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Guidance Document

MRR Guidance on Risk assessment and control activities – Examples

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Status of this document:

This document is part of a series of documents provided by the Commission services for supporting the implementation of Commission Regulation (EU) No. 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council[1].

The guidance represents the views of the Commission services at the time of publication. It is not legally binding.

This document takes into account the discussions within meetings of the informal Technical Working Group on the Monitoring and Reporting Regulation under WGIII of the Climate Change Committee (CCC), as well as written comments received from stakeholders and experts from Member States.

The Commission has provided a tool for carrying out risk assessments which operators and aircraft operators may use. This tool and all guidance documents and templates can be downloaded from the Commission's website at the following address: http://ec.europa.eu/clima/policies/ets/monitoring/documentation_en.htm.

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:181:0030:0104:EN:PDF

1 INTRODUCTION

1.1 General

This document supplements GD 6 “Guidance on data flow & control activities” by presenting examples. For more details on data flow & control activities and on the risk assessment in the context of the monitoring and reporting of GHG emissions in the EU ETS, please refer to that guidance document[2].

Note that the examples presented are quite common cases. Nevertheless operators should not be tempted to copy text from this document, but should always define their monitoring methodology in a very installation-specific way, choosing the most appropriate means of monitoring, with the lowest possible uncertainty and highest robustness against errors.

1.2 Background information

Section 4.2 of Guidance Document 6 suggests carrying out the risk assessment for the whole data flow from obtaining primary data from measurement instruments to the final annual emissions report, including document management and storage of data. In order to lower the risk by subsequent control measures, it can be distinguished between the following cases:

a) Control measures lowering the probability of an incident;

b) Control measures lowering the impact of an incident;

c) Combinations of a) and b) lowering both the probability and the impact of an incident.

In some cases it can be discussed whether a measure should be considered as a control measure or to be part of the data flow activities (i.e. part of the inherent risk). In any event the resulting probability and impact of the overall risk, i.e. Inherent Risk (IR) x Control Risk (CR), will be the same. In the examples below such situations are included. For transparency reasons usually both risk situations are included in the assessment, the one without and the one with the control measure.

For assessing the impact of control measures, the following guiding principles may be applied:

- Increasing the number of possibilities to obtain data reduces the probability of (total) failure. Without further measures, the impact stays the same, such as in example 1 below. This generally applies to all types of correlated measurements, such as measuring the same source stream under the same conditions etc.
- Increasing the number of readings of the meter, or the number of representative samples for analyses, reduces the impact, because the individual reading refers to a smaller part of the total emissions.
- For control activities measures are useful which rely on correlated, but independently monitored data sources. E.g. it is often useful to monitor both the fuel input and the heat output (or product output) of a process simultaneously. The probability is low that reading of both parameters fails at the same time. For these cases, it is appropriate to consider probability of failure of the primary in-

[2] http://ec.europa.eu/clima/policies/ets/monitoring/docs/gd6_dataflow_en.pdf

strument as the probability that the incident occurs, but only the difference in uncertainty of the surrogate data as the worst case impact.

- Critical points in the data flow may offset the positive effect of other control activities. If for example all types of data are stored in the same (and only one) location, the effect of previous control measure may be lost again. For example, if all the data is stored in the same PC, and if backups are not made frequently, and also no paper copies of the primary data (meter readings, analysis results, etc) are kept, a single harddisk crash may have catastrophic impact on the whole data, and the control measure of parallel data sources is void.

In the exemplar, several control measures are sometimes proposed simultaneously. In general, this is a valid approach. Identifying and assessing risks separately from each other may often be difficult due to interdependencies or overlaps between individual incidents and control measures. Too detailed assessment will often not add any value to the assessment. Finally, spending too much effort on such details or interdependencies may distract the assessor from focussing on really critical issues exhibiting a non-acceptable risk level.

