

## 23. ES 23: Use at industrial sites; Use of nickel metal-derived micronutrient powder in biogas production

### 23.1. Title section

Sector of use: Agriculture, forestry, fishery (SU 1)

Environment	
1: Use of nickel metal-derived micronutrient powder in biogas production - no releases	ERC 4
Worker	
2: Handling of solutions (reception and charging/discharging the bioreactor)	PROC 8b
3: Handling of biodegradable bags (reception and charging/discharging the bioreactor)	PROC 21
4: Wet cleaning	PROC 28
5: Cleaning/removal of dust	PROC 28

### 23.2. Conditions of use affecting exposure

#### 23.2.1. Control of environmental exposure: Use of nickel metal-derived micronutrient powder in biogas production - no releases (ERC 4)

Amount used, frequency and duration of use (or from service life)
Daily amount per site $\leq$ 0.025 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 $\leq$ 10 tonnes/year
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.

#### 23.2.2. Control of worker exposure: Handling of solutions (reception and charging/discharging the bioreactor) (PROC 8b)

Product (article) characteristics
Limit the substance content in the product to 20 %
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.

### 23.2.3. Control of worker exposure: Handling of biodegradable bags (reception and charging/discharging the bioreactor) (PROC 21)

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

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

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

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

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

## 23.3. Exposure estimation and reference to its source

### 23.3.1. Environmental release and exposure: Use of nickel metal-derived micronutrient powder in biogas production - no releases (ERC 4)

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

### 23.3.2. Worker exposure: Handling of solutions (reception and charging/discharging the bioreactor) (PROC 8b)

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

### 23.3.3. Worker exposure: Handling of biodegradable bags (reception and charging/discharging the bioreactor) (PROC 21)

Route of exposure and type of effects	Exposure estimate	RCR
Inhalation, systemic, long term	9E-3 mg/m <sup>3</sup> (Measured data)	0.18
Inhalation, local, long term	9E-3 mg/m <sup>3</sup> (Measured data)	0.18
Inhalation, local, acute	0.037 mg/m <sup>3</sup> (Measured data)	< 0.01
Dermal, local, long term	0.076 µg/cm <sup>2</sup> (Measured data)	< 0.01
Combined, systemic, long term		0.18

### 23.3.4. Worker exposure: Wet cleaning (PROC 28)

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

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

## 23.4. 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".