figure 9: Relationship between Sufficient and Appropriate Evidence

Appropriate evidence can further be broken down into the two characteristics: relevant and reliable. Relevant is evidence that pertains to the verification objectives. It is the verifier's responsibility to correctly identify the relevant information. Information provided that is not relevant to the verification cannot be considered for the purposes of issuing assurance on the greenhouse gas assertion.

The reliability of the evidence depends on the nature and source of the evidence. Table 14 below shows a general hierarchy of evidence.

Table 14: General Hierarchy of Evidence

Hierarchy	Evidence Type	Example
High 	Evidence that is collected directly by the verifier	Inspection of greenhouse gas inventory through a site visit Re-calculation of the total greenhouse gas emissions
	Documentary evidence that originates outside of the responsible party's data management system but is processed by it	Electricity or natural gas invoices
	Documents produced by the assertor	Operational records
Low	Oral evidence	Interviews with maintenance personnel

Two forms of evidence that tend to vary the most in reliability are documentary evidence obtained from external sources and analytical testing results.

- Documentary evidence obtained from external sources, such as production from pipeline companies, or acreage from insurance companies, will depend highly on the purpose and design of the third party data management system and the purpose for which the third party is collecting the data.
- Analytical testing varies based on the strength of the underlying relationships. Analytical tests that are based on mass or energy flows are typically very strong forms of analytical tests while tests that are based on extrapolations, averages, or samples are less reliable.

The verifier must use professional judgment to assess the reliability of the documentary and analytical evidence to determine whether it is appropriate for the purposes of greenhouse gas verification.

For example, if there is a risk that the inventory is incomplete, the verifier may undertake a physical inspection of the site, examine satellite imagery of the site, review as-built drawings, interview maintenance staff and site personnel, inspection permits, etc. to develop an understanding of the emissions inventory based on the risk associated with inventory completeness. At a high level of risk, a physical inspection is more appropriate because this form of evidence has higher reliability than other tests. At a low level of risk, interviews with operations personnel and an inspection of as built drawings may be sufficient to address risks at reasonable costs.

3.6.5 Site Visits

AESRD requires verifiers to conduct a site visit. If the entire site cannot be physically and economically inspected for greenhouse gas inventory completeness, a risk-based sampling approach can be used (e.g., site visits for conservation cropping projects, assessing pipeline operations). **Justification for the site visit approach used must be documented in the verification plan and verification report**.

3.6.6 Presentation and Disclosure

Presentation and disclosure attributes are assertions made by the responsible party as to whether the program criteria have been applied appropriately to develop the greenhouse gas assertion and whether disclosures provided are adequate. The attributes have the following categories: occurrence and responsibility; completeness; classification and understandability; accuracy and quantification; and consistency.

Procedures used to assess presentation and disclosure attributes are not typically risk driven. Instead, they are a series of checks developed by the verifier based on program criteria and professional judgment used to assess disclosure areas revealed during the verification.

Any misstatements encountered during the assessment of the presentation and disclosure of the greenhouse gas assertion should be documented in the statement of unadjusted differences (refer to Section 4) and included in the verification report.

3.6.7 Estimates

In some cases, greenhouse gas quantification uses estimates to determine the volume of gas emitted to the atmosphere/sequestered. Estimates are used because direct metering is unavailable or may not result in more accurate emissions information (e.g., generic fitting counts yield more defensible fugitive emissions estimates than a once per year LDAR test for fugitive emissions).

Verifiers must test estimates used by the responsible party to create the greenhouse gas assertion. Evidence for the reasonableness of the estimate can be obtained from one or a combination of the following approaches:

- Development of procedures that test the responsible party's processes used to make the estimate(s); and/or
- Preparation of an independent estimate.

Procedures used to test estimates include:

- Examining the completeness, accuracy and relevancy of the underlying data used in the estimate. If information is generated by the responsible party, the integrity of the information will need to be consistent with the system(s) used to generate the greenhouse gas assertion;
- Examining the underlying assumptions for the estimate. This may include examining the assumptions and comparing them to prior operating conditions (e.g., does the estimate apply to the operating conditions?), assessing the appropriateness of the estimation model (e.g.,

using a seasonal model vs. a prior period model), includes all appropriate factors (e.g., fuel consumption or fuel consumption and load), etc.;

- Testing the calculations, nature, timing and extent of the procedures based on risk. Verifiers may also perform recalculations to test estimates.
- Where possible, comparing prior estimates to actual results.
- Using independent estimates developed by the verifier to confirm the responsible party's estimates. **If independent estimates are used, the verifier must ensure that the independent estimate is relevant and appropriate to assess the original estimate against program criteria.**

If verifiers encounter ranges in the estimate to the degree that it causes presentation and disclosure concerns for the assertion, the verifier should consider additional disclosure, or issuing a modified or adverse opinion.

3.6.8 Uncertainty

Greenhouse gas quantification has inherent uncertainty in the measurements and calculations. For facilities, AESRD has specified acceptable measurement and calculation approaches that limit uncertainty while recognizing restrictions on available data and measurement techniques (see Table 15 below). Facilities are required to use the most accurate methodology available and cannot fall below certain thresholds delineated in Table 15. The *Technical Guidance for Completing Specified Gas Compliance Reports* and the *Technical Guidance for Completing Baseline Emissions Intensity Applications* provide more information on reporting documentation requirements for facilities.

Offset project quantification methodologies, including uncertainty, are assessed during protocol development and published in the relevant quantification protocols. Offset projects are required to ensure the data collection and offset project specific calculations are appropriate and meet Alberta Offset System program requirements. More information on protocol development requirements is available in the *Technical Guidance Document for Offset Protocol Developers.* More information on offset project requirements is available in the *Technical Guidance Document for Offset Project Developers.*

Verifiers are required to assess the appropriateness of the methodology used against program requirements. If opportunities for improvement are identified, these should be noted in the verification report.

If verifiers encounter uncertainty to the degree that it causes presentation and disclosure concerns for the assertion, the verifier should consider additional disclosure, or issuing a modified or adverse opinion.