2 EXAMPLE INSTALLATION

2.1 Information about the example installation

The installation discussed in this chapter is producing lime, and is emitting on average 100,000 t CO_2 per year. The following source streams need monitoring:

Fuel/Material	Estimated emissions (t CO_2 / a)	Further information
Natural gas	25,000	Activity data determined by invoices
		Calculation factors determined by using national default values
Lime	75,000	Activity data determined by weighing of trucks upon delivery
		Calculation factors determined by sampling and laboratory analyses

2.2 Data flow and Control activities

2.2.1 General considerations

This section discusses the general approach to determine the probability and impact levels of the inherent and control risk associated with each incident. The resulting exemplar risk assessment for the example installation can be found after this section.

As indicated in sections 4.3.1 and 4.3.2 of Guidance Document 6 this assessment should rather be "semi-quantitative" than a mathematically demanding exercise. However, in the following examples still some calculations related to the example lime installation are carried to give an insight on the way of thinking behind the attributed probability and impact levels for the exemplar risk assessment.

Examples for control measures lowering the probability of an incident:

Example 1:
The natural gas fuel stream in the example lime installation is measured by a gas flow meter. As a control measure a secondary (redundant) gas flow meter could be installed.[3] This measure would impact the probability of the incident, because now both metering devices have to fail to lead to a loss of activity data due to gross failure of metering. However, the impact of such failure still is that in the worst case scenario activity data for the whole reporting period is lost. If the probability that one instrument fails is 10%, then the probability that both instruments fail within one reporting period is $10\%^2 = 1\%$ (corresponding to the statement: "gross failure of both metering devices within one reporting period happens every 100 years").

Example 2:
After the analysis of one batch of limestone in the example installation the laboratory recognises that the sample has been contaminated. As a result the emission factor of this batch is lost. However, as a control measure the laboratory is keeping retained samples according to common good laboratory practice. Due to the fact that samples from this batch can now be re-analysed, the probability that the emission of one batch is completely lost is greatly reduced.

Examples for control measures lowering the impact of an incident:

Example 3:
In addition to receiving monthly invoices for the natural gas in the example lime installation, the shift manager reads the gas meter e.g. weekly or even daily. The probability of a metering device's gross failure would still be 10% but the impact would only be 1/4 or even 1/30, respectively, of the original inherent risk.

Example 4:
Another and probably the most important influence on lowering the impact of an incident is the availability of plausibility (cross) checks. Such checks include comparison with data for e.g. heat, electricity or product production as well as data derived from correlating parameters or from historic trends.

Examples for control measures lowering both the probability and the impact of an incident:

Example 5:
In the example the operator is using invoices as the primary data source for determining the monthly activity data of the source stream "natural gas". Those invoices are based on the trading partner's readings of the main gas flow meter. As a consequence gross failure of the main gas meter may in a worst case scenario have an impact of 2,000 t CO_2, i.e. 1/12 of the annual emissions from natural gas, for one reporting period. As this value is between impact levels 3 (1,000 t CO_2) and 4 (5,000 t CO_2) the more conservative level 4 is taken for further calculations. The operator assesses the probability of such failure to be about 10% (= probability level 3) which corresponds to the statement: "Gross failure of the main gas meter is expected to occur on average every ten years". The resulting inherent risk ($R = P \times I$) is 500 t CO_2. This means that the expected risk for a misstatement before taking into account any control activities for each reporting period is 500 t CO_2.

Since the flow meter is under national legal metrological control and maintenance or replacement is done in regular intervals the probability of gross failure is being reduced (assessed to occur with a probability of 1%, probability level 2). In addition to that, cross-checks with e.g. production data will even be available in case gross failure should still occur. Conservatively assuming that the correlation between production data and activity data exhibits an associated uncertainty of 25% the resulting im-

[3] Note that pursuant to point (e) of Article 18(3) of the MRR the cost-efficiency of this improvement might be evaluated by assessing whether the annual costs for the secondary system can be considered unreasonable. For that purpose the benefit has to be calculated taking into account the default improvement factor of 1%, because the tier is not affected.

