

Preliminary Findings from a Downstream User Survey - Molybdenum

**Exposure Scenario Workshop
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Background 1/2

- Purpose/scope
 - To enable a first tier (i.e. screening) assessment of:
 - Environmental emissions / occupational exposure
 - Industrial uses
 - “First level” downstream use
 - To indicate willingness to submit existing monitoring data (occ. exp.)
- MoCon covers 13 substances, including
 - Molybdenum metal
 - Oxides
 - Salts

Background 2/2

- Main Downstream User sectors include
 - Steels / Alloys
 - Catalysts
 - Powders
 - Corrosion inhibitors / Water treatment

In total, 12 pre-defined sectors plus “others”
- Product categories
 - Pre-defined product categories plus “others”

Used questionnaire - Functionality

- User friendliness
 - Designed to be completed electronically
 - Use of check-boxes and dropdown menus, where appropriate
 - Maximisation of uniform responses (avoidance of free-text entries)
- Safe and easy data transfer/analysis
 - Automatic import of questionnaire data into relational database
 - Plausibility/completeness check prior to upload
 - Journal of communication (questionnaire submissions, additional requests, etc.)
 - Dynamic reporting

Used questionnaire – Sections 1/4

1 General Information

1a Address of responder

Company name:

Facility identification (where appropriate):

Street:

Postal code and City:

Country:

Contact details

Contact person:

Phone:

Fax:

Email:

1b Production Details

Please provide production details below:

EINECS and name of Molybdenum substance used:

Annual Maximum Number:

289-178-0	Roasted Molybdenite Conc. (tech oxide)
215-204-7	Molybdenum Trioxide (pure)
231-107-2	Molybdenum Metal
231-551-7	Sodium Molybdate
248-517-2	Ammonium Dimolybdate
234-722-4	Ammonium Heptamolybdate
235-650-6	Ammonium Octamolybdate
232-192-9	Calcium Molybdate
304-589-8	Ferromolybdenum
282-217-2	Ferromolybdenum Slags
215-263-9	Molybdenum Disulphide (lubricant grd.)
242-637-9	Molybdenum Dioxide

1c Downstream use

Please select all that apply:

<input type="checkbox"/> Powder	<input type="checkbox"/> Pigments	<input type="checkbox"/> Alloys	<input type="checkbox"/> Steels	<input type="checkbox"/> Catalysts	<input type="checkbox"/> Corrosion inhibitors	<input type="checkbox"/> Flame/smoke suppressor	<input type="checkbox"/> Tracer element	<input type="checkbox"/> Molybdenum metal	<input type="checkbox"/> Micronutrient	<input type="checkbox"/> Lubricants	<input type="checkbox"/> Pulp & paper	<input type="checkbox"/> Other use	
<input type="checkbox"/> Stainless Steel	<input type="checkbox"/> Tool Steels	<input type="checkbox"/> Special Steels	<input type="checkbox"/> High Speed Steels	<input type="checkbox"/> High Strength Low Alloy Steels	<input type="checkbox"/> Other (specify): <input type="text"/>	<input type="checkbox"/> Hydrotreating	<input type="checkbox"/> Oxidation Catalyst	<input type="checkbox"/> Hydrosulphurisation	<input type="checkbox"/> Polymerisation	<input type="checkbox"/> Other (specify): <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>
<input type="checkbox"/> Ferromolybdenum	<input type="checkbox"/> Ferromolybdenum Slags	<input type="checkbox"/> Molybdenum Disulphide (lubricant grd.)	<input type="checkbox"/> Molybdenum Dioxide	<input type="checkbox"/> Hydrodesulphurisation	<input type="checkbox"/> Polymerisation	<input type="checkbox"/> Other (specify): <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	<input type="checkbox"/> please specify: <input type="text"/>	
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1d Comments

- General information
 - Company identification
- Production details
- Sector and product category

Used questionnaire – Sections 2/4

2c Activity based process description
 For each sub-process (where relevant), please enter a name and a step-wise process description, following the details in the example given in the left column in the entry fields provided:

Example	Flow chart	Sub-process name Description
<p><u>Material handling</u></p> <p>The raw material, in the form of ingots or powders (or other forms), are delivered either on a pallet or loose, and are manually loaded onto a conveyor for direct feeding into the furnace for melting.</p>	<p>Raw material handling</p> <p>Unloading, loading, weighing</p>	<p>«Subprocess Name» «Description»</p>
<p><u>Thermal processing – melting of ingots</u></p> <p>A variety of different feedstocks are put in an electric arc furnace (EAF) operating on a highly automated basis. The release of the molten metal from the furnace may be - automated, using tipping furnaces - carried out manually (tapping). This involves breaching the sand or ceramic material holding the molten metal, which then flows out through a permanent channel by a worker using a long pole.</p>	<p>Processing</p> <p>First stage processing</p>	<p>«Subprocess Name» «Description»</p>
<p><u>Mechanical process –hot rolling of the material</u></p> <p>The molten metal is then refined using argon/oxygen decarburisation (AOD), reducing the carbon content to a desired level. The molten metal then undergoes continuous casting and hot processing for forging into its final form. This is supervised and operated on a highly automated basis.</p>	<p>Further processing (I)</p> <p>Other and/or second stage processing</p>	<p>«Subprocess Name» «Description»</p>
<p><u>Further processing</u></p> <p>Further processing include cold processing, annealing, pickling and cold rolling and finally finishing. These steps can lead to fume and dust generation as well as waste water.</p>	<p>Further processing (II)</p> <p>Second stage processing</p>	<p>«Subprocess Name» «Description»</p>
<p><u>Shipping</u></p> <p>The produced shapes are stored in an interim storage facility and shipped from there without packaging upon customer request. Trucks are loaded by means of forklifts. No direct handling involved.</p>	<p>Shipping / Packaging</p> <p>Packaging, internal logistics</p>	<p>«Subprocess Name» «Description»</p>
<p><u>Cleaning and maintenance</u></p> <p>This includes furnace-cleaning entailing cooling the furnace, removal of waste material using hand or power tools. Other maintenance tasks include maintenance of dust extraction systems, cleaning of the storage facility.</p>	<p>Cleaning and Maintenance</p> <p>(Routine operations)</p>	<p>«Subprocess Name» «Description»</p>

2d Comments

- Process description
 - Workflow / activity based
 - Example description provided
 - Users define activities based on their specific process
 - Define name
 - Provide short description

Used questionnaire – Sections 3/4

4 Occupational Exposure

The following 6 pages are directly associated to the up to six processes for which a description was requested in section 2 above. Please fill in the appropriated sheets, by providing the requested information relevant for the assessment of worker exposure at these workplaces.

4a Activity specific sheet Raw material handling

(i) Physical state of the Molybdenum compound
Please identify the physical state of the used Mo compound:

Activity specific sheet Raw material handling

Physical state of the Molybdenum compound
Please identify the physical state of the used Mo compound:

Specification of packaging types (please check box if used and state the used size)

<input checked="" type="checkbox"/> IBC (Intermediate Bulk Container, e.g. big bag):	<input type="text"/>	[kg]
<input type="checkbox"/> HDPE / plastic buckets:	<input type="text"/>	[kg]
<input type="checkbox"/> Plastic bags:	<input type="text"/>	[kg]
<input type="checkbox"/> Paper bags:	<input type="text"/>	[kg]
<input type="checkbox"/> Pre-weighted dose/bags (not to be opened before use)	<input type="text"/>	[kg]
<input type="checkbox"/> Others (please specify: <input type="text"/>):	<input type="text"/>	[kg]

Duration of activity and exposure settings

Molybdenum compound is handled time(s) per for minutes.

Respiratory protective equipment

Pattern of use:

Gloves

Pattern of use:

Type of glove (description):

- Occupational exposure
 - Separate sheets for each defined activity
 - Physical state of the substance
 - Specification of packaging types
 - Exposure modifiers
 - Use of RPE
 - Use of gloves

Used questionnaire – Sections 4/4

- Willingness to provide existing monitoring data

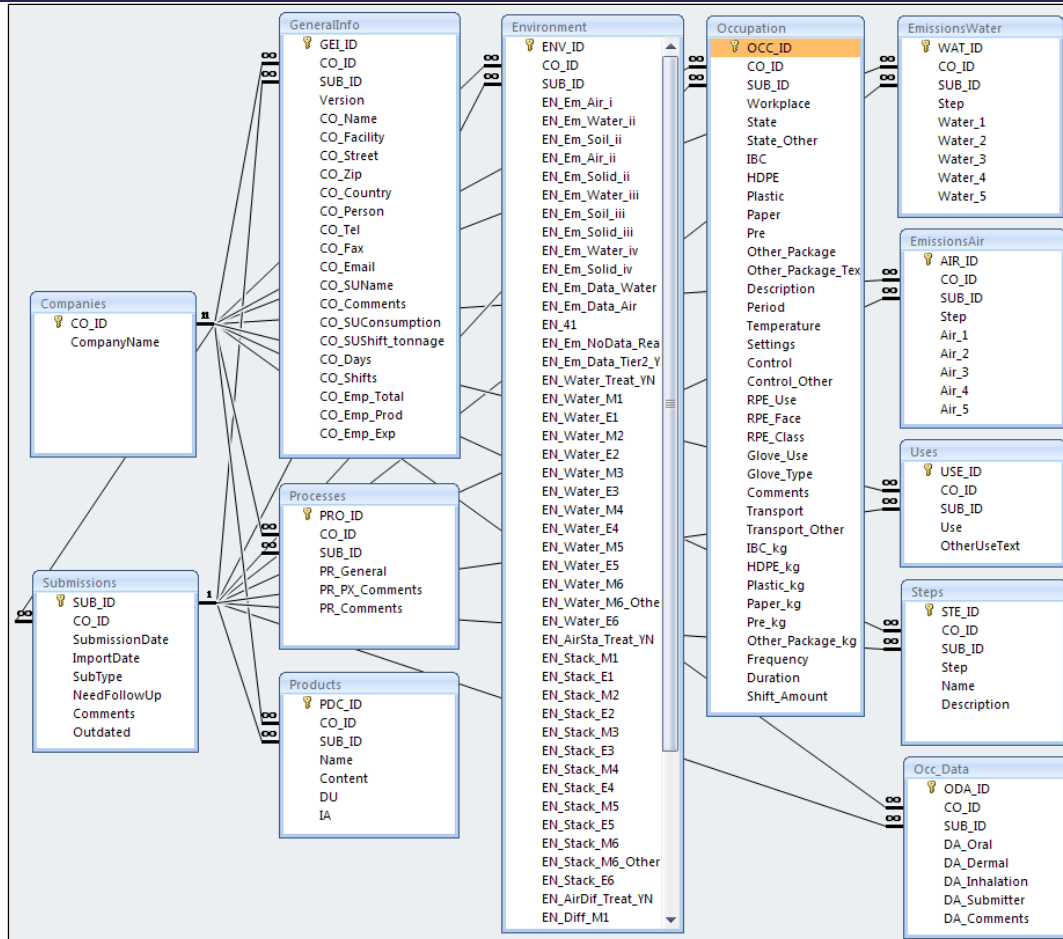
4g Availability of occupational exposure data

