

Exposure Scenario provided in accordance with EU Directive 2004/37/EC, Regulation (EC) No 1907/2006 Annex I and the terms of the REACH authorisation No. REACH/20/12/2

## 1. TITLE SECTION

<b>Substance</b>	<b>Strontium chromate (CAS number 7789-06-2, EC number 232-142-6)</b>
<b>ES/use name</b>	Use in primers applied by aerospace and defence sector <sup>1</sup> where any of the following key functionalities or properties is necessary for the intended use: corrosion resistance, active corrosion inhibition, adhesion promotion, thermal shock resistance and chemical resistance  Strontium chromate may only be used for primers applied by the aerospace and defence sector.  <u>Important note:</u> The authorisation for the use of strontium chromate is <u>not</u> granted for use in primers applied by the aerospace and defence sectors where none of the key functionalities or properties listed in the use is necessary for the intended use.

### 1.1. Scope

#### ENVIRONMENT (Environment Contributing Scenario – ECS)

ECS 1: Use of strontium chromate in primers applied by aerospace and defence companies and their associated supply chains.	ERC 5
--	-------

#### WORKER (Worker Contributing Scenario – WCS)

WCS 1: Delivery and storage of raw material	PROC 1
WCS 2: Decanting, mixing and filling of guns, cups or small containers	PROC 5
WCS 3: Surface treatment by spraying in spray cabin/spray booth	PROC 7
WCS 4: Surface treatment by spraying outside of paint-booth	PROC 7
WCS 5: Surface treatment by brushing/rolling (small to medium sized parts)	PROC 10
WCS 6: Surface treatment by brushing (very small parts/touch-up)	PROC 10
WCS 7: Cleaning of equipment – tools cleaning (closed system)	PROC 8b
WCS 8: Cleaning and maintenance of equipment – tools cleaning (paint cabin)	PROC 8b
WCS 9: Cleaning – paint cabin and ancillary areas	PROC 8b
WCS 10: Infrequent maintenance activities	PROC 8a
WCS 11: Machining operations on small to medium sized parts containing Cr(VI) on an extracted bench/extraction booth including cleaning	PROC 21, 24
WCS 12: Machining operations on small to medium sized surfaces containing Cr(VI) on an extracted bench/extraction booth including cleaning	PROC 21, 24
WCS 13: Machining operations in large work areas on parts containing Cr(VI) including cleaning	PROC 21, 24
WCS 14: Machining operations in large work areas on surfaces containing Cr(VI) including cleaning	PROC 21, 24
WCS 15: Machining operations on parts containing Cr(VI) in small work areas including cleaning	PROC 21, 24
WCS 16: Machining operations on surfaces containing Cr(VI) in small work areas including cleaning	PROC 21, 24
WCS 17: Sanding of large surfaces containing Cr(VI) in large work areas including cleaning	PROC 21, 24
WCS 18: Waste management	PROC 8b
WCS 19: End of Life	PROC 8a

This ES includes relevant information provided in the Cytec Engineered Materials Ltd. Chemical Safety Report (CSR) for strontium chromate (see AFA No. [0117-01](#)), in accordance with ECHA's illustrative example of an exposure

<sup>1</sup> Aerospace and defence sector includes companies principally engaged in carrying out the design, development, manufacture, maintenance, modification, overhaul, repair, or support of civil or military aerospace and defence equipment, systems, or structures, plus any derivative uses.

scenario, and follows ECHA’s guidance on extracting the relevant information from the comprehensive exposure scenarios in the CSR.

## 1.2. Explanation on the approach taken for the ES

All worker exposure estimates are given in terms of Cr(VI) and are expressed as 8-hour Time Weighted Average (TWA).

The frequency of a specific activity in the worker sub-scenarios is expressed as daily activity unless otherwise stated. *As long-term exposure is the relevant period for long-term health effects, the duration of exposure per day as set out in the ES is expressed as average duration per day over a longer period (e.g. 2 hours each day are equal to 4 hours every second day). Therefore, the duration of exposure per day is not the same as the maximum allowed duration in any one day.*

Occupational exposure estimates are based on measured data and/or on modelled data, using the exposure model ‘Advanced REACH Tool 1.5’ or ‘ART’<sup>2</sup>. ART is a second-tier model calibrated to assess exposure to inhalable dust, vapours, and mists; this Exposure Scenario is within the scope of ART. Additional parameters used for the purpose of modelling are provided in the CSR for the relevant worker contributing scenarios (WCS).

