9. ES 9: Use at industrial sites; Use of nickel oxide sinter in the production of stainless, special steels and special alloys

9.1. Title section

Product category: Base metals and alloys (PC 7)
Sector of use: Manufacture of basic metals, including alloys (SU 14)

Environment	
1: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D10	ERC 6a
2: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D100	ERC 6a
3: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D1000	ERC 6a
4: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to marine water	ERC 6a
Worker	
5: Raw material handling	PROC 26
6: Smelting	PROC 22
7: Maintenance in contaminated areas	PROC 28
8: Wet cleaning	PROC 28
9: Cleaning/removal of dust	PROC 28

9.2. Conditions of use affecting exposure

9.2.1. Control of environmental exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D10 (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 4.164 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 <= 1.52E3 tonnes/year
Emission days >= 365 days/year
Technical and organisational conditions and measures
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
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 marine water assumed
Receiving water dilution (fresh or marine) >= 10
Receiving surface water flow >= 1.8E4 m3/day

Assumed effluent discharge flow from site >= 2E3 m3/day

9.2.2. Control of environmental exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D100 (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 38.35 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 <= 1.4E4 tonnes/year
Emission days >= 365 days/year
Technical and organisational conditions and measures
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
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 marine water assumed
Receiving water dilution (fresh or marine) >= 100
Receiving surface water flow >= 1.98E5 m3/day
Assumed effluent discharge flow from site >= 2E3 m3/day

9.2.3. Control of environmental exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D1000 (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 151.5 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 <= 5.53E4 tonnes/year
Emission days >= 365 days/year
Technical and organisational conditions and measures
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
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 marine water assumed
Receiving water dilution (fresh or marine) >= 1E3
Receiving surface water flow >= 2E6 m3/day
Assumed effluent discharge flow from site >= 2E3 m3/day

9.2.4. Control of environmental exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to marine water (ERC 6a)

Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 111.0 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 <= 4.05E4 tonnes/year
Emission days >= 365 days/year
Technical and organisational conditions and measures
Chemical precipitation or sedimentation or filtration or electrolysis or reverse osmosis or ion exchange
Electrostatic precipitator or wet electrostatic precipitator or cyclones or fabric/bag filter or ceramic/metal mesh filter or wet scrubber
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
Receiving water dilution (fresh or marine) >= 100
Assumed effluent discharge flow from site >= 2E3 m3/day

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

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
Local exhaust ventilation
Semi-closed system
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 10 (90% 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.

9.2.6. Control of worker exposure: Smelting (PROC 22)

Product (article) characteristics
Physical form of product: Molten.
Maximum emission potential covered in this ES: Medium (temperature based).
Technical and organisational conditions and measures
Local exhaust ventilation
Semi-closed system
Covers use at temperatures above melting point.

9.2.7. Control of worker exposure: Maintenance in contaminated areas (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 (potentially lasting for an entire shift or even longer if critical equipment needs to be repaired).
Technical and organisational conditions and measures
Machinery to be maintained is to be turned off during work.
Conditions and measures related to personal protection, hygiene and health evaluation
APF of RPE = 10 (90% 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.

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

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution and other liquid materials, e.g. suspensions are also covered.
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).

9.2.9. 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.

9.3. Exposure estimation and reference to its source

9.3.1. Environmental release and exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D10 (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.057 kg/day	Estimated release factor

Release route	Release rate	Release estimation method
Air	0.57 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	4.96E-3 mg/L (EUSES 2.1.2)	0.699
Sediment (freshwater)	87.7 mg/kg dw (PEC sediment calculation method for metals)	0.805
Agricultural soil	16.26 mg/kg dw (EUSES 2.1.2)	0.544

9.3.2. Environmental release and exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D100 (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.529 kg/day	Estimated release factor
Air	5.247 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	4.8E-3 mg/L (EUSES 2.1.2)	0.676
Sediment (freshwater)	83.4 mg/kg dw (PEC sediment calculation method for metals)	0.765
Agricultural soil	16.83 mg/kg dw (EUSES 2.1.2)	0.563

9.3.3. Environmental release and exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to fresh water D1000 (ERC 6a)

Release route	Release rate	Release estimation method
Water	2.091 kg/day	Estimated release factor
Air	20.72 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Fresh water	3.65E-3 mg/L (EUSES 2.1.2)	0.514
Sediment (freshwater)	53.2 mg/kg dw (PEC sediment calculation method for metals)	0.488
Agricultural soil	18.71 mg/kg dw (EUSES 2.1.2)	0.626

9.3.4. Environmental release and exposure: Intermediate use of nickel oxide sinter in the production of stainless, special steels and special alloys - Direct discharge to marine water (ERC 6a)

Release route	Release rate	Release estimation method
Water	0.805 kg/day	Estimated release factor

Release route	Release rate	Release estimation method
Air	15.18 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

Protection target	Exposure estimate	RCR
Marine water	3.19E-3 mg/L (EUSES 2.1.2)	0.37
Sediment (marine water)	92 mg/kg dw (PEC sediment calculation method for metals)	0.844
Agricultural soil	18.04 mg/kg dw (EUSES 2.1.2)	0.604

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

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.014 mg/m³ (Measured data)	0.28
Inhalation, local, long term	0.014 mg/m³ (Measured data)	0.28
Inhalation, local, acute	0.071 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	5.18 µg/cm² (Measured data)	0.432
Combined, systemic, long term		0.28

9.3.6. Worker exposure: Smelting (PROC 22)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.021 mg/m³ (Measured data)	0.42
Inhalation, local, long term	0.021 mg/m³ (Measured data)	0.42
Inhalation, local, acute	0.085 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm² (Measured data)	0.063
Combined, systemic, long term		0.42

9.3.7. Worker exposure: Maintenance in contaminated areas (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	4.5E-3 mg/m³ (Measured data)	0.09
Inhalation, local, long term	4.5E-3 mg/m³ (Measured data)	0.09
Inhalation, local, acute	0.023 mg/m³ (Measured data)	< 0.01
Dermal, local, long term	5.18 µg/cm² (Measured data)	0.432
Combined, systemic, long term		0.09

9.3.8. 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)	0.063
Combined, systemic, long term		0.12

9.3.9. 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)	0.01
Dermal, local, long term	0.76 µg/cm² (Measured data)	0.063
Combined, systemic, long term		0.64

9.4. 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”.