30. ES 30: Use at industrial sites; Use of nickel metal for the manufacture of nickel-containing inorganic pigments

30.1. Title section

Sector of use: Manufacture of fine chemicals (SU 9)

Environment	
1: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Discharge to fresh water via municipal sewage treatment plant	ERC 6a
2: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Direct discharge to fresh water	ERC 6a
3: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Direct discharge to marine water	ERC 6a
Worker	
4: Raw material handling	PROC 26
5: Closed mixing and transfer process	PROC 2
6: Automated transfer process	PROC 8b
7: Manual transfer operation	PROC 26
8: Drying and calcining	PROC 22, PROC 4, PROC 2, PROC 3, PROC 9
9: Wet cleaning	PROC 28
10: Cleaning/removal of dust	PROC 28

30.2. Conditions of use affecting exposure

30.2.1. Control of environmental exposure: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Discharge to fresh water via municipal sewage treatment plant (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.459 tonnes/day (All the amounts and concentrations are expressed as Ni as this is the driver for the environmental risk assessment.)
Annual amount per site <= 156 tonnes/year
Emission days >= 340 days/year
Technical and organisational conditions and measures
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Conditions and measures related to biological sewage treatment plant
Municipal sewage treatment plant is assumed.
Assumed domestic sewage treatment plant flow >= 2E3 m3/day
Conditions and measures related to external treatment of waste (including article waste)

Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow >= 1.8E4 m3/day
No discharge to marine water assumed
Receiving water dilution (fresh or marine) >= 10

30.2.2. Control of environmental exposure: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Direct discharge to fresh water (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.459 tonnes/day (All the amounts and concentrations are expressed as Ni as this is the driver for the environmental risk assessment.)
Annual amount per site <= 156 tonnes/year
Emission days >= 340 days/year
Technical and organisational conditions and measures
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow >= 2.97E4 m3/day
No discharge to marine water assumed
Receiving water dilution (fresh or marine) >= 100
Assumed effluent discharge flow from site >= 225 m3/day

30.2.3. Control of environmental exposure: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Direct discharge to marine water (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 0.459 tonnes/day (All the amounts and concentrations are expressed as Ni as this is the driver for the environmental risk assessment.)
Annual amount per site <= 156 tonnes/year
Emission days >= 340 days/year
Technical and organisational conditions and measures
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.
Other conditions affecting environmental exposure
No discharge to freshwater assumed
Assumed effluent discharge flow from site >= 225 m3/day

Local marine water dilution factor 100

30.2.4. Control of worker exposure: Raw material handling (PROC 26)

Product (article) characteristics
Physical form of product; Solid, high dustiness
Technical and organisational conditions and measures
Local exhaust ventilation
Semi-closed system

30.2.5. Control of worker exposure: Closed mixing and transfer process (PROC 2)

Product (article) characteristics
Physical form of product: Damp solid.
Technical and organisational conditions and measures
Automated task
Use in closed process

30.2.6. Control of worker exposure: Automated transfer process (PROC 8b)

Product (article) characteristics
Physical form of product; Solid, high dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
Ensure automation of the process as far as technically feasible
Ensure segregation of worker from the source.
Use of an integrated local exhaust ventilation is required.

30.2.7. Control of worker exposure: Manual transfer operation (PROC 26)

Product (article) characteristics
Physical form of product; Solid, high dustiness
Amount used (or contained in articles), frequency and duration of use/exposure
Avoid carrying out activities involving exposure for more than 1 hour per day.
Technical and organisational conditions and measures
Use of general ventilation with an efficiency of at least 17% is required.
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 40 (97.5% respiratory protection). For further specification, refer to section 8 of the SDS.
Wear suitable gloves tested to EN374.; For further specification, refer to section 8 of the SDS.

30.2.8. Control of worker exposure: Drying and calcining (PROC 22, PROC 4, PROC 2, PROC 3, PROC 9)

Product (article) characteristics

Physical form of product: Damp solid.
Maximum emission potential covered in this ES: Low.
Technical and organisational conditions and measures
Local exhaust ventilation
Semi-closed system
Elevated temperature

30.2.9. Control of worker exposure: Wet cleaning (PROC 28)

Product (article) characteristics
Physical form of product: Solution and other liquid materials, e.g. suspensions are also covered.
Maximum emission potential covered in this ES: Very low.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
Cleaning machines such as power sweeper, no direct manual cleaning.
Covers use at ambient temperatures.
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 10 (90% respiratory protection).

