FS Section	Content field	Explanation of content
1. Title	1.1 Title of SPERC.	**Manufacture of metal-containing catalysts**
	1.2 SPERC code:	Catalysts Europe SPERC 2,1 v1.0
2. Scope	**2.1 Substance/Product Domain**	
	Substance types / functions / properties included or excluded:	Metals and metal compounds of nickel, cobalt, chromium, molybdenum, vanadium, copper and zinc
	Additional specification of product types covered:	Manufacture of metals and metal compounds within catalysts or catalyst precursors during catalyst manufacture or regeneration of previously used catalysts. This includes both powdered and shaped catalyst and precursors.
	Inclusion of sub-SPERCs:	n/a
	2.2 Process domain	
	Description of activities/processes:	Processes, tasks and activities include: – Raw material delivery and handling; – Catalyst production (including regeneration): dissolving, precipitating, filtrating, drying/heat treatment, mixing, forming, impregnation, calcination, reduction, sulfiding, regeneration, reduction, stabilisation, screening; – Catalyst packaging: filling operations; – Cleaning and maintenance; – Catalyst storage.
	2.3 List of applicable Use Descriptors	
	LCS:	M
	SU:	8, 9
	PC:	19, 20, 21. PC 0 : Other (UCN P15500 – Catalysts)
3. Operational conditions	**3.1 Conditions of use**	
	Location of use:	Indoor (ESCOM 11070000319)
	Water contact during use:	y (ESCOM 10133220222, 10133220218)
	Connected to a standard municipal biological STP:	y (ESCOM 11133170650)
	Rigorously contained system with minimisation of release to the environment:	n
	Further operational conditions impacting on releases to the environment.	The manufacture of metal-containing catalysts includes open and closed systems and both wet and dry processes. Emissions to air may arise from delivery, handling, drying, forming, impregnation, screening and filling. The important sources of wastewater during catalyst production are filtration, maintenance and cleaning. The bulk of waste-water arises from filtration and washing of the precipitated material. All waste-water is treated in an effluent treatment plant and the resulting filter cake is generally sent for recycling to recover metals. Particulate material captured from airborne emissions is also sent for recycling.
	3.2 Waste Handling and Disposal	
	Waste Handling and Disposal:	The filter cake from on-site treatment plants is processed for metal reclamation (recycling).

4. Obligatory RMMs onsite	**RMM limiting release to air:**	Direct emissions to air should be mitigated by application of one or more of the following RMMs: • HEPA filtration (ESCOM 9267234005), Fabric filters (ESCOM 9267234003) and Bag or Ceramic Filters (ESCOM 12355002122) • Wet Scrubbers (ESCOM 9267234016) • Dry or semi-dry Scrubbers (No available ESCOM phrase) • Metallic Grids (ESCOM 12355002122)
	RMM Efficiency:	≥99%
	Reference for RMM Efficiency (air):	Data on removal efficiency were provided by Catalysts Europe member companies. One or more of these RMMs (of which HEPA/bag filtration and wet scrubbers are the most common) were reported to be present in more than 88% of sites. RMM efficiency (RE_{sperc}) was reported to be ≥99%.
	RMM limiting release to water:	Direct emissions to water should be mitigated by application of one or more of the following RMMs: • Precipitation (ESCOM 12355002126) • Sedimentation (ESCOM 12355002126) • Filtration (ESCOM 12355002126) • Distillation (ESCOM 9267234037) • Ion Exchange (ESCOM 12355002126)
	RMM Efficiency (water):	99%
	Reference for RMM Efficiency (water):	Data on removal efficiency were provided by Catalysts Europe member companies. One or more of these RMMs (of which chemical precipitation is the most common) were reported to be present in more than 70% of sites. RMM efficiency was reported as 95-99.9%. RE_{sperc} is taken to be 99% (50th percentile of reported site-specific RE).
	RMM limiting release to soil:	None. There are no emissions to soil during manufacture or regeneration of catalysts
	RMM Efficiency (soil):	n/a
	Reference for RMM Efficiency (soil):	n/a
5. Exposure Assessment Input	**5.1 Substance use rate**	
	Amount of substance use per day:	M_{sperc} = 4,000 kg/d (as metal equivalent)
	Fraction of EU tonnage used in region:	n/a
	Fraction of Regional tonnage used locally:	n/a
	Justification / information source:	M_{sperc} is calculated as an indicative realistic worst case value based on the highest 90th percentile daily production volume for any of the individual metals used in catalyst production.
	5.2 Days emitting	
	Number of emission days per year:	340
	Justification / information source:	Values for emission days per year were provided by 13 sites across Europe producing catalysts. The median value of 340 days per year was selected
	5.3 Release factors	
	sub-SPERC identifier:	n/a
	ERC:	1
	sub-SPERC applicability:	n/a
	5.3.1 Release Factor – air	
	Numeric value / percent of input amount (Air):	0.018% (Release after on-site RMM)
	Justification of RFs (Air):	The release factor to air is derived from measured stack emission data from catalyst manufacturers in various EU member states between 2012-2016. The releases factor is calculated as a realistic worst-case value based on metal-specific 90th percentile site-specific release factors from 13 sites for production of metal-containing catalysts.

	5.3.2 Release Factor – water	
	Numeric value / percent of input amount (Water):	0.040% (Release after on-site RMM)
	Justification of RFs (Water):	The release factor to water is derived from measured wastewater emission data from catalyst manufacturers in various EU member states between 2012-2016. The releases factor is calculated as a realistic worst-case value based on metal-specific 90th percentile site-specific release factors from 13 sites for production of metal-containing catalysts.
	5.3.3 Release Factor – soil	
	Numeric value / percent of input amount (Soil):	There are no emissions to soil during manufacture or regeneration of catalysts.
	Justification of RFs (Soil):	n/a
	5.3.4 Release Factor – waste	
	Percent of input amount disposed as waste: numerical range	n/a
	Justification of RFs: freetext	The filter cake from on-site treatment plants is processed for metal reclamation (recycling) Metal particulates from stack filters are sent for recycling.
References to SPERC Background Document		
	Reference to Background Document	Information on RMMs and emissions for the non-ferrous metals industry are detailed in *EC (2017), Integrated Pollution Prevention and Control (IPCC): Reference Document on Best Available Techniques (BAT) in the Non Ferrous Metals Industries (EUR 28648; EN 2017).*