Table 15: Uncertainty of Measurements and Calculations

Measurement	Certainty	Calculation
Monitoring and direct measurement	Most	Mole balance with emission factors
Intermittent (periodic) direct measurement		Equipment-specific emission factors
Calculated based on measured surrogate parameters		Manufacturer's emission factors
Estimated from design requirements		Generic emission factors
	Least	Top-down emission factors

3.6.9 Fraud

Fraud is a serious issue that violates the conditions of the verification contract and raises concerns about the internal controls of the responsible party. If fraud is occurring, this implies that internal controls are inappropriate or ineffective. Greenhouse gas verifications are not designed to test for fraud; however, fraud is occasionally encountered during verification. If fraud is encountered, the verifier is advised to cease further work until legal advice has been obtained. Depending on legal council and the nature of the fraud encountered, the verifier may continue with the verification and notify the intended user, withhold the verification report, or withdraw from the verification.

The verifier must notify the reporting party's senior management of the issues and intended course of action.

3.6.10 Summary of Verification Procedures

The verification strategy will likely involve substantive procedures and, to an appropriate extent, tests of controls. Table 16 below provides a summary of how tests of controls differ from substantive procedures in terms of their types, purpose, testing, applicable procedures, timing in the verification, and how they fit into the risk assessment.

Table 16: Summary of Verification Procedures

	Test of Controls	Substantive Procedures
Types	Design effectiveness Operating effectiveness	Test of details Analytical procedures
Purpose	Determine the effectiveness of the design and operation of controls	Determine the truth and fairness of greenhouse gas assertions
Nature of test	Frequency of deviations of control	Greenhouse gas errors
Applicable verification procedures	Inquiry, observation, inspection, re-performing	Inquiry, observation, inspection, re-performing, analytical procedures,

	Test of Controls	Substantive Procedures
		re-calculation, tracing and vouching
Timing	Interim work	Shortly after greenhouse gas assertion is compiled
Audit risk component	Control risk	Detection risk

4 Execution

Execution is the collection of evidence using the procedures developed in the planning phase. This step is iterative in that the evidence collected will inform additional procedures that may be required, and in some cases, will change the verification strategy, and verification plan including the sampling plan.

Site visits, although not a verification procedure, are a convenient method of executing certain types of procedures, particularly those that rely on inspection. **Site visits are required by AESRD.**

Table 17: Examples of Procedures Best Conducted at the Site Visit

Objective/Risk	Procedure
Gain an understanding	Identify meter locations relative to inventories and reported data Inspect operations records that are housed on-site Observe data controls in place
Inventory incompleteness	Observe during the site tour all sources and sinks on site and reconcile with greenhouse gas inventory
Measurement inaccuracy or inapplicability of quantification methods	Inspect maintenance records that are housed on-site
Incomplete greenhouse gas inventory or inapplicability of quantification methods	Inquire of site personnel on site operations, maintenance and improvements
Incomplete greenhouse gas inventory or inapplicability of quantification methods	Inspect the physical environment that may affect operations

During the execution phase, verifiers must track the unadjusted errors and qualitative concerns encountered in the verification execution. This is normally done using a summary of unadjusted differences (SUD) table, which is kept in the verifier's working files. A SUD table documents the unadjusted error type, description of the error, the location to where the supporting documentation can be found in the verifier's working paper files, and the affect the error has on the greenhouse gas assertion. The SUD table is used to document both quantitative and qualitative errors and concerns, and includes the documentation of any disclosure concerns. Table 18 provides an abbreviated sample of a SUD table.

Table 18: Example of Summary of Unadjusted Differences (SUD) Table

Unadjusted Error Type	Description	Cross-Reference	Effect on the Greenhouse Gas Assertion (amount, %)
Misstatement	Emissions have been incorrectly categorized as combustion, when they are process emissions.	Procedure 1.2.5	Stationary Fuel Combustion (-403 tonnes, -1%) Industrial Process (403 tonnes, +4%) Total Emissions (0, 0%)
Disclosure	Uncertainty for fugitive emissions is over 50% because of measurement technique.	Procedures 1.5.3; 3.4.2	Presentation of information only.
Misstatement	Entry error for fuel consumption in November.	Procedure 4.7.2	Stationary Fuel Combustion (40 tonnes, 0.1%) Total Emissions (40 tonnes, 0.004%)

Verification plans should be modified when:

- A review of aggregated unadjusted errors determines issues with controls that affect the integrity of the evidence. Examples include lack of training for key personnel, incorrect data collection or review processes, etc.;
- Aggregated unadjusted misstatements approach materiality. The verifier may modify the verification plan to collect additional evidence to confirm whether the aggregated errors are material. The closer the aggregate errors are to materiality, the more effort the verifier has to expend to confirm the greenhouse gas assertion.

Observation: *Examples of issues identified through government audit:*

- Use of inappropriate emission factors (e.g., updated versions not applied);
- Use of generic emission factors when site specific data was available;
- Approved emissions intensity limit not applied;
- Use of inconsistent methodologies between baseline and project for offsets, or baseline and compliance period for facilities;
- Unavailability, lack of, insufficient and/or inappropriate supporting records; and
- Less accurate methodologies used when more accurate methodologies are available.

4.1.1 Sampling

Sampling is used to test controls, evidence, and internal procedures to determine whether the information is reliable and correct. Sampling is based on the principle that a statistically relevant percentage of the population can be used to infer results on the entire population. Sampling manages risks while balancing time and cost to undertake the verification.

Table 19: Control vs. Substantive Sampling

Controls Sampling	Substantive Sampling
Sampling controls and internal procedures is based on frequency of operation of the control (e.g., number of calibrations) or internal procedure (e.g., production balancing) rather than the amount of the data that the control or procedure manages. The population is the number of times that control operated or the procedure was implemented. The results of the sample are a yes/no answer; either the control/procedure was implemented correctly or it was not.	Substantive sampling is based on the amount of data (e.g., meter readings). The population is the amount of data in the period examined. The results of sampling data are a range of values.

