EUROPEAN COMMISSION
DIRECTORATE-GENERAL
CLIMATE ACTION
Directorate B – Carbon Markets & Clean Mobility
CLIMA.B.2 – ETS (II): Implementation, Policy Support & ETS Registry

AV Training Handbook

2020

This handbook is intended for use in the training of verifiers involved in verification of GHG annual emissions reports under the EU ETS, for (lead) assessors of accreditation bodies responsible for oversight and witnessing of verifiers as well as for practitioners of competent authorities responsible for the review of GHG emissions reports and verification reports.

This handbook has been composed on the basis of a case study and model answers developed for the online 2020 Accreditation and Verification Training Event that took place in two rounds: on 16-18 September to discuss the case study within small discussion groups and on 25 September 2020 to highlight the main conclusions from the case study and to discuss further verification related topics.

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1 Introduction

This handbook is intended as guidance for training of verifiers, (lead) assessors of national accreditation bodies (NABs) as well as for practitioners from Competent Authorities (CAs) working in the area of Verification and Accreditation for the EU ETS (European Union Emission Trading System). It was prepared for the online 2020 Accreditation & Verification (A&V) Training Event organised by the EU ETS Compliance Forum secretariat on behalf of the European Commission.

The training aimed at providing an up to date and shared understanding of the following main topics:

- Verifiers' scope of verification, risk analysis, sampling of data and of internal controls, and application of materiality and reasonable assurance judgments in sectors with complex data flows;
- How to determine a reasonable allocation of time for verifications;
- The types of checks to perform during verification of installations with complex data flows (drawing distinctions between the role of the verifier compared to the role of the CA).

The verification issues raised during the training were explored and explained on the basis of a complex case study and a set of questions. The training programme consisted of two rounds:

- In **round 1** web meetings were organised for 18 small discussion groups which consisted of a balanced mix of CAs, NAB and verifier representatives from different MS so as to maximise the training and exchange of experience. On average each discussion group was made up of 3-5 verifiers, 3-4 practitioners from the CAs and 1-3 representatives from the NABs. Each discussion group was facilitated by an highly experienced moderator with verification expertise. The webinars of these discussion groups took place on 16/17/18 September.
- In **round 2** a plenary webinar was organised on 25 September 2020 to present model answers and discuss the results identified by each of the discussion groups. In the afternoon there was an opportunity to discuss key verification issues of a more general nature not necessarily related to the case study.

Before the event the case study had been made available to each participant. The case study exists of a description of the installation, the activities carried out by the installation, the applicable monitoring methodology and other relevant information. An excel file with additional information on fuels used in the installation and corresponding data was provided as well. At the end of the case study questions are formulated which formed the basis of the discussions.

All participants had been advised to assess the case study carefully and consider in detail the questions related to the case study. They were advised to acquaint themselves with the requirements in the MRR and AVR and to study the relevant guidance documents. The regulations and guidance documents can be found on the EU ETS MRV website of the European Commission: https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/monitoring-reporting-and-verification-eu-ets-emissions_en#tab-0-1

Participants were instructed to ask themselves "does the verifier have the information needed to answer the question, should the verifier ask the operator for additional information, or should the verifier do additional tests to ensure that it is able to address the issue."

Suggestions for the use of this handbook. *To maximise the benefits of this handbook, verification bodies, NABs and CAs are advised to make the case study and the questions available to their staff. The trainers are advised to make use of the model answers (instructions to trainers) provided in chapter III.*

2. Case Study for online EU ETS AV Training event 2020

Case Study: Cement Production Plant

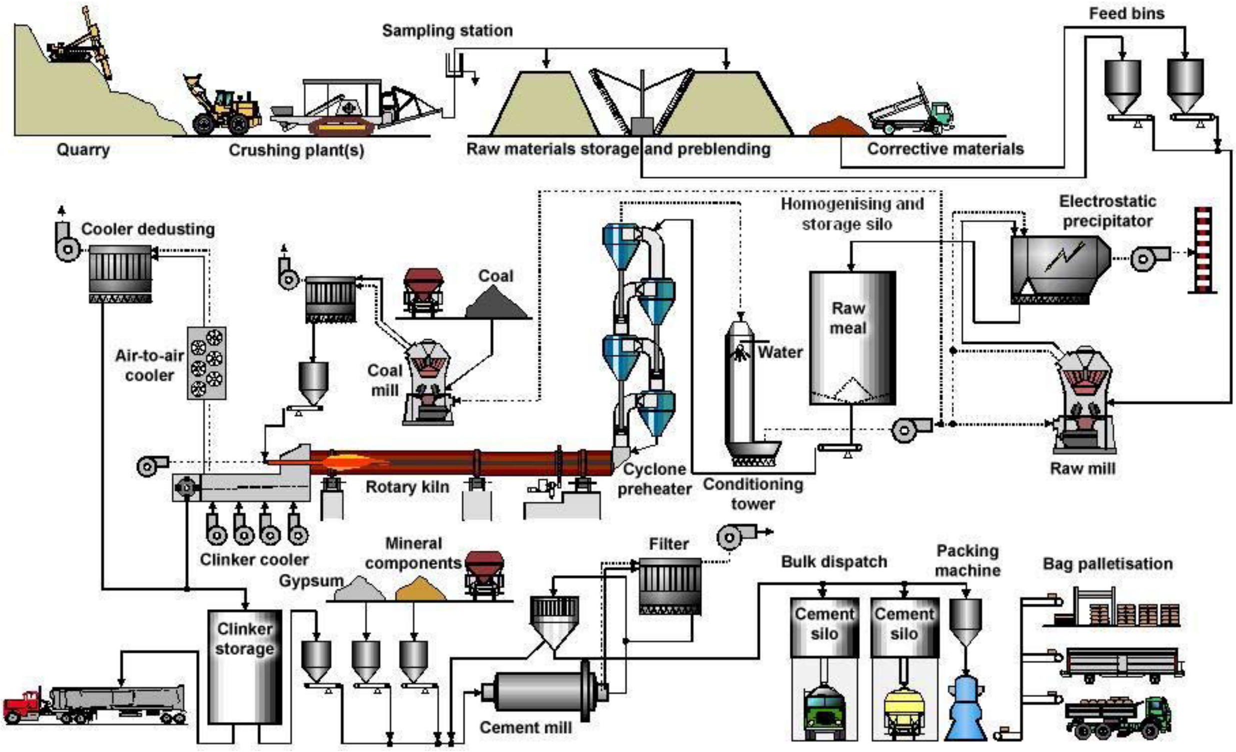
Note – this scenario is a hypothetical installation not reflecting any real-life installation. The focus of the case study is related to data management, inherent and control risks and verification activities.

Introduction

A case study is given below followed by a series of questions that should be worked through in relation to the case study. This material should be worked through in advance of participation in the discussion groups. Please keep notes to enable you to contribute to the discussions. The form at the end of this document can help you to record risks and verification activities for example: associated with different parts of the dataflow that you might be evaluating.

Case Study: Cement production

CEMA is a grey cement clinker production plant, using 2 rotary kilns. The production plant is located close to a waterway. The diagram below shows an overview of the production process.



Source: [103, CEMBUREAU, 2006]

Description of processes and activities:

Naturally occurring calcareous deposits, such as limestone, marl or chalk, provide the source for calcium carbonate. Silica, iron oxide and alumina are found in various ores and minerals, such as sand, shale, clay and iron ore. The main raw materials, such as limestone, chalk, marl and shale or clay, are extracted from a quarry close to the plant. After primary crushing, the raw materials are stored ready for further preparation. Other raw materials, such as bauxite, iron ore, blast furnace slag or foundry sand, are brought in from elsewhere.

The basic chemistry of the cement manufacturing process begins with the decomposition of calcium carbonate ($CaCO_3$) in a kiln at about 900°C to create calcium oxide (CaO - lime) and liberated gaseous carbon dioxide (CO_2); this process is known as calcination. This is followed by the 'clinkering' process in which the calcium oxide reacts at a high temperature (typically 1400–1500°C) with silica, alumina and ferrous oxide to form the silicates, aluminates, and ferrites of calcium which together comprise the clinker. The clinker is then ground or milled together with gypsum and other additives to produce cement.

The two CEMA kilns uses various types of conventional fossil fuels, as well as alternate fossil, mixed fuels and a small fraction of biomass fuels (as outlined below). Storage silos hold the finished cement until it is shipped. Most cement is sold in bulk and shipped by barge or truck; about 5-10% is sold bagged in sacks.

Management, quality control and control room operations are directed from the Plant office which also contains the laboratory.

The site has a range of small equipment that uses LPG and Gas Oil as well as an emergency generator and fire pumps fired by Gas Oil.

Excess heat from the kilns is recovered and sent to the local authority district heating system to support social housing.

Kiln Fuels

In addition to the LPG (F6) and Gas Oil (F7), the kiln is able to co-fire a range of different fuels including:

Fuels Listed in the Monitoring Plan	
Solid	Liquid
(F1) Coal	(F3) Kerosene*
(F2) Pet Coke	(F9) Waste solvent
(F4) Waste Tyres	Gaseous
(F8) Sewage pellets*	(F5) Natural Gas
(F10) Municipal waste derived fuel	**Deminimis Source Streams*

The fuel used to fire the kilns depends on availability and economics at the time of operation.

Coal and pet coke are delivered to the installation port by means of barges. On average each barge offloads 2500 tonnes. Determination of the cargo quantity takes place using approved chartered surveyors applying a water displacement method which can guarantee an uncertainty of ±1%.

After unloading, the coal and pet coke is stored in two heaps (Location reference: 530106: coal storage, 540105: pet coke). From the heaps, the coal/pet coke is transported towards the mill on conveyor belts and fed into the kilns. On 1st January each year, a chartered surveyor conducts a stock measurement of each of the heaps for both volume and density.

The coal/pet coke consumed is calculated using a stock balance:

Fuel C = Fuel P + Fuel S – Fuel E

Where:

Fuel C = Fuel consumed in year y

Fuel P = Fuel delivered in year y

Fuel S = Stock begin year y

Fuel E = Stock end year y

From each shipment a sample of coal or pet coke is taken in accordance with ISO 1988 and all samples are analysed by an external laboratory.

Other fuels and materials/additives are weighed onto site over calibrated road weighbridges and the relevant Activity Data is determined using a stock balance method. With the exception of tyres, a representative sample is taken of each of these fuels and sent to the lab to determine % biomass, NCV, carbon content and the associated Emissions Factor (EF). Calculations for the tyres use country specific default values of 0.088 tCO2/TJ (EF) and 28.2 GJ/t (NCV) are used due to the difficulty in obtaining representative samples.

For de minimis fuels:

- F3 - an estimation is applied or a non-calibrated flow meter is used to determine activity data and national default values are used for the calculation factors.
- F8 – it is assumed that all deliveries in the reporting year are consumed in that year. Sewage pellets are 100% solid biomass and the operator uses an EF of zero.

Kiln Feed and Kiln Dust:

Materials Referenced in the Monitoring Plan	
Kiln Feed (M1-9)	Kiln Dust (M10-M11)
Clinker	

At the end of each month the Environmental Protection Manager receives an e-mail from the Production Department stating the information needed to calculate the CO_2 emissions from kiln feed:

- **For Line 1:** the amount of the total raw mill feed consumed (derived from readings of the eight Schenck Microcont FCO421 weigh feeders W1-W8). The dry quantity of mill feed is used, taking into account the moisture in the weight of the raw mill feed.
- **For Line 2:** The quantity of kiln feed used during the process is weighed on entering the kiln using the kiln feed system Schenck Coriolis meter (W9).