Where the sample size and sampling strategy is adequate (i.e. personal sampling data), the risk characterisation relies on the measured exposure values. The results of exposure modelling were used for the risk characterisation when adequate measurement data were not available.

## 2. CONDITIONS OF USE AFFECTING EXPOSURE

This section includes the Operational Conditions (OCs) and Risk Management Measures (RMMs) for each contributing scenario.

### 2.1. ENVIRONMENT CONTRIBUTING SCENARIO: Use of strontium chromate in primers applied by aerospace and defence companies and their associated supply chains (ERC 5)

<i>Amount used, frequency and duration of use (or from service life)</i>	
▪ Daily use at site <sup>3</sup> :	<= 0.001 tonnes/day [as Cr(VI)]
▪ Annual use at a site <sup>3</sup> :	<= 0.025 tonnes/year [as Cr(VI)]
<b>Technical and organisational conditions and measures</b>	
<ul style="list-style-type: none"> <li>▪ Air emission abatement: at least 99% efficiency</li> <li>▪ Negligible discharge of Cr(VI) in wastewater from the site</li> <li>▪ All solid and any liquid waste is collected and either the collected waste is directly forwarded to an external waste management company, or Cr(VI) in wastewater is reduced to Cr(III) on-site, and the treated waste is forwarded to an external waste management company (licenced contractor) for disposal as hazardous waste</li> </ul>	
<b>Conditions and measures related to sewage treatment plant</b>	
<ul style="list-style-type: none"> <li>▪ Not applicable – negligible discharge of Cr(VI) in wastewater from the site</li> </ul>	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
<ul style="list-style-type: none"> <li>▪ Collection of all solid and liquid waste, elimination of Cr(VI) from waste water, reuse disposal as hazardous waste by an external waste management company (licenced contractor)</li> </ul>	

<sup>2</sup> The use of ART for workers exposure assessment under REACH is described in ECHA’s updated Guidance on Information Requirements and chemical safety assessment R.14, Vers. 2, May 2010. Background information for ART are provided in: Fransman W., Cherrie J., van Tongeren M., Schneider T., Tischer M., Schinkel J., Marquart H., Warren, N.D., Spankie S., Kromhout H., Tielemans E. Development of a mechanistic model for the Advanced REACH Tool (ART). Version 1.5, January 2013.

<sup>3</sup> Represents average use per site.

**Other conditions affecting environmental exposure**

- Exhaust air is passed through filters or wet scrubbers according to best available technique (minimum efficiency 99%)

**2.1.1. Specific Conditions of REACH authorisation [C\(2020\) 6231](#) (Article 2, points 11(b), 12, 14, 15 and 16)**

- Implement at least annual monitoring programmes for chromium (VI) emissions to wastewater and air from local exhaust ventilation. Those programmes shall be based on relevant standard methodologies or protocols and be representative of the operational conditions and risk management measures (such as wastewater treatment systems, gaseous emission abatement techniques) used at the individual sites where measurements are carried out.
- The information gathered via the measurements and related contextual information shall be used by the authorisation holders and their downstream users to regularly review the appropriateness and effectiveness of the risk management measures and operational conditions in place and to introduce measures to further reduce exposure and emissions.
- The results of those measurements as well as of any action taken following the review shall be documented and be made available by the authorisation holders and their downstream users, upon request, to the competent authorities of the Member State where the authorised uses take place.
- The downstream users shall make available to the Agency the information from the monitoring programme, including the contextual information associated to each set of measurements, for the first time by 17 September 2021, for transmission to the authorisation holders for the purpose of verifying and validating the exposure scenarios and afterwards for the preparation of the review report referred to in Article 61(1) of Regulation (EC) No 1907/2006.
- Continuation of monitoring requirements
  - Downstream users may reduce the frequency of measurements once they can clearly demonstrate to the competent authority of the Member State where the use takes place that exposure to humans and releases to the environment have been reduced to as low a level as technically and practically possible and that the risk management measures and operational conditions correspond to the exposure scenarios and function appropriately.
  - Where the frequency of the monitoring programme has been reduced, any subsequent changes to the operational conditions or risk management measures that may affect the exposure at the site where the use takes place shall be documented. The authorisation holders and the downstream users shall assess the impact of such changes by monitoring, to demonstrate that exposure of workers and emissions to the environment continue to be reduced to as low a level as technically and practically possible.

