

**SEZIONE 1. Identificazione della sostanza o della miscela e della società/impresa**

**1.1. Identificatore del prodotto**

Nome prodotto : MANGANESE CLORURO 4 H2O PL  
 Codice prodotto : 074357  
 Numero CAS : 13446-34-9  
 Numero CE : 231-869-6  
 Registrazione REACH : 01-2119934899-15-XXXX

**1.2. Pertinenti usi identificati della sostanza o miscela e usi sconsigliati**  
 Industria chimica, additivo feed e additivo per fertilizzanti.

**1.3. Informazioni sul fornitore della scheda di dati di sicurezza**

ELETTROCHIMICA VALLE STAFFORA SPA  
 Via Roggia Bartolomea, 7 – 20090 Assago (MI)  
 Tel. 02-2105161 – fax 02-21051633  
 Tel. 0383-93521 – fax 0383-944594

Indirizzo e-mail [quality@vallestaffora.it](mailto:quality@vallestaffora.it)

**1.4. Numero telefonico di emergenza**

Centro antiveleni PAVIA – (IRCCS Fond. Maugeri) tel. 0382-24444  
 Centro antiveleni MILANO – (Ospedale Niguarda) tel. 02-66101029  
 Centro antiveleni BERGAMO – (Ospedali Riuniti) tel. 800 883300  
 Centro antiveleni PORDENONE (Ospedale Civile) – tel. 0434 – 399698  
 Centro antiveleni FIRENZE – (Ospedale Careggi) tel. 055-7947819  
 Centro antiveleni ROMA – (Policlinico A. Gemelli) tel. 06-3054343  
 Centro antiveleni ROMA – (Policlinico Umberto I°) tel. 06-49978000  
 Centro antiveleni NAPOLI – (Ospedale Cardarelli) tel. 081-7472870  
 Centro antiveleni FOGGIA (A.O. Universitaria) – tel. 0881 – 732326

**SEZIONE 2. Identificazione dei pericoli**

**2.1 Classificazione della sostanza o della miscela**

**Classificazione secondo il Regolamento (CE) n. 1272/2008 [CLP]**

CLASSE	CATEGORIA	SPECIFICA	AVVERTENZA	FRASE H
Acute Tox.	4	Tossicità acuta, orale	ATTENZIONE	H302
Aquatic Chronic	2	Pericoloso per l'ambiente acquatico		H411

**2.2. Elementi dell'etichetta**

**Etichettatura secondo il regolamento (CE) n. 1272/2008 [CLP]**

Il prodotto è classificato ed etichettato conformemente al regolamento CLP.

**Pittogrammi di pericolo**



Avvertenza **ATTENZIONE**

**Indicazioni di pericolo**

H302 Nocivo se ingerito

H411 Tossico per gli organismi acquatici con effetti di lunga durata

**Consigli di prudenza**Prevenzione

P264 Lavare accuratamente la cute dopo l'uso

P270 Non mangiare, né bere, né fumare durante l'uso

P273 Non disperdere nell'ambiente

Reazione

P301+P312 IN CASO DI INGESTIONE accompagnata da malessere: contattare un CENTRO ANTIVELENI o un medico

P330 Sciacquare la bocca

Smaltimento

P501 Smaltire il prodotto/recipiente in conformità con le disposizioni locali / regionali / nazionali / internazionali

**2.3. Altri pericoli**

Non classificato come PBT/vPvB secondo gli attuali criteri europei.

**SEZIONE 3. Composizione/informazioni sugli ingredienti****3.1. Sostanze**

IDENTIFICAZIONE	CONC. %	CLASS. 1272/2008 (CLP)
MANGANESE CLORURO 4 H <sub>2</sub> O MnCl <sub>2</sub> * 4H <sub>2</sub> O CAS N. 13446-34-9 CE N. 231-869-6 REACH N. 01-2119934899-15-XXXX (anidro)	>95,0	Acute Tox. Oral 4, H302 Aquatic Chronic 2; H411

**3.2. Miscele**

Informazione non pertinente.

**SEZIONE 4. Misure di primo soccorso****4.1. Descrizione delle misure di primo soccorso****INALAZIONE**

Portare subito la persona esposta all'aria aperta. Se necessario provvedere alla respirazione artificiale. In caso di difficoltà respiratorie consultare immediatamente un medico.

**INGESTIONE**

Sciacquare immediatamente la bocca e bere abbondante acqua. Non somministrare mai liquidi ad una persona incosciente. Non indurre il vomito. Consultare immediatamente un medico.

**CONTATTO CON LA PELLE**

Togliersi di dosso gli indumenti contaminati e sciacquare bene la pelle con acqua e sapone. Se necessario consultare immediatamente un medico. Lavare gli indumenti contaminati prima del riutilizzo.

**CONTATTO CO GLI OCCHI**

Lavare prontamente e abbondantemente gli occhi con acqua mantenendo le palpebre aperte. Continuare a sciacquare per almeno 15-20 minuti. Consultare un oftalmologo.

**4.2. Principali sintomi ed effetti, sia acuti e che ritardati**

Può causare nausea, vomito e disturbi gastrointestinali.

### **4.3. Indicazione dell'eventuale necessità di consultare immediatamente un medico e trattamenti speciali**

Nessuna raccomandazione impartita. Nel dubbio, CONSULTARE UN MEDICO.

## **SEZIONE 5. Misure antincendio**

Il prodotto non è infiammabile.

### **5.1. Mezzi di estinzione**

#### **Mezzi di estinzione idonei**

CO<sub>2</sub>, schiuma, polvere ed acqua nebulizzata.

#### **Mezzi di estinzione non idonei**

Evitare l'utilizzo di getti diretti di acqua. (Utilizzare getti per raffreddare i contenitori)

### **5.2. Pericoli speciali derivanti dalla sostanza o dalla miscela**

La combustione può provocare esalazioni di acido cloridrico allo stato gassoso (HCl) e cloro. Il prodotto di per sé non brucia.

### **5.3. Raccomandazioni per gli addetti all'estinzione degli incendi**

Utilizzare getti d'acqua per raffreddare i contenitori. Se è possibile rimuoverli dall'area di pericolo.

Evitare che l'acqua fuoriuscita raggiunga fognature e falde acquifere. Utilizzare mezzi di contenimento adatti. Arginare e raccogliere l'acqua usata per estinguere l'incendio. Spruzzare acqua per raffreddare i contenitori.

Mezzi protettivi per il personale antincendio: in caso d'incendio indossare un respiratore autonomo e indumenti di protezione completa.

## **SEZIONE 6. Misure in caso di rilascio accidentale**

### **6.1. Precauzioni personali, dispositivi di protezione e procedure in caso di emergenza**

Avvertire tutti dei potenziali pericoli ed evacuare se necessario. Spegnerne tutte le sorgenti d'ignizione. Evitare scintille, fiamme, calore. Evitare di fumare. Ventilare. Evitare l'accumulo di cariche elettrostatiche. In caso di ventilazione insufficiente, usare un apparecchio respiratorio adatto. Indossare indumenti di protezione come descritto nella Sezione 8 di questa scheda di sicurezza. Evitare l'inalazione di polvere. Evitare il contatto con gli occhi e con la pelle.

### **6.2. Precauzioni ambientali**

Raccogliere e smaltire le fuoriuscite come indicato al punto 13. Non scaricare nelle fognature, nei corsi d'acqua o nel terreno. Le fuoriuscite o gli scarichi non controllati in corsi d'acqua devono essere IMMEDIATAMENTE segnalati all'Autorità per la prevenzione e la protezione ambientale o all'ente normativo competente.