The feed to each raw mill is recorded by the differential measurement of the amount in the feeders mentioned above, the measurements of which are automatically added to the electronic counter of the feeders. The Control Room Operator manually enters the readings from the meter totalisers onto the plant's daily production form. These measurements are communicated to the Production Department by the Control Room Operator.

Calibration and maintenance of the production feeder measuring devices are carried out according to calibration instructions developed by the plant.

The quantity per unit time (mass flow rate) of the kiln dust discarded is measured after the dust-bin when all dust collected is discharged to a haulage wagon once per month - a truck scale is used (W10). Weighing is performed by a Production Department operative once each month for line 1 and every two months for line 2. The results of these weightings are kept by the Production Department according to Working Instruction WI 110-2.

- **For Line 1:** at the end of each month following internal review the Production Department sends an e-mail to the Environmental Protection Manager stating the amount of dust discarded as derived from the measurement of truck weight and the associated dry raw mill feed weight from the meters. The calculated percentage of discarded dust to the dry raw mill feed is applied to the consumption of dry raw mill feed for the following month until a new percentage is derived.

- **For Line 2:** Every Two Months month following internal review the Production Department sends an e-mail stating the amount of dust discarded as derived from the measurement of truck weight and the associated dry kiln feed weight from the meters. The calculated percentage of discarded dust to the dry kiln feed is applied to the consumption of dry kiln feed for each of the following months until a new percentage is derived.

Production:

Cement despatched is weighed over calibrated road weighbridges and a stock balance is done taking account of any imported cement; the result of the stock balance is the manufactured cement

The truck weigh scale is calibrated annually by an external party; and both calibration and internal maintenance of the truck weigh scale is performed according to Work Instructions developed by the plant.

In addition, for the calculation of CO_2 emissions, the Production Quality Department sends an email at the end of each month to the Environmental Protection Manager stating:

(a) The monthly average of the composition of the raw mill feed for line 1 and kiln feed for line 2 that result from the analysis of samples taken every two hours. Stoichiometric ratios, are used to convert the composition data into emissions factors. Each sample is analysed by the plant laboratory.

(b) A monthly average of the moisture content of the feed into the lines. For each of the mill feeders, a sample is taken once per day for analysis by the plant laboratory. A monthly average of the moisture content of these samples is created for use in determining the dry weight of material.

The total carbonate CO_2 in the discarded kiln dust for both lines is determined through a 'Loss On Ignition' (LOI) test (applying EN-196-2), which is carried out on samples taken once per day at a collection point that is located after the dust bins. The Quality Control Manager is responsible for the calculation of the monthly averages of the weight fraction of the total carbonate CO_2 in the discarded kiln dust.

Emissions from non-carbonate carbon in the raw meal is determined once a year by the plant laboratory.

The Environmental Protection Manager uses these data for the calculation of monthly CO_2 emissions from the processing of kiln feed.

Approved Monitoring Plan:

The installation is permitted at Category C. The approved plan refers to calculation method A: process emissions from the raw meal components are monitored based on the carbonate content of the process input. All dust leaves the kiln system.

The sampling plan states:

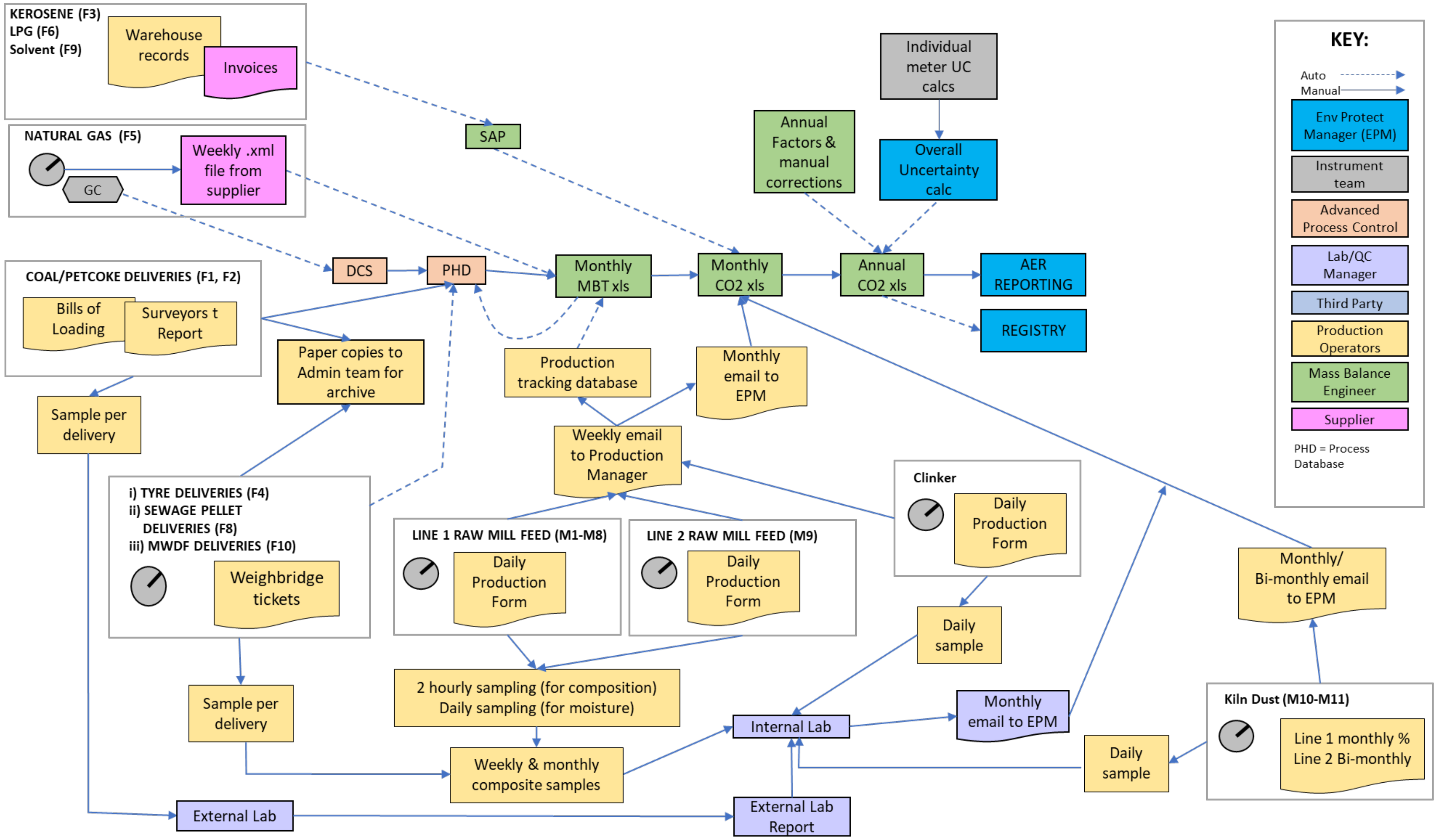
- **Clinker** – a daily sample is taken from which a monthly composite is produced and sent to the lab for analysis of MgO and CaO concentrations.
- **Chalk and raw meal**- – a daily sample is taken from which a monthly composite is produced and sent to the lab for analysis of CaO and MgO content, carbon dioxide content and total organic carbon
- **Coal, pet coke and waste derived fuels (F1, F4 and F10)**– representative samples are taken from each delivery along with a record of the moisture of the delivered fuel; weekly and monthly composite sample are also created and sent to the lab for analysis of - calorific value; and % content of carbon, ash, moisture, biomass, non-biomass and inert mass.

Except for Coal and Pet Coke, samples taken are analysed in the installation's internal lab

The excel file provides data on inputs of coal, pet coke, natural gas, tyres, solvents and kerosene.

The following page in this document outlines the installation’s data flow.

Cement Plant Emissions Accounting Data Flow



Source: Planet & Prosperity Ltd, 2019, as adapted

Questions:

1. What information does the verifier need to determine the depth and scope of verification and what does the verifier need to consider?
2. Given the context in this case, what inherent and control risks should the verifier identify and on what elements should the verifier focus its checks? Please indicate the reasons why you think the verifier should focus on these elements.
3. How much time should the verifier allocate to the verification of this installation and how would you allocate this time to the different parts of the verification work? [*Please state the factors you will take into account in allocating the number of days to the verification*]
4. What specific checks does the verifier need to carry out on the monitoring methodology and what evidence should they be looking for? Which/how much of this checking needs to be done 'on site'?
5. What checks should the verifier carry out on the internal control activities and the control system?
    a. How would you carry out these checks? [*Please list the specific control processes, procedures and documents you would expect to find on site*]
    b. What difference would it make to your planned checks if the records were in paper format versus electronic format (e.g. Word documents, excel spreadsheets or databases)? What are the risks associated with each format?
6. What tests and checks should the verifier carry out on the installation's data and how would you carry out these checks?
7. What approach should the verifier take to sampling for their tests and checks; how much should be included in testing? (*consider both qualitative and quantitative approaches*)? Please answer the following questions:
    a. How would the verifier define the sampling size for checking the data and control activities? [*i.e. what approach and sampling method would you us*e]
    b. What would be sampling size be? [*I.e. what proportion of each data set within the overall data population would you test and why*]
    c. Where would the focus of sampling effort be?
    d. What tests would be done on the elements selected for checking and why?
    e. How would you change the sampling approach planned above if this was an installation with a simpler data flow (for example a smaller number of steps, lower number of source streams, less people involved etc.) or much tighter internal controls? *[please provide details of what and how you would change the approach and sample size planned etc.]*
8. Are there any systematic errors in the data provided? If yes describe what they are and how you would resolve them.
    a. How should the verifier identify random errors in the data set provided? [*i.e. what checks or tests would you do*]
    b. How should the verifier deal with any random errors identified?
9. The verifier has identified an error in part of the data flow - what affect will this have on sampling of data and the internal control system? *[i.e. would identifying an error change the verifier's planned approach for checking the data and controls, and why]*
10. How and where would the verifier record information on tests/checks and their outcome in the internal verification documentation? *[state what type and level of detail should be recorded].*

11. You are taking over the verification from a prior Lead Verifier, after reading the previous year's work papers to see how the verification was previously planned and the findings of the verifier's work, you discover that the installation has installed a CEMS on its main kiln stack and now determines its emissions using continuous emission measurement:
    a. How would this affect the scope of verification?
    b. How would this affect the approach to data and internal control system sampling?
    c. What changes should the verifier make in the verification plan?
    d. What checks have to be carried out on the data and internal control system; and how would you carry out these checks?
12. For the new Phase 4, the operator asks the verifier to also verify its annual activity level report.
    a. How would this affect the scope of verification and time allocation?
    b. What additional elements should the verifier consider in that case?
    c. What additional checks would the verifier carry out on the data and internal control system?

3. Model answers to case study

The case study introduces a cement production plant using 2 rotary kilns. The production plant is located close to a waterway. The installation is a category C installation.

Please note that the model answers are not exhaustive. They provide questions and considerations what the verifier should look for in a particular case. The individual circumstances, inherent and control risk at an installation determine the scope and depth of verification and what activities are carried out.

<u>Question 1</u>

What information does the verifier need to determine the depth and scope of verification and what does the verifier need to consider?

Article 7(4) of the AVR outlines most of the scope of verification. The verifier is required to assess:

- Completeness of the emission report (AER) and its compliance with Annex X of the MRR;
- Compliance with the approved MP and permit;
- Whether data in the AER is free from material misstatements;
- Information in support of improving the operator's performance on monitoring and reporting.