**2.2. WORKER CONTRIBUTING SCENARIOS 1 - 18**

<b><i>WCS 1: Delivery and Storage of raw material (PROC 1) (e.g., in sealed containers and stored in a chemical storage room for dangerous chemicals)</i></b>	
<b>Product (Article) characteristics</b>	
▪ Substance type	Substance as such/in a mixture
▪ Concentration of Cr(VI)	Minor (5 - 10 %)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 8 hour
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Basic general ventilation (1 - 3 air changes per hour)
▪ Containment	Closed system (minimal contact during routine operations)

<b>WCS 1: Delivery and Storage of raw material (PROC 1) (e.g., in sealed containers and stored in a chemical storage room for dangerous chemicals)</b>	
▪ Local exhaust ventilation	No localized controls
▪ Occupational Health and Safety Management System	Advanced <sup>4</sup>
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	Not required
<b>Other conditions affecting workers exposure</b>	
▪ Place of use	Indoor
▪ Temperature	<= 40 °C
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0 µg/m<sup>3</sup></b> – no potential for worker exposure

<b>WCS 2: Decanting, mixing and filling of guns, cups or small containers (PROC 5)</b>	
<b>Product (Article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Fixed capturing hood <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature
▪ Work area	Indoors
▪ Room size	Any size workroom
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.17 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<sup>4</sup> Such systems are consistent with the duty of care set out through general Health and Safety at Work legislation, as well as via more specific legislation, such as the Carcinogens Directive (2004/37/EC) and the Chemical Agents at Work Directive (98/24/EC) and include, for example: areas using Cr(VI) are restricted to essential workers with appropriate PPE; workers are informed of temporary, planned higher exposure and how to minimise exposure; appropriate hygienic procedures are in place; appropriate training is provided on potential risks to health, exposure prevention, hygiene requirements, PPE, etc.; appropriate warning and hazard labelling is provided; workers are informed on abnormal exposures as quickly as possible, etc.

<sup>5</sup> Or equivalent LEV to achieve the specified percent reduction.

<b>WCS 3: Surface treatment by spraying in spray cabin/spray booth (PROC 7)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 120 min
<b>Technical and organisational conditions and measures</b>	
▪ Work area	Down-flow spray room <sup>5</sup> (80.00 % reduction)
▪ Local exhaust ventilation	No localized controls
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, at least half mask with A2P3 filter (APF 30 according to German BG rule 190)
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Spray room
▪ Spray direction	In any direction (including upwards)
▪ Spray technique	Spraying with no or low compressed air use
▪ Application rate	Moderate (0.3 - 3.0 L/minute)
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which paint spray activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.055 µg/m<sup>3</sup></b> (Measured, 90th percentile value)

<b>WCS 4: Surface treatment by spraying outside of paint-booth (PROC 7)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 30 min
▪ Frequency of activity	2 days/week (reduction factor of 0.4 applied)
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	No localized controls

<b>WCS 4: Surface treatment by spraying outside of paint-booth (PROC 7)</b>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, at least half mask with A2P3 filter
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature (indoors) / Ambient (outdoors)
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors/outdoors
▪ Room size	3000 m <sup>3</sup>
▪ Spray direction	In any direction (including upwards)
▪ Spray technique	Spraying with no or low compressed air use
▪ Application rate	Very low (< 0.03 L/minute)
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which paint spray activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>40 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for frequency)	<b>16 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for frequency and RPE) <sup>6</sup>	<b>0.53 µg/m<sup>3</sup></b> (modelled with ART 1.5)
<b>WCS 5: Surface treatment by brushing/rolling (small to medium sized parts) (PROC 10)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Fixed capturing hood <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.

<sup>6</sup> A factor of 30 was applied, based on an APF 30 assigned for this RPE according to the German BG rule 190

<b>WCS 5: Surface treatment by brushing/rolling (small to medium sized parts) (PROC 10)</b>	
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Any size workroom
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.57 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 6: Surface treatment by brushing (very small parts/touch-up) (PROC 10)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 30 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	No localized controls
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature (indoors) / Ambient (outdoors)
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors/outdoors
▪ Room size	Any size workroom
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.28 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 7: Cleaning of equipment – tools cleaning (closed system) (PROC 8b)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min

<b>WCS 7: Cleaning of equipment – tools cleaning (closed system) (PROC 8b)</b>	
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Fixed capturing hood <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting worker exposure</b>	
▪ Process temperature	Room temperature
▪ Process fully enclosed?	Yes
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Any size workroom
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.017 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 8: Cleaning and maintenance of equipment – tools cleaning (paint cabin) (PROC 8b)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Specialised room ventilation with more than 10 ACH
▪ Local exhaust ventilation	No localized controls
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors (Spray room/paint mixing room)
▪ Room size	Any size workroom
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which paint spray activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	