Please indicate in the list below for route exposure monitoring data is available at your site:

- Oral exposure
- Dermal exposure
- Inhalation exposure

In case you have indicated the presence of monitoring data above, are you willing to provide these data upon future request for use in a possible higher tier exposure assessment?

Relational database



Example tier 1 assessment 1/3

- Data as submitted via questionnaire (one activity)

- (i) **Physical state of the Molybdenum compound**

Please identify the physical state of the used Mo compound:

powder

- (ii) **Specification of packaging types**

IBC (Intermediate Bulk Container, e.g. big bag):

1000 [kg]

- (iv) **Duration of activity and exposure settings**

Molybdenum compound is handled 1 time(s) per day for 10 minutes.

Substance temperature during this activity:

15-35 [°C]

Exposure settings:

enclosed space

Pattern of exposure control:

dilution ventilation

Maximum amount of Mo compound handled per shift:

1268 [kg]

- (v) **Respiratory protective equipment**

Pattern of use:

mandatory

Face piece:

quarter mask

Protection class (particles):

P2

- (vi) **Gloves**

Pattern of use:

voluntary

Type of glove (description):

Cat-2

Example tier 1 assessment 2/3

(TRA tool v2 not yet available, anticipated release date: April 2009)

- Example of a tier 1 assessment in EASE
 - Activity: Raw material handling (powder handling)
 - Process temperature: 15-35°C
 - Solid substance
 - Exposure to dust
 - Substance is mobile
 - “No” vapour pressure
 - Inhalable particle size
 - Dry manipulation
 - No particle aggregation
 - LEV absent (“dilution ventilation”)

Example tier 1 assessment 3/3

- EASE model estimation
 - LEV absent: 5 - 50 mg/m³
 - LEV really absent?
“Possible dust emissions during this operation despite the applied aspiration system”
 - LEV present: 2 - 5 mg/m³
- Refinements (**expected** to be implemented in TRA tool, v2)
 - Frequency and duration of exposure (10 min/day instead of full-shift)
 - Use of RPE → APF of 10 for a P2 quarter mask (only used as last resort)
- Further refinements (beyond Tier 1 tools)
 - Air monitoring
 - Particle size considerations

Some Preliminary Findings

- Response level:

- For Mo in metallurgical applications: reasonable
- For Mo in chemical applications: poor feedback !
- Total responses: 92 from companies in approx. 11 out of EU 27 countries

Why 'approx'? – nearly all steel sector responses were anonymised

- Zero response for some substances
- Reasonable indication of uses – further refinement needed
- Poor availability of exposure data

REACH Importers but no Users?

No.	Substance	MoCon DUQ responses	Pre-SIEF Survey Responses	REACH Importers
1	RMC	7	86	
2	FeMo	42		
3	CaMo	0	25	5
4	Mo Metal	15	434	
5	Mo Dioxide	2	28	
6	ADM	3	28	
7	SoMo	6	82	48
8	Pure Oxide	13	174	
9	Heptamolybdate	0	39	15
10	Octamolybdate	0	17	8

Issues identified:

- Q dissemination by industry, not MoCon. Customer confidentiality maintained, but unable to quantify market coverage or response levels
 - Anonymisation of responses can render them meaningless – and worse, can lead to a conclusion of risk where in reality there is no risk
 - Difficulty with quantifying representativeness
 - Long process - six months to obtain initial responses – substantial further refinement needed. Zero responses for some sectors
 - Absence of data means modelling using default assumptions (worse case) throughout supply chain to end-of-life
 - May need to instigate some targeted exposure monitoring
 - Need for industry to be better engaged in this task
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Thank you!