There are several different types of sampling that can be used:

- Statistical: statistical sampling in which any item in a population has an equal chance of being chosen. Probability theory is used to evaluate the results. Often used in combination with stratified sampling.
- Strategic: the sample is specifically selected because of risk indications (e.g., analytical testing, high risk of control failure, etc.).
- Systematic: the sample has a specified sampling interval (e.g., temporal or size).
- Convenience: the sample is readily available to the verifier.
- Stratified: the population has been divided into sub-populations; the sample design is based on the sub-populations. Sub-populations can be based on a variety of characteristics such as timing (e.g., seasons of the year, end-of-the-month, etc.), source types (e.g., a particular type of engine), metering types (e.g., ultrasonic meters), business units (e.g., olefin manufacturing), etc.
- Unstructured: the sample has no structured technique. AESRD will not accept unstructured sampling.

Each form of sampling, except unstructured sampling, has its own application based on the nature of the evidence and type of analysis being done. Unstructured sampling has limited underlying rigor. AESRD will not accept greenhouse gas verifications based on unstructured sampling.

Table 20: Types and Application of Sampling

Sampling Type	Typical Conditions of Application
Statistical	When low risk conditions apply and there is a large amount of data or controls to test. When the characteristics of the sample are to be extrapolated to the population.
Strategic	When preliminary analytics reveal a high or medium material risk at a particular period and further details are required.
Systematic	When a high or medium material risk occurs on a regular basis (e.g., rolling over into a new accounting year, annual maintenance turn-overs, seasonal variations, shift changes).
Convenience	When low risk and a small sample is sufficient to demonstrate that data is accurate or controls are functioning.
Stratified	When the population is not normal in distribution (e.g., bimodal) and can be stratified into multiple sub-populations that are more normally distributed. When different sections of the population have different risks (e.g., the materiality or the level of risk is different), the sampling will be different for the different sections (e.g., near a threshold of measurement, larger sources versus smaller sources)

4.1.1.1 Small Sample Statistics

Small populations (less than 100) are common in greenhouse gas verifications. The assumption of a normally distributed population may not be applicable for smaller populations. **Small populations must be confirmed that they are normally distributed, prior to using statistical techniques that assume a normal distribution.** As populations and associated samples get smaller, the need to sample larger portions of the population increases. The desired confidence interval and tolerable error should be used to determine an acceptable sample size. **Rationale for the sample size used must be documented in the verifier's working files.** AESRD recommends populations of 12 or less are sampled in their entirety.

Verifiers may need to subcontract expertise in statistical sampling for more complex samples (e.g., extremely large or complex samples).

Verifiers must take steps to guard against the risk of coming to a wrong conclusion based on the sample evidence (e.g., type I and II null hypotheses, sampling risk). These actions should be documented in the verifier's working files.

> ***Hint:*** *Outliers are samples that do not reflect the underlying characteristics of the population. The deviations caused by outliers are not normally extrapolated to the remaining population as their effect is considered "localized" or "isolated". Justification for outliers must be clearly documented in the verifier's working files.*

4.1.1.2 Sampling Process

The sampling process is divided into three phases: planning, execution and completion (Figure 10). The planning phase identifies the objectives of the sampling, the acceptable deviation, the population and sample unit, and size of sample. The execution phase collects and analyzes the sample using procedures discussed above. The completion phase evaluates the results.

The verifier must assess sampling results to decide whether any of the deviations identified are outliers based on the distribution characteristics of the population. If outliers are identified, they must be clearly documented and justified as to why they are considered outliers in the working paper files. Deviations that are not considered to be outliers must be projected onto the remainder of the population to estimate the magnitude of the error. This is done to determine how close the projected error is to the tolerable error (tolerable error is discussed in Section 3.5.2 above), whether the nature of the error has further ramifications to the assertion, and the relationship of this error to other verification evidence.

Figure 10: Sampling Process

Table 21 provides an example planning stage sampling plan.

Table 21: Example Sample Plan

Category/Line-Item	Objective	Acceptable Deviation	Population	Sample Unit	Sample Size	Sample Type
Stationary Fuel Combustion	to determine the accuracy of the coal records	10%	365 coal records	tonne of coal	76	Statistic (95% confidence level)
Indirect Emissions	to determine the cut-off of the electricity records	8%	365 electricity records	kWh	12	Systematic – at the end of each month
Stationary Fuel Combustion	to determine the completeness and accuracy of NG records	6%	365 meter readings	GJ	31	Strategic – during the month of August

4.1.2 Aggregation Process[25]

The responsible party will aggregate the greenhouse gas and supporting information for submission to AESRD.

If the responsible party makes changes to the assertion or supporting materials after compilation and prior to submission to AESRD, **these changes must be disclosed to the verifier as they could impact the validity of the verification**. **Any material changes that occur during this stage of the aggregation process must be examined by the verifier to determine whether the changes are reasonable and correct, and do not introduce error in the assertion**.

Information in the greenhouse gas assertion cannot be changed once the verifier has issued a statement of verification. Any changes made at this point will nullify the verification. If changes are made[26], **the verifier must review the changes**, and may need to perform additional procedures and/or issue an amendment to the statement of verification. See Section 5.3 for further information on subsequent events.

4.1.3 Conformance to Program Criteria

Evidence collected by the verifier is reviewed against program criteria to ensure conformance with program requirements. Verifiers typically have a checklist based on the mandatory components in the program criteria, which include calculation methods, emission factors, global warming potentials, and reporting requirements, which is used to support the assessment. For example, if the verification procedure is to recalculate the aggregated greenhouse gas emissions for the combustion category, the verifier will use the global warming potentials (GWPs) for each greenhouse gas species and calculations specified in the program criteria.

The conformance assessment should be documented in the verifier's working papers and **a summary of key findings must be provided in the verification report.**

4.1.4 Mandatory Procedures

The following are mandatory procedures and activities that AESRD requires verifiers to perform as part of the greenhouse gas verification done under the *Specified Gas Emitters Regulation*.

4.1.4.1 Facilities

The following procedures must be performed as part of reasonable assurance verification on facilities:

[25] This section refers to the aggregation of data and information by the facility or project proponent and not to aggregated projects.