<b>WCS 8: Cleaning and maintenance of equipment – tools cleaning (paint cabin) (PROC 8b)</b>	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.089 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 9: Cleaning – paint cabin and ancillary areas (PROC 8b)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Liquid
▪ Concentration of Cr(VI) in mixture	Minor (5 - 10 %)
▪ Vapour pressure of substance	< 0.01 Pa
▪ Viscosity	Low
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min
<b>Technical and organisational conditions and measures</b>	
▪ Local exhaust ventilation	No localized controls
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process temperature	Room temperature
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Any size workroom
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which paint spray activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>0.17 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 10: Infrequent maintenance activities (PROC 8a)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Powders, granules or pelletised material
▪ Powder weight fraction [Cr(VI)]	Minor (5 - 10 %)
▪ Dustiness	Fine Dust
▪ Moisture content	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 240 min
▪ Frequency of activity	1 time/month (reduction factor of 0.05 applied)
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	No localized controls

<b>WCS 10: Infrequent maintenance activities (PROC 8a)</b>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, at least half mask with A2P3 filter
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Any size workroom
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which activities with solid chromates are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where solid chromates are handled.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>130 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for frequency)	<b>6.5 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for frequency and RPE) <sup>6</sup>	<b>0.22 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 11: Machining operations on small to medium sized parts containing Cr(VI) on an extracted bench/extraction booth including cleaning (PROC 21, 24)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Solid object
▪ Solid weight fraction	< 0.1 % <sup>7</sup>
▪ Moisture content	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity:	< 180 min <sup>8</sup>
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Fixed capturing hood /Vacuum cleaner <sup>5</sup> (HEPA filter with at least 99.00 % reduction)

<sup>7</sup> The Cr(VI) weight fraction of the part is assumed to be < 0.1 %. In case of lower or higher Cr(VI) content, estimated exposure would be reduced or increased in a linear way (i.e. 0.5 % concentration in the product would lead to an increase of the exposure estimate by a factor of 5). If needed, OCs and RMMs could be adjusted for that different situation.

<sup>8</sup> This scenario covers also machining operations with a longer duration of activity but with a higher level of respiratory protection, e.g. by using a half mask with P3 filter (e.g. APF 30 according to the German BE rule 190) or a full-face mask with P3 filter (e.g. APF 400 according to the German BG rule 190).

**WCS 11: Machining operations on small to medium sized parts containing Cr(VI) on an extracted bench/extraction booth including cleaning (PROC 21, 24)**

**Conditions and measures related to personal protection, hygiene and health evaluation**

▪ Respiratory Protection	Yes, half mask with P2 filter  <i>(If individual workplace monitoring data do not confirm negligible exposure below 1 µg/m<sup>3</sup> (e.g. &lt; 0.1 µg/m<sup>3</sup>), additional protection adapted to such measured exposure is required (e.g., half mask with P2 filter).</i>
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.

**Other conditions affecting workers exposure**

▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Equipment level	Any size workroom

**Specific Condition(s) imposed by the granted authorisation**

The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.

Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.

**Exposure Concentration**

Inhalation, local, long-term	<b>1.1 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>9</sup>	<b>0.11 µg/m<sup>3</sup></b> (modelled with ART 1.5)

**WCS 12: Machining operations on small to medium sized surfaces containing Cr(VI) on an extracted bench/extraction booth including cleaning (PROC 21, 24)**

**Product (article) characteristics**

▪ Substance product type	Solid object
▪ Solid weight fraction	< 13 % <sup>10</sup>
▪ Moisture content	Dry product (< 5 % moisture content)

**Amount used (or contained in articles), frequency and duration of use/exposure**

▪ Duration of activity	< 180 min <sup>11</sup>
------------------------	-------------------------

**Technical and organisational conditions and measures**

▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Fixed capturing hood /Vacuum cleaner <sup>5</sup> (HEPA filter with at least 99.00 % reduction)

<sup>9</sup> A factor of 10 was applied, based on an APF 10 assigned for this RPE according to the German BG rule 190

<sup>10</sup> The Cr(VI) content of the surface is assumed to be < 13 %. In case of lower or higher Cr(VI) content, estimated exposure would be reduced or increased in a linear way. If needed, OCs and RMMs could be adjusted for that different situation.

<sup>11</sup> This scenario covers also machining operations with a longer duration of activity but with a higher level of respiratory protection, e.g. by using a full-face mask with P3 filter and air supply (e.g. APF 1000 according to the German BG rule 190).