pact would be 500 t CO_2 (impact level 2). This means that the expected risk for a misstatement after taking into account control activities for each reporting period is 5 t CO_2

Example 6:
In the example the operator is determining the emission factor of the limestone (Monitoring Method A: Carbonate Input) in his own non-accredited laboratory. In case the log-book containing data for calculating the emission factor is lost, also the emission factor is lost. The inherent risk associated with such an incident is calculated taking into account that in the worst case (i.e. assuming the worst expected limestone quality) the limestone gathered from a quarry exhibits an emission factor of about 0.4 t CO_2 / t. This is deviating by approximately 10% from pure $CaCO_3$ (EF = 0.44 t CO_2 / t). With these assumptions the impact may be 10% of the annual emissions stemming from the decomposition of limestone, i.e. 7.500 t CO_2. Therefore, the impact level in the example is 5 (> 5.000 t CO_2). As a control measure, data from the log-book is transferred to the electronic system at least weekly, hence reducing the impact of such loss to 1/52 of the annual value.

Example 7:

The same approach is applicable for assessing the risk that the installation's own laboratory does not provide correct results. Considering a potential inherent impact on the emission factor of 5% in the worst case the impact on the emissions is determined to be *5% × 75.000* = 3.750 t CO_2 / t, i.e. impact level 4. The participation of the installation's non-accredited laboratory in annual inter-laboratory testing as part of the procedure demonstrating equivalence to EN ISO/IEC 17205 serves as a control measure lowering the probability of this incident. Additional plausibility/cross-checks with historic data will lower the impact even further.

2.2.2 Full exemplar risk assessment

Table 1. Risk matrix showing the levels of impact (in t CO2e) and probability (in % chance the incident occurs during one year) and the resulting risk (=probability x impact). It is distinguished between low (green), medium (yellow), and high (red) risk.

Probability	Impact	1	2	3	4	5
		50,0	500,0	1.000,0	5.000,0	20.000,0
1	0,50%	0,3	2,5	5,0	25,0	100,0
2	1,00%	0,5	5,0	10,0	50,0	200,0
3	10,00%	5,0	50,0	100,0	500,0	2.000,0
4	20,00%	10,0	100,0	200,0	1.000,0	4.000,0
5	50,00%	25,0	250,0	500,0	2.500,0	10.000,0

1 *Table 2. Exemplar risk assessment for a lime producing installation*

Process/Activity	Incident	Type of risk	Inherent Risk				Inherent Risk x Control Risk				
			P	I	Risk		Control Measure(s)	P	I	Risk	
Main gas flow meter	Gross failure	Activity data lost or inaccurate	3	4	500,0	**HIGH**	Fuel supplier contract → high availability; cross check with invoices/production data (see procedure on how to close data gaps)	2	2	5,0	**LOW**
	Meter malfunction	Activity data lost or inaccurate	3	3	100,0	**MED**	Fuel supplier contract → high availability; procedure for corrective action part of EN ISO 9001	1	3	5,0	**LOW**
	Missing calibrations	Activity data incorrect (drift or other inaccuracies)	4	3	200,0	**HIGH**	Fuel supplier contract → high availability; quality assurance procedure for maintenance part of EN ISO 9001	1	3	5,0	**LOW**
	Display error or misreading	Activity data incorrect	3	3	100,0	**MED**	Cross check with production data; values reviewed by a 2nd person	1	2	2,5	**LOW**
	Invoices wrong		3	4	500,0	**HIGH**	Shift manager reads gas meter on 1 Jan each year (at 11:30), compares with invoices; compare invoices with other months and previous years	1	3	5,0	**LOW**
	Not appropriate for the operating conditions or not appropriately installed		3	2	50,0	**MED**	Checklist comparing conditions applied and manufacturer's specification; personnel regularly educated (see procedure for managing O&M and ETS personnel)	1	2	2,5	**LOW**
	Electronic volume converter malfunction		3	2	50,0	**MED**	Fuel supplier contract → high availability; proxy data available (see procedure on how to close data gaps)	2	2	5,0	**LOW**