### **6.3. Metodi e materiali per il contenimento e per la bonifica**

Evitare di produrre e diffondere polvere. Aspirare la polvere mediante speciale aspiratore dotato di filtro anti-particelle, o spazzare con cautela e raccogliere in contenitori chiusi. Pulire l'area lavando abbondantemente con acqua. Ricordare che le superfici possono diventare sdruciolevoli. Assicurarsi che i rifiuti e i materiali contaminati siano raccolti e rimossi dall'area di lavoro appena possibile e posti in un contenitore riportante adeguata etichettatura.

### **6.4. Riferimento ad altre sezioni**

Per informazioni relative ad una manipolazione sicura vedere sezione 7.

Per informazioni relative all'equipaggiamento protettivo ad uso personale vedere sezione 8. Per informazioni relative allo smaltimento vedere sezione 13

## **SEZIONE 7. Manipolazione e immagazzinamento**

### **7.1. Precauzioni per la manipolazione sicura**

Conservare lontano da fiamme e scintille - Non fumare. Evitare l'accumulo di cariche elettrostatiche. Indossare indumenti di protezione completa in caso di prolungata esposizione e/o alte concentrazioni.

Assicurare una buona ventilazione. Evitare il contatto con pelle e occhi.

Manipolare rispettando una buona igiene industriale e le misure di sicurezza adeguate. Sul posto di lavoro non fumare, non bere né mangiare durante le manipolazioni. Durante le manipolazioni operare debitamente protetti.

### **7.2. Condizioni per l'immagazzinamento sicuro, comprese eventuali incompatibilità**

Conservare nell'imballaggio originale ben chiuso in luogo asciutto, fresco e ben ventilato. Non conservare in prossimità di fonti di calore e non esporre a temperature elevate. Proteggere dalla luce solare diretta. Evitare l'umidità. Conservare lontano da materiali incompatibili (vedere Sezione 10).

Contenitori NON idonei: contenitori in metallo e metalli leggeri.

Temperatura idonea: +15/+25°C.

### **7.3. Usi finali particolari**

Nessuna informazione disponibile.

## **SEZIONE 8. Controllo dell'esposizione/protezione individuale**

### **8.1. Parametri di controllo**

Non stabiliti.

Gli ambienti di lavoro devono essere adeguatamente aerati. Ove necessario, installare fonti di aspirazione localizzata ed efficaci sistemi di ricambio d'aria generale. Se queste misure non sono sufficienti sarà necessario far uso di adeguati mezzi di protezione delle vie respiratorie.

### **8.2. Controlli dell'esposizione**

#### **Controlli tecnici idonei**

È necessario adottare le generali misure di igiene industriale al fine di assicurare una manipolazione sicura del prodotto. Devono essere seguite le comuni misure di igiene (es. fare la doccia e cambiarsi gli abiti alla fine del turno di lavoro) per evitare possibili contaminazioni dell'ambiente domestico. Non bere e non fumare sul luogo di lavoro, indossare abiti e calzature da lavoro. Il personale deve essere costantemente aggiornato circa le pratiche di igiene nei luoghi di lavoro e dell'utilizzo dei mezzi di protezione personale.

Misure e dispositivi di protezione individuale:

#### **PROTEZIONE RESPIRATORIA**

Apparecchio respiratorio consigliato in caso di mancata ventilazione o eccessiva formazione di polvere: maschera con filtro P2 (rif. EN 143).

#### **PROTEZIONE DELLE MANI**

Per scegliere i guanti più adatti chiedere consiglio al fornitore dei guanti che può dare informazioni relative alla durata limite del loro materiale costitutivo (rif. EN 374).

#### **PROTEZIONE DEGLI OCCHI**

Portare occhiali di sicurezza approvati contro le sostanze chimiche in caso di probabile rischio di esposizione degli occhi (rif. EN 166).

#### **PROTEZIONE DELLA PELLE**

Camice / tuta da lavoro idonea alle vigenti normative.

**CONTROLLO DELL'ESPOSIZIONE AMBIENTALE**

Assicurare un'adeguata ventilazione localizzata e generale.  
Tenere i contenitori ben chiusi.  
Evitare che l'acqua fuoriuscita raggiunga fognature e falde acquifere.

**SEZIONE 9. Proprietà fisiche e chimiche**

**9.1. Informazioni sulle proprietà fisiche e chimiche fondamentali**

Aspetto	: Polvere cristallina
Colore	: Rosa
Odore	: Simile al cloro
Valore pH	: 3-6 (10 g/l a 50°C)
Punto di fusione	: 446,85°C
Punto di ebollizione	: Non disponibile
Punto di infiammabilità	: Non applicabile
Infiammabilità (solido, gas)	: Non applicabile
Densità relativa	: 2,54 g/cm <sup>3</sup> (a 21,5°C)
Solubilità	: 799 g/dm <sup>3</sup>
Coeff. di ripartizione n-ottanolo/Acqua	: Non applicabile
Temperatura di autoaccensione	: Non applicabile
Temperatura di decomposizione	: 240°C (eliminazione dell'acqua di cristallizzazione)
Viscosità	: Non applicabile
Proprietà esplosive	: Non applicabile
Proprietà ossidanti	: Non applicabile

**9.2. Altre informazioni**

Densità Bulk	: 1150 kg/m <sup>3</sup>
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**SEZIONE 10. Stabilità e reattività**

**10.1. Reattività**

Il prodotto è stabile rispettando le condizioni di manipolazione e stoccaggio.

**10.2. Stabilità chimica**

Il prodotto è stabile rispettando le condizioni di manipolazione e stoccaggio.

**10.3. Possibilità di reazioni pericolose**

Rischio di esplosione con: metalli alcalini, zinco.

Rischio di reazioni violente con: acidi e perossido di idrogeno.

**10.4. Condizioni da evitare**

Evitare calore, fiamme e altre sorgenti d'ignizione. Evitare umidità.

Rilascia acqua di cristallizzazione se scaldato (T > 240°C).

**10.5. Materiali incompatibili**

Contenitori di metallo / metalli leggeri, acciaio dolce, sodio, ossido di sodio, potassio e zinco.

**10.6. Prodotti di decomposizione pericolosi**

In caso d'incendio possono formarsi gas nocivi di HCl e cloro.

**SEZIONE 11. Informazioni tossicologiche**

**11.1. Informazioni sugli effetti tossicologici**

Tossicità acuta

Nocivo se ingerito

LD50 – Orale, ratto	1484 mg/kg
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### Corrosione/irritazione cutanea

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti.

### Lesioni oculari gravi/irritazioni oculari gravi

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti.

Può causare seri danni agli occhi.

### Sensibilizzazione respiratoria o cutanea

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti.

### Mutagenicità sulle cellule germinali

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti

### Cancerogenicità

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti.

### Tossicità per la riproduzione

Tossicità per la riproduzione. Sospettato di nuocere al feto.

### Tossicità specifica per organi bersaglio (STOT) – esposizione singola

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti.

### Tossicità specifica per organi bersaglio (STOT) – esposizione ripetuta

Sulla base dei dati disponibili i criteri di classificazione non sono soddisfatti.

*Inalazione:* può causare danni al cervello se l'esposizione è prolungata e ripetuta.