30.2.10. Control of worker exposure: Cleaning/removal of dust (PROC 28)

Product (article) characteristics
Physical form of product: Residual dust.
Amount used (or contained in articles), frequency and duration of use/exposure
Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
Cleaning is conducted using cleaning machines, in particular hovering is applied and the use of compressed air is omitted.
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 20 (95% respiratory protection). For further specification, refer to section 8 of the SDS.

30.3. Exposure estimation and reference to its source

30.3.1. Environmental release and exposure: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Discharge to fresh water via municipal sewage treatment plant (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.021 kg/day	Estimated release factor
Air	0.021 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR

Protection target	Exposure estimate	RCR
Fresh water	3.34E-3 mg/L (EUSES 2.1.2)	0.471
Sediment (freshwater)	45.2 mg/kg dw (PEC sediment calculation method for metals)	0.415
Sewage Treatment Plant	6.2E-3 mg/L (EUSES 2.1.2)	0.019
Agricultural soil	16.37 mg/kg dw (EUSES 2.1.2)	0.548

30.3.2. Environmental release and exposure: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Direct discharge to fresh water (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.021 kg/day	Estimated release factor
Air	0.021 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	3.39E-3 mg/L (EUSES 2.1.2)	0.478
Sediment (freshwater)	46.5 mg/kg dw (PEC sediment calculation method for metals)	0.427
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

30.3.3. Environmental release and exposure: Intermediate use of nickel metal for the manufacture of nickel-containing inorganic pigments - Direct discharge to marine water (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.021 kg/day	Estimated release factor
Air	0.021 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	9.58E-4 mg/L (EUSES 2.1.2)	0.111
Sediment (marine water)	33.2 mg/kg dw (PEC sediment calculation method for metals)	0.305
Agricultural soil	16.20 mg/kg dw (EUSES 2.1.2)	0.542

30.3.4. Worker exposure: Raw material handling (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.028 mg/m³ (Measured data)	0.56
Inhalation, local, long term	0.028 mg/m³ (Measured data)	0.56
Inhalation, local, acute	0.111 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm² (Measured data)	0.022
Combined, systemic, long term		0.56

30.3.5. Worker exposure: Closed mixing and transfer process (PROC 2)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	6E-3 mg/m³ (Measured data)	0.12
Inhalation, local, long term	6E-3 mg/m³ (Measured data)	0.12
Inhalation, local, acute	0.017 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	0.076 µg/cm² (Measured data)	< 0.01
Combined, systemic, long term		0.12

30.3.6. Worker exposure: Automated transfer process (PROC 8b)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.031 mg/m³ (Measured data)	0.62
Inhalation, local, long term	0.031 mg/m³ (Measured data)	0.62
Inhalation, local, acute	0.093 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	1 µg/cm² (Measured data)	0.029
Combined, systemic, long term		0.62

30.3.7. Worker exposure: Manual transfer operation (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.042 mg/m³ (MEASE)	0.84
Inhalation, local, long term	0.042 mg/m³ (MEASE)	0.84
Inhalation, local, acute	0.416 mg/m³ (MEASE)	0.035
Dermal, local, long term	5.18 µg/cm² (Measured data)	0.148
Combined, systemic, long term		0.84

30.3.8. Worker exposure: Drying and calcining (PROC 22, PROC 4, PROC 2, PROC 3, PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.016 mg/m³ (Measured data)	0.32
Inhalation, local, long term	0.016 mg/m³ (Measured data)	0.32
Inhalation, local, acute	0.016 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm² (Measured data)	0.022
Combined, systemic, long term		0.32

30.3.9. Worker exposure: Wet cleaning (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	6E-3 mg/m³ (Measured data)	0.12
Inhalation, local, long term	6E-3 mg/m³ (Measured data)	0.12
Inhalation, local, acute	0.026 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm² (Measured data)	0.022
Combined, systemic, long term		0.12

30.3.10. Worker exposure: Cleaning/removal of dust (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.032 mg/m³ (Measured data)	0.64
Inhalation, local, long term	0.032 mg/m³ (Measured data)	0.64
Inhalation, local, acute	0.189 mg/m³ (Measured data)	0.016
Dermal, local, long term	0.76 µg/cm² (Measured data)	0.022
Combined, systemic, long term		0.64

30.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance: Please refer to Section 0.3 of this “ES for Communication”.