Key Guidance note II.1 on the scope of verification provides further information on the scope of verification.

Article 10 AVR outlines the type of information the verifier needs to ask the operator in order to carry out the verification. The verifiers needs to consider the following:

- What is the latest version of the approved MP? Article 10 AVR requires the operator to send the latest version to the verifier. In addition to the approved MP the verifier would also need access to supporting documentation such as uncertainty assessments and sampling plans;
- What is the latest version of the permit? Have there been any changes to the permit?
- What is the installation's category and applicable materiality level? The verifier must apply reasonable level of assurance (Article 7(1) AVR) and the materiality level is 2 % for Category C installations (Article 23 AVR). The materiality level helps determine the depth of the verification;
- The installation boundaries: what are the emission sources, units and source streams listed in the MP? Does this include everything on site that should be in the MP? In order for the verifier to assess the installation boundaries it is important for the verifier to get:
    - The layout plan of the installation;
    - The data flow: the route by which data from primary sources end up in the emission reports (e.g. including manipulation[1], aggregation, collation etc.). The data flow can cover several departments, owners, spreadsheets/databases, automated systems).
- The categorisation of the source streams as this can help the focus of data testing;
- What are the risks of misstatements and non-conformities (e.g. are there significant inherent and control risks in the accounting process?)?
  Please see AVR KGN II.2 on risk analysis for information on how to assess inherent risks and control risks. These issues will also come up under the next questions;
- Whether the operator's risk assessment is adequate for their internal control and to assist the verifier in understanding the operator's reasons for implementing (or not) control activities. Please note that this does not exempt the verifier from doing its own risk analysis, but the operator's analysis should be used as the starting point. Where the operator's risk assessment is

[1] *Data manipulation is the process of changing data to transform it into something meaningful in the context of the emission report, e.g. conversion of units, adjusting orders of magnitude, determination of emission factors from analytical data by means of calculation etc.*

found to be limited or incorrect, the verifier will take this into account in the planning of the verification activities and in their findings;

- What are the specifics of the monitoring methodology, e.g.
    - type of monitoring methodology applied for different source streams (e.g. stock balance for coal and pet coke, country specific default values for waster tyres);
    - the determination of the % of biomass, net calorific value, carbon content and emission factors for sewage pellets, municipal waste derived fuel, waste solvent and natural gas;
    - estimation method for kerosene;
    - sampling for analysing the MgO and CaO concentrations of clinker, the CaO and MgO content, carbon dioxide content and total organic carbon of chalk and raw meal and for analysing the calorific value coal of petcoke and waste derived fuels[2]
    - the use of sampling for determining the density and volume of coal as well as moisture content and calorific value of solid biomass; and any agreed alternate methods for taking samples if the auto-sampler fails whether the sampling plan is approved by the CA;
    - type of default factors used and where they are sourced from;
    - whether the external lab is EN ISO 17025 accredited or not;
    - type of measurement instruments used; and whether these instruments are covered by national legislation on national legal metrological control.
- Whether the operator has established and implemented procedures used to manage the data flow activities in accordance with Article 58 MRR and whether these procedures are effective to mitigate the inherent risks. The operator would need to give access to internal procedures that are referred to in the approved MP as well as other relevant procedures;
- The control system and control environment - a first impression on the robustness and quality of control activities and procedures: e.g.;
    - whether manual controls or automatic controls are used. In this case the Control Room Operator manually enters the readings from the meter totalisers onto the plant's daily production form;
    - whether double checks are performed by a different persons (four eyes principle), including plausibility checks. There is for example no second person checking the work of environmental protection manager;
    - the way (data for) the emission report is extracted from the data management system;
    - the frequency and type of calibration of measurement instruments and their fitness for purpose based upon original design and installation;
    - whether part of the monitoring activities within an installation have been outsourced; and the type of control activities in place to ensure the quality of outsourced activities;
    - whether correlation and comparison checks (against other appropriate data or sub-sets) and completeness checks on data have been performed by the operator in accordance with Article 63 MRR;
    - the type and quality of controls on recording and transmitting data into IT systems; and the control of black box databases, archives and source data in other IT systems and advanced process control systems.
- Have there been any changes in the reporting period? If so, were these changes significant and was CA approval obtained? Have the other changes ('not significant' changes) been notified to the CA?
- Has there been communication between the CA and the installation?

[2] This also applies to the % content of carbon, ash, moisture, biomass, non-biomass and inert mass.

- What were the results of previous verification? Is there an improvement report from previous year? (this information may also be asked for in the pre-contract stage). And has it been acted upon in accordance with the agreed deadline.

Question 2

Given the context in this case, what inherent and control risks should the verifier identify and on what elements should the verifier focus its checks? Please indicate the reasons why you think the verifier should focus on these elements.

Participants should ask themselves generic questions about what they would be looking for in terms of inherent and control risks.

Examples of inherent risks include:

- Complexity of the data flow. There are multiple fuels in different combinations and at different times;
- Risk of an incomplete data set, e.g. completeness of list of shipments, purchasing department records finances not matching deliveries, omitting source streams;
- Relevance and proportional size of emissions related to each source stream or emission source. The source stream: the major source streams, coal and petcoke, are larger than the de-minimis source streams sewage pellets and kerosene; the impact of any error etc. in these major source streams on declared emissions is therefore greater so any inherent risk will have a greater effect. It is important to check categorisation of source streams (major, minor and de-minimis);
- Risks of sampling not complete as some of the controls are lacking;
- Risk of measurement readings not correct;
- Complexity of operator's operations;
- Additional risks associated with liquid fuel, in particular if the operator claims a zero-rate emission factor; risks whether the energy balance between fossil and non-fossil fuels consumed matches the CO_2 balance declared;
- Incorrect default values for emissions factors for waste tyres;
- Risks of stock balance not being accurate (for example, stock adjustments between years meaning prior year closing balance doesn't match current year opening balance in records);
- Risks of samples not being analysed, risks of forgetting to send samples for analyses, risks of non-representative sampling, risks of a sample not being controlled through to the lab (chain of custody);
- Samples are not taken correctly and/or the samples are not representative of the fuel consumed;
- Manual transfer of data and transfer of data by e-mail.

Examples of control risks include:

- Controls in place for managing the quality and competence of an external lab. For example, is the lab accredited according to EN ISO 17025? If not what controls might be expected;
- Competence of staff involved in data accounting: e.g. competence of the administrative team carrying out cross checks of the readings of weighbridges to supplier's invoices; checking off sample results against the sample register and entering this information into the database;
- Readings from the movements control room are incorrectly logged on the delivery sheet or incorrectly entered into the fuel stock and energy accounting database;
- Lack of some controls and procedures (e.g. procedures for completeness of sources and source streams, procedures for outsourced activities such as controls on activities of outsourced labs, management of change, no secondary validation of data);

- Risks that the controls in place in the database to stop unauthorized access of data or to change data are not effective or can be overridden;
- Procedure for checking completeness and appropriateness of monitoring plan is not robust;
- The responsibilities related to generation of data versus the responsibilities of validation of data are not sufficiently separated causing risks to errors in data;
- No proper segregation of responsibilities;
- Risks of calibration of measurement/sampling equipment not being carried out or not being carried out properly (e.g. infrequent calibration, malfunctioning of equipment, failure of bias tests).
- There is no proper control of the IT system (e.g. advanced process control, office type systems, control of documents and records (including retention, archive, back-up etc.)

Focus of verification checks include:

- Major source streams: coal and petcoke. However smaller source streams should not be left unchecked;
- Testing of control activities (e.g. focus on manual transposition of data and anywhere that involves human action, e.g. manual cross checks, manual entering of data etc.);
- Checks related to biomass;
- Checks on measurement equipment, calibration and measurement results;
- Checks on competence of labs and associated personnel (depending on the type of laboratory);
- Sampling and analysis of waste derived fuel;
- Database and spreadsheet used for CO_2 calculation (correctness of information and applied calculation methods).

Question 3

How much time should the verifier allocate to the verification of this installation and how would you allocate this time to the different parts of the verification work? [Please state the factors you will take into account in allocating the number of days to the verification]

When determining the time needed for a verification engagement, the verifier should ensure that each individual step in the verification process is covered in the time allocation. This means that sufficient time should be allocated for not only the time spent on site at the operator's premises and for the off-site activities performed by the verification team, but also for the activities to be carried out by the independent reviewer and for any technical expert support that may be needed. The verifier should therefore consider the time involved in:

- Planning and initial review of the documentation and relevant information;
- Strategic analysis, risk analysis, drafting the verification plan (including the sampling plan and testing plan);
- Process analysis, follow-up of issues identified during the verification and finalisation of verification;
- Preparation of internal verification documentation, preparation of the verification report and verification opinion statement;
- Internal technical review (independent review).

During the training sessions different reflections were given on the number of days to be spent on verification: numbers ranges from 7 to 10 days. The time allocated is very specific to each installation and situation. It is dependent on several factors including:

- Complexity of data flow and how many data points are covered and how many different departments or teams are involved;

- The type of controls (when the control activities are extensive or not functioning effectively, this requires more time to check);
- The scale of the installation and its emissions: please note that the size of emissions and installations is not the only determining factor: e.g. category C installation may be large and technically simple or may be large and technically complex – these will have different time requirements);
- The number, type and size of source streams;
- Complexity of elements of the monitoring methodology such as for biomass, sampling/analysis of waste derived fuel etc.;
- Lack of internal controls and (documented) procedures;
- Whether the verifier is new to the installation (a new verifier organisation or a new lead auditor could require more time to familiarise themselves with the installation and data accounting and management processes);
- Whether there have been changes in the installation, its activities or accounting processes.

More information on the relevant factors can be found in KGN II.12 on time allocation.

Question 4

What specific checks does the verifier need to carry out on the monitoring methodology and what evidence should they be looking for? Which/how much of this checking needs to be done 'on site'?