### Tossicità per aspirazione

Nessuna classificazione di tossicità per aspirazione

Gli uomini esposti a polveri di manganese hanno mostrato una diminuzione della fertilità. L'avvelenamento cronico da manganese coinvolge principalmente il sistema nervoso centrale.

I primi sintomi includono languore, sonnolenza e debolezza nelle gambe. Un aspetto simile a una maschera sul viso, disturbi emotivi come una risata incontrollabile e un'andatura spastica con tendenza a cadere nel camminare sono le conclusioni in casi più avanzati. Un'alta incidenza di polmonite è stata riscontrata in lavoratori esposti alla polvere o ai fumi di alcuni composti di manganese. Per quanto a nostra conoscenza, le proprietà chimiche, fisiche e tossicologiche non sono state investigate a fondo.

## **SEZIONE 12. Informazioni ecologiche**

### **12.1. Tossicità**

Nessun dato disponibile.

Il prodotto è da considerarsi come pericoloso per l'ambiente e presenta tossicità per gli organismi acquatici con la possibilità di provocare a lungo termine effetti negativi per l'ambiente acquatico.

### **12.2. Persistenza e degradabilità**

Il metodo di decomposizione biologica non è applicabile alle sostanze inorganiche.

### **12.3. Potenziale di bioaccumulo**

Nessuna informazione disponibile.

### **12.4. Mobilità nel suolo**

Alta poiché il prodotto è molto solubile in acqua.

### **12.5. Risultati della valutazione PBT e vPvB**

Non classificato come PBT/vPvB.

### **12.6. Altri effetti avversi**




In alte concentrazioni, questo prodotto può essere pericoloso per la vita acquatica. A causa del basso pH associato a questo prodotto, le piante contaminate da questo prodotto possono essere danneggiate o distrutte. Gli animali contaminati da questa soluzione possono essere gravemente feriti o uccisi.

**SEZIONE 13. Considerazioni sullo smaltimento**
**Informazioni generali**
**13.1. Metodi di trattamento dei rifiuti**

I rifiuti sono classificati come rifiuti pericolosi. Praticare lo smaltimento in discariche autorizzate secondo quanto disposto dalle autorità locali per i rifiuti. Stesso vale per i contenitori.

**SEZIONE 14. Informazioni sul trasporto**

Il trasporto deve essere effettuato negli imballaggi originali e, comunque, in imballaggi che siano costituiti da materiali inattaccabili dal contenuto e non suscettibili di generare con questo reazioni pericolose. Gli addetti al carico e allo scarico della merce pericolosa devono aver ricevuto un'appropriata formazione sui rischi presentati dal preparato e sulle eventuali procedure da adottare nel caso si verifichino situazioni di emergenza.

	<b>ADR/RID/ADN</b>	<b>IMDG</b>	<b>IATA</b>
<b>14.1 UN N.</b>	3077	3077	3077
<b>14.2 Nome di spedizione ONU</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese (II) chloride 4-hydrate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese (II) chloride 4-hydrate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese (II) chloride 4-hydrate)
<b>14.3 Classi di pericolo connesse al trasporto</b>	Classe 9 	Classe 9 	Classe 9 
<b>14.4 Gruppo d'imballaggio</b>	III	III	III
<b>14.5 Pericoli per l'ambiente</b>	SI	SI	SI
<b>14.6 Precauzioni speciali per gli utilizzatori</b>	Nessuna informazione disponibile	Nessuna informazione disponibile	Nessuna informazione disponibile
<b>14.7. Trasporto di sfuso secondo l'appendice II della Convenzione Marpol 73/78 e secondo il codice IBC</b> Nessuna informazione disponibile			

**SEZIONE 15. Informazioni sulla regolamentazione**
**15.1. Norme e legislazione su salute, sicurezza e ambiente specifiche per la sostanza o la miscela**

Categoria Seveso:

E2

Restrizioni relative al prodotto secondo l'Allegato XVII Reg. (CE) 1907/2006:

NESSUNA

Sostanze in Candidate List (Art. 59 REACH):

NESSUNA

Sostanze soggette ad autorizzazione (Allegato XIV REACH):

NESSUNA

Controlli Sanitari:

I lavoratori esposti a questo agente chimico pericoloso per la salute devono essere sottoposti alla sorveglianza sanitaria effettuata secondo le disposizioni dell'art. 41 del D.Lgs. 81 del 9 aprile 2008 salvo che il rischio per la sicurezza e la salute del lavoratore sia stato valutato irrilevante, secondo quanto previsto dall'art. 224 comma 2.

**SEZIONE 16. Altre informazioni**

Scheda di sicurezza revisionata in accordo con il Regolamento (CE) 453/2010

Acute Tox. (Oral) Cat. 4

Acquatic Chronic Cat. 2

*Testo completo delle frasi H di cui alla sezione 3.*

H302 Nocivo se ingerito

H411 Tossico per gli organismi acquatici con effetti di lunga durata

**BIBLIOGRAFIA GENERALE:**

1. Regolamento (CE) 1907/2006 del Parlamento Europeo (REACH)
2. Regolamento (CE) 1272/2008 del Parlamento Europeo (CLP) e successivi APT
3. Regolamento (CE) 453/2010 del Parlamento Europeo
4. Regolamento (CE) 830/2015 del Parlamento Europeo
5. The Merck Index. Ed. 10
6. Handling Chemical Safety
7. Niosh - Registry of Toxic Effects of Chemical Substances
8. INRS - Fiche Toxicologique
9. Patty - Industrial Hygiene and Toxicology
10. N.I. Sax - Dangerous properties of Industrial Materials-7 Ed., 1989
11. GESTIS Substance Database:  
<http://www.dguv.de/ifa/en/gestis/stoffdb/index.jsp>
12. Sito ECHA: <http://apps.echa.europa.eu/registered/registered-sub.aspx>

**15.2. Valutazione della sicurezza chimica**

E' stata elaborata una valutazione di sicurezza chimica.

Legenda

ACGIH	: American Conference of Governmental Industrial Hygienists
ADR / RID	: Accordo europeo per il trasporto delle merci pericolose su strada
CAS	: Chemical Abstract Service
CLP	: Regolamento (CE) 1272/2008
DNEL	: Livello derivato senza effetto
EC 50	: Half maximal effective concentration
EINECS	: European Inventory of Existing Commercial Chemical Substances
GHS	: Sistema armonizzato globale per la classificazione e l'etichettatura dei prodotti chimici
IATA / ICAO	: Regolamento per il trasporto di merci pericolose della associazione internazionale del trasporto aereo
IMDG / IMO	: Codice marittimo internazionale per il trasporto delle merci pericolose
IMO	: International Maritime Organization
IUCLID	: International Uniform Chemical Information Database



LC 50	: Concentrazione letale 50%
LD 50	: Dose letale 50%
LOAEL	: Lowest Observed Adverse Effect Levels
N.A.	: Non Applicabile
N.D.	: Non Disponibile
NOAEL	: No Observed Adverse Effect Level
NOEC	: No Observed Effect Concentration
Numero EC	: Numero identificativo in ESIS (archivio europeo delle sostanze esistenti)
Numero INDEX	: Numero identificativo nell'Allegato VI del CLP
OCSE	: Organizzazione per la cooperazione e lo sviluppo economico
OECD	: Organization for Economic Co-operation and Development
OEL	: Livello di Esposizione Occupazionale
PBT	: Persistente, bioaccumulabile e tossico secondo il REACH
PEL	: Livello prevedibile di esposizione
PNEC	: Concentrazione prevedibile priva di effetti
PNOC	: Concentrazione di polveri aerodisperse
REACH	: Regolamento (CE) 1907/2006
RID	: Regolamento per il trasporto internazionale di merci pericolose su treno
TLV	: Valore limite di soglia
TLV CEILING	: Concentrazione che non deve essere superata durante qualsiasi momento dell'esposizione lavorativa
TWA STEL	: Limite di esposizione a breve termine
TWA	: Limite di esposizione medio pesato
VLEP	: Valore Limite Esposizione Professionale
VOC	: Composto organico volatile
vPvB	: Molto persistente e molto bioaccumulabili secondo REACH

### Nota per l'utilizzatore

Le informazioni contenute in questa scheda si basano sulle conoscenze disponibili presso di noi alla data dell'ultima versione. L'utilizzatore deve assicurarsi della idoneità e completezza delle informazioni in relazione allo specifico uso del prodotto.