[26] Refer to Section 5.3 for guidance on subsequent events.

- Gain an understanding of the greenhouse gas data management systems through physical inspection of measurement methods and the responsible party's data management systems at the facility (i.e., through a site visit[27]);
- Compare the current facility conditions, including methodologies being used, to the approved baseline emissions intensity conditions and report on any discrepancies observed. Misstatements must be documented in the verification report;
- Compare the greenhouse gas inventories inspected through the site visit[27] to the greenhouse gas inventory identified in the baseline emissions intensity report and the annual specified gas compliance report to identify any discrepancies. Misstatements must be documented in the verification report;
- Design substantive procedures (e.g., access to raw data and records) for three critical points along the data trail for all significant line items[28]:
- As close to the measurement point as feasible;
- At the application of emission factors and aggregation of annual data; and
- Close to the assertion as feasible.
- For Emission Performance Credit generation, the verifier must inquire as to the cause of the credit generation (e.g., energy efficiency measures, production downturn, etc.) and report the response in the verification report.

4.1.4.2 Offset Projects

The following procedures must be performed as part of reasonable assurance verification of offset projects:

- Gain an understanding of the greenhouse gas data management systems through physical inspection of measurement methods and data management systems using a site visit[14].

[27] In some circumstances, a comprehensive site visit may not be feasible (e.g., for an entire pipeline operation) or not necessary (e.g., the verifier conducted a site visit of the facility between July 1 and March 31 and is aware that facility operations have not changed). If the verifier feels a site visit is unnecessary, the verifier should contact AESRD to confirm that the rationale and proxy data being used are acceptable before proceeding.

In cases where it is impractical to do a site visit of the whole facility (e.g., pipelines), the verifier must do an office visit to assess the responsible party's data management systems and records, and may need to visit a representative portion of the operations such as a compressor station or similar.

[28] Significant line items are items that contribute 10 percent or more to the total emissions inventory for the facility or constitute 10 percent of the emission reductions in a project.

- Compare the offset project and baseline conditions to those identified in the Offset Project Plan and Offset Project Report. Discrepancies must be documented in the verification report.
- Compare the greenhouse gas inventories inspected during the site visit[29] to the greenhouse gas inventory stated in the Offset Project Plan. Discrepancies must be documented in the verification report.
- Compare the offset project performance to those emission reductions and or removals stated in the Offset Project Plan and Offset Project Report. Discrepancies must be documented in the verification report.
- Design substantive procedures for three critical points along the data trail for significant line items[28]:
- As close to the measurement point as feasible;
- At the application of emission factors and aggregation of annual data; and
- Close to the assertion as possible as feasible.

5 Completion

The completion phase is the final phase of the verification in which the verifier finalizes their findings, and issues a verification report and statement of verification for the greenhouse gas verification. The verifier will:

1. Check for subsequent events that may affect the greenhouse gas assertion;
2. Review verification procedures and findings:
    a. Reassess materiality and risk;
    b. Review high level analytics;
    c. Assess the evidence and come to a conclusion on whether the greenhouse gas assertion conforms to the program criteria; and
    d. Assess whether the greenhouse gas assertion conforms to program disclosure requirements;
3. Come to a conclusion about the greenhouse gas assertion;
4. Draft the verification report and statement of verification;
5. Have the peer reviewer review and sign off on the working papers;
6. Sign the statement of verification; and

[29]In some cases, such as aggregated projects, it may not be practical to visit all sites each year. Site visits should be undertaken on a sample basis. Justification for the sample size and selection process must be provided in the verification report.

7. Issue the greenhouse gas verification report including the statement of verification to the client.

5.1 General Review

During the overall review, the verifier will:

- Reassess the risks and materiality assessment;
- Confirm that sufficient and appropriate evidence has been acquired to come to a conclusion on the greenhouse gas assertion;
- Examine whether the greenhouse gas assertion is consistent with the program criteria;
- Check to see that the verification standards were adhered to; and
- Develop a conclusion based on the evidence collected.

This high level review is usually carried out by the lead verifier or another team member with enough experience to assess judgment calls, understand the weighing of evidence, conduct high level analytics, and evaluate the greenhouse gas assertion against program criteria and verification standards.

5.1.1 Check on Materiality and Risk

Materiality and risks are briefly re-evaluated to determine whether there were any factors or evidence that may have caused materiality or risks to change during the course of the verification. A complete evaluation of the materiality and risks is generally not necessary.

Completion materiality is the materiality level set by the intended user (i.e., AESRD) for total misstatements and errors. Refer to Section 3.5.

Risks are reassessed to ensure that appropriate procedures have been designed and executed to accurately test the risks identified in the assertion. Reminder, **risks** may change over the course of the verification as more information becomes available and as such, **must be reassessed at the end of the verification to ensure all risks were identified and tested.**

Both the materiality and risk assessments may identify additional issues that will require further work by the verifier before a statement of verification can be issued.

5.1.2 High Level Analytics

Verifiers must review the high level analytics applied to ensure they remain representative and appropriate for the verification, as appropriate. See Section 3.3 for more information on analytics.

5.1.3 Sufficient and Appropriate Evidence

Verifiers must ensure sufficient and appropriate evidence was collected. Verifiers may need to collect additional records and perform additional procedures if it is determined that insufficient records were collected or available to support the verification.

In some cases, the verifier may determine there are insufficient evidence to support a conclusion on the greenhouse gas assertion. In these instances, the verifier will need to issue a scope limitation, or a

qualified statement of verification advising readers that the information may contain misstatements (see Section 5.1.5.2.2).

The assessment of evidence must be documented in the verifier's working files, including copies of relevant information needed to support the verifier's opinion.

5.1.3.1 Working Paper Files

The purpose of working paper files is to document the verification to demonstrate that the verification was conducted in accordance with verification standards (ISO 14064-3, and if applicable, other standards).

Verifiers must be able to demonstrate the verification was properly planned and carried out, and had adequate supervision, appropriate review, and sufficient and appropriate evidence to support the conclusion.