Information on checks to be carried out on the monitoring methodology is included in section 3.2 of AVR KGN II.3 on process analysis. The verifier will need to check whether the monitoring methodology described in the approved MP has been correctly applied. Usually the verifier will first do high level checks on the methodology and data (e.g. checking the data flow) and then do detailed checks as a result of the verifier's risk analysis and/or issues identified during the verification (e.g. errors in the data, controls not effective). For this case study, this can include:

Which checks	Checks to be carried out:
Checking the spreadsheets and other tools or software used to calculate emissions	• whether spreadsheets etc. are functioning and formulae have been correctly set up to meet the approved monitoring method in the MP; • validation and other tests done for software databases etc. before they go live; • comparisons between the outputs of data calculation spreadsheets used for different purposes (e.g. internal reporting vs external reporting, where separate spreadsheets are used); • Please see question 5 for the type of checks that should be carried out on software and IT used to calculate the emissions.
Checking correct total and subtotals used in the formulae to calculate emissions and parameters	• re-calculation of the totals and sub-totals by the verifier to confirm outputs of spreadsheets (applying the formulae as listed in the approved MP), etc.; • review work instructions etc. and check how operator personnel have calculated totals and sub-totals; whether and what validation/ control activities have been applied; • cross check emissions produced with other data (e.g. energy generated, fuel related energy balance etc.); • completeness checks, checks on whether the data represent all items (e.g. deliveries; number of invoices; samples); • cross check emissions with production data; • checks on capacity changes; • evaluate formulae in databases and look for evidence of independent validation of the set-up of databases.
Checking application of correct tiers according to the approved MP and checking whether uncertainty thresholds have been met	• checking category of source streams (major, minor and de-minimis); • checking correct application of approved tiers and assess whether the actual situation at the installation reflects the approved MP: i.e. is the tier mentioned in the approved MP the correct one?; • review calibration reports, bias test, stock surveys etc. to confirm the basis of calculations;

Which checks	Checks to be carried out:
	• inspect measurement equipment and assess how the uncertainty assessment has been prepared for activity data. Please note that the verifier would not repeat the uncertainty calculations or do a detailed check on the calculation methodology; they should check that the input data for the calculation is reasonable. However, if in assessing that an appropriate uncertainty has been completed the verifier identifies that there might be a problem with the approach to calculating uncertainty, this should be raised as an issue that the operator should look at.
Checking application of corrects units of measurement for parameters	• checking calculation formulae etc. against approved MP and MRR to ensure the correct units of input and output data are used; • checking meter equipment readings.
Checking storage of fuels	• checking locations and conditions; • checking whether records and MP reflect the actual situation.
Checking the measurement equipment and how data gathering is carried out.	• checks are performed depend on the type of measurement equipment. In any case checks are performed on: o measurement equipment itself (physical inspection during installation's site visits: e.g. type, construction data, manufacturer, serial number, meter positions); o calibration (records, correct references to installed equipment) (see control activities – review documentation); o alternate instruments / methods (e.g. in case of instrument failure); o configuration of measurement equipment in the flow computer or DCS[3] etc.
Check application of stock pile survey to determine density and volume coal	• checking whether stockpile survey has been carried out according to specified and recognised standards; • checking whether the stockpile survey has been carried out by qualified and competent personnel; • checking whether the stockpile survey has been carried out on a periodic basis (e.g. quarterly basis); • checking whether a process of smoothing is applied e.g. rolling annual average; • checking whether the required uncertainty has been met.
Check weigh readings of amount of total raw mill feed consumed and quantity of kiln feed	These checks are part of the control activities under question 5 (checks on weighbridges)
Sampling of waste derived fuels, coal and pet coke	The verifier needs to check the application of the sampling plan: how, where and when samples are taken and by whom. The verifier will: • check samples taken by specialist contractors or laboratory personnel lead to lower risks than samples taken by field operatives. • Check the competence of personnel taking samples; • observe – if possible- how samples are taken in order to evaluate whether the approach to sampling meets the specific standard that would result in representative sample and that requirements of sampling plan are met by persons taking the sample. If it is not possible to observe (e.g. there is no delivery of fuel/material due) then a reasonable range of field operatives responsible for sampling should be interviewed to establish what they each do; and to compare responses to each other and to the sampling plan requirements; • establish that for the batch deliveries of fuels if consolidated samples are being created to send to the laboratory, the consolidation only relates to samples from an individual batch; • check appropriateness of sampling to deliver quality required for the approved monitoring methodology (e.g. where sampling is occurring, conditions under which samples are taken and how samples are taken, whether sample seal bags/containers are used, how conditions of moisture were taken into account); • check correct and consistent application of frequency and method of sampling; • check representativeness of sampling and sampling patterns; • check application of specified sampling standards; • check changes to sampling plan and whether these have been agreed with the laboratory conducting the analysis, and also approved by CA;

[3] Distributed/Digital control system

Which checks	Checks to be carried out:
	• check procedures in place for sampling to ensure it is controlled; • check when, where and how samples of source streams are taken and by whom; • check sample containers[4], transport of samples to the lab, storage and other aspects of chain of custody[5]. • evaluate sample uncertainty especially for variable fuels such as waste derived fuel] sample uncertainty calculations to confirm frequency of sampling is appropriate; • check results of sampling and analysis: e.g. have results been applied to appropriate batches, whether the operator is required to determine the calculation factor by analysis of samples; • check whether analysis and sampling have been carried out according to applicable standards; • check whether proper documentation is retained from laboratory tests to calculate emissions data, e.g. results from tests for establishing calculation factors.
Uncertainty assessment	The verifier will evaluating the uncertainty analysis to see if it is complete; that input data is reasonable and evidenced; that the calculation has been done appropriately; and/or it is provided by a competent independent third party. The type of input data used depends on the methodology, the type of measurement instrument, and on the approach the operator applies to uncertainty calculations used to demonstrate that the required tier and associated uncertainty threshold is met. The approach used to assess whether the required uncertainty for activity data is being met, depends on whether the measurement instrument is under the operator's own control or under the control of other parties. For more information please see KGN II.3 on process analysis.
Checking invoices and delivery notes	• check amount of fuel/ material listed in invoices and delivery notes; • check the time period to which invoices relate; • cross checks to meter readings/ weighbridge tickets, if relevant; • check any adjustments made to invoices (e.g. credit notes etc.); • KGN II.3 on process analysis explains what to do if the invoiced quantity does not entirely tally at the start of the reporting period (i.e. invoice is not related to a period starting/ending 1/1/## or 31/12/##).
Checking whether activity data and related data are properly documented	• review how documentation is stored (see control activities); • review documentation to see whether relevant information has been documented.
Checking proper use of default values for the emission factors of waste tyres	• check with approved MP and cross check with MRR.

Which checks should be done on site during the visit?

Checks on site include the following:

- Interviews with relevant operational personnel and administrative team;
- Checking implementation of the monitoring plan in actual practice;
- Cross-check whether the installed equipment matched the information on the calibration records (type, manufacturer, serial number etc.);
- Visual inspection on whether the installation boundaries approved in the MP and other elements of the MP reflects the actual situation of the installation (e.g. source streams, emission sources). The verifier will not solely focus on the MP, but will also do checks on fuel purchase records etc. and other checks to see whether any evidence can be found of unlisted source streams coming on site and perhaps being combusted with or without the emissions being reported;

[4] Samples should be analysed as quickly as possible, containers should be correctly sealed and opened to avoid introduction of impurities, loss of quality etc.

[5] Chain of custody means that there is a traceable chain of control from the point at which a sample is taken all the way through to the laboratory. In principal the term refers to the chronological documentation or paper trail, showing the trail, custody, control, transfer, analysis, and disposition of the sample; generally the trail using standard forms, unique reference identification numbers enabling tracking of an individual sample across the chain and knowing who did what and when etc.

- Checking implementation in practice of procedures and control activities through interview and observation (e.g. appropriateness of procedures, completeness and implementation of procedures, effectiveness of control activities);
- Following a sample through the process; checking existence of maintenance plans, invoices, checking locations and conditions of storage of fuels;
- Visual inspection of meters, and weighbridges; collection of serial numbers and Field Tags from instruments in situ to cross check to records;
- Checking records and interviewing engineers in relation to maintenance, calibration and uncertainty of metering/weighing of fuels.

__Question 5a__

What checks should the verifier carry out on the internal control activities and the control system? How would you carry out these checks? [Please list the specific control processes, procedures and documents you would expect to find on site]

Key Guidance note II.3 on process analysis provides information on how verifier check the control activities and procedures. In this case study there is a lack of robust controls and procedures. So the verifier needs to determine what is missing compared to what is required by the MRR. In addition the verifier needs to assess whether existing procedures have weaknesses and whether these are appropriate to address the risks to misstatements and non-conformities.

Gaps in control activities and procedures include for example:

- Lack of secondary validation of data;
- Inappropriate and ineffective internal review;
- There is no proper control on outsourced activities (e.g. activities of external lab, maintenance of meter);
- There is no proper management of changes in the installation;
- There is no proper control of the IT system (e.g. advanced process control, office type systems, control of documents and records (including retention, archive, back-up etc.).

Examples of checks carried out on the control activities and procedures include the following:

Which checks	**Checks to be carried out:**
Whether calibration on weighbridges has been performed and whether this was done properly	• whether the weighbridges are covered by national legal metrological control; • documentation on whether weighbridges have been calibrated, checked and adjusted prior to use, at regular intervals, and according to the frequency in the approved MP or in written procedures; • whether maintenance has been carried out according to the manufacturer's recommendations and specifications; • whether calibration is carried out and whether there are regular on site loop calibrations; • whether there are limitations to weighbridge calibrations; • documentation to confirm whether measurement equipment has been checked against appropriate calibration standards; • documentation to confirm that checks have been carried out in accordance with requirement measurement standards and procedures (e.g. reports, certificates, signed off work instructions); • whether prompt corrective action has been taken by the operator if measurement equipment was found not to function properly; • check on age of weighbridge (i.e. when was it installed); • whether the weighbridge resembles the information on the calibration documentation (e.g. type, manufacturer, construction of data, serial number); • visual inspection of weighbridge & interview weighbridge operator (e.g. is it at the correct location, is the weighbridge installed properly, is it functioning effectively).
Check on automatic samplers and control activities implemented to ensure the automatic samplers are	• whether samplers are functioning, have been installed correctly and have passed recent bias tests, including representativeness of sampling; whether data gaps have occurred; and if yes, whether corrective action or another approach has been

Which checks	Checks to be carried out:
functioning effectively	applied; • control activities and maintenance tools built into the automatic samplers: e.g. recovery, continuity; • maintenance of automatic samplers (e.g. whether maintenance and bias testing has been carried out and at what frequency).
Checking cross checks between weighbridge values and delivery notes from the supplier, manually entering into the fuel stock and energy accounting database	• whether persons responsible for doing cross checks and manually entering data are competent, and do not perform conflicting duties (e.g. recording, processing and reporting are carried out by different persons) – through interviews and review of documentation; • whether a four eye principle is applied (double check by another person); • observation on how responsible persons are doing the cross checks; • if necessary, re-performing cross checks to confirm they have been applied correctly.
Checking off sample results against the sample register and checking the readings from weighbridges to the suppliers' invoices	• whether persons responsible for doing the checking are competent, and do not perform conflicting duties (e.g. recording, processing and reporting are carried out by different persons) – through interviews and review of documentation; • whether a four-eye principle is applied (double check by another person); • observation on how responsible persons are doing the cross checks; • if necessary, re-performing cross checks to confirm they have been applied correctly; • cross checking rail vs belt weighed data.
Checking automatic downloading of data from database to excel spreadsheet and uploading data to database	Assess and consider risks related to using automatic controls and downloading of data. Verifiers need to understand extent of the risks and control of these risks in relation to IT systems. In addition verifiers will also consider: • proper use of calculation formulae and access controls; possibility of recovering data; continuity planning; and security with respect to IT and advanced process control systems; • whether IT systems and processes are managed under an effective IT Management System such as ISO 20000; Verifier checks control activities that are implemented in the IT system and electronic interfaces to ensure: • timeliness, availability and reliability of data; • correctness and accuracy of data, e.g. avoid double counting etc.; • completeness of data; • continuity of data to avoid data being lost and to ensure traceability of data; • integrity of data: i.e. data is not modified by unauthorised persons. Control activities could also include a manual check on whether the IT system is functioning and whether the above points are met. It will include control activities and maintenance tools built into the IT system such as access controls, backups, recovery, continuity planning, change management and security. The type of testing carried out by the verifier depends on whether these control measures are manual or electronic. Where, detailed checks/validation of IT systems is required the verification team may require the addition of an appropriate Technical Expert.
Checks on external lab activities. Type of checks depend on whether the lab is accredited or not	Please also note that where an external lab is used this is considered an outsourced process; so the verifier will check: • what activities have been outsourced to the lab; • control activities in place to ensure the quality of outsourced activities, e.g. assessing procedures for procurement, internal audit (including frequency of audits), carrying out plausibility checks on returned analysis data, checking contracts with external lab, instrument engineers, checking how an operator ensures that the party to which the activity is outsourced, carries out the activities according to the MRR and other requirements; • confirmation with the lab that relevant elements of the sampling plan are acceptable, where changes have been made [MRR Article 33(1)].
Checks on internal lab	• assess whether the internal lab to analyse the other fuels than coal and petcoke is accredited or not. If it is not accredited the verifier should check whether the CA has approved the use of non-accredited lab because of unreasonable costs. If there is not such an approval the verifier should direct the operator to the CA to obtain approval. • if the internal laboratory is accredited the verifier checks that the