Non si deve interpretare tale documento come garanzia di alcuna proprietà specifica del prodotto. Poiché l'uso del prodotto non cade sotto il nostro diretto controllo, è obbligo dell'utilizzatore osservare sotto la propria responsabilità le leggi e le disposizioni vigenti in materia di igiene e sicurezza. Non si assumono responsabilità per usi impropri. Fornire adeguata formazione al personale addetto all'utilizzo di prodotti chimici.

## **EXPOSURE SCENARIO No. 1:**

### **Formulation of fertiliser solutions containing MnCl<sub>2</sub> and use of solution containing MnCl<sub>2</sub> by spraying solutions**

#### **1. Sector of Use (SU)**

SU 1: Agriculture, forestry, fishery

SU 10: Formulation [mixing] of preparations and/or re-packaging

SU 21: Private households (=general public =consumers)

#### **2. Process Category (PROC)**

PROC 2: Use in closed, continuous process with occasional controlled exposure (e.g. sampling)

PROC 3: Use in closed batch process (synthesis or formulation)

PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 11: Spraying outside industrial settings or applications

#### **3. Product category (PC)**

PC 12: Fertilizers

#### **4. Environmental Release Category (ERC)**

ERC 8d: Wide dispersive outdoor use of processing aids in open systems

#### **5. Processes, tasks, activities included in the scenario**

Manganese chloride is used in the agricultural sector to correct manganese deficiency in the soil. The formulation of fertilizers containing manganese chloride takes place in a range of processes, such as closed, contained processes with almost no possibility of direct contact to semi-closed or open multistage processes providing the opportunity for significant exposure at any stage. Flakes of manganese chloride may be delivered to professionals/farmers who empty the transport containers or bags, mix the solid with water and apply the resulting solution to the field or growing crop using a motorised sprayer. Alternatively a solution of up to 30% manganese chloride could be supplied for direct use in spraying.

#### **6. Product characteristics**

Liquid fertilizers containing manganese chloride (at <1%), where manganese chloride is a micro-nutrient and formulation of solutions containing 30% MnCl<sub>2</sub> (covered by MEASE scenario for > 25% solutions)

#### **7. Maximum annual tonnes**

Up to 50 tonnes of MnCl<sub>2</sub> will be used per year in the EU.

## 8. Duration and frequency of exposure

Formulation of fertilizers with manganese chloride flakes may occur on approximately 200 to 300 days per year up to 24 hours a day.

Preparation and spraying of manganese chloride solutions may occur on 150 days per year. Workers may have to repeat the activities several times a day and the exposure duration may be up to 8 hours per working day.

## 9. Technical conditions and measures to reduce or avoid human exposure

During formulation of fertiliser solutions containing >25% MnCl<sub>2</sub>, LEV is not required either during handling of the solid during transfer or during the normal working shift, with respect to exposure to MnCl<sub>2</sub>. This risk mitigation would apply to concentrations that are less than 25%, since the mitigation is related to the handling of the solid, which would be a common step throughout. Therefore it would include formulation of general liquid fertilisers where MnCl<sub>2</sub> is present at < 1% as a micronutrient.

During transfer of MnCl<sub>2</sub> flakes to water to make solutions for spraying, the farmer/professional does not require RPE.

In the case of application of the 30% solution of MnCl<sub>2</sub> via air-assisted sprayer, in order to apply the quantity in the table above at the rate specified, the worker **must** be in an enclosed cabin with positive pressure and functioning filtration unit. This is based on the EFSA opinion on exposure during spraying using air-assisted sprayer.

In the case of application of the 30% solution of MnCl<sub>2</sub> via air-assisted sprayer, in order to apply the quantity specified at the rate specified, the worker **must** be in an enclosed cabin with positive pressure and functioning filtration unit. This is based on the EFSA opinion on exposure during spraying using air-assisted sprayer.

During mixing/loading of a maximum of 206 kg of wettable powder fertiliser (with 1% MnCl<sub>2</sub>) or 1032 kg of fertiliser (with 0.2% MnCl<sub>2</sub>) and the subsequent application by air-assisted sprayer on 8 hectares of orchards (or equivalent), **no risk mitigation measures** are required.

During mixing/loading of a maximum of 1600 kg of fertiliser (with 0.2% MnCl<sub>2</sub>) or 320 kg fertiliser (with 1% MnCl<sub>2</sub>) and the subsequent application over 20 hectares of agricultural land, using a boom-sprayer, **no risk mitigation measures** are required.

During mixing/loading of up to 1080 lt of liquid fertiliser (with 0.2% MnCl<sub>2</sub>) and its subsequent application over 8 hectares of orchards (or equivalent), using air-assisted spraying, **no risk mitigation measures** are required.

During mixing/loading of up to 1900 lt of liquid fertiliser (with 0.2% MnCl<sub>2</sub>) and its subsequent application over 20 hectares of agricultural land, using a boom-sprayer, **no risk mitigation measures** are required.

No risk mitigation is required for worker re-entry to field sprayed with MnCl<sub>2</sub> solution.

No risk mitigation measures are required by the professional when handling undiluted fertiliser containing < 1% MnCl<sub>2</sub> as micronutrient, for use in fertigation systems.

PROC	LEV	Respiratory protection
3	No	No
4		
5		
8b		

**10. Conditions and measures related to personal protection, hygiene and health protection**

During formulation of fertiliser solutions containing >25% MnCl<sub>2</sub> gloves (with 90% protection, and where workers receive basic training) are only required when handling the solid flakes. When pure MnCl<sub>2</sub> is being handled, eye protection should also be worn due to the classification as severe eye irritant.

Based on the type of use-pattern, it is realistic to assume that a farmer would make up their solution outside, where some natural ventilation is present. During transfer of MnCl<sub>2</sub> flakes to water to make solutions for spraying, the farmer/professional should wear gloves with an efficiency of 90% (PROC 9) or 95% (PROC 8a). Eye protection should be worn.

During application of a 30% solution of MnCl<sub>2</sub> - made up from supplied MnCl<sub>2</sub> flake - onto agricultural land ,the model used assumes 99% protection from the gloves. Normal coveralls should be worn, and appropriate eye protection.

In the case of application of the 30% solution of MnCl<sub>2</sub> to agricultural land using a boom-sprayer at the quantity and area specified, gloves (99% protection assumed in model), and coveralls should be worn. Eye protection is recommended.

For exposure during mixing/loading and application of a supplied 30% solution of MnCl<sub>2</sub> onto agricultural land the model used, assumes 99% protection from the gloves. Normal coveralls should be worn during application, and appropriate eye protection for mixing/loading and application is recommended.

