



International
Antimony Association

**Guidance for the monitoring of
antimony in inhalable and respirable
airborne particulate matter in workplace atmospheres**

**Part 2: Use of the antimony inhalation exposure data
and contextual information MS Excel template**

Version 1.2

June 2019



VERSIONS

Version	Date issued	Remarks
1.1	19.02.2019	Public version
1.2	09.04.2019	<p>Main updates as follows:</p> <ul style="list-style-type: none">• Email address for template returns corrected to shahzad.rashid@iom-world.org• Section 5, Worksheet 2 'Exposure Scenario': Inclusion of columns to allow for information on secondary CES relevant to the exposure situation to be recorded (if applicable). New column to allow for entry of any additional exposure scenario information. New column to allow for information on packaging sizes to be entered (if applicable). New column to indicate if workers have been fit testing for the RPE worn (if applicable). New column to allow for entry of any additional risk management measure information.• Section 6, Worksheet 3 'Sample data': Inclusion of column to allow user to enter details of why activity is considered not to be representative of exposure scenario (if applicable). Inclusion of column to allow for entry of alternative Sb substance (if applicable). Inclusion of columns to allow for entry of mass of Sb, Pb, As on filter. Refinement of Sb, Pb, As concentration data entry. Inclusion of columns to allow for entry of average Sb, Pb, As detected on the field blank filters.• Section 7, Worksheet 4 'Summary'. Inclusion of text to highlight that this worksheet may not work correctly in older versions of MS Excel due to compatibility issues.• Minor spelling and formatting issues also corrected

Contents

1. Introduction.....	2
2. Data protection considerations.....	3
3. Using the template.....	4
4. Worksheet '1. Sb site details'	6
A. Company / contact details.....	6
B. Company / contact details.....	6
5. Worksheet '2. Exposure scenario'	7
6. Worksheet '3. Sample data'	10
7. Worksheet '4. Summary'	13
8. Amending and deleting existing data.....	14
9. Quality control, analysis and reporting	15
10. Acknowledgments	16

1. Introduction

i2a's Product Stewardship program includes a Workplace Exposure Monitoring Campaign aimed to provide relevant¹ and reliable² exposure data to expert agencies and authorities³ in charge of assessing the risk associated to the production and use of Sb chemicals on the workplace. Provision of an appropriate exposure database will avoid worst-case assumptions, and accompany experts and regulators towards the most proportionate and efficient opinions and decisions.

A summary of the aims of i2a's exposure monitoring campaign are as follows:

- Collect relevant and reliable personal Sb⁴ exposure data from representative sites throughout the value chain (including production and main uses).
- Document the current Sb exposure levels in workplaces where Sb substances are produced and/or used, and quantify this exposure in both the inhalable and respirable fractions of the airborne particulate matter.
- Demonstrate compliance with current and recently revised occupational exposure levels, as well as expected future revisions of these.
- Develop sector recommendations for the continued prevention, minimization and control of Sb exposure in workplaces.

To achieve these aims it is vital that as wide a range and number of Sb producer and downstream user sites participate in the campaign. A separate guidance document details the standardised inhalation exposure sampling and analytical methodology to be followed.

In addition, it is imperative that the collected exposure measurement data and supporting contextual data are collated into a systematic, centralised manner to facilitate data analysis necessary to achieve the project aims.

A Microsoft (MS) Excel template '**Sb data collection template**' has been developed to allow participants to enter information concerning inhalable and respirable antimony inhalation exposure data collected as part of the of the Workplace Exposure Monitoring Campaign. In the event that IOM undertakes a measurement campaign on a company's behalf, they will populate the template for the collected inhalation exposure data.

This document provides guidance and instructions on how participants should complete and return this template. It is requested that the completed MS Excel template is returned as soon as measurement results are available and certainly by no later than **31st August 2019** for inclusion in the first round of data analysis.

NOTE - In instances where IOM are carrying out the measurement campaign on the company's behalf, they will complete a copy of the template.

¹ Relevant: Related specifically to Sb

² Reliable: Trustworthy, credible, and valid; generated and collected on the basis of documented and repeatable protocols

³ E.g.: IARC, NTP, FDA, EPA, ACGIH, NIOSH, OSHA, ECHA, SCOEL, and equivalent bodies worldwide

⁴ Samples will also be analyzed for lead (Pb) and arsenic (As) as potential contaminants, with the results of these measurements also being summarized and reported.