<b>WCS 12: Machining operations on small to medium sized surfaces containing Cr(VI) on an extracted bench/extraction booth including cleaning (PROC 21, 24)</b>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
<ul style="list-style-type: none"> <li>▪ Respiratory Protection</li> </ul>	<p>Yes, full-face mask with P3 filter</p> <p><i>If individual workplace monitoring data do not confirm negligible exposure below 1 µg/m<sup>3</sup> (e.g. &lt; 0.1 µg/m<sup>3</sup>), additional protection adapted to such measured exposure is required (e.g., full-face mask with P3 filter).</i></p>
<ul style="list-style-type: none"> <li>▪ PPE</li> </ul>	<p>PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.</p>
<b>Other conditions affecting workers exposure</b>	
<ul style="list-style-type: none"> <li>▪ Process fully enclosed?</li> </ul>	No
<ul style="list-style-type: none"> <li>▪ Effective housekeeping practices in place?</li> </ul>	Yes
<ul style="list-style-type: none"> <li>▪ Work area</li> </ul>	Indoors
<ul style="list-style-type: none"> <li>▪ Room size</li> </ul>	Any size workroom
<b>Specific Condition(s) imposed by the granted authorisation</b>	
<p>The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.</p> <p>Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.</p>	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>150 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>12</sup>	<b>0.375 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 13: Machining operations in large work areas on parts containing Cr(VI) including cleaning (PROC 21, 24)</b>	
<b>Product (article) characteristics</b>	
<ul style="list-style-type: none"> <li>▪ Substance product type</li> </ul>	Solid object
<ul style="list-style-type: none"> <li>▪ Solid weight fraction</li> </ul>	< 0.1 % <sup>7</sup>
<ul style="list-style-type: none"> <li>▪ Moisture content</li> </ul>	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
<ul style="list-style-type: none"> <li>▪ Duration of activity</li> </ul>	< 60 min <sup>8</sup>
<b>Technical and organisational conditions and measures</b>	
<ul style="list-style-type: none"> <li>▪ General ventilation</li> </ul>	Good natural ventilation (0 - 2 air changes per hour)
<ul style="list-style-type: none"> <li>▪ Local exhaust ventilation</li> </ul>	Wetting at the point of release/on-tool extraction/vacuum cleaning <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
<ul style="list-style-type: none"> <li>▪ Respiratory Protection</li> </ul>	<p>Yes, half mask with P2 filter</p> <p><i>(If individual workplace monitoring data do not confirm negligible exposure below 1 µg/m<sup>3</sup> (e.g. &lt; 0.1 µg/m<sup>3</sup>), additional protection adapted to such measured exposure is required (e.g., half mask with P2 filter).</i></p>

<sup>12</sup> A factor of 400 was applied, based on an APF 400 assigned for this RPE according to the German BG rule 190.

<b>WCS 13: Machining operations in large work areas on parts containing Cr(VI) including cleaning (PROC 21, 24)</b>	
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Large workrooms only
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>2.0 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>9</sup>	<b>0.20 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 14: Machining operations in large work areas on surfaces containing Cr(VI) including cleaning (PROC 21, 24)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Solid object
▪ Solid weight fraction	< 13 % <sup>10</sup>
▪ Moisture content	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min <sup>11</sup>
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Wetting at the point of release/on-tool extraction/vacuum cleaning <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, full-face mask with P3 filter
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Large workrooms only
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	

<b>WCS 14: Machining operations in large work areas on surfaces containing Cr(VI) including cleaning (PROC 21, 24)</b>	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>270 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>12</sup>	<b>0.675 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 15: Machining operations on parts containing Cr(VI) in small work areas including cleaning (PROC 21, 24)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Solid object
▪ Solid weight fraction	< 0.1 % <sup>7</sup>
▪ Moisture content	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	No localized controls
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, full-face mask with P3 filter  <i>If individual workplace monitoring data do not confirm negligible exposure below 1 µg/m<sup>3</sup> (e.g. &lt; 0.1 µg/m<sup>3</sup>), additional protection adapted to such measured exposure is required (e.g., full-face mask with P3 filter).</i>
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Small workrooms only
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
Mechanical ventilation shall be used for machining activities in small work areas, unless use of mechanical ventilation would introduce risks (e.g. local spark risk) or would otherwise not be technically and practically possible.	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>64 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>12</sup>	<b>0.16 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 16: Machining operations on surfaces containing Cr(VI) in small work areas including cleaning (PROC 21, 24)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Solid object
▪ Solid weight fraction	< 13 % <sup>10</sup>
▪ Moisture content	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 60 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Local exhaust ventilation	Wetting at the point of release <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, full-face mask with P3 filter and air supply  <i>If individual workplace monitoring data do not confirm negligible exposure below 1 µg/m<sup>3</sup>, localised controls and/or additional protection adapted to such measured exposure is required. Such measures could include, for example, use of wetting agent and/or use of vacuum extraction (with HEPA filter) to reduce airborne concentrations and/or full-face mask with P3 filter and air supply</i>
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Small workrooms only
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
Mechanical ventilation shall be used for machining activities in small work areas, unless use of mechanical ventilation would introduce risks (e.g. local spark risk) or would otherwise not be technically and practically possible.	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>830 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>13</sup>	<b>0.83 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 17: Sanding of large surfaces containing Cr(VI) in large work areas including cleaning (PROC 21, 24)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Solid object
▪ Solid weight fraction	< 13 % <sup>10</sup>
▪ Moisture content	Dry product (< 5 % moisture content)