In the case of application of the 30% solution of MnCl<sub>2</sub> to agricultural land using a boom-sprayer at the quantity and area specified, gloves (99% protection assumed in model), and coveralls should be worn. Eye protection is recommended. It is not considered likely that solutions greater than 30% MnCl<sub>2</sub> would be supplied. However, if they were, it is considered that the exposure would be similar, as it would be the actual amount of MnCl<sub>2</sub> (in kg) applied per area, upon which the model bases exposure. There would be less of such a higher strength solution handled at the loading stage, hence less exposure time, so exposure would be similar to a larger amount at a lower concentration, over a longer loading time. Therefore it is appropriate to recommend similar protective equipment as for a 30% solution.

In relation to application by air-sprayer, during mixing/loading of worst-case maximum of 12400 kg of wettable powder fertiliser containing up to 1% MnCl<sub>2</sub> (as micronutrient), gloves (99% assumed in model) should be worn together with RPE (type FFP2SL or P2). For subsequent application of this quantity over 8 hectares of orchards (or equivalent where upward spraying involved), using air-assisted sprayer , gloves (99% protection), coveralls and an enclosed cabin with positive pressure and functioning filtration unit must be used (in accordance with EFSA opinion).

In relation to application by boom-sprayer, during mixing/loading of worst-case maximum of 9200 kg of wettable powder fertiliser containing up to 1% MnCl<sub>2</sub>, gloves (99% protection) and RPE (type A12P) should be worn and during application of this amount over 20 hectares, using a boom-sprayer, gloves (99% protection) and coveralls should be worn. In the case of boom-sprayers , no cabin can be used to increase the protection factor as the model utilises data which was partially based on exposure where cabins were used, so can't be used (EFSA opinion).

**Exposure during farmer/professional mixing and loading of wettable powder (containing up to 1% MnCl<sub>2</sub>) to produce solution for application by spraying**

Activity	RMMs
<b>Mixing and loading:</b> 12400 kg of wettable powder containing 1% MnCl <sub>2</sub> (for <u>air-assisted sprayer</u> on tractor)	Gloves, RPE ( <b>type FFP2SL or P2</b> )
<b>Application:</b> 12400 kg of fertiliser containing 1% MnCl <sub>2</sub> at rate up to 1550 kg/ha using <u>air-assisted spraying</u> over 8 hectares of orchards.	Gloves, coveralls, <u>enclosed tractor cabin with positive pressure and functioning filtration unit</u>
<b>Mixing and loading:</b> 9200 kg of wettable powder containing 1% MnCl <sub>2</sub> (for <u>boom-sprayer</u> )	Gloves,RPE whilst loading ( <b>type A12P</b> )

<p><b>Application:</b> 9200 kg of fertiliser (containing 1% MnCl<sub>2</sub>) over 20 hectares, using <u>boom sprayer</u></p>	Gloves, coveralls.
<p><b>Mixing and loading:</b> a) 206 kg of general fertiliser containing 1% MnCl<sub>2</sub> for application over 8 hectares using <u>air-assisted sprayer</u> b) 1032 kg general fertiliser containing 0.2% MnCl<sub>2</sub>, for application over 8 hectares, using <u>air-assisted sprayer</u></p>	<b>NO RMM</b>
<p><b>Application:</b> a) 206 kg of general fertiliser containing 1% MnCl<sub>2</sub> for application over 8 hectares using <u>air-assisted sprayer</u> b) 1032 kg general fertiliser containing 0.2% MnCl<sub>2</sub>, for application over 8 hectares, using <u>air-assisted sprayer</u></p>	<b>No RMM</b>
<p><b>Mixing and loading:</b> a) 1600 kg of general fertiliser containing 0.2% MnCl<sub>2</sub> for application over 20 hectares with <u>boom-sprayer</u>. Assumed 3 hr required. b) 320 kg of general fertiliser containing 1% MnCl<sub>2</sub>, for application over 20 hectares with <u>boom-sprayer</u>. Assumed 1 hr required.</p>	<b>No RMM</b>
<p><b>Application:</b> a) 1600 kg of general fertiliser containing 0.2% MnCl<sub>2</sub>, over 20 hectares using tractor with <u>boom-sprayer</u>. b) 320 kg of general fertiliser containing 1% MnCl<sub>2</sub>, over 20 hectares using <u>boom-sprayer</u>.</p>	<b>No RMM.</b>

**Exposure during application of a 30% solution of MnCl<sub>2</sub> (made up from supplied MnCl<sub>2</sub> flake) agricultural land**

Activity	RMMs
<p><b>Application:</b> 224 L of 30% MnCl<sub>2</sub> solution (equiv to 67.2 kg MnCl<sub>2</sub>) over 8 hectares of orchards, via <u>air-assisted sprayer</u> (linked to Ecetoc PROC 9 for mixing/loading of flakes)</p>	Gloves, coveralls, <u>enclosed tractor cabin</u> with positive pressure <u>and</u> functioning filtration unit.
<p><b>Application:</b> 440 Lt of 30% MnCl<sub>2</sub> solution (equiv to 132 kg MnCl<sub>2</sub>) over 20 hectares using <u>spray boom</u> (linked to PROC 8a for mixing/loading of flake)</p>	Gloves, coverall, sturdy footwear

**Exposure during mixing/loading and application of a supplied 30% solution of MnCl<sub>2</sub> onto field or open space**

Activity	RMMs
<p><b>Mixing/loading :</b> 400 lt of 30% solution of MnCl<sub>2</sub> (equiv to 13% Mn) for use with <u>air-assisted sprayer</u></p>	Gloves.
<p><b>Application :</b> 400 lt of 30% solution onto 8 hectares of</p>	Gloves, coveralls, enclosed cabin with positive pressure <u>and</u> functioning filtration

orchards using tractor with <u>air-assisted sprayer</u>	unit.
<b>Mixing/loading:</b> 316 lt of 30% solution (equiv to 94.8 kg of MnCl <sub>2</sub> ) for use with <u>boom sprayer</u>	Gloves
<b>Application:</b> 316 lt of <u>supplied 30%</u> solution of MnCl <sub>2</sub> (equiv to 94.8 kg of MnCl <sub>2</sub> ) onto 20 hectares using tractor with <u>boom sprayer</u> .	Gloves, coveralls

**Exposure during farmer/professional mixing and loading of liquid fertiliser (containing up to 0.2% MnCl<sub>2</sub>) to and application by spraying**

Activity	RMMs
<b>Mixing/loading:</b> 1080 lt of liquid fertiliser containing 0.2% of MnCl <sub>2</sub> (equiv to 0.09% Mn) for use with <u>air-assisted sprayer</u>	No RMM
<b>Application:</b> 1080 lt of liquid fertiliser containing 0.2% of MnCl <sub>2</sub> (equiv to 0.09% Mn) for application with <u>air-assisted sprayer</u> over 8 hectares of orcha	No RMM
<b>Mixing/loading:</b> 1900 lt of liquid fertiliser containing 0.2% of MnCl <sub>2</sub> (equiv to 0.09% Mn) for use with <u>boom sprayer</u>	No RMM
<b>Application :</b> 1900 lt of liquid fertiliser containing 0.2% of MnCl <sub>2</sub> (equiv to 0.09% Mn) for application over 20 hectares with <u>boom sprayer</u>	No RMM

**11. Emission values of substances for various elements of the environment**

**Summary of the releases to the environment**

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation (kg/d)	Justification
<b>Tier 1</b>	Emission to air during episode	0.0274	13.7	based on tonnage of 50 and ERC8d Default release of 100%
	Emission to wastewater during episode	0.0274	11	Release prior to STP based on tonnage of 50 and ERC8d Default release of 100%
	Emission to surface water	---	16.4	Regional loss to freshwater
	Emission to industrial soil	---	2.74	based on tonnage of 50 and ERC8d Default release of 20%
	Emission to agricultural	---	2.74	based on tonnage of 50 and ERC8d Default

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation (kg/d)	Justification
	soil			release of 20%

## 12. Technical conditions and measures to reduce or avoid environmental exposure

By definition, MnCl<sub>2</sub> is applied to agricultural fields or pots of soil where there is a manganese deficiency and therefore the application of the MnCl<sub>2</sub> will not result in levels significantly above the natural range of manganese levels in soil. Overall it is therefore concluded that there is no adverse environmental impact from the formulation/use of MnCl<sub>2</sub> as a liquid fertilizer and that the tier 1 PEC values in soil have no relevance in this context.