Which checks	Checks to be carried out:
	➢ laboratory is accredited according to EN ISO/IEC 17025 by assessing the lab accreditation certificate ➢ the analytical tests as outlined in the contract with the accredited lab have been carried out according to the approved MP ➢ the scope of the laboratory's accreditation covers the required test methods and sample analyses mentioned in the approved MP • if the internal laboratory is not accredited the verifier checks the lab's equivalence to ISO 17025. The verifier will do additional checks to ensure that the requirements listed in Article 34(2) and (3) of the MRR as approved by the CA in the MP are actually being applied and proper quality control is being achieved. Section 4.2 of Frequently Asked Questions AV provides information on what type of checks the verifier will carry out. These checks include tests on technical competence of lab personnel, capability of managing personnel, procedures, documents, laboratory standards (chemicals etc.), equipment, tasks and output reporting in a reliable manner. The verifier will do spot checks on this evidence. As the risks are high and the robustness of the corporate management system is unclear, spot checks will need to be quite extensive. The verifier will also check whether inter-comparison or proficiency tests have been undertaken with other accredited (or recognised) laboratories. • In addition to these checks the verifier assesses ➢ separation of the operator's staff responsibilities for checking and validating data; ➢ checks on manual transfers of data and the set up and validation of automated systems such as databases or spreadsheets that pull data from a database; as well as the correctness of formulae /algorithms in spreadsheets, databases and the DCS/Plant information system; ➢ controls on training and competence of staff; ➢ the standards and methodologies used for sampling and analysis; ➢ controls on analytical equipment (maintenance, calibration – gases and curves;
Transfer daily readings from weighbridges to electronic spreadsheets	• ensure no mis-upload of data, including : o standard template used for data upload has not been changed; o upload macros have not been adjusted.
Check on whether corrective action have been taken in the case of malfunctioning of equipment or identification of mistakes	• corrective action has been indeed taken in those situations and there is confirmation that emissions are not underestimated; • effective control activities have been implemented to prevent data flow activities and control activities from not functioning properly or from being outside the boundaries set in the relevant procedures; • criteria in the procedures for data flow activities and control activities are addressed and met by the operator, and whether details of these procedures are effective to avoid malfunctions; • operator has notified the CA of any equipment failures or drops to lower tiers during the reporting period, and that efforts were made to correct the failures as promptly as possible.
Checking competence of personnel	• assess in interviews and through document review and observation on whether personnel carrying out control activities are competent • assess whether there is a control process that defines who can do which activities and what competence is needed for these activities.

Question 5b

What difference would it make to your planned checks on internal control activities and the control system if the records were in paper format versus electronic format (e.g. Word documents, excel spreadsheets or databases)? What are the risks associated with each format?

Electronic records require often different checks. The table below shows risks that can occur with paper and electronic records. The checks need to be tailored to mitigate the risks. More information is provided in KGN II.3 on processs analysis.

Paper records	Electronic records
Often manually created with no link to primary data. The inherent risks to manually created data are generally higher.	Formula/ algorithm set up error
Incorrectly recorded information on document	• Accidental (or deliberate) change of data • Correction n primary data may not make it to final report due to 'link' problems
Storage conditions result in degraded documents	Failure of backups etc.
Loss of documents (e.g. warehouse fire)	Incompatibility of archive with new IT systems

Question 6

What tests and checks should the verifier carry out on the installation's data and how would you carry out these checks?

The verifier has to assess whether the data flow as described in the approved MP meets the actual process in practice by testing data flow activities, checking data trails and following the sequence and interaction of the data flow activities from primary data generation, through manipulation to final output reporting. The verifier traces data back to primary sources[6], checks the existence, consistency and validity of primary data sources and follows data points though each subsequent step in the data flow.

In addition, the verifier will check which persons are responsible for specific data flow activities. An important aspect which the verifier shall take into account when assessing inherent risks related to data flow activities, is whether these persons are accustomed to, and competent, to deal with specific data flow activities assigned to them. This will be done by inquiry (interviews with personnel), checking competence criteria and document, and observation on how the data flow activities are carried out by the personnel.

Other checks on data may include:

- Completeness checks to ensure all emission sources and source streams are included;
- Cross checking between different data sets (e.g. month on month comparisons against production data;
- Comparison to installation mass balance done for e.g. Solomon Index or other internal purpose, cross check against financial data);
- Plausibility checks against prior period data (eg same time prior year) and other horizontal/vertical checks to identify outliers or in appropriate trends;
- Cross checking with external data (e.g. fuel supplier data);
- Reconciliations and re-performance (check on whether the verifier achieves the same results);
- Checking measurement results and readings;
- Checking accuracy of calculations and associated formulae, checking CO_2 calculation spreadsheets or other database output;
- Checking whether there are data gaps or double counting, and checking whether/how these data gaps or double counting were addressed;
- Analytical procedures (e.g. plausibility checks, checks on fluctuations, trends, comparing GHG emissions with previous year emissions, checks on anomalies in data and data gaps, comparing emissions with fuel consumption (and – for the power sector - energy produced), comparing operational conditions with trends in fuel consumption over time, are other databases available to use as proxies);
- Checking laboratory results; what tests is the lab applying? If the lab results do not contain uncertainties, is there an inherent uncertainty that is accepted?

[6] Invoices, log books, primary meter data in the DCS/PI etc;

- Transfer and conversion to factors, stoichiometric calculation factors; stock pile surveys;
- Checking extremes, see whether these are included or excluded, what is the procedure for handling such data points;
- Comparison of data sets to new downloads from installation software systems (e.g. comparing primary data in spreadsheets etc. to another version pulled off the system for the verifier whilst on site);
- Checking of formulas to identify systematic errors;
- Checking installation boundaries (completeness and categorisation of source streams and emission sources) – through walk-around inspection, cross checks with permit and review of relevant operational/contractual lay-out plans and piping and instrumentation diagrams followed by cross check of the data on source streams and emission sources, other data verification checks and plausibility checks.

Question 7

What approach should the verifier take to sampling for their tests and checks; how much should be included in testing? (consider both qualitative and quantitative approaches)? Please answer the following questions:

Question 7a

How would the verifier define the sampling size for checking the data and control activities? [i.e. what approach and sampling method would you use]

Two types of sampling can be distinguished:

- Statistical sampling: the verifier will use probability sampling and selection methods (random, systematic or stratified sampling) to select items to be evaluated in the verification this ensures the random selection of sample items and the use of probability theory to evaluate sample results. Probability sampling provides an objective method of determining the sample size and selecting the items to be examined. A number of sampling techniques come into perspective that assist the verifier in its conclusion on the number of misstatements in the sample and the misstatements in the entire population of data. These different techniques are described in the Commission guide to audit sampling.
    - The final goal of statistical sampling is to project (extrapolate or estimate) onto the whole population, the value of the variable (observed during testing of the sample) to determine whether a population is materially misstated and by how much
- Non-statistical: this is any sampling procedures that does not permit the numerical measurement of the sampling risk, even if the verifier selects a random sample. It does not allow the determination of precision which means audit risk is less well (or not controlled); it can't be ensured that the sample is representative of the population; and any error must be assessed empirically.
    - This approach is more appropriate where, for example, the population size (or sample size) is very small (for example less than 150 sampling units)
    - This approach works best where the data universe is divided into sub-populations where each group has similar characteristics.
    - Sample size is determined using professional judgement and taking into account the confidence in the internal control systems for the relevant data. The EC financial auditor's guide states a minimum level of 10% of the population being sampled (see the following questions).

In general, non-statistical sampling is carried out. For more information on non-statistical sampling please see KGN II.4 on sampling. The following elements are important when determining the approach for sampling:

- The case specific nature of sampling – i.e. the type of sample depends on the installation and its internal controls. More robust controls mean a smaller sample could be taken to start with as systematic errors etc. can reasonably be expected to have been found and removed);
- What principles should apply to sampling;
- What factors should be taken into account to determine sample size, including – how big the overall data universe is; how many different populations of data there are and differences in the size of populations (for example a population of 12 gas invoices would reasonably have a 100% sample);
- The sampling effort and size.

Question 7b

What would be sampling size be? [I.e. what proportion of each data set within the overall data population would you test and why]

The sampling size highly depends on how good the internal controls and the inherent and control risks involved. Discussion in training session showed that in general 10% or in most cases a higher percentage is used for sampling. This % can increase if errors are found in the data or if the internal controls proof are not functioning properly or are weak. In this case a higher % of sampling size is warranted because of the weakness in the controls. More information is provided in KGN II.4 on sampling and the European Commission's financial audit guide: https://ec.europa.eu/regional_policy/sources/docgener/informat/2014/guidance_sampling_method_en.pdf

Question 7c

Where would the focus of sampling effort be?

The focus of the sampling effort would in principle be on major sources, manual data handling, data sets where internal controls are poor or non-existent, complex calculations or aggregations of data. Multiple suppliers have delivered batches of fuel. Samples need to be taken in such a way that all suppliers are covered in the sample.

Question 7d

What tests would be done on the elements selected for checking and why?

Based on the EC Auditor Guidance for financial management control systems, internal controls specified under Article 58-64 of the MRR can be evaluated against the following categories based on the verifier's professional judgement taking into account any other available audit evidence, the outcome of the evaluation of internal controls sets the level of residual risk (compliance and misstatement) likely in the data universe to be sampled and tested:

Category	**Summary on reliability and sampling**	**Confidence in controls**	**Minimum non-statistical sample recommended***
Category 1. **Works well. No or only minor improvement(s) needed.**	There are no deficiencies or only minor deficiencies found. These deficiencies have no, or minor impact on the functioning of the assessed internal control. **Base level of sampling is warranted**	High (i.e high assurance is obtained from the results of the application of internal controls to the data set)	10% of population being tested
Category 2. **Works, but some improvement(s) are**	Some deficiencies were found. These deficiencies have a moderate impact on the	High	10% of population being tested

Category	Summary on reliability and sampling	Confidence in controls	Minimum non-statistical sample recommended*
needed	functioning of the assessed internal control. Recommendations have been formulated for implementation by the operator. **Base level of sampling is warranted**		
Category 3. **Works partially; substantial improvement(s) are needed**	Serious deficiencies were found that raise risk of misstatement or non-compliance by the operator. The impact on the effective functioning of the internal control is significant. **Increased sampling of data is warranted.**	Moderate	10% - 20% of population being tested based on auditors' professional judgement [and increased if errors are identified]
Category 4. **Essentially does not work**	Numerous serious and/or wide-ranging deficiencies were found that significantly raise risk of misstatement or non-compliance by the operator. The impact on the effective functioning of the assessed internal control is highly significant – the control functions poorly or does not function at all. **Significantly increased sampling of data is warranted**.	Low (i.e low assurance is obtained from the results of the application of internal controls to the data set so much greater testing of the data populations is required)	10% - 20% of population being tested based on auditors' professional judgement [and increased if errors are identified]

* See ECs guidance on sampling for financial audit authorities (guidance_sampling_method_en.pdf)

Checks would therefore be carried out on the control activities, including the operators risk assessment of inherent & control risks and the written procedures that have been implemented by the operator to mitigate the identified risks. Please see question 5 for more information on the type of checks carried out.