<sup>13</sup> A factor of 1000 was applied, based on an APF 1000 assigned for this RPE according to the German BG rule 190

<b>WCS 17: Sanding of large surfaces containing Cr(VI) in large work areas including cleaning (PROC 21, 24)</b>	
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 120 min
<b>Technical and organisational conditions and measures</b>	
▪ Work area	No barriers or screens <sup>5</sup> (80.00 % reduction)
▪ Local exhaust ventilation	Wetting at the point of release/on-tool extraction/vacuum cleaning <sup>5</sup> (90.00 % reduction)
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ Respiratory Protection	Yes, full-face mask with P3 filter and air supply
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Downward laminar flow booth
▪ Technique	Dry abrasive blasting with spray direction in any direction (including upwards)
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which machining activities are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where machining activities take place.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>1200 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>13</sup>	<b>1.2 µg/m<sup>3</sup></b> (modelled with ART 1.5)

<b>WCS 18: Waste management (PROC 8b)</b>	
<b>Product (article) characteristics</b>	
▪ Substance product type	Powders, granules or pelletised material
▪ Powder weight fraction [Cr(VI)]	Minor (5 - 10 %)
▪ Dustiness	Fine Dust
▪ Moisture content	Dry product (< 5 % moisture content)
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
▪ Duration of activity	< 30 min
<b>Technical and organisational conditions and measures</b>	
▪ General ventilation	Good natural ventilation (0 - 2 air changes per hour)
▪ Primary	Low level containment (90.00 % reduction) <sup>14</sup>

<sup>14</sup> Low-level containment can, e.g., be described as “Physical containment or enclosure of the source of emission. The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity.” [Advanced REACH Tool (ART) version 1.5].



<b>WCS 18: Waste management (PROC 8b)</b>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
▪ PPE	Yes, half-mask with A2P3 filter  <i>During waste transfer activities with potential to exposure to airborne hexavalent chromium, at least half-mask with A2P3 filter is worn</i>
▪ PPE	PPE is not specified according to this Authorisation. Section 8 of the applicable SDS contains supplier advice to inform PPE selection for this task, which may include additional considerations.
<b>Other conditions affecting workers exposure</b>	
▪ Process fully enclosed?	No
▪ Effective housekeeping practices in place?	Yes
▪ Work area	Indoors
▪ Room size	Any size workroom
<b>Specific Condition(s) imposed by the granted authorisation</b>	
The area in which activities with solid chromates are undertaken shall be restricted either physically by means of barriers / signage or through strict procedure during the activity and for a specific time after the operation.	
Effective cleaning practices shall be implemented in order to prevent surface contamination in the vicinity where solid chromates are handled.	
<b>Exposure Concentration</b>	
Inhalation, local, long-term	<b>5.7 µg/m<sup>3</sup></b> (modelled with ART 1.5)
Inhalation, local, long-term (adjusted for RPE) <sup>15</sup>	<b>0.19 µg/m<sup>3</sup></b> (modelled with ART 1.5)

### 2.2.1. Risk characterization related to combined exposure

Workers in the process of use of strontium chromate in primer applications by aerospace and defence companies and their associated supply chains could conduct some combinations of tasks (sub-scenarios). A possible combination of sub-scenarios is the combination of WCSs 2, 11 or 12, 3 and 8. This would result in a combined exposure estimate of 0.69 µg/m<sup>3</sup>. Another possible combination of sub-scenarios is the combination of WCSs 2, 3, 4 and 8. The combined exposure estimates (as the 90<sup>th</sup> percentile value of model-based exposure distribution) of these activities would be 0.84 µg/m<sup>3</sup>.