In addition the PEC values are less or in the range of the background concentration of manganese in European environments (15.9 µg Mn/L in surface water, 452 mg/kg in sediment, 428.6 mg/kg in soil; "Probabilistic Distribution of Manganese in European Surface Water, Sediment and Soil and Derivation of Predicted Environmental Concentrations (PEC)", Parametrix, 2009 and supported by GEMAS data). Hence, they are considered to show that there will be no risk to the environment from this use.

## 13. Exposure concentration in sewage treatment plants (STP)

Predicted Exposure Concentrations (PEC) in sewage

Assessment	Compartment	Value	Justification
Tier 1	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	0.011	EUSES-Output
	Concentration in sewage sludge (in mg/kg dwt.)	6.91	EUSES-Output

## 14. Waste management measures

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be treated in a sewage treatment plant prior to discharge into the environment, characterized by purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

### Shortcuts included in the document:

RPE – Respiratory Protective Equipment  
 PEC – Predicted Exposure Concentrations  
 STP – Sewage Treatment Plant  
 LEV – Local Exhaust Ventilation  
 ES – Exposure Scenario  
 RMM – Risk Management Measures

## **EXPOSURE SCENARIO No. 2:**

### **Formulation of granulate fertilizers and professional and private use of fertiliser granulates containing MnCl<sub>2</sub>**

#### **1. Sector of Use (SU)**

SU 0-2: Other activities related to manufacturing of chemical products

SU 1: Agriculture, forestry, fishery

SU 3: Industrial manufacturing

SU 10: Formulation [mixing] of preparations and/or re-packaging

SU 21: Private households (=general public =consumers)

SU 22: Public domain (administration, education, entertainment, services, craftsmen)

#### **2. Process Category (PROC)**

PROC 3: Use in closed batch process (synthesis or formulation)

PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC 14: Production of preparations or articles by tableting, compression, extrusion, peletisation

PROC 26: Handling of solid inorganic substances at ambient temperature

#### **3. Product category (PC)**

PC 12: Fertilizers

#### **4. Environmental Release Category (ERC)**

ERC 11b: Wide dispersive indoor use of long-life articles and materials with high or intended release

#### **5. Processes, tasks, activities included in the scenario**

The formulation of fertilizers containing manganese chloride takes place in a range of processes, such as closed batch processes to semi-closed or open multistage processes providing the opportunity for significant exposure at any stage. Fertilisers containing manganese chloride are available to professional and private users. These preparations normally are in the form of granulates, which can be dissolved in irrigation water or in the form of a small rod that can be placed in flowerpots and is meant to release the nutrients over a longer period. Gardeners may use such fertilisers regularly, e.g. on 100 to 150 days per year, whereas private users will use the fertilisers infrequently, e.g. 4 times a year.

#### **6. Product characteristics**

Granulate fertilizers



## 7. Maximum annual tonnes

Up to 50 tonnes of MnCl<sub>2</sub> will be used per year in the EU.

## 8. Duration and frequency of exposure

Formulation of fertilizers with manganese chloride flake may occur on approximately 200 to 300 days per year up to 24 hours a day.

The exposure duration during the application of the fertilizer is expected to be considerably less than 8 hours per day.

## 9. Technical conditions and measures to reduce or avoid human exposure

### Formulation of solid fertilisers containing < 1% MnCl<sub>2</sub> (i.e. as micronutrient)

PROC	LEV (efficacy in %)	Respiratory protection
3	No	
4	90	
5	90	
8b	No	
9	No	No
14	No	
26 (MEASE was used, as no equivalent in ECETOC)	90	

## 10. Conditions and measures related to personal protection, hygiene and health protection

During loading and application of granulate fertiliser to bare agricultural land, the worker should wear suitable gloves. The model used to obtain the exposure does not specify what constitutes suitable, but it is advisable that they give 90% protection. No RPE is required, and eye protection is not needed for the MnCl<sub>2</sub> when present at less than 3% in the formulation. For application of granule fertiliser to other open areas (parks, public lawns, golf courses) this is regarded as the same as scenario for spreading over bare agricultural land, so only suitable gloves are recommended. No eye protection or RPE is needed.

**Exposure to manganese chloride during loading and application of fertilizer on bare agricultural land and application to paved surfaces and use in amenity/horticultural situations.**

Activity	RMMs
<b>Loading</b> up to 19800 kg of <b>granule</b> fertiliser containing 1% MnCl <sub>2</sub> (equivalent to 0.44% Mn)	Suitable gloves
<b>Application</b> of up to 19800 kg of <b>granule</b> fertiliser containing 1% MnCl <sub>2</sub> , over 20 hectares of bare ground, using Tractor.	Suitable gloves
<b>Loading/Application</b> of up to 80 kg of <b>granule</b> fertiliser containing 1% MnCl <sub>2</sub> (Hand-held use on paved surfaces and use in amenity/horticultural situations)	Suitable gloves

**Exposure to manganese chloride during consumer application of fertilizer on lawns and gardens**

Activity	RMMs
Application of solid fertiliser (containing up to 0.09%Mn)	None

## 11. Emission values of substances for various elements of the environment

### Summary of the releases to the environment

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation (kg/d)	Justification
Tier 1	Emission to air during episode	0.0274	13.7	based on tonnage of 50 and ERC11b Default release of 100%
	Emission to wastewater during episode	0.0274	11	Release prior to STP based on tonnage of 50 and ERC11b Default release of 100%
	Emission to surface water	n.a.	2.74	Regional loss to freshwater
	Emission to industrial soil	n.a.	n.a.	Not applicable (n.a) according to Table R16-23 in this ERC
	Emission to agricultural soil	n.a.	n.a.	

## 12. Technical conditions and measures to reduce or avoid environmental exposure

By definition,  $MnCl_2$  is applied to agricultural fields or pots of soil where there is a manganese deficiency and therefore the application of the  $MnCl_2$  will not result in levels significantly above the natural range of manganese levels in soil. Overall it is therefore concluded that there is no adverse environmental impact from the formulation/use of  $MnCl_2$  as a granulate fertilizer and that the tier 1 PEC values in soil have no relevance in this context.

In addition the PEC values are less or in the range than the background concentration of manganese in European environments (15.9  $\mu g$  Mn/L in surface water, 452 mg/kg in sediment, 428.6 mg/kg in soil; "Probabilistic Distribution of Manganese in European Surface Water, Sediment and Soil and Derivation of Predicted Environmental Concentrations (PEC)", Parametrix, 2009 and supported by GEMAS data). Hence, they are considered to show that there will be no risk to the environment from this use.