Categorising the elements of internal controls allows the verifier to focus their testing effort on controls where there is low confidence of them working. This means that data testing would be reduced for areas where controls have high confidence and increased for areas where controls have low confidence.

Different data populations can be defined with in EU ETS data universe (e.g. for different source streams and calculation factors) – different internal controls may apply to each of these populations so the level of sampling in each population may differ.

<u>**Question 7e**</u>

How would you change the sampling approach planned above if this was an installation with a simpler data flow (for example a smaller number of steps, lower number of source streams, less people involved etc.) or much tighter internal controls? [please provide details of what and how you would change the approach and sample size planned etc.]

If the data flow is simple and there is a low number of source streams and data involved, it may be more efficient for a verifier to not carry out sampling and to test the full data set. It depends on the size of data, the number of steps in the data flow, the people and controls involved as well as the complexity of the installation and the system what decision a verifier will make.

Question 8

Are there any systematic errors in the data provided? If yes describe what they are and how you would resolve them.

There are missing data points, zero errors and 'stuck data points' in parts of the data set which the participants should find if they are pattern spotting. The main resolution is to require the operator to check explain and/or correct the identified errors before repeating the tests on the data; along with understanding the cause of the error and whether this represents a weakness in internal controls or is a random (non-controllable) error. Verifier findings might also include analysis of any weaknesses that resulted in the errors and the need to improve internal control. The table below shows what errors were could be found in the excel sheet provided with the case study:

Area in excel	Examples of errors
Data on coal petcoke	• The formula is left out in a few rows in the excel sheet but the values are however correct (row 160-220); • The wrong C-content column is included (row 510-530); • The same moisture content is listed for rows 356 till 382. The verifier needs to investigate whether the values are correct.
Tyres	• In this sheet an error was included in the delivery notes: some advised weights are expressed in tonnes and not kg; • The same result is expressed in the excel for every load over a period of a couple of days. This can mean that the weighbridge is malfunctioning; • There are missing data for the weighbridge because the weighbridge was not functioning or switched off; • There is missing data because the weighbridge is down for calibration. Another weighbridge should have been used or data should have been taken from the delivery notes or an alternate approach should have been applied.
Natural gas	• <u>Column on calculated CO2:</u> Calculation is done twice: in gas data set and again in the Monthly CO2 spreadsheet. So there is duplication on the data system. The verifier would have to check the root cause of this duplication. • <u>Column on net calorific value:</u> From March to August and again from October the data from the online gas chromatograph is not good. The gas chromatograph is under the control of the site and there is a direct autolink to the site's DCS which has its implications on the data flow activities. Verifiers would look for alternate sampling (including checking location of sample points, frequency of sampling, which lab is analysing it, whether CA approval is obtained etc, implications for monitoring methodology such as impact on tiers and uncertainty. An analysis will have to be made how the data gap was filled; and what the installation is doing to correct or replace the online gas analyser. • <u>Column on Main PI Meter:</u> There is no data on the meter from 7 October onwards. The Main PI meter is a supplier owned meter. The verifier would check the root cause of the missing data: e.g. a long shutdown for overhaul maintenance, a failure of the telemetry link from the meter; or a failure to receive and upload the xml file from the supplier to the sites PHD. There are intermittent calculation failures in the month before so this could also be indicative of an emerging meter failure. The verifier would also look for alternate methods, tier impacts, uncertainty impacts, how the data gap was filled; and what the supplier is doing to correct or replace the meter
Kerosene	<u>Column on net weight:</u> a mix of data is included on consumption, deliveries and internal transfer between storage tanks. The verifier would have to distinguish between the different types of data and check the opening and closing stocks, the movements between tanks, the maintenance and uncertainty associated with tank measurement instruments.

Question 8a

How should the verifier identify random errors in the data set provided? [i.e. what checks or tests would you do

This would include plausibility checks, cross checks and analytical procedures on the data. Please see the response to question 6.

Question 8b

How should the verifier deal with any random errors identified?

Depending on the scale of the identified error and its potential impact on the population and the overall result of the emissions calculation, the size of the sample should be increased to double check whether there are more such random errors. Please see KGN II.4 on sampling for more information.

Question 9

The verifier has identified an error in part of the data flow - what affect will this have on sampling of data and the internal control system? [i.e. would identifying an error change the verifier's planned approach for checking the data and controls, and why]

It depends on whether it is a systematic or random error:

- Systematic errors can be corrected easily so the verifier would only need to check that the correction has been made throughout the whole of the relevant data set. It is however important to understand the cause of the error. If the systematic error is a result of controls that are lacking or not functioning properly, it might be more complex to correct the non-conformities and non-compliance issues
- Random errors would need an increase in the number of samples taken to a level that would bring confidence that all random errors have been identified.
- If the error arises from the failure of an internal control, the verifier needs to look at what control has failed, what needs to be corrected or improved and whether more sampling of relevant data needs to be done.

KGN II. 4 on sampling provides more information.

Question 10

How and where would the verifier record information on tests/checks and their outcome in the internal verification documentation? [state what type and level of detail should be recorded].

The risk assessment would identify the type and level of tests that are planned, and the associated internal verification documentation records the outcome of the tests (including where there were no problems). Any issues (or errors) to be resolved would be recorded in an issues log to enable tracking and an audit trail between the tests, test results and findings in the opinion statement

Quality of internal papers needs to be sufficient for an independent person to be able to read the internal verification documentation and understand the conclusions.

Question 11

You are taking over the verification from a prior Lead Verifier, after reading the previous year's work papers to see how the verification was previously planned and the findings of the verifier's work, you discover that the installation has installed a CEMS on its main kiln stack and now determines its emissions using continuous emission measurement:

Question 11a

How would this affect the scope of verification?
First of all the CA would have to check whether the significant change of the monitoring methodology has been approved by the CA. If that is not the case, the verifier has to stop the verification according to Article 7(6) of the AVR and refer the operator back to the CA to obtain approval. If the approval has been obtained, the verifier checks implementation of the monitoring plan and accuracy of the data. Verifiers should be aware that applying CEMS involves different inherent and control risks and will have an impact on what checks the verifier will carry out and on what elements the verifier will focus. For more information please see MRR GD7 on CEMS.

Please also note that the verifier should assess whether it has sufficient competence in the verification team to carry out checks on CEMS and relevant data and internal controls. Additional technical experts may be necessary.

Question 11b

How would this affect the approach to data and internal control system sampling?

The focus of attention would initially shift from detailed data checking to detailed checking of the internal controls associated with the CEMS, the continuous measurement system itself. The better the internal controls the less risk there is of data errors. If the CEMS is well controlled and the internal controls in the system are strong, further detailed sampling on the data may be less extensive. This depends on the risks involved. The application of CEMS does however not mean that no data testing needs to be carried out. This will still be necessary in order to determine whether the emission report is free from material misstatements.

Question 11c

What changes should the verifier make in the verification plan?

See above the checks will focus on the CEMS. The type of changes depends on the inherent and control risks involved. More information can be found in MRR GD 7 on CEMS.

Question 11d

What checks have to be carried out on the data and internal control system; and how would you carry out these checks?

The verifier will carry out checks on the correct application of the monitoring methodology laid down in the approved MP, perform substantive data testing and check the validity used for calculating the uncertainty levels. Substantive data testing will include data verification and analytical procedures. Checks will for example be done on:

- recalculating emissions from the primary CEMS instruments and comparing to that calculated by the software system.
- the measured values by using the results of corroborative calculations performed by the operator
- what standards are applied and whether these standards are complied with; λ check on representativeness of measurements;
- completeness of hourly data and of substitution data for incomplete hours;
- calculations and underlying measurements if the flow rate is calculated;
- calibration and maintenance documentation for flow and concentration measurements;
- whether correct substitute values have been used if there have been missing data;
- whether the CA has been notified if any part of the CEMS has been out of operation for more than five consecutive days.
- Alternate/replacement value calculations for data gaps; corroboration calculations for CO_2.

The extent to which any data testing is carried out depends on the outcome of the verifier's assessment of the data flow; control activities and the procedures; and the subsequent verifier risk analysis.

As with the calculation based methodology the verifier will assess whether the data flow described in the approved MP matches the actual practice. In order to determine this the verifier will trace the data back to the primary source and follow the sequence and interaction of the data flow activities. Examples of specifics that the verifier will consider when checking the data flow of the measurement based methodology include:

- location of stacks/ducts and continuous measurement systems;
- process types and variations (e.g. whether the CO_2 or N_2O concentration remains within the valid range, review of historical data, meter readings);
- how meter readings are transferred to the data management system;

- diagrams of emission points, location of sampling points;
- calculations and aggregation of data.

More information in provide in section 6.1 of MRR GD 7 on CEMS.

In addition verifiers will check the control activities, procedures that are specifically relevant for a measurement based methodology as well as the maintenance and calibration of instruments associated with the CEMS and its data links between different parts of the system (flue gas flow and other peripheral measurements and calculations etc). The verifier will check that the installation of the CEMS equipment is correct and that the equipment itself is appropriate. This includes checks on the validation of the output of the system and annual validation/inter-comparison etc. The verifier will also check the data links between the CEMS software system and any plant information system/excel sheets used for capturing information for reporting.

Application of EN 14181 is the key element in the quality assurance of continuous measurement systems. When checking the control activities the verifier must include certain checks on the application of the QALs and Annual surveillance test (AST). See Guidance Document 7 on CEMS for more information. The table below provides examples of checks the verifier will perform on the QALs and AST.

Area that is checked	**Examples of checks**
QAL1	The principles and scope of QAL1 are described in section 3.3.1. The verifier should for example check: • whether a QAL1 has been executed by assessing the report that has been drafted by the manufacturer, supplier or operator of the measurement system • whether the conditions in the installation match the conditions covered by the QAL1 assessment; • whether relevant sources and components of uncertainty have been considered in the uncertainty calculations; e.g. the uncertainty of the O2 analyser if relevant. • whether the uncertainty associated with the concentration determination, combined with the uncertainty associated with the flow determination con- centration determination, meets the uncertainty requirements for the overall emission measurement approved in the MP.
QAL 2	The key outcome of QAL2 is the variability of the calibration function (derived in-situ) which allows calculation of the contribution of the concentration measurement to the overall uncertainty and to demonstrate compliance with the tier requirements in the approved MP. The verifier should for example check: • whether QAL2 has been executed within the specified timeframe (See MRR GD4) - every 5 years - or more frequently in response to other EN 14181 findings (e.g. QAL3), or other requirements; and has been carried out by a competent laboratory the AVR • whether EN 15259 has been used for installation of the CEMS. (Correct installation of the CEMS is a prerequisite for QAL2) • whether the required functionality tests have been performed and passed • whether testing and calibration results have been documented and whether corrective and preventive actions have been taken into account by the operator as necessary; • whether the laboratory that performed the QAL2 tests is accredited (in which case the verifier checks whether the scope of accreditation covers the areas of relevance to QAL2 testing and EU ETS and whether the certificate is appropriate and valid for the EU ETS reporting period) If a non-accredited laboratory is used or the accreditation does not cover the required scope the commissions A&V FAQ describes tests to be performed. • whether the correct calibration function has been programmed in the CEMS; • whether an appropriate annual average hourly concentration of the GHG has been used as a substitute for the ELVs for the calibration. For measurement of N_2O emissions this is particularly relevant since concentrations during periods without abatement differ significantly from those during normal operations. • whether any major change in the plant operation or any major change or repair in the