Working paper files are retained by the verifier and may be reviewed by AESRD if situations arise that require clarification on the scope and extent of the verification. These might include instances where a government audit identifies material issues in a facility or offset project's greenhouse gas assertion; assessment by the auditor general to review program performance including efficacy of the Specified Gas Emitters program and/or the Alberta Offset System; or in the event of legal action.

Table 22 provides minimum record requirements for working papers. **Working papers must be held for a minimum of seven years.**

Table 22: Minimum Content of Working Paper Files

Category			Information
Verification acceptance			Client evaluation Verification evaluation Independence evaluation Team evaluation
Planning	Risk Identification	Gain an Understanding	Data flow and controls descriptions Process flow diagrams Historical analysis
		Risk Assessment	Risk matrix with inherent, control and detection risks assessed at the assertion level
		Planning Analytics	Analytics as appropriate (e.g., comparative and relationship)
		Contribution Analysis	Identification of material categories done on a line-item and gas type basis
		Materiality Analysis	Materiality and tolerable error
	Verification Strategy		General approach divided into line items and/or attributes, if appropriate Draft greenhouse gas assertion
	Verification Plan		List of procedures linked to the risks identified Schedule of verification activities

	Sampling Plan		Sampling strategy for procedures, as needed
Execution	Evidence		Each procedure used, the evidence supplied, the conclusions reached as a result of the evidence, signature of the verifier and date completed Checklist for compliance against the program criteria Summary of unadjusted differences
Completion	Conclusion		Subsequent events check Overall review signed off by verification team leader Final greenhouse gas assertion (dated) Draft statement of verification
	Review		Peer reviewer approval and sign off (dated)
	Issuance		Final statement of verification (dated)

Note: working papers are the legal property of the verifier[30]; however, access must be granted to AESRD and/or the client upon request to meet regulatory and contractual agreements.

5.1.4 Evaluation against Program Criteria and Disclosure Requirements

Evaluation against program criteria is usually done using a checklist to assess conformance with the calculations and reporting requirements. This checklist is based on the requirements stated in the program criteria (*Act*, regulations, and guidance documents).

Verifier uses professional judgment and experience to determine whether disclosure provided is sufficient and appropriate to support the greenhouse gas assertion and program requirements. See Section 5.1.4 above for more information on disclosure requirements.

5.1.5 Develop a Conclusion

The verifier must develop a conclusion about the greenhouse gas assertion.

> ***Reminder:*** *As of January 1, 2012, AESRD requires all greenhouse gas verifications to be completed to a reasonable assurance level.*

A *reasonable* assurance[31] conclusion is a positive factual statement (audit) that says the greenhouse gas assertion is correct. **A verifier must do sufficient testing of the evidence to determine that the assertion is materially correct and fairly presented.**

Developing a conclusion requires assessing:

- Whether the quantification methods used are consistent with the program criteria;
- The evidence is sufficient and appropriate to support the greenhouse gas assertion;
- The quantitative aspects of the summary of unadjusted differences (SUD) is below the completion materiality set by AESRD;
- Estimates used are reasonable;

[30] As established in Chantrey Martin & Co. vs. Martin (1953) 3 WLR 459

[31] Alberta no longer accepts limited level of assurance

- The greenhouse gas assertion provides adequate disclosure for significant judgments and uncertainties such that the intended user can understand them; and
- The wording of the conclusion (e.g., determining whether the opinion should be an unqualified opinion or one with modifications).

The summary of unadjusted differences (SUD) (refer to Section 4) is used to assist the development of a conclusion. The SUD table includes both quantitative and qualitative items encountered during the verification that were incorrect and have not been corrected by the responsible party. **Unresolved differences must be below the completion materiality threshold. Verifiers must not sign off on a greenhouse gas assertion that has material, unresolved differences.**

Material misstatements identified during the verification must be resolved during the verification and will not appear in the SUD. If material errors in facility submissions cannot be resolved by the compliance deadline, the responsible party will need to contact AESRD to determine an appropriate course of action.

Offset projects cannot be serialized on the Alberta Emissions Offset Registry until material errors have been resolved.

Quantitative materiality is assessed by aggregating the quantitative misstatements in the SUD table. AESRD requires quantitative materiality of misstatements to be reported as:

1) Errors aggregated to take into consideration overstatements and understatements (net error); and
2) Errors aggregated using the absolute values of the errors (absolute error).

The first method using net error assessment provides an assessment of the true impact the errors on the greenhouse gas assertion. It is used to determine whether the aggregated errors are material. Aggregated errors that are less than the evaluation materiality threshold are considered immaterial. If the value of the aggregated errors approaches the evaluation materiality threshold, the verifier may need to perform additional procedures to confirm that the aggregated errors are actually below the materiality threshold. In other words, the closer the errors are to materiality, the more effort verifier has to put in to ensure that the errors do not exceed materiality.

The second method using absolute values for errors provides an assessment of internal control challenges within the organization. The higher the absolute error, the higher the controls risk. For example, two errors that are equal and large, but of opposite sign will cancel each other in the first method of error aggregation, but will be clearly identified in the second method of error aggregation (e.g., first: +10-10=0; second: |+10|+|-10|=20).

AESRD requires both approaches to materiality to be reported in the verification report.

Qualitative issues are also summarized in the SUD table. Professional judgment is used to determine how these issues will be handled. Examples of qualitative issues that may require modified opinions or additional disclosure are:

- Significant unreliability in the responsible party's data management systems that calls into question the integrity of the assertion;

- Extremely high uncertainty in the assertion that undermines the validity of the assertion (e.g., 100 per cent uncertainty in emission reductions);
- Reluctance or failure to disclose information that limits the verifier's ability to render an opinion on the greenhouse gas assertion including, but not limited to fraud or intentional misreporting; and/or
- Changes in operations that make the program criteria less applicable.

5.1.5.1 Statement of Verification

A statement of verification must contain the following information:

- Title;
- Addressee;
- Introductory paragraph that includes: the verification objective; the greenhouse gas assertion, including the assertion period covered; and responsibilities of the responsible party; and verifier;
- Scope paragraph that includes a reference to the program criteria, the verification standard used, and the verification procedures performed;
- Opinion paragraph that states the verifier's conclusions on the greenhouse gas assertion;
- Date;
- Verifier's Address; and
- Designated Signing Authority's Signature.

5.1.5.2 Modifications to the Statement of Verification

Situations may arise that affect the verifier's ability to issue a positive assurance finding. Matters (issues) that do not affect the verifier's opinion, but need to be disclosed to the end user are done through an *emphasis of matter.* Matters (issues) that affect the verifier's opinion can result in a qualified opinion, disclaimer of opinion, or adverse opinion. Figure 11 provides a flow chart for the different types of opinions available to the verifier based on the unique circumstances of the verification. It takes into consideration whether the misstatements are material and pervasive to the greenhouse gas assertion, whether there was adequate disclosure, and if there are significant uncertainties that affect the conclusion.

5.1.5.2.1 Emphasis of Matter

Verifiers may add an emphasis of matter to a statement of verification to draw the attention of the intended user to a significant uncertainty. Uncertainties differ from an error in that an uncertainty is not an incorrect value. Rather, it means the potential variability in a value. Uncertainty also differs from an estimate in that estimates have an underlying basis, model or concept to create the estimate.

5.1.5.2.2 Qualified Opinions

Qualified opinions offer a favorable opinion on the greenhouse gas assertion except for a specific scope limitation or disagreement with the greenhouse gas assertion.

- Scope limitations occur when there is a specific, known situation that impedes the verifier's ability to perform procedures. Examples include, but are not limited to, records being destroyed in a fire, or appointing verifiers too late to carry out certain procedures.
- Disagreement with the greenhouse gas assertion occurs when there is a disagreement with the responsible party about greenhouse gas accounting policies, their method of application or adequacy of disclosure. Example disagreements include different opinions on appropriate calculation methodologies, estimation techniques, and adequacy of disclosures provided.

The verifier must decide whether the qualification is material and/or pervasive to the greenhouse gas assertion. If it is material or pervasive, a disclaimer or adverse opinion must be considered.

A qualified opinion statement of verification must contain the following:

- Description of the limitation or disagreement; and
- The effect on the greenhouse gas assertion.

5.1.5.2.3 Disclaimer of Opinion

A disclaimer of opinion is used when the verifier, despite best efforts, cannot come to a conclusion. This may occur if the greenhouse gas assertion contains significant uncertainties, or if requested evidence was not available and the verifier was unable to complete the verification.

A disclaimer of opinion involves issues that are material and pervasive to the greenhouse gas assertion. In this case, the verification is terminated and a disclaimer statement is issued. Examples of what would cause a disclaimer of opinion are:

- Unavailability of a significant amount of evidence;
- High uncontrollable uncertainty; or
- An error(s) that is known to be material to the greenhouse gas assertion but cannot be quantified.

5.1.5.2.4 Adverse Opinion

An adverse opinion is issued when the greenhouse gas assertion contains: one or more material misstatements; improper application of the program criteria and subsequent disclosure that are material and pervasive; or uncertainties that are material and pervasive. An adverse opinion occurs when the verifier can quantify and/or describe the effect of the misstatement and applies to the entire greenhouse gas assertion.

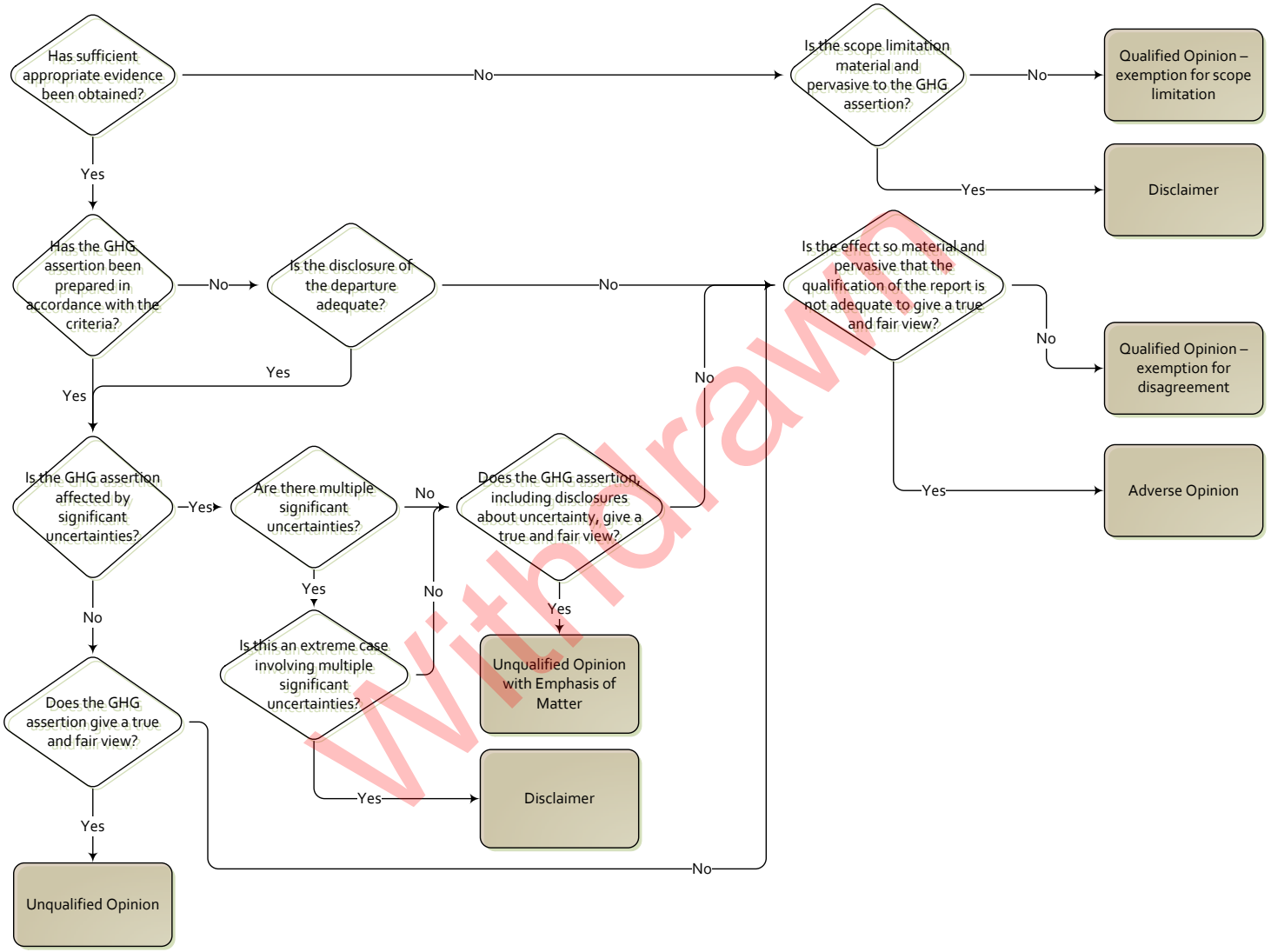

Figure 11: Modifications to the Statement of Verification

5.1.6 Peer Review

The peer review provides an independent review of the verification before the statement of verification and verification report are released to the client. The peer reviewer is a qualified individual that has not been involved in the verification, collection of evidence, application of procedures, or any of the major decisions pertaining to the verification. **This person must be familiar with program criteria, verification procedures, the subject matter, and internal risk procedures**.

The peer review focuses on:

- Appropriateness of team competencies;
- Review of significant decisions made during the verification;
- Whether sufficient and appropriate evidence was collected to support the conclusion;
- Whether the evidence collected supports the conclusions proposed by the verification team;
- Review of the greenhouse gas assertion and the statement of verification;
- Review of the verification report; and
- Review of the verification process compared with the verification standard(s) applied.

The peer reviewer must be identified in the verification report.

Supporting documents for the peer review including the credentials[32] of the peer reviewer, what was reviewed, the conclusions reached, and the date of the review must be kept in the verifier's working papers.

5.1.7 Issuance of the Statement of Verification

The final statement of verification must be signed by the designated signing authority.

Electronic signatures are allowed. **The electronic signature must be of sufficient quality to identify the person signing statement of verification and verification report, and be consistent with the purpose of the document or record being signed.** AESRD reserves the right to request signed originals where the electronic signature is ambiguous or cannot be verified.

> ***Note:*** *The Specified Gas Emitters Regulation requires the third party verifier to be an individual. If a company wishes to sign on behalf of the Corporation, sign-off must be done as:*
>
> *Company Name*
>
> *Per [name and signature of Corporate Binding Official]*

The signed statement of verification must be appended to the verification report and submitted to the client. The statement of verification and verification report will form part of the facility's compliance report or baseline emissions intensity application. **Offset project developers must submit a statement of verification and verification report to the Alberta Emissions Offset Registry as part of the credit serialization process.**

[32] Refer to Section 2.2.4.3 for peer reviewer competencies.

5.2 Verification Report

AESRD requires a verification report to accompany the statement of verification. This report provides background information necessary to understand the verification strategy and conclusions supporting the statement of verification. AESRD has prescribed standard content requirements for the verification reports in the relevant technical guidance documents. Table 23 provides a summary of these requirements including additional clarification on reporting requirements.

Table 23: Verification Report Contents

Verification Section	Facility/Offset Project Content	Further Comments and Description
Summary	Summary table containing: • Facility/offset project identification information • Facility/offset project contact information • Verification objective • Verification summary • Verification team members • Report and audit dates	This section provides a brief overview of the verification. Use of the standardized format provided in templates facilitates government review.
Introduction	Provide an introduction to the facility and the verification. This includes a description of the: • Facility/offset project; and • Facility/offset project boundary. For facilities, this includes: • The approved baseline emissions intensity; • The net emissions intensity limit; and • A summary of changes at the facility since the baseline period. For offset projects, this includes: • The offset project baseline; • A summary of changes to the baseline since the offset project start date; and • A summary of changes at the offset project since the offset project start date.	Boundaries should be defined by: • Geographical • Organization • Activities and processes • Greenhouse gas inventory • Relevant greenhouse gases • End products • Time period **If information is excluded, justification must be provided.** Process flow diagrams and aerial photos assist in understanding the scope of the verification. The purpose of the baseline intensity/baseline description is to ensure that they are still applicable to the facility/offset project. The discussion should include: • Identification of the major sources of emissions/removals; and • Identification of the calculations used.

Verification Section	Facility/Offset Project Content	Further Comments and Description
Objective	Discuss the objective of the verification.	The objective of the verification should be to express an opinion rather than a particular conclusion.
Scope	Discuss the scope of the verification.	The scope should align with the description of the facility/offset project. Any discrepancies should be justified.
Program Criteria	List or reference the program criteria used and any relevant supporting documentation used.	The program criteria are the benchmarks (e.g., act, regulations, protocols, guidance documents, etc.) used to assess the greenhouse gas assertion. **Any unique benchmarks such as calculations for specific emissions must be justified.** Note: ISO 14064-3 or ISAE 3000 are verification standards, not program criteria.
Verification Strategy, Verification Procedures and Sample Plan	The final version of the verification plan which includes the verification strategy, verification procedures, and sample plan. The actual verification procedures and sampling plan can be in an Appendix.	The final version of the verification plan needs to be included in the verification report. It is helpful to describe the approach (i.e., degree of controls reliance) used in designing the verification plan. Verification procedures need to be described in sufficient detail to understand how the verification was done. Procedures need to connect to risks identified by the verifier for the greenhouse gas statement and attribute level for each material line item, including the nature, timing, and extent of the procedures. Describe, as appropriate, the procedures used to assess: • Facility boundaries; • Methodologies, emission factors and conversions used; • Comparability with the approved baseline;

Verification Section	Facility/Offset Project Content	Further Comments and Description
		• Conformance to the program criteria; • Integrity of the responsible party's data management system and controls; • Greenhouse gas data and information, including the type of evidence collected, verification testing and crosschecking; • For offset projects, a comparison of the greenhouse gas assertion to the Alberta offset program requirements; • Details of site visit; and • Other relevant information.
Verification Schedule	Provide a list of verification activities and dates	A timeline of the verification process
Verification Findings	Discuss findings including: • Material and immaterial discrepancies identified, including net and absolute materiality; • Observed issues with the facility/offset project boundary; and • A summary of findings including the SUD table.	Typically, if there is a problem with the data, one or more controls have failed. Verifiers are encouraged to document data and control errors such that the responsible party has sufficient information to determine corrective actions to improve the data management system over time. Note: the verifier cannot provide solutions to issues as this would be considered consulting and could compromise the verifier's independence. Discuss findings including: • Weaknesses in the responsible party's data management system and controls; • Incompleteness in the greenhouse gas inventory; and • Concerns with production values.
Statement of Verification	The verifier's opinion on the greenhouse gas assertion. **For facilities, the statement of verification must be consistent with Statement of Verification provided in the compliance report form and is appended to the verification report.**	Most modifications to the statement of verifications should have supporting clarification in the assertion.

Verification Section	Facility/Offset Project Content	Further Comments and Description
	For offset projects, the statement of verification must be developed by the verifier to meet the requirements stated in this document and is appended to the verification report.	
Confirmations	Documentation of confirmations done as part of the verification process, including inconsistencies observed.	Confirmations are used to check additional reporting information before it is submitted for compliance. Confirmations are discussed in Section 5.4.
Appendix	**Facility submissions must include signed:** • **The Statement of Verification (SoV)** • **The Conflict of Interest (COI)** • **The Statement of Qualification (SoQ)** **Offset projects must include a signed Statement of Verification and Conflict of Interest checklist.** If not included in the body of the report, include the final verification plan, final sampling plan, and any relevant documentation such as methodologies, and calculations that provide clarity and assist AESRD.	

Templates for statement of qualifications and conflict of interest checklist are available in the relevant guidance documents for facilities and offset projects. While the layout of the verification report may be adjusted to suit individual preferences, **the content specified in the template must, in all cases, be included. Where the verifier feels a category is not applicable to the verification, sufficient rationale must be provided to explain why the information is not necessary to the verification.**

5.3 Subsequent Events

Subsequent events are events that occur after the greenhouse gas assertion period, and may occur before or after the statement of verification has been issued. These events may affect the validity of the greenhouse gas assertion.

Subsequent events deal with either situations that existed during the verification, but changed after the greenhouse gas assertion period, or new situations that arose after the greenhouse gas assertion period. Examples of subsequent events are shown in Table 24.

Table 24: Examples of Subsequent Events

Existing Conditions that have Changed	New Situations
Estimation procedures use to determine fugitive emissions will be updated to reflect better scientific knowledge	An emergency system shut-down caused significant emissions
Announcement that Federal regulations will be imposed on greenhouse gas emissions for this facility next year	Acquisition of a neighboring facility will change baseline and facility emissions
	Offset project was destroyed by a forest fire

New situations that arise after the assertion period do not generally require adjustments to previous greenhouse gas assertion values, but may require disclosure to maintain a true and fair representation of facility operations. Subsequent events that occurred during the assertion period may require further action by the verifier.

If subsequent events are identified before the verifier has issued a statement of verification, the verifier must assess the event and implications to the greenhouse gas assertion. Additional evidence may need to be collected, and additional procedures may need to be performed before the verifier can come to a conclusion and issue a statement of verification.

If the event is noticed after the statement of verification has been issued, the verifier may conduct limited testing including collection of additional evidence, and suggest amendments to the greenhouse gas assertion. If changes are made to the greenhouse gas assertion, a modified statement of verification with an emphasis of matter will be issued, and will need to be submitted to the AESRD.

The degree of change needed to the statement of verification (e.g., emphasis of matter, or a qualified or adverse opinion) will depend on how material and pervasive the subsequent event is to the greenhouse gas assertion.

Table 25 provides more information on the types of subsequent events and normal corrective actions.

Table 25: Types of Subsequent Events

	Between end of collecting evidence and issuance of the statement of verification (Proactive)	After the statement of verification has been issued (Reactive)
Verifier Responsibility	Discover and evaluate events that are likely to have a material effect on the greenhouse gas assertion.	Evaluate only those events that come to their attention.
Verifier Possible Actions	Collect additional evidence. Request greenhouse gas assertion disclosures. Alter original statement of verification.	Suggest an amendment to the greenhouse gas assertion. Issue a modified statement of verification.
Verification Procedures	Reviewing the most recent greenhouse gas information. Inquiring about recent activities that could affect the greenhouse gas assertion (e.g., new regulations or guidance, acquisitions/divestitures, operational interruptions).	None required.

5.4 Confirmations

Confirmations are beyond the scope of a greenhouse gas verification, but are activities AESRD requires verifiers to perform during the verification. Confirmations determine whether the information reported in the greenhouse gas assertion are accurate (e.g., responsible party, address, dates, title, consistency across documents, etc.). **AESRD requires the following information to be confirmed:**

Table 26: Information Confirmed during the Verification

Facility Baseline Applications	Facility Compliance Reports	Offset Projects
Information contained in Tabs A1, A2, A3, and A4	Information contained in Tabs A1, A2, A3, and A4	Consistency of offset project information across offset project documentation
	Correct net emissions intensity limit being used and compared to the approved baseline emission intensity	Offset project location and any applicable approvals information
Methodology documents have been included.	Methodology documents have been included.	Methodology documents or procedures manual exist.
Confirmation that the N/A boxes have been appropriately filled out.	Confirmation that the N/A boxes have been appropriately filled out.	Offset project contact, report dates, emission reduction numbers, etc. (part of one above)
Completeness and accuracy of process and data flow diagrams.	Completeness and accuracy of process and data flow diagrams	Completeness and accuracy of process and data flow diagrams
	Justification for emission performance credits being claimed	

Any discrepancies in the confirmed information noted by the verifier should be documented in the confirmation section of the verification report.