## 13. Exposure concentration in sewage treatment plants (STP)

Predicted Exposure Concentrations (PEC) in sewage

Assessment	Compartment	Value	Justification
Tier 1	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	0.011	EUSES-Output
	Concentration in sewage sludge (in mg/kg dwt.)	6.91	EUSES-Output

## 14. Waste management measures

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be

treated in a sewage treatment plant prior to discharge into the environment, characterized by purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

**Shortcuts included in the document:**

RPE – Respiratory Protective Equipment  
PEC – Predicted Exposure Concentrations  
STP – Sewage Treatment Plant  
LEV – Local Exhaust Ventilation  
ES – Exposure Scenario  
RMM – Risk Management Measures

## **EXPOSURE SCENARIO No. 3:**

### **Unloading, packaging and cleaning in industrial settings**

#### **1. Sector of Use (SU)**

SU 3: Industrial manufacturing

SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)

SU 10: Formulation [mixing] of preparations and/or re-packaging

#### **2. Process Category (PROC)**

PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

#### **3. Product category (PC)**

Not applicable

#### **4. Environmental Release Category (ERC)**

Not applicable

#### **5. Processes, tasks, activities included in the scenario**

The use of manganese chloride in industrial manufacturing and formulation requires unloading of manganese chloride and/or preparations containing the substance from transport containers of varying size. At the end of the processes the final manganese chloride products or the formulated preparations are packed for shipment. Both, unloading and packaging can be performed at dedicated facilities and may involve more or less automated and contained processes. The industrial processes could lead to limited formation of manganese chloride dust and other dusts, which need to be removed regularly by cleaning the facilities. Unloading, packaging and cleaning processes can be performed at industrial indoor and outdoor settings.

#### **6. Product characteristics**

The manganese chloride products or formulated preparations containing the substance

#### **7. Maximum annual tonnes**

These scenarios are covered by the assessments for ES 1 and 2.

#### **8. Duration and frequency of exposure**

Unloading, packaging and cleaning may occur more or less intermittently during normal working days on up to 360 days per year. While packaging may be performed nearly continuously for 24 hours a day, it is expected that unloading and cleaning operations take significantly less than a working shift of 8 hours per day or are performed in campaigns that may take a full working shift and may be distributed over the year.

#### **9. Technical conditions and measures to reduce or avoid human exposure**

The workers may experience inhalation exposure to dusts during the unpackaging of manganese chloride (due to grinding of flakes during transport from outside the EU), and also to products containing manganese chloride and during cleaning. No measured long-term occupational exposure concentrations are available. The long-term occupational exposure concentrations are

calculated with the ECETOC TRA tool (ECETOC 2010), taking into account a low dustiness of the substance. To cover the packaging at dedicated facilities and the use of large and small containers, 8b (dedicated facilities, large containers) and 9 (dedicated facilities, small containers) are used to calculate the exposure concentrations.

Cleaning is represented by PROC 8b, as intimate contact with undiluted substance is possible. The maximum 8-hour TWA concentration is 0.1 mg/m<sup>3</sup> when no LEV and respiratory protection is used. This corresponds to a manganese concentration of 0.04 mg/m<sup>3</sup>.

During the handling and use of aqueous manganese chloride solutions, no inhalation exposure is expected because the vapour pressure of manganese chloride is very low which makes evaporation of the substance very unlikely.

No measured acute peak concentrations occurring during transfer activities and cleaning are available. The exposure concentration calculated with TRA tool for exposure duration of 8 hours is highest due to the nature of the model always predicting 8-hour TWA concentrations. The concentration obtained for 8-hour duration is considered as a good approximation of the acute inhalation exposure concentrations which may occur during transfer activities and cleaning. The exposures in the table below are for pure MnCl<sub>2</sub> and considered to cover exposure to solutions for MnCl<sub>2</sub> as well.

**Exposure to manganese chloride flakes and preparations, for unloading, packaging and cleaning in industrial settings**

PROC	LEV (efficacy in %)
8b	no
9	no

**Exposure to manganese chloride solutions (>25%)**

PROC	LEV (efficacy in %)
8b	no
9	no

**10. Conditions and measures related to personal protection, hygiene and health protection**

Generally, during unloading, packaging and cleaning in industrial settings, where solid MnCl<sub>2</sub> exposure may occur, workers should wear gloves with 90% protection and have basic training with these gloves, unless higher protection is specified in the specific exposure scenario for an identified use. Eye protection should be worn when handling MnCl<sub>2</sub> flakes or solutions above 3% concentration. No RMM is needed for solutions of MnCl<sub>2</sub>, on assumption that no aerosol formation can occur during handling activity.

**11. Emission values of substances for various elements of the environment**

No environmental exposure assessment was performed for this use. These scenarios are covered by the risk assessments for ES 1 and 2.

**12. Technical conditions and measures to reduce or avoid environmental exposure**

These scenarios are covered by the assessments for ES 1 and 2.

**13. Exposure concentration in sewage treatment plants (STP)**

These scenarios are covered by the assessments for ES 1 and 2.

**14. Waste management measures**

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be treated in a sewage treatment plant prior to discharge into the environment, characterized by

purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

**Shortcuts included in the document:**

RPE – Respiratory Protective Equipment

PEC – Predicted Exposure Concentrations

STP – Sewage Treatment Plant

LEV – Local Exhaust Ventilation

ES – Exposure Scenario

RMM – Risk Management Measures

ECETOC-TRA - Tier 1 software tool that can be used to generate exposure/emissions estimates in the absence of (measured) data.

TRA – Targeted Risk Assessment

TWA - Time-weighted average exposure

## **EXPOSURE SCENARIO No. 4:**

### **Surface treatment of seeds with manganese chloride**

#### **1. Sector of Use (SU)**

SU 3: Industrial manufacturing

SU 22: Public domain (administration, education, entertainment, services, craftsmen)

#### **2. Process Category (PROC)**

PROC 13: Treatment of articles by dipping and pouring

#### **3. Product category (PC)**

PC 12: Fertilizers

#### **4. Environmental Release Category (ERC)**

ERC 8d: Wide dispersive outdoor use of processing aids in open systems

#### **5. Processes, tasks, activities included in the scenario**

Manganese chloride is used in the area of surface treatment of seeds that may be placed indoors or outdoors. On an industrial scale, seeds are (automatically) dipped into solutions containing the substance to treat their surfaces. On a professional scale, liquid mixtures available as such may be brushed onto surfaces or seeds dipped into the solution of manganese chloride. The surface treatment leads to the inclusion of the substance into or onto a matrix.

#### **6. Product characteristics**

Preparations containing manganese chloride

#### **7. Maximum annual tonnes**

Up to 5 tonnes  $MnCl_2$  will be used per year in the EU.

#### **8. Duration and frequency of exposure**

Industrial processes may be performed on up to 300 days per year up to 8 hours a day. The contact frequency for professional users may be up to 220 days per year and the contact duration may be up to 8 hours a day.

#### **9. Technical conditions and measures to reduce or avoid human exposure**

During surface treatment of seeds, no LEV is required with respect to  $MnCl_2$  exposure.

#### **10. Conditions and measures related to personal protection, hygiene and health protection**

During surface treatment of seeds, no gloves are required with respect to  $MnCl_2$  exposure, but eye protection should be worn when concentration is  $> 3\%$   $MnCl_2$ .