Area that is checked	Examples of checks
	CEMS has occurred which affects the appropriateness of the current QAL2 assessment; and whether a new QAL2 procedure has been carried out in that case.
QAL3	The verifier should check that the procedure: • has been correctly implemented throughout the year and is up to date; • covers the information required of QAL3 by EN 14181; • is recorded in control charts; • ensures that results have been properly documented; • allows for and where necessary has resulted in appropriate action (e.g. adjustment, maintenance, re-calibration) where drift and/or precision is found to be out of control.
AST	The verifier should check that an AST report is available for the reported year and assess this report. Similar checks as those relating to the QAL 2 procedure should be performed. This includes for example whether: • recommendations from previous AST and QAL2 tests have been taken into account; • whether the correct calibration function has been programmed in the CEMS; • whether during the last AST a minimum of five parallel SRM measurements have been carried out evenly distributed over one working day; • the required functionality tests have been performed and passed; • the laboratory that performed the AST tests is accredited (in which case the verifier checks whether the scope of accreditation covers the areas of relevance to AST testing and EU ETS and whether the certificate is appropriate and valid for the EU ETS reporting period) If a non-accredited laboratory is used or the accreditation does not cover the required scope the commissions A&V FAQ describes tests to be performed.
Flue gas flow	The MRR does not mention a specific standard to be used for flow measurement. But section 3.2 of MRR GD 4 recommends the use of EN 16911. MRR also allows the alternate determination of flue gas flow by calculation (see section 3.2.) The verifier should check whether: • appropriate standards have been used (eg EN 15259/ EN ISO 16911-2) and whether these standards have been applied correctly; • the continuous flow measurement is representative (if Article 43(5)(b) of the MRR is applied); • the calculations in the mass balance are correctly applied (for application of MRR Article 43(5)(a)): e.g. checking whether input data in the calculation formulae result in correct emission data, whether all parameters in the mass balance have been taken into account, performing plausibility checks on the input and output data, checking plausibility of measured values; • relevant sources and components of uncertainty have been considered in the uncertainty calculations for all relevant parameters (see MRR Article 43(5)); • the validity of the information used for uncertainty calculations can be confirmed, e.g. through calibration reports, service and maintenance reports, manufacturer's specifications • the uncertainty associated with the flow determination, combined with the uncertainty associated with the concentration determination, meets the uncertainty requirements for the overall emission measurement approved in the MP.

Question 12

For the new Phase 4, the operator asks the verifier to also verify its annual activity level report.

Question 12a

How would this affect the scope of verification and time allocation?

Verification of annual activity level report involves checks on different data sets. Different inherent and control risks are concerned which has an impact on the type of checks and activities to be carried out by the verifier. GD4 on verification of baseline data reports and annual activity level reports provides more information on the type of checks to be carried out. Additional time may be required for the verification of annual activity level data due to the complexity in the applicable benchmarks for this installation, in particular in this first year of annual activity level verification.

Question 12b

What additional elements should the verifier consider in that case?

This installations is covered by the product benchmark, the heat benchmark and fuel benchmark. This means that the verifier should focus on the parameters and data related to those benchmarks. Additional product and heat information need to be assessed (and electricity if that is generated on site).

Question 12c

What additional checks would the verifier carry out on the data and internal control system?

As this installation is covered by a product benchmark and a heat benchmark as well as the fuel benchmark, there will be additional product and heat information to be assessed (and electricity if that is generated on site). The verifier will check whether the data in the annual activity level report have been monitored and reported correctly in accordance with the MMP. This relates to both the annual activity level data and the underlying data and parameters listed in section 2.3 to 2.7 of Annex IV of the FAR. It will however also perform checks on compliance with the FAR.

Additional checks will for example be needed on the following:

- Completeness of sources and source streams etc. in the MMP,
- Correctness and completeness of sub-installation boundaries including any change in the boundaries because of the addition of the heat recovery
- Correct application of the MMP, including the application of data sources for the different benchmarks
- whether the energy consumption is correctly attributed to sub-installations
- the start of normal operations as this is relevant for defining activity levels. According to the FAR the start of normal operations is the first day of operations, i.e. as soon as the process is started (this includes the period of commissioning).
- The relevant parameters in Annex IV sections 2.3 to 2.7 of the FAR. Whether data gaps or double counting occurs
- the accuracy of parameters in Articles 21 of the FAR (heat flow between installations) and 22 of the FAR (exchangeability of fuel/electricity) and whether the methodologies to determine those parameters have been correctly applied
- Whether the product definition for clinker production has been correctly applied (e.g. whether the products fall under the relevant definition, checks on the annual quantity of products);
- Correct attribution of activity levels for the fall-back allocation approaches (heat, district heating, fuel and process emissions sub-installations) according to the carbon leakage status of the products linked to those sub-installations and to the NACE/PRODCOM codes of these products.
- Historical activity levels (based on mean values of the baseline period and the relevant calculation methods)
- Installation maintenance and calibration of product and heat 'meters'.
- Data verification checks such as plausibility checks and analytical procedures on underlying data, tracing the data back to primary source data, cross checks between data sets and analytical checks to spot outliers and anomalies. Cross checks will for example need to be made against the additional calculation sheets and procedures that relate to the MMP

Please note that the verifier should be aware that the MMP may have changed since last year. The verifier should therefore check in the strategic analysis whether changes have occurred and whether these have been approved by the CA (if these changes were significant). The verifier should check the CA correspondence related to this

4. Main conclusions from AV training event

The following conclusions came out of the AV training event

- Overall there is a good understanding of how risks impact the focus and depth of verification. Additional guidance on this topic is not needed
- Verifier's sampling of data and controls is very case specific and it is difficult to provide guidance on this. An update of KGN II.4 on sampling can clarify the concept of statistical and non-statistical sampling and principles applied during sampling but training seem to be the most appropriate instrument how different sampling methods are carried out
- The discussions showed that in general verifiers apply non-statistical sampling methods and that when they are sampling they tend to cover more than 10% of the data sets. Sampling size is mostly driven by the size and complexity of the data sets and the inherent and control risks involved.
- Further guidance on time allocation is needed to ensure more consistency between verifiers. It is important to note that verifier need to determine the amount of time to be spent on verification based on factors that are specific to an installation. KGN II.12 provides guidance on the type of factors that may be applicable. The man day tool that was developed as a supportive tool for NABs to carry out cross checks on time allocation should not be used to determine time. The man day tool should be amended according to phase 4 requirements.
- How verifiers deal with sector specific issues and MR specific elements remains challenging and could benefit from more training. This concerns for example how to assess evidence of non-accredited labs, CEMS, biomass, operator's sampling and uncertainty assessment.
- Sector specific case studies are the best instrument to explain the concepts of auditing, sampling, verification checks and application of materiality
- Verification of annual activity level data is a new topic and further guidance and training would be welcome
- The quality of internal verification documentation of a verifier has improved over the years. Further guidance is not needed.
- It is important to start early in verification, in particular when a verifier verifies both annual activity data and annual emissions data.
- If the same verifier is doing the verifications of annual activity data and annual emissions, it should be aware that these are separate verifications involving different types of risks, requiring checks on different data sets and internal controls, and subject to different rules and scope of verification. Where data sets and internal controls on the collection of data are the same for both AER and ALC reporting, verifiers may look at synergies in data checking or combining site visits provided that the verifier takes into account the different objectives of the verifications and treats the verification work as separate verifications. It also needs to ensure that appropriate time is allocated to both verifications and the AVR requirements on rotation are applied.
- Discussions showed that it was importance to have clarity on how to deal with the impact of COVID-19 on verification. These discussions led to changes in AVR and update of KGN II.5 on virtual site visits
- Exemplars or training are likely the best method to improve consistency in verification reporting
- Further guidance may be needed on how to deal with specific impartiality issue.

Annex I: Programme of the 2020 EU ETS CF A&V Training Event

Accreditation and Verification Training Event 2020 – Plenary Session 25 September 2020

Objective: To provide a training/information webinar for representatives from the EU ETS Competent Authorities (CAs), verifiers and National Accreditation Bodies (NABs) on some more complex issues associated with EU ETS verification.

Set-up of the plenary session:
The morning session will be dedicated to the cement case study going over key points and conclusions from the discussion groups. The focus of the discussion will be on the following topics:

- Scope and detail of verification and the factors that influence these elements
- How to determine a reasonable allocation of time for verifications
- The different checks on monitoring methodology
- Sampling
- Use of CEMS and impact on different verification activities
- Key checks on annual activity level data.

In the afternoon session a variety of verification topics will be addressed based on questions collected from the audience before and during the event. These topics are not necessarily related to the case study.

Housekeeping rules:
Because of the large number of participants the microphones of participants will be muted. If participants have questions, they are kindly asked to include them in the chat and the moderator will pick them up for the discussion.

The discussion will be led by the moderator with the support of key experts, the two trainers/moderators from round 1 discussion session and a selected number of CA and NAB experts.

Programme for the online plenary A&V training event

25 September 2020

Time	Session	Who
10:00 - 10:05	Opening, welcome, agenda and objectives of the webinar – Rules of communication	Chair
10:05 -10:15	Short overview on round 1 discussions and discussions	Machtelt Oudenes
10.15 – 11.00	Key conclusions and feedback on questions on the case: • Impact of complexity on scope and detail of verification • Checks on monitoring methodology • Time allocation	Discussion led by moderator
11.00- 11.10	Short break	
11:10 - 12:30	Key conclusions and feedback on questions on the case: • Data verification and sampling • Recording in internal verification documentation • Use of CEMS and impact on verification • Practical issues on the verification of annual activity level data (in relation to this case)	Discussion led by moderator
12:30 - 14:00	Lunch	
14:00 - 14:05	Opening of the afternoon training	Chair
14:05 -14.45	Presentation on: • Conclusions on EU ETS MRVA implementation in Europe, in particular verification/accreditation (CCEV5) • Update of the AVR for the fourth trading period • Update of guidance and templates	Machtelt Oudenes/ Guillaume Coron
14.45 – 15.40	Discussion on key verification topics	Discussion led by moderator
15:40- 16:00	Conclusions and AOB	Moderator/Chair

Annex II: Presentations plenary session 2020 AV training event

Discussion on case study

Machtelt Oudenes, SQ Consult

A&V Training Event, 25 September 2020

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Discussions on case aim to increase harmonised understanding on:

- *Impact complexity of the installation and specific situation on ground on scope and depth of verification*
- *Time allocation*
- *The type of checks to perform on specific M&R issues and controls/procedures*
- *Sampling and data verification*
- *Factors that can influence the scope of verification, time allocation, sampling and checks to be carried out*

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Set-up of the training on case

- *Around 180 participants joined in round 1 training and were distributed over 18 discussion groups moderated by two highly experienced verifiers Lucy Candlin and Sven Starckx*
- *Each discussion group was "balanced" concerning verifiers, NABs and CA representatives from Member States*
- *Discussions in round 1 were held on 16/17/18 September*
- *Objective of this morning in the plenary session:*
  - Discuss key points and conclusions coming from round 1 discussions
  - Provide some feedback on key responses to questions in the case