A further possible, though unlikely, combination of activities would be that all machining activities (WCS 11-16) would be conducted by one operator in a single day. The combined exposure estimate (as the 90<sup>th</sup> percentile value of model-based exposure distribution) of these activities would be 2.35 µg/m<sup>3</sup>.

### 2.2.2. Other Specific Conditions of REACH authorisation [C\(2020\) 6231](#) (Article 2, points 6, 10, 11(a), 12, 14, 15 and 16)

- Downstream users shall implement best practices to reduce workplace exposure to strontium chromate and emissions to the environment to as low a level as technically and practically feasible, including the use of closed systems and automation, whenever possible. Where this is not possible, the downstream users shall use local exhaust ventilation (LEV) systems that are appropriately designed, dimensioned, located and maintained to capture and remove strontium chromate.

<sup>15</sup> A factor of 30 was applied, based on an APF 30 assigned for this RPE according to the German BG rule 190

- Where closed systems and automation are not used, the non-use of LEV shall only be permitted in the exceptional circumstances where the use of LEV is technically impossible and subject to the provision of appropriate justification.
- Information on LEV systems put in place in the installations where the authorised uses take place, as well as on their maintenance, shall be made available for inspection by the competent authority of the Member States.
- LEV and personal respiratory equipment (RPE) shall be checked and tested periodically (including fit testing of RPE) and records of these periodical checks and tests shall be kept and made available for national competent authorities of the Member States where the use takes place.
- Workers shall be supervised and trained on the adequate use of personal protective equipment (PPE) and RPE and their medical fitness shall be examined annually.
- At least annual air monitoring programmes on occupational exposure to chromium (VI) shall be implemented in accordance with Article 5(5)(e) of Directive 2004/37/EC. The first measurements shall be performed without delay and at the latest on 17 March 2021. Those programmes shall be based on relevant standard methodologies or protocols and be representative of:
  - the range of tasks undertaken where exposure to chromium is possible, including tasks involving process and maintenance workers;
  - the operational conditions and risk management measures typical for each of these tasks;
  - the number of workers potentially exposed
- The information gathered via the measurements and related contextual information shall be used by the authorisation holders and their downstream users to regularly review the appropriateness and effectiveness of the risk management measures and operational conditions in place and to introduce measures to further reduce exposure and emissions.
- The results of those measurements as well as of any action taken following the review shall be documented and be made available by the authorisation holders and their downstream users, upon request, to the competent authorities of the Member State where the authorised uses take place.
- The downstream users shall make available to the Agency the information from the monitoring programme, including the contextual information associated to each set of measurements, for the first time by 17 September 2021, for transmission to the authorisation holders for the purpose of verifying and validating the exposure scenarios and afterwards for the preparation of the review report referred to in Article 61(1) of Regulation (EC) No 1907/2006.
- Continuation of monitoring requirements
  - Downstream users may reduce the frequency of measurements once they can clearly demonstrate to the competent authority of the Member State where the use takes place that exposure to humans and releases to the environment have been reduced to as low a level as technically and practically possible and that the risk management measures and operational conditions correspond to the exposure scenarios and function appropriately.
  - Where the frequency of the monitoring programme has been reduced, any subsequent changes to the operational conditions or risk management measures that may affect the exposure at the site where the use takes place shall be documented. The authorisation holders and the downstream users shall assess the impact of such changes by monitoring, to demonstrate that exposure of workers and emissions to the environment continue to be reduced to as low a level as technically and practically possible.

## 2.3. Exposure estimation and reference to its source

### 2.3.1. Environmental release and exposure

#### Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Air	Release factor	<b>Initial release factor:</b> 50% <b>Final release factor:</b> 0.5% <b>Local release rate:</b> 0.005 kg/day

### Exposure and risks for the environment and man via the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Not relevant	
Sediment (freshwater)	Not relevant	
Marine water	Not relevant	
Sediment (marine water)	Not relevant	
Predator (freshwater)	Not relevant	
Predator (marine water)	Not relevant	
Top predator (marine water)	Not relevant	
Sewage treatment plant	Not relevant	
Air	<b>Local PEC:</b> 9.521E-8 mg/m <sup>3</sup>	
Agricultural soil	Not relevant	
Predator (terrestrial)	Not relevant	
Man via Environment - Inhalation	<b>Local PEC:</b> 9.521E-8 mg/m <sup>3</sup>	Based on the dose-response relationship derived by the RAC, considering a 70 year exposure time (24h/day, 7d/week), the following excess lifetime risk for the general population is derived based on the estimated exposure: 2.76E-03 per 1000 exposed.
Man via Environment - Oral	Not relevant	

