

22. ES 22: Formulation or re-packing; Use of nickel metal powder in the formulation of micronutrient additives for biogas production

22.1. Title section

Environment	
1: Use of nickel metal powder in the formulation of micronutrient additives for biogas production - no releases	ERC 2
Worker	
2: Nickel powder reception (dusty solid)	PROC 26
3: Preparing the additive in solution	PROC 3
4: Preparing the additive as solid	PROC 3
5: Filling of solutions	PROC 9
6: Filling of biodegradable bags	PROC 9
7: Palletising	PROC 21
8: Wet cleaning	PROC 28
9: Cleaning/removal of dust	PROC 28

22.2. Conditions of use affecting exposure

22.2.1. Control of environmental exposure: Use of nickel metal powder in the formulation of micronutrient additives for biogas production - no releases (ERC 2)

Amount used, frequency and duration of use (or from service life)
Annual amount per site <= 10 tonnes/year
Daily amount per site <= 0.025 tonnes/day (All the amounts and concentrations are expressed as Ni as this is the driver for the environmental risk assessment.)
Technical and organisational conditions and measures
The substance should not be released to air
The substance should not be released to water
Conditions and measures related to external treatment of waste (including article waste)
Dispose of waste product or used containers according to local regulations.

22.2.2. Control of worker exposure: Nickel powder reception (dusty solid) (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.

22.2.3. Control of worker exposure: Preparing the additive in solution (PROC 3)

Product (article) characteristics
Physical form of product: Solution.
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
Closed process with occasional opening
Use of an integrated local exhaust ventilation is required.

22.2.4. Control of worker exposure: Preparing the additive as solid (PROC 3)

Product (article) characteristics
Physical form of product; Solid, low 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
Closed process with occasional opening
Use of an integrated local exhaust ventilation is required.

22.2.5. Control of worker exposure: Filling of solutions (PROC 9)

Product (article) characteristics
Maximum emission potential covered in this ES: Very low.
Physical form of product: Solution.
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
Covers use at ambient temperatures.

22.2.6. Control of worker exposure: Filling of biodegradable bags (PROC 9)

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.

22.2.7. Control of worker exposure: Palletising (PROC 21)

Product (article) characteristics
Limit the substance content in the product to 1 %
Physical form of product: Massive object (biodegradable bags).

22.2.8. 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).

22.2.9. 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.

22.3. Exposure estimation and reference to its source

22.3.1. Environmental release and exposure: Use of nickel metal powder in the formulation of micronutrient additives for biogas production - no releases (ERC 2)

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

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

22.3.2. Worker exposure: Nickel powder reception (dusty solid) (PROC 26)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.014 mg/m ³ (Measured data)	0.28
Inhalation, local, long term	0.014 mg/m ³ (Measured data)	0.28
Inhalation, local, acute	0.071 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	5.18 µg/cm ² (Measured data)	0.148
Combined, systemic, long term		0.28

22.3.3. Worker exposure: Preparing the additive in solution (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.02 mg/m ³ (Measured data)	0.4
Inhalation, local, long term	0.02 mg/m ³ (Measured data)	0.4
Inhalation, local, acute	0.06 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.4

22.3.4. Worker exposure: Preparing the additive as solid (PROC 3)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.02 mg/m ³ (Measured data)	0.4
Inhalation, local, long term	0.02 mg/m ³ (Measured data)	0.4
Inhalation, local, acute	0.06 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.4

22.3.5. Worker exposure: Filling of solutions (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, long term	0.012 mg/m ³ (Measured data)	0.24
Inhalation, local, acute	0.047 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.24

22.3.6. Worker exposure: Filling of biodegradable bags (PROC 9)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	0.014 mg/m ³ (Measured data)	0.28
Inhalation, local, long term	0.014 mg/m ³ (Measured data)	0.28
Inhalation, local, acute	0.071 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	5.18 µg/cm ² (Measured data)	0.148
Combined, systemic, long term		0.28

22.3.7. Worker exposure: Palletising (PROC 21)

22.3.8. Worker exposure: Wet cleaning (PROC 28)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	6E-3 mg/m ³ (Measured data)	0.12
Inhalation, local, long term	6E-3 mg/m ³ (Measured data)	0.12
Inhalation, local, acute	0.026 mg/m ³ (Measured data)	< 0.01
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.12

22.3.9. 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/m ³ (Measured data)	0.64
Inhalation, local, long term	0.032 mg/m ³ (Measured data)	0.64
Inhalation, local, acute	0.189 mg/m ³ (Measured data)	0.016
Dermal, local, long term	0.76 µg/cm ² (Measured data)	0.022
Combined, systemic, long term		0.64

22.4. 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".