2. Data protection considerations

The IOM in Edinburgh have been contracted by i2a to collate the provided exposure and contextual data and the analysis of this to provide the summary statistics.

Data provided to the IOM will be stored on the secure IOM server and will be accessed only by designated project team members.

i2a will be provided with a copy of the overall exposure database, which will not include company names.

IOM will retain and share with EBRC (subject to appropriate confidentiality agreements) a version of the database where the company names remain linked with the data that they provided to assist with linkages with other previous data collection initiatives under REACH. EBRC (www.ebrc.de) are in charge of reviewing the REACH exposure assessments and exposure scenarios for i2a.

As the data required are sensitive, to prevent any unauthorised access to the template during the collection and submission process, you should:

1. Protect the template with a password. On the top menu go to **Tools>>Options**, then the **Security** tab, and enter a password in the 'password to open' field and press OK. It will prompt you to re-enter your password and then click on the OK button. You should then save the file to ensure the security changes are kept. The template will now require a password to be entered to open.
2. On submission of your data, please email the completed updated and password protected file to Shahzad Rashid at shahzad.rashid@iom-world.org. In addition, and in a separate email, please send a copy of your password for the file to allow us to unlock and retrieve the documents.

The following sections of this document provide guidance on how to enter the required inhalation exposure data and supporting contextual information into the MS Excel template. **This guidance has also been duplicated in the MS Excel template, with descriptions of each individual parameter being available by hovering /clicking on the parameter heading.**

If you have any questions concerning data entry, security and usage of the data please contact Karen Galea (IOM) on karen.galea@iom-world.org or by telephone on +44 (0) 131 449 8034. Alternatively contact Caroline Braibant (i2a) on caroline.braibant@antimony.com or by telephone on +32 (2) 779 00 49.

We would be grateful if you can return your completed template as soon as measurement results are available and certainly by no later than **31st August 2019** for inclusion in the first round of data analysis.

3. Using the template

There are five different tabs located at the bottom left hand side of the MS template that should be worked through. These are as follows:

1. **Introduction and instructions** – This worksheet contains a brief introduction about the data collection process and condensed information on how to enter your data.
2. **Worksheet '1. Sb site details'** – This has two very general sections which allow for the input of information on who is completing the template and selected site information.
3. **Worksheet '2. Activity information'** – This allows for the collection of information about the exposure scenarios taking place at your site for which Sb air samples were collected from your workers. This also includes the collection of information on the operational conditions and risk management measures used.
4. **Worksheet '3. Sample data'** – This worksheet requires more detailed information about inhalable and respirable Sb exposure measurements to be input. This is not just the numerical results but also the information that is needed to understand what they mean, for example, information on how these were collected (sampled), when and where they were collected in the site and how they were analysed (in the laboratory).
5. **Worksheet '4. Summary'** – This worksheet is provided for illustration purposes with further enhancement planned for the future. This worksheet will show summarized results (Min, Max and Average) of Sb concentrations by Substance name, Exposure Scenario entered on the "3. Sample data" worksheet. You are asked not to type anything on this page as the table will be filled in automatically from the data entered in the other worksheets.

It is strongly recommended that completion of this template takes place over three phases:

- The first phase being any time prior to the measurement campaign where worksheet 1 is completed.
- Phase 2 is at the time of the measurement campaign where worksheets 2 and 3 (up to and including column P) are populated.
- The remaining columns of worksheet 3 should be completed at Phase 3, which is upon receipt of the laboratory analysis results.

You will note in the template that both free text responses and selection from drop down pick-lists is required.

You can directly write or paste data into the cells. If you have trouble pasting the data into the cell, then click on the cell and paste the data into the **Insert Function** field at the top of the screen (Figure 1).

There are some cells where you must select an option from a drop down pick-list. There may be occasions where a response to a given input parameter is **not known**. In such instances please either **input 'Unknown'** or **select 'Unknown'** from the drop down pick-list.

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E3 The workplace is provided with local exhaust ventilation.

	A	B	C	D	E	F
1	1) Exposure Situation Details					
2	ES_ID	Exposure Situation Name	General Description of the situation (e.g. industry, activities, type of product)	Activity determinants (techniques, use-rate)	RMM (Local exhaust ventilation, enclosure, segregation, type of PPE, type of PPE)	Product information (analyse concentration, dustiness, volatility)
3	1	Spraying of isocyanate-containing paint [no spraybooth & LEV]	This situation describes the work of spray painters in the car body repair industry. The operators were measured between 6-40 minutes. The sprayers were exposed to paint during the whole measurement time.	The cars were sprayed with isocyanate-containing paint. The paint was sprayed in a downward direction using HPLV spray guns with a use rate of 0.03-0.3 l/min.	The workplace is provided with local exhaust ventilation.	The paint was diluted and of low viscosity. The hardeners used in this study contained an average of 60% isocyanates (range 40-100%). The assumed dilution of paint, thinner and hardener was 1:1:1. Total NCO groups were measured and converted to mg/m ³ (using molecular weights of the different NCO groups). The exposure measurements reflect exposure levels to total NCO groups.

Figure 1 Alternative means of pasting data

4. Worksheet '1. Sb site details'

As applicable, input free text or select from the drop-down list in the relevant white cells of the template.

A. Company / contact details

Use this section to enter the data for the company / contact person providing the template.

Parameter	Description	Type of data entry	Example text
Company name	Name of company providing data	Free text	IOM
Company site name	Name of site where inhalable and respirable data was collected	Free text	IOM Edinburgh
Company site address	Address of site where inhalable and respirable data was collected	Free text	Research Avenue North, Riccarton, Edinburgh
Country site located	Country in which the site is located	Drop down list	United Kingdom
Person completing template	Name of person completing template	Free text	Karen Galea
Job title	Job title of person completing template	Free text	Exposure Scientist
Address (if different to site)	Address of contact person if different from site	Free text	
Telephone	Telephone number of contact person	Free text	+44(0)131 449 8034
E-mail	Email address of contact person	Free text	karen.galea@iom-world.org
Date completed	Date Microsoft template completed	Free text	31/11/18

B. Company / contact details

Use this section to enter details of the site providing the inhalable and respirable inhalation exposure data.

Parameter	Description	Type of data entry	Example text
Sb producer or downstream user	Is site a producer / downstream user of Sb substances?	Drop down list	Producer
Annual operating days	Number of operating days	Free text	365
Number of operating hours per day	Average number of operating hours per day	Free text	16
Number of shifts per day	Average number of operating shifts per day	Free text	2
Total number of employees	Number of personnel employed at site including managers, office staff, production workers etc.	Free text	250
Number of employees directly involved in Sb substance production or use	Number of personnel employed at site involved in the production / use of Sb substances	Free text	200

5. Worksheet '2. Exposure scenario'

Use this sheet to provide details of each exposure scenario for which inhalable and respirable Sb monitoring samples were collected at your site.

As applicable, input free text or select from the drop-down list in the relevant white cells of the template.

Parameter	Description	Type of data entry	Example text
Similar Exposure Group (SEG)	Describe the work activity according to the task and job description	Free text	Undertaken by loading operatives. Product is received in 100kg bags which are mounted above a storage hopper. Bag is opened at the base to release powder into hopper. The empty bag is removed and replaced with another full bag. This normally takes place at the start of the working shift and continues for one to two hours.
Name of Sb substance(s) manufactured / used at the site:	Select name(s) of Sb substances produced / used at site (new row for each)	Drop down list	Antimony metal (7440-36-0)
Exposure Scenario	Select relevant Sb generic exposure scenario	Drop down list	Manufacture - Use of antimony containing materials in the recycling/production of antimony metal
Primary Contributing Exposure Scenario (CES)	Select relevant Sb contributing exposure scenario that operator predominately undertakes during the shift	Drop down list	Raw material handling
Market sector / lifecycle stage	Select Sb market sector / lifecycle stage relevant to the Sb substance	Drop down list	Manufacture
CES duration per shift (hr)	Typical duration of primary contributing exposure scenario within shift (hrs)	Free text	6
CES frequency per shift	Typical frequency of primary contributing exposure scenario per shift	Free text	1
Secondary Contributing Exposure Scenario (CES)	Select relevant Sb contributing exposure scenario that operator additionally undertakes	Drop down list	Raw material handling

Parameter	Description	Type of data entry	Example text
	during the shift (if applicable)		
Secondary CES duration per shift (h)	Typical duration of secondary contributing exposure scenario within shift (hrs) (if applicable)	Free text	6
Secondary CES frequency per shift	Typical frequency of secondary contributing exposure scenario per shift (if applicable)	Free text	1
Additional exposure scenario information	Enter any additional exposure scenario information considered relevant	Free text	
Physical form of SB substance	Select physical form of Sb substance	Drop down list	Solid
Average quantities of Sb substance(s) used / manufactured per shift including units:	Give typical quantities per shift, including measurement unit	Free text	100 kg
Where Sb substances are packed / unpacked, provide details of the packaging size	Give details of the typical size of packaging	Free text	25kg bags
Working environment	Nature of workers typical working environment	Drop down list	Indoors
Ambient workplace temperature conditions (oC)	What was the ambient temperature in the work area during the measurement campaign?	Free text	20
Automated / manual process	Indicate automation (or otherwise) of process	Drop down list	Automated
Process temperature (oC)	Temperature (oC) of process	Free text	60
General ventilation	Indicate type of general ventilation in working area	Drop down list	Both
Sb substance in an enclosed process?	Is the Sb substance in high integrity contained in a fully closed system?	Drop down list	No
Separation of workers from emission points, e.g. control room, cabin	Provide details of the use of any measures to separate workers from emission points	Free text	Works from control room most of shift

Parameter	Description	Type of data entry	Example text
Use of local exhaust ventilation (LEV)	Provide details of LEV used (if any).	Drop down list	Enclosing - can be full (e.g. a glove box) or partially enclosed (eg fume cupboard)
Respiratory protective equipment used	Details of RPE used when undertaking this scenario	Drop down list	FFP1 filtering face mask
Workers 'fit tested' for respiratory protective equipment (RPE)	Have workers been fit tested for the RPE being worn?	Drop down list	Yes
Protective gloves used	Details of protective gloves used (e.g. make, material and whether disposable / reusable)	Free text	Ansell disposable nitrile
Other personal protective equipment (PPE) required (excluding RPE and gloves)	Description of other PPE required	Free text	safety glasses, overalls
Additional risk management measures information	Enter any additional risk management measures information considered relevant	Free text	

6. Worksheet '3. Sample data'

Input free text or select from the drop-down list in the relevant white cells of the template for each **individual** inhalable and respirable Sb inhalation exposure sample collected and reported at the site. This is not just the numerical results but also the information that is needed to understand what they mean, for example, information on how these were collected (sampled), when and how they were analysed (in the laboratory).

Parameter	Description	Type of data entry	Example text
Sample number	Unique number to identify individual measurement	Free text	IOM01
Sampling date (dd/mm/yy)	Date measurement collected (dd/mm/yy)	Free text	01/01/19
Personal measurement?	Was the sample taken on a worker?	Drop down list	Yes
Worker job title	Job title of worker who wore personal measurement	Free text	Forklift truck driver
Relevant exposure scenario number (from worksheet 2)	Enter relevant exposure scenario number from worksheet 2, e.g. 1, 2, etc.	Drop down list	2
Workers shift duration (hours)	Duration of workers shift (hours)	Free text	8
Activities measured during sampling period representative of exposure scenario?	Where the activities that the worker carried out representative of their usual exposure scenario?	Drop down list	Yes
If activities not representative of exposure scenario, provide details	If activities were not representative of the exposure scenario, provide information why this is considered to be the case	Free text	Packaging line broke down - no packing for ½ the shift
Was the Antimony (Sb) substance used/produced during monitoring the same as stated in exposure scenario?	Were the Sb substances used / produced same as stated in the exposure scenario information?	Drop down list	Yes
Alternative Sb substance	If Sb substance was different to that stated in exposure scenario, select relevant substance	Drop down list	Diantimony trioxide
Sample collected in accordance to Sb Guidance document?	Was the sample collected in accordance to the Sb monitoring guidance document?	Drop down list	Yes
If no, what sampling method was used?	If the sample was not collected in accordance to the Sb monitoring guidance document, provide details of method used - head, filter etc.	Free text	
Sampling head used	Enter name of sampling head used, e.g. IOM head, cyclone etc.	Free text	IOM head

Parameter	Description	Type of data entry	Example text
Size fraction sampled	Size fraction sampled, e.g. inhalable or respirable	Drop down list	Inhalable
Average flow rate (l/min)	Average flow rate across sampler over monitoring period	Free text	2.0
Duration of sampling period (min)	Duration of measurement period in minutes	Free text	480
Laboratory analysis in accordance to Sb Guidance document?	Was the laboratory analysis carried out in accordance to the Sb monitoring guidance document?	Drop down list	Yes
If no, what analytical method was used?	If the sample was not analysed in accordance to the Sb monitoring guidance document, what method was used?	Free text	
Name and address of analytical laboratory	Name and address of laboratory who completed the sample analysis	Free text	IOM, Research Avenue, North, Riccarton, Edinburgh
Does lab fulfil specified QA/QC requirements?	Confirmation that the lab fulfils the QA/QC requirements stated in i2a monitoring guidance	Drop down list	Yes
Limit of detection (LOD) for Antimony (Sb) (μg)	Specify analytical limit of detection for Sb in μg . LOD is the smallest amount or concentration of analyte in the test sample that can be reliably distinguished from zero.	Free text	0.2
Limit of quantification (LOQ) for Antimony (Sb) (μg)	Specify limit of quantification for Sb in μg . LOQ is the lowest concentration at which the analyte can not only be reliably detected but at which some predefined goals for bias and imprecision are met. The LoQ may be equivalent to the LoD or it could be at a much higher concentration.	Free text	0.2
Mass Antimony (Sb) on sample (mg)	Specify mass of Sb detected on the sample (mg)	Free text	0.2
Antimony (Sb) concentration on sample (mg/m^3). Enter numeric value only.	Concentration for Sb on the sample in mg/m^3	Free text	0.02
Is the Measurement for Antimony (Sb) <Limit of Detection?	Indicate if the Sb measurement was below the limit of detection for the analytical method for Sb	Drop down list	No
Antimony (Sb) 8-Hour Time Weighted Average (TWA)	Enter 8-hour TWA Concentration for Sb (only if calculated)	Free text	0.02

Parameter	Description	Type of data entry	Example text
(mg/m ³) (if calculated). Enter numeric value only.			
Average Antimony (Sb) mass on blank field filters (ug)	Enter the average mass of Sb determined from the blank field filters (ug)	Free text	0.003
Mass Lead (Pb) on sample (mg)	Specify mass of Pb detected on the sample (mg)	Free text	0.2
Lead (Pb) concentration on sample (mg/m ³). Enter numeric value only.	Concentration for Pb on the sample in mg/m ³	Free text	0.02
Is the Measurement for Lead (Pb) <Limit of Detection?	Indicate if the Pb measurement was below the limit of detection for the analytical method for Pb	Drop down list	Yes
Lead (Pb) 8-Hour Time Weighted Average (TWA) (mg/m ³) (if calculated). Enter numeric value only.	Enter 8-hour TWA Concentration for Pb (only if calculated)	Free text	0.02
Average Lead (Pb) mass on blank field filters (ug)	Enter the average mass of Pb determined from the blank field filters (ug)	Free text	0.003
Mass Arsenic (As) on sample (mg)	Specify mass of As detected on the sample (mg)	Free text	0.2
Arsenic (As) concentration on sample (mg/m ³). Enter numeric value only.	Concentration for As on the sample in mg/m ³	Free text	0.02
Is the Measurement for Arsenic (As) <Limit of Detection?	Indicate if the As measurement was below the limit of detection for the analytical method for As	Drop down list	Yes
Arsenic (As) 8-Hour Time Weighted Average (TWA) (mg/m ³) (if calculated). Enter numeric value only.	Enter 8-hour TWA Concentration for As (only if calculated)	Free text	0.02
Average Arsenic (As) mass on blank field filters (ug)	Enter the average mass of As determined from the blank field filters (ug)	Free text	0.003

7. Worksheet '4. Summary'

This worksheet is for illustration purposes with further enhancement planned for the future. **Please note that this worksheet may not work correctly in older versions of MS Excel due to compatibility issues.**

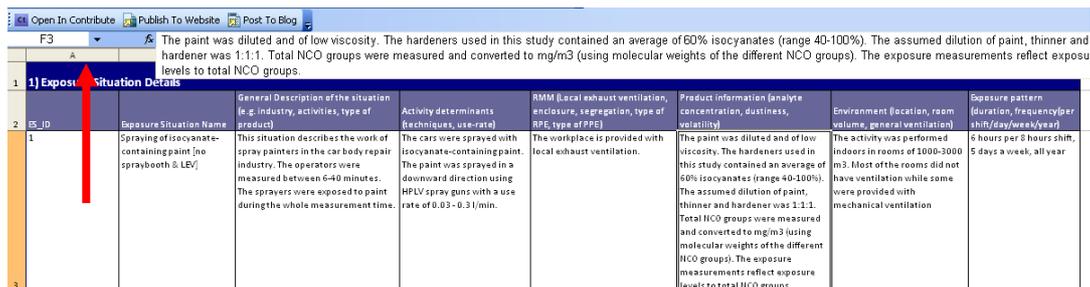
This worksheet will show summarized results (Minimum, Maximum and Average) of Sb concentrations by Substance name, (Contributing) Exposure Scenario entered on the "3. Sample data" worksheet. These simple summary statistics are presented for both the inhalable and respirable aerosol fractions.

You are asked not to type anything on this page as the table will be filled in automatically from the data entered in the other worksheets.

When you first open this worksheet, you will notice that dummy data is provided in the table. Right click on any of the colour-coded cells on the sheet and press "Refresh" to obtain updated summary results, which relate to your populated template. Please note that some of summary results may be shown as 'Blank' if data not available on 'Exposure scenario' or 'Sample data' sheets.

8. Amending and deleting existing data

If you need to amend a record already entered, identify the sheet you wish to change and select the required cell. Next, amend the required information in the **Insert Function** area at the top of the sheet (Figure 2) and press **{Save}**. Please note that writing directly into a cell will overwrite the previous text.



1) Exposure Situation Details							
ES_ID	Exposure Situation Name	General Description of the situation (e.g. industry, activities, type of product)	Activity determinants (techniques, use-rate)	RMM (local exhaust ventilation, enclosure, segregation, type of RPE, type of PPE)	Product information (analyse concentration, dustiness, volatility)	Environment (location, room volume, general ventilation)	Exposure pattern (duration, frequency per shift/day/week/year)
1	Spraying of isocyanate-containing paint (no spraybooth & LEV)	This situation describes the work of spray painters in the car body repair industry. The operators were measured between 6-40 minutes. The sprayers were exposed to paint during the whole measurement time.	The cars were sprayed with isocyanate-containing paint. The paint was sprayed in a downward direction using HPLV spray guns with a use rate of 0.03 - 0.31/min.	The workplace is provided with local exhaust ventilation.	The paint was diluted and of low viscosity. The hardeners used in this study contained an average of 60% isocyanates (range 40-100%). The assumed dilution of paint, thinner and hardener was 1:1:1. Total NCO groups were measured and converted to mg/m ³ using molecular weights of the different NCO groups. The exposure measurements reflect exposure levels to total NCO groups.	The activity was performed indoors in rooms of 1000-3000 m ³ . Most of the rooms did not have ventilation while some were provided with mechanical ventilation.	6 hours per 8 hours shift, 5 days a week, all year

Figure 2: Amending entered data

You can delete the text from the cell by simply selecting the required cell and pressing **{Del}** button on your keyboard or by overwriting it.

9. Quality control, analysis and reporting

Upon receipt by the IOM, the supplied data in the MS Excel template will be assessed against the following assessment criteria, for inclusion within the overall Exposure Measurement campaign database:

- Sampler used: Sampling was carried out in accordance with i2a's Guidance Monitoring recommendations
- Sample analysis: Analysis was performed by a laboratory in accordance with i2a's Guidance Monitoring recommendations
- Sampling duration: Sampling duration is recorded
- Sample result: Sb analysis result is provided
- Contextual information: Result has required contextual information (e.g. specific workplace, process, task, description of the operational conditions, risk management measures in place)

Samples not fulfilling these basic criteria will not be included in the exposure database (may potentially be considered for qualitative assessment only).

The exposure measurement results will be converted to a common unit. Measurement results that were identified as being less than the LOD will be assigned a value of half the LOD where this was provided. A simple descriptive analysis (number of measurements, mean, standard deviation, geometric mean, geometric standard deviation, minimum, maximum and 75, 90 and 95th percentile (where more than 6 measurements were available) of the pooled collected inhalable and respirable data will be completed for each identified SEG, CS, and Sb substance and presented in a report outlining the results of each phase of the measurement campaigns.

Summary information for the Pb and As measurement results will also be provided.

No company or sites names will be explicitly identified in the aggregated data.

10. Acknowledgments

This guidance document was drafted for i2a by the IOM, Edinburgh, being informed by similar templates developed for a number of industrial sectors. Thanks to the i2a Monitoring Task Force and the workshop participants for their helpful comments and suggestions during the drafting and finalization of this document.