## 11. Emission values of substances for various elements of the environment

### Summary of the releases to the environment

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation for formulation and service life (kg/d)	Justification
Tier 1	Emission to air during episode	formulation: 2.74E-03 Service life: 0	1.37	based on tonnage of 5 and ERC8d Default release of 100% for formulation and 0% for service life
	Emission to wastewater during episode	Formulation: 2.74E-03 Service life: 8.8E-04	1.1	Release prior to STP based on tonnage of 5 and ERC8d Default release of 100% and 3.2% for service life
	Emission to surface water	Not considered on the local scale	1.64	Regional loss to freshwater
	Emission to industrial soil	Not considered on the local scale	0.274	based on tonnage of 5 and ERC8d Default release of 20% and 3.2% for service life
	Emission to agricultural soil	Not considered on the local scale	0.274	based on tonnage of 5 and ERC8d Default release of 20% and 3.2% for service life

## 12. Technical conditions and measures to reduce or avoid environmental exposure

MnCl<sub>2</sub> is used as a seed dressing and therefore the application of the MnCl<sub>2</sub> will not result in levels significantly above the natural range of manganese levels in soil. Overall it is therefore concluded that there is no adverse environmental impact and that the tier 1 PEC values in soil have no relevance in this context. In addition the waste stage of treated seeds is considered to be covered by the service life stage.

## 13. Exposure concentration in sewage treatment plants (STP)

### Predicted Exposure Concentrations (PEC) in sewage

Assessment	Compartment	Value	Justification
Tier 1	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	1.1E-03	EUSES-Output



(formulation/ use)	Concentration in sewage sludge (in mg/kg d.w.)	0.691	EUSES-Output
Tier 1 (service life)	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	3.52E-04	EUSES-Output
	Concentration in sewage sludge (in mg/kg d.w.)	0.222	EUSES-Output

#### 14. Waste management measures

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be treated in a sewage treatment plant prior to discharge into the environment, characterized by purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

#### Shortcuts included in the document:

PEC – Predicted Exposure Concentrations

STP – Sewage Treatment Plant

LEV – Local Exhaust Ventilation

ES – Exposure Scenario

RMM – Risk Management Measures

## **EXPOSURE SCENARIO No. 5:**

### **Use of the substance in the production of other manganese based compounds and as intermediate**

#### **1. Sector of Use (SU)**

SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)

SU 9: Manufacture of fine chemicals

#### **2. Process Category (PROC)**

PROC 2: Use in closed, continuous process with occasional controlled exposure (e.g. sampling)

#### **3. Product category (PC)**

PC 19: Intermediate

#### **4. Environmental Release Category (ERC)**

ERC 6a: Industrial use of intermediates

#### **5. Processes, tasks, activities included in the scenario**

Manganese chloride as such or in aqueous solution is used for the production of other manganese based compounds and as intermediate in the manufacture of fine chemicals. It is used in closed continuous processes.

The workers have to transfer the manganese chloride from storage containers to the manufacturing equipment (covered in ES 3).

#### **6. Product characteristics**

Manganese-based compounds

#### **7. Maximum annual tonnes**

Up to 50 tonnes of  $MnCl_2$  will be used per year in the EU.

#### **8. Duration and frequency of exposure**

Manganese chloride may be used in the production of other manganese based compounds or as intermediate, in closed continuous processes, on up to 330 to 360 days per year 24 hours a day.

#### **9. Technical conditions and measures to reduce or avoid human exposure**

No LEV is needed (for PROC 2).

#### **10. Conditions and measures related to personal protection, hygiene and health protection**

During use of  $MnCl_2$  flake, gloves (90% protection with basic training) are sufficient. Eye protection should be worn for handling  $MnCl_2$  flakes and for solutions with  $> 3\%$   $MnCl_2$ .

## 11. Emission values of substances for various elements of the environment

### Summary of the releases to the environment

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation (kg/d)	Justification
Tier 1	Emission to air during episode	10	6.85	based on tonnage of 50 and ERC6a Default release of 5%
	Emission to wastewater during episode	4	2.19	Release prior to STP based on tonnage of 50 and ERC6a Default release of 2%
	Emission to surface water	---	3.29	Regional loss to freshwater
	Emission to industrial soil	---	0.137	based on tonnage of 50 and ERC6a Default release of 0.1%
	Emission to agricultural soil	---	0.137	based on tonnage of 50 and ERC6a Default release of 0.1%
Tier 2	Emission to air during episode	0	0	based on tonnage of 50 and refined emissions of 0% to air
	Emission to wastewater during episode	0	0	based on tonnage of 50 and refined emissions of 0% to water
	Emission to surface water	0	0	based on tonnage of 50 and refined emissions of 0% to water
	Emission to industrial soil	0	0.137	based on tonnage of 50 and ERC6a Default release of 0.1%
	Emission to agricultural soil	0	0.137	based on tonnage of 50 and ERC6a Default release of 0.1%

## 12. Technical conditions and measures to reduce or avoid environmental exposure

Wet waste from the manufacturing processes should be collected/ retained in a double plastic lined collecting pond on site.

### 13. Exposure concentration in sewage treatment plants (STP)

#### Predicted Exposure Concentrations (PEC) in sewage

Assessment	Compartment	Value	Justification
Tier 1	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	1.6	EUSES-Output
	Concentration in sewage sludge (in mg/kg d.w.)	1.01E+03	EUSES-Output
Tier 2	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	Not relevant, no local exposure waste water	EUSES-Output
	Concentration in sewage sludge (in mg/kg d.w.)	Not relevant, no local exposure to waste water	EUSES-Output

### 14. Waste management measures

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be treated in a sewage treatment plant prior to discharge into the environment, characterized by purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

#### Shortcuts included in the document:

PEC – Predicted Exposure Concentrations

STP – Sewage Treatment Plant

LEV – Local Exhaust Ventilation

ES – Exposure Scenario

# EXPOSURE SCENARIO No. 6:

Metal alloy production

## 1. Sector of Use (SU)

SU 3: Industrial manufacturing

SU 14: Manufacture of basic metals

## 2. Process Category (PROC)

PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities

PROC 23: Open processing and transfer operations (with minerals) at elevated temperature

PROC 26: Handling of solid inorganic substances at ambient temperature

## 3. Product category (PC)

not applicable

## 4. Environmental Release Category (ERC)

ERC 1: Production of chemicals

## 5. Processes, tasks, activities included in the scenario

Manganese chloride solid is used for the production of metal alloys mainly aluminium alloys and magnesium alloys. It is used in batch processes in an industrial setting. Open processing and transfer operations at elevated temperatures may occur. Workers will have to transfer manganese chloride from storage containers to the manufacturing equipment in a non-dedicated facility (PROC 8a). Transfer of  $\text{MnCl}_2$  into the manufacturing process (PROC 23) is most likely to be automated, as the contents in the vessel are likely to be very hot (magnesium and aluminum melt around  $650^\circ\text{C}$ ), with potential for fire risk if hot magnesium or aluminium vapours come into contact with air! Exposure to  $\text{MnCl}_2$  after addition (PROC 4) may occur, although the likelihood of  $\text{MnCl}_2$  existing as a substance after addition to the process is very low. This is because  $\text{Mn}^{2+}$  would be reduced to Mn by magnesium or aluminium and/or would form precipitates with impurities such as iron that are present. Therefore no further consideration of life-cycle for  $\text{MnCