Quality assurance (QA)/ Quality control (QC) and verification

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PARTNERSHIP FOR MARKET READINESS
3rd Regional MRV Technical Training
Izmir, Turkey
September 17 – 19, 2014

- QA vs QC
- QC and monitoring plan
- QA – verification and other options

Definitions

Data Quality Management

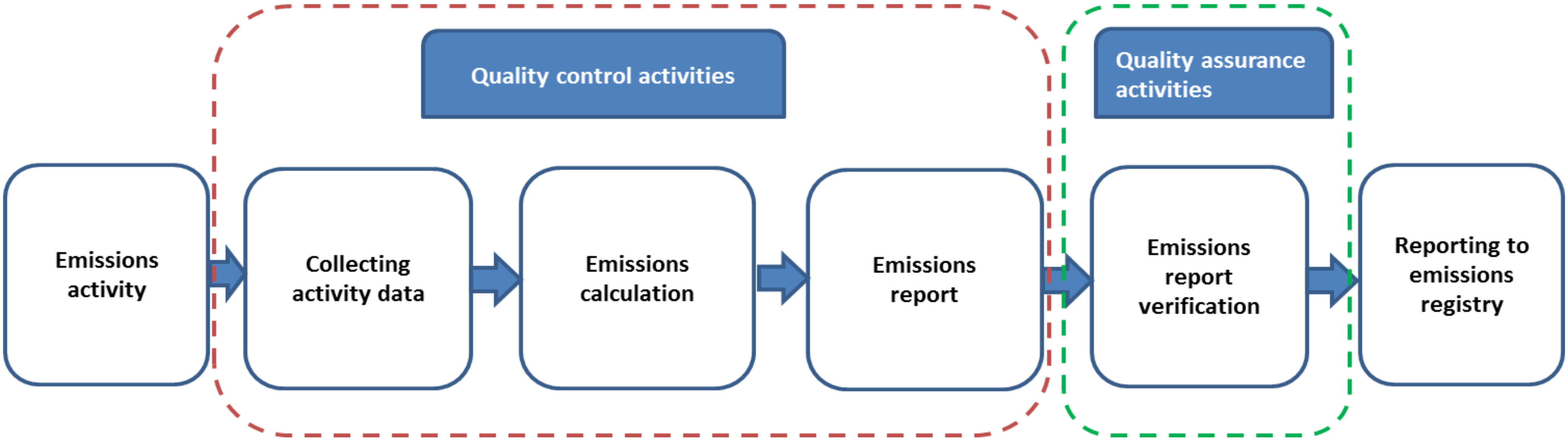
Quality Control

a system of checks to assess and maintain the quality of the GHG emission report

Quality Assurance

a planned system of review procedures conducted outside the actual monitoring process, compilation by personnel not directly involved in the monitoring process.

Quality Control vs. Quality Assurance



Purpose of QA/QC

- **Investigate accuracy, completeness, transparency, consistency**
- **Risk management**
  - **Preparation and controls now avoids potential big problems later**
- **Management and credibility**
  - **Without checks, risk "garbage in as garbage out"**
  - **Assurance builds trust and confidence**
- **Continuous improvement**
  - **State of the art always evolving**

The Monitoring Plan

- Provides documentation of the reporting entity's emissions monitoring methodology
- Explains data flow
- A living document
- Programs can provide templates
  - EU ETS requires installations to submit a report
  - EPA asks entities to prepare a plan, but not required to submit

Examples of QC Activities along the Data Trail

- **Input controls**
  - **Metering equipment maintenance, calibration**
  - **Only personnel with training, job duty, data access**
- **Data protection, version control, back ups, archiving, security**
- **Data checks**
  - **Sequence testing, missing data tests, record counts, reasonableness checks, reference checks, transcription checks, units**
- **Process controls**
  - **Recalculation, profile analysis (related sources), trend/variance analysis (over time)**

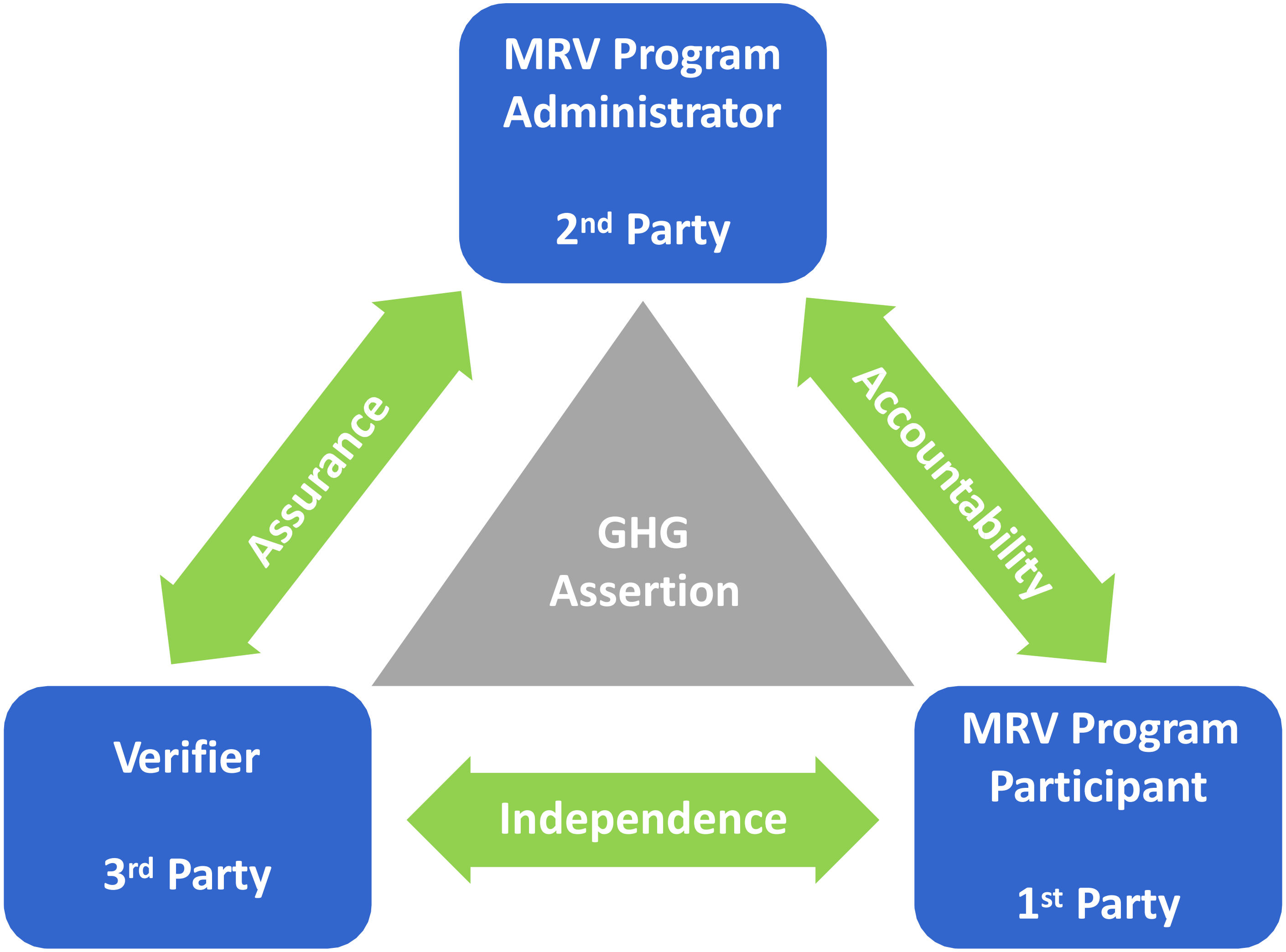
Quality Assurance System

Preparation	• Independence Confirmation • Competency Assessment	Quality Assurance Team
Plan	• Preliminary Assessment: Quality Control System • Risk Assessment: GHG Monitoring Procedure	Quality Assurance Plan
Performance	• Data Quality Control System Assessment • GHG Data Assessment	Quality Assurance Report
Improvement	• Discuss Findings • Corrective Action Request • Re-assessment and Conclusion	Data Quality Assurance

Type of Quality Assurance

Type of Quality Assurance	Description	Independence Mechanism
Internal Assurance/ Internal auditing	Persons(s) from within the reporting company but independent of the GHG inventory determination process conducts internal assurance	Different lines of reporting
External Assurance/Verification	Person(s) from an organization independent of the product GHG inventory determination process conducts third party assurance	Different business from the reporting company

Verification Relationships



Verification Options

Self Certification	• Relatively low cost option • May not instill sufficient confidence in data if it is the only QA mechanism utilized
Regulatory Authority Review	• Carries high level of confidence • Labor and cost intensive • Demands high level of technical capacity
Third Party Verification	• Carries high level of confidence when done by accredited third party verifiers as per laid out guidelines • Higher cost to the reporter→ May affect program uptake

Level of assurance

‘Reasonable assurance’ means a high but not absolute level of assurance (Wording from international standard ISAE 3000 (www.ifac.org))

Reasonable level of assurance	Limited level of assurance
Intensive verification	Less intensive verification
Verification statement positively worded:	Verification statement with double-negative wording:
We have found that the emissions report is a fair representation of the emissions of the installation, and contains no material misstatements…	Nothing has come to our attention that causes us to believe that the data is not stated in all material respects in accordance with the relevant criteria…

Levels of Assurance

- **LoA depends on the use of the verification statement and the intended user**
  - **Regulatory compliance (mandatory facility reporting)**
  - **Market transactions (emissions trading)**
  - **Public relations (claims about GHG management efforts)**
- **The degree of confidence the intended user (program administrator) requires in a verification statement**

- **<u>Inherent risk</u> due to the complexity of the processes that are basis of GHG calculations and GHG assertions**
  - **Lower for a facility with a single combustion source vs. petroleum refinery**
- **<u>Control risk</u> due to failure of facility controls to prevent, detect, or correct an error or omission (QA/QC, metering)**
  - **Lower for an established company, with audited financial system**
- **<u>Detection risk</u> due to failure of verification activities to identify or detect evidence of material misstatement**
  - **Higher if entity is spread over a large area, multiple owners, mentality of fear or resentment towards the verifier, lack of cooperation**

Two-step approach

Check the control system

Reliable and effective → Relatively small sample for detailed check

Exist but not reliable/effective → Bigger sample for detailed check

Not existent/small amount of data → Full check of data

Other Parameters

- Materiality
- Inherent Risk
- Level of Assurance

Materiality

- **Criteria for determining if errors, omissions, misrepresentations, and non-conformities within or underlying a GHG assertion influence the decisions of the intended users**
- **Quantitative**
  - **uncertainty or error of 5% in the total emissions from the organization's inventory would affect decision**
- **Qualitative**
  - **uncertainties related to issues that are not easily expressed numerically, such as the potential of industry or market instability**

'**Materiality Thresholds** ': the quantitative threshold or cut-off point above which misstatements, individually or when aggregated with other misstatements, are considered material

- **Absolute/relative/mixture**
  - **e.g., 1000 metric tonnes of CO2e per year/**
  - **e.g., plus or minus 5% of annual total**
  - **e.g., 1000 metric tonnes of CO2e per year or 5% of total, whichever is less**
- **Varies by industry sector, GHG source**
- **Materiality thresholds guide verifiers in their determination of whether a discrepancy is material or not**

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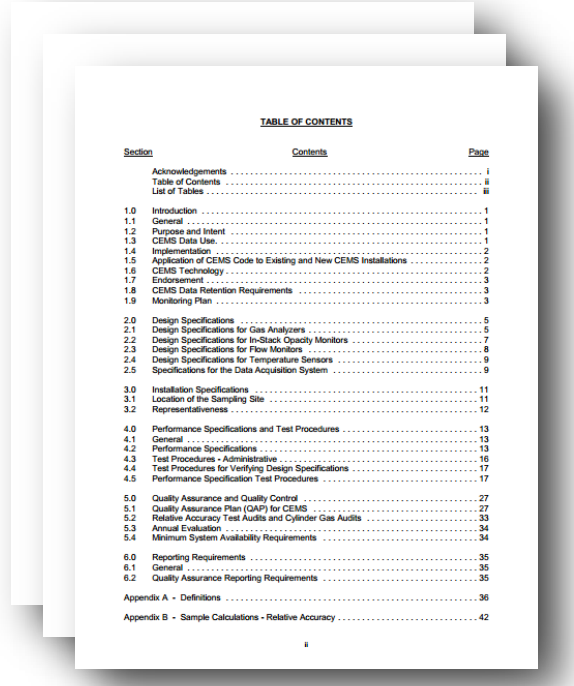
Materiality Aggregation/Disaggregation

- **10% of an individual GHG source**
  - **A boiler is an example of an individual source of combustion emissions**
  - **A natural gas pipeline is an example of a source of fugitive emissions**
- **5% of GHG emissions from a facility or site**
- **Discrepancies that are immaterial individually may be material when aggregated**

- **IPCC QA/QC and Uncertainty Guidelines**
- **Program requirements integrated into monitoring, data management, record keeping**
- **Industry standards, national standards, equipment specifications (e.g., metering equipment calibration)**



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Recap

- QA and QC are both measures to improve data quality
- QA and QC are often internalized to monitoring and reporting functions
- Several options for verification systems
  - Frequency (annually, every 2-3 years)
  - Verification activities (desk review, onsite audit…)
  - Program design (based on facility size, type of source….)
- Benefits from verification, but no 'bullet proof' guarantee
  - Trade off between cost and level of assurance
  - Different risks exist
  - Materiality defines the acceptable level

Thank You

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