Truck weighing bridge (limestone activity data)	Gross failure	Activity data lost or inaccurate	3	2	50,0	**MED**	Cross check with invoices (supplier's metering data) and with production data	3	1	5,0	**LOW**
	Meter malfunction	Activity data lost or inaccurate	3	3	100,0	**MED**	Temporary use of invoices as data sources; procedure for corrective action part of EN ISO 9001	1	1	0,3	**LOW**
	Missing calibrations	Activity data incorrect (drift or other inaccuracies)	4	3	200,0	**HIGH**	Cross checks with production data; quality assurance procedure for maintenance part of EN ISO 9001	1	2	2,5	**LOW**
	Display error or misreading	Activity data incorrect	3	3	100,0	**MED**	Cross check with invoices, supplier's metering data and with production data; values reviewed by a 2nd person	1	1	0,3	**LOW**
	Not appropriate for the operating conditions or not appropriately installed		3	3	100,0	**MED**	Checklist comparing conditions applied and manufacturer's specification; personnel regularly educated (see procedure for managing O&M and ETS personnel), cross checks	1	1	0,3	**LOW**
Stock changes (limestone)	Forgetting to determine stocks at beginning or end of the year		4	2	100,0	**MED**	Nomination of a 2nd person responsible for keeping track of stocks; automatic alert messages in MS Outlook calendar	1	2	2,5	**LOW**
Emission Factor (Limestone)	Log-book lost	Emission factor lost	2	5	200,0	**HIGH**	Analytical data is at least weekly transferred into electronic files; clear responsibilities for data management + back-up	1	2	2,5	**LOW**
	Batch not analysed or data lost	Emission factor wrong	3	3	100,0	**MED**	Nomination of a 2nd person responsible for keeping track of sampling and analyses; retained samples are being kept; (see procedure for managing ETS personnel)	1	3	5,0	**LOW**
	Samples not representative		3	3	100,0	**MED**	Homogenous raw material; see procedure for reviewing appropriateness of the sampling plan	1	3	5,0	**LOW**
	Frequency of analyses not sufficient		3	2	50,0	**MED**	Regularly checked for improvement reports (Art. 69(1)) if "1/3"-rule still applicable	1	2	2,5	**LOW**
	Installation's own laboratory does not provide correct results		3	4	500,0	**HIGH**	Annual participation in inter-laboratory testings; See procedures for demonstrating equivalence to accr. lab. in accordance with Article 34; plausibility	1	2	2,5	**LOW**

							checks					
	Weighted average not correctly calculated		4	2	100,0	**MED**	Review by a 2nd person; New personnel regularly instructed keep track in the log-book of each size of batches analysed	1	2	2,5	**LOW**
	Analytical method in-appropriate		2	2	5,0	**LOW**	Long experience with analysing limestone; Annual participation in inter-laboratory testings; See pro-cedures for demonstrating equivalence to accr. lab. in accordance with Article 34	1	2	2,5	**LOW**
Data transfer to electronic files	Wrong data transfer to Excel MRV file	Activity data and emission factor incor-rect	5	5	10.000,0	**HIGH**	Review by a 2nd person; cross checks with previ-ous years and production data	2	2	5,0	**LOW**
	File or computer da-mage	Emissions calculations lost	4	5	4.000,0	**HIGH**	IT data storage system in place; proxy data for da-ta gaps available (production, previous years)	1	2	2,5	**LOW**
	Calculation errors	Emissions wrong	3	4	500,0	**HIGH**	Cross checks with result in COM's AER template; review by 2nd person; cross checks with previous years	1	1	0,3	**LOW**
New source streams	Miss inclusion of new fuels or materials	Emissions wrong	1	1	0,3	**LOW**	Highly unlikely; kiln only designed for firing natural gas and limestone with specific properties	1	1	0,3	**LOW**

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