### 2.3.2. Worker exposure

#### Exposure concentrations and risks for worker

Worker Contributing Scenario	Route of exposure and type of effects	Exposure Concentration	Risk Characterisation <sup>16</sup>
WCS 1: Delivery and storage of raw material	Inhalation, local, long-term (qualitative)	0 µg/m <sup>3</sup> – no worker exposure	Not applicable
WCS 2: Decanting, mixing and filling of guns, cups or small containers	Inhalation, local, long-term (90 <sup>th</sup> percentile, ART 1.5)	0.17 µg/m <sup>3</sup>	0.68 per 1000 exposed workers
WCS 3: Surface treatment by spraying in spray cabin/spray booth	Inhalation, local, long-term (90 <sup>th</sup> percentile, Measured data)	0.055 µg/m <sup>3</sup>	0.22 per 1000 exposed workers
WCS 4: Surface treatment by spraying outside of paint-booth	Inhalation, local, long-term, adjusted for frequency and RPE (90 <sup>th</sup> percentile, ART 1.5)	0.53 µg/m <sup>3</sup>	2.13 per 1000 exposed workers
WCS 5: Surface treatment by brushing/rolling (small to medium sized parts)	Inhalation, local, long-term (90 <sup>th</sup> percentile, ART 1.5)	0.57 µg/m <sup>3</sup>	2.28 per 1000 exposed workers
WCS 6: Surface treatment by brushing (very small parts/touch-up)	Inhalation, local, long-term (90 <sup>th</sup> percentile, ART 1.5)	0.28 µg/m <sup>3</sup>	1.12 per 1000 exposed workers
WCS 7: Cleaning of equipment – tools cleaning (closed system)	Inhalation, local, long-term (90 <sup>th</sup> percentile, ART 1.5)	0.017 µg/m <sup>3</sup>	0.07 per 1000 exposed workers

<sup>16</sup> Based on the dose-response relationship for lung cancer mortality derived by the RAC, considering a 40-year working life (8h/day, 5d/week), the excess lifetime lung cancer mortality risk up to age 89 is derived based on the estimated exposure.

Worker Contributing Scenario	Route of exposure and type of effects	Exposure Concentration	Risk Characterisation <sup>16</sup>
WCS 8: Cleaning and maintenance of equipment – tools cleaning (paint cabin)	Inhalation, local, long-term (90 <sup>th</sup> percentile, ART 1.5)	0.089 µg/m <sup>3</sup>	0.36 per 1000 exposed workers
WCS 9: Cleaning – paint cabin and ancillary areas	Inhalation, local, long-term (90 <sup>th</sup> percentile, ART 1.5)	0.17 µg/m <sup>3</sup>	0.68 per 1000 exposed workers
WCS 10: Infrequent maintenance activities	Inhalation, local, long-term, further adjusted for frequency and RPE (90 <sup>th</sup> percentile, ART 1.5)	0.22 µg/m <sup>3</sup>	0.87 per 1000 exposed workers
WCS 11: Machining operations on small to medium sized parts containing Cr(VI) on an extracted bench/extraction booth including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.11 µg/m <sup>3</sup>	0.44 per 1000 exposed workers
WCS 12: Machining operations on small to medium sized surfaces containing Cr(VI) on an extracted bench/extraction booth including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.375 µg/m <sup>3</sup>	1.5 per 1000 exposed workers
WCS 13: Machining operations in large work areas on parts containing Cr(VI) including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.20 µg/m <sup>3</sup>	0.8 per 1000 exposed workers
WCS 14: Machining operations in large work areas on surfaces containing Cr(VI) including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.675 µg/m <sup>3</sup>	2.7 per 1000 exposed workers
WCS 15: Machining operations on parts containing Cr(VI) in small work areas including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.16 µg/m <sup>3</sup>	0.64 per 1000 exposed workers
WCS 16: Machining operations on surfaces containing Cr(VI) in small work areas including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.83 µg/m <sup>3</sup>	3.32 per 1000 exposed workers
WCS 17: Sanding of large surfaces containing Cr(VI) in large work areas including cleaning	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	1.2 µg/m <sup>3</sup>	4.8 per 1000 exposed workers
WCS 18: Waste management	Inhalation, local, long-term, further adjusted for RPE (90 <sup>th</sup> percentile, ART 1.5)	0.19 µg/m <sup>3</sup>	0.76 per 1000 exposed workers
WCS 19: End of Life	Not applicable	Not applicable	Not applicable