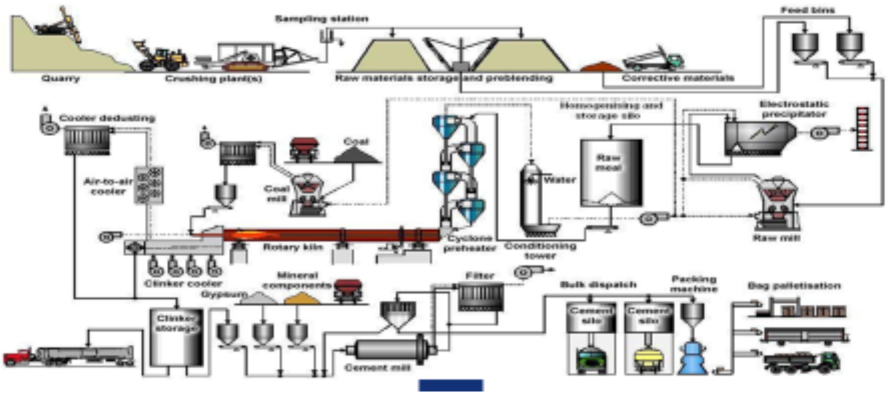
Follow-up after the training

- *After the training event, the training documentation will be updated for cascading further in your organisation/MS*
- *Training documentation will contain the entire case study including the model answers and explanations*
- *Training material will be sent to all participants and published on the Commission's Website:* *https://ec.europa.eu/clima/policies/ets/monitoring_en#tab-0-1*

Introduction case study

Case study

- *Installation producing cement with 2 rotary kilns*
- *Category C installation with multiple fuels and data points*



Further information on case

- *Fossil and mixed fuels and a small fraction of biomass fuels*
- *Method A is applied to determine the emissions of raw meal materials*
- *Complex data flow with many data points*
- *Data on inputs of coal, pet coke, natural gas, tyres, solvents and kerosene provided in excel*
- *External lab to analyse samples of coal and pet coke*
- *Internal lab to analyse samples of other fuels*
- *Management, quality control and control room operations directed from Plant Office*

Key questions in case study

- *Verifier's scope and depth of verification*
- *Connection with the verifier's risk analysis*
- *Checks on monitoring methodology and M&R specific issues*
- *Time allocation*
- *Checks on data and checks on quality assurance/control*
- *Sampling and impact of errors in data on sampling*
- *Impact of CEMS on scope of verification*
- *Key checks on annual activity level data*

Applicable Articles and Guidance

- *Relevant Articles in the AVR:*
  - Article 7: scope of verification and level of assurance
  - Article 9: time allocation
  - Article 10: information to be provided by operator to verifier
  - Article 12: risk analysis
  - Article 13: verification plan
  - Article 14-17: checks on controls and data
  - Article 21: site visits
- *Relevant guidance includes EGD I, and KGN II.1, II.2, II.3, II.4, II.5, II.7 as well as relevant MR guidance documents to understand M&R specific issues*

Thank you for your attention

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Evaluation of MRVA implementation and Update of AVR

Machtelt Oudenes (SQ Consult)

Online A&V training event
25 September 2020

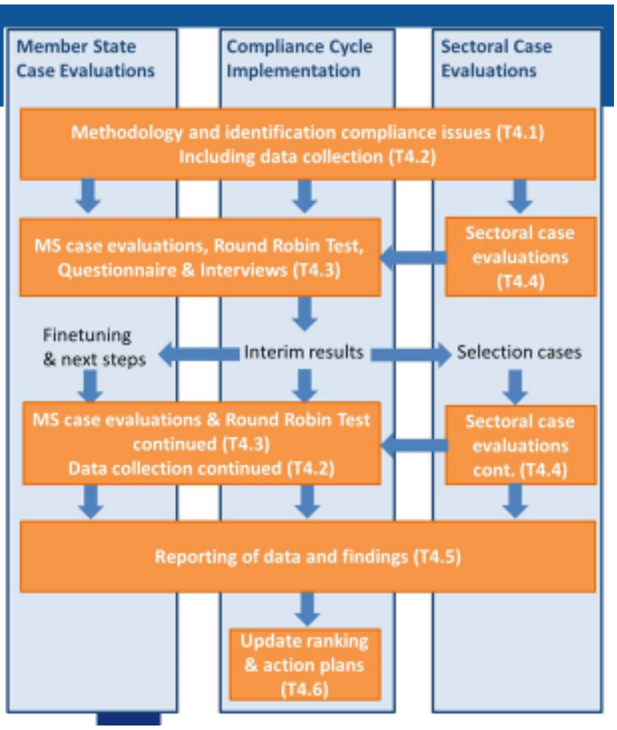
5th Compliance Cycle Evaluation

- *Complete and in-depth analysis of each MS's MRVA implementation status*
- *Serving several aims*
  - Improvement of all aspects in the compliance cycle
  - Confidence in harmonised compliance cycle implementation
  - Support MS awareness concerning further improve efficiency
  - Support identification of further need for support and guidance
  - Provide specific tools, exemplars, etc.
- *Building on previous Compliance Reviews and information sources*

Methodology CCEV 5

Key elements:

- Analysis of CCEV information Art 21 reports
- Survey to complement missing information
- Information collected from other sources
- MS case evaluations (analysing MP, AER, VR, IR of 1 installation/AO)
- Case evaluations of information exchange between NAB and CA
- Round Robin Test
- Sectoral case evaluations (12 sectors)
- Ranking table and MS-specific action plans



Main conclusions - M&R

- *MS improved their procedures/organisation since 2015*
- *Most improvements have been made in the monitoring approval, AER/VR review processes and inspection*
- *Some monitoring issues continue to be challenging: e.g.*
  - Uncertainty assessment and sampling plan for complex installations
  - Demonstrating sustainability of biomass
  - Role of CA vs verifiers regarding risk assessment and procedures
  - Assessing evidence of non-accredited labs
- *The quality of reporting has improved but there are still common issues identified across MS: e.g. missing source streams, data gaps, inconsistencies with the MP*
- *AER review and improvement process is working more effectively*

Main conclusions - verification

- *Overall verifier capacity is adequate for the number of reports to be verified but it varies between countries*
  - Mutual acceptance of verifiers has improved capacity
  - National language and procedures generally do not prevent foreign verifiers from carrying out verification in another country
  - Limited capacity in complex and rare sectors which require highly experienced verifiers
  - Minor fluctuations in capacity over the years but recently some changes have occurred because of accreditation of verifiers of allocation data
- *Verifier time allocation is not always consistent*
  - Often late verifications leaving little time to correct issues
  - In some cases CAs reported a discrepancy of the time given the installation's complexity
  - Generally such issues are reported to the NAB to be addressed

Main conclusions - visits & reporting

- *Verifier's site visits are not often waived, in particular when approval of the CA is required*
  - Mostly for off-shore, very simple installations and small emitters
  - In countries where the CA relies heavily on verifiers to check some MPs elements, site visits are usually not waived.
- *Classification of misstatements, non-conformities and non-compliance issues has improved over the years but:*
  - Non-conformities and non-compliance can be difficult to classify
  - Recommendations of improvements are not always classified properly
- *Improvement procedures in general work effectively, in particular if it concerns addressing issues reported by the verifier*
  - Improvement issues are not always actively monitored by the CA
  - Recommendations of improvement not always a priority

Main conclusions - issues found

- *Examples of typical errors made by verifiers:*
  - Missed source streams and sources
  - Incorrect classification of source streams or sustainable biomass
  - Missed discrepancies in completeness of emission sources/ flights
  - Incorrect default values that were missed by verifiers
  - Exceedance of de-minimis thresholds missed by verifiers
  - Application of materiality
- *Identification of impartiality concerns:*
  - CA often expressed concerns that some recommendations for improvement that could be perceived as providing consultancy
  - CA sometimes voiced concerns for familiarity risks

Main conclusions - information exchange

- *Information exchange between NAB and CA on a national basis generally works effectively, but could be improved across borders*
  - Timeliness and completeness of information exchange increased
  - CA more inclined to check and use information from NABs and vice versa
  - The level of checks carried out by the CA on the reports differ
  - Not always clear understanding on what is a complaint, what should be shared with the NAB and what process should be followed
  - The NAB do not always report back consistently and timely on information that has been shared by the CA
- *Improvement in information exchange expected because of new requirements in the AVR: e.g.*
  - Update of work programme by 31 January
  - Management report needs to include information on what action NAB has taken as a result of information shared by the CA

Main conclusions - case evaluation

- *Most MS use Commission templates. MS templates usually meet Commission templates but not in all cases*
- *Templates helped harmonise MS approaches and how installations complete MPs, AER and VR*
- *Not all documents evaluated were complete: e.g.*
  - Justification for not meeting tiers incomplete
  - Data gap sections in emission report or verification report not totally filled
- *Level of detail varied in some cases : e.g.*
  - Description of procedures in MP, description of installation/activities
  - Description of calculation approaches
- *In some cases there were inconsistencies between documents: e.g.*
  - Discrepancies on MP versions mentioned in different documents
  - Inconsistencies in source streams, sources, tiers between documents

Main conclusions - case evaluation

- *Quality of verification reports (VR) across MS can be improved: e.g.*
  - Inconsistencies in time allocated to site visits, misclassifications
  - Level of detail in Annex I varies and is not always detailed enough
  - Inconsistencies between verification opinion statement and Annex I
  - Inconsistencies with monitoring details/ source streams listed in AER
  - Datagap section not completed correctly
  - Materiality level in Annex II of the VR not completed
  - Reference to old standards or missing references in Annex II
- *Improvement report not always clear how VR issues are addressed*
- *Room for improvement in the information exchange templates*
  - Drop down boxes are not always clearly understood
  - Differences in how NAB report on dates of site visits/ assessment
  - Information in open text fields not always clear or evidence not added

Recommendations

- *More clear instructions on where particular guidance can be found*
- *Tailored training between CAs, NABs and verifiers seem to increase stakeholder's awareness on how to deal with specific issues*
- *It is important that training can be cascaded to others within the CA, NAB or verifier organisation*
- *Sharing experiences on certain topics between MS helps in harmonising implementation further*
- *More guidance or clarification in existing guidance may be needed:*
  - Time allocation
  - How to deal with specific issues such as sustainability of biomass
  - Sampling

Update of the AVR

Changes for the 4th trading period

Compared to AVR 2018 the following changes were made:

- *Changes to include verification of annual activity level data*
- *Rotation of lead auditors*
- *Amendments as a result of revisions in ISO standards*
- *Textual clarification where needed*

Verification of annual activity level data

- *Verification of annual activity level reports (AALR) follow similar approaches as verification of baseline data reports*
  - Same steps in verification process and verification procedures
  - Similar requirements on sampling, reporting, materiality, addressing issues, impartiality, verifier procedures, VOS
  - Information exchange between NAB and CA
  - Application of uniform standards such as ISO 14065, 17011
  - Accreditation of verifiers required for scope 98 and sector scope
- *Changes made to apply provisions to verification of AALR*

Verification of annual activity level data

- *Some specific rules were needed:*
  - Type of information to be provided by operators
  - Some additional checks in the data verification
  - Additional items to be reported in the VR (e.g. annual activity level data and changes in parameters/energy efficiency)
  - How to address non-conformities and recommendations
  - Specific criteria for the waive of site visits
  - Specific competence rules for EU ETS auditors and NAB assessors

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Other amendments

- *Required break of 3 years for lead auditors verifying the same installation for 5 consecutive years*
  - Verification includes verification of AER and/or allocation data
  - Rotation relates to fourth trading period
- *Clarifications and minor changes as a result of revisions in ISO 14064-3, 14065 and new standard ISO 17029*
  - Better alignment with the new revisions in the standard
  - Removal of unambiguities and discrepancies
  - More clear references
- *Minor clarifications to improve the understanding of the text, correction of typos and up to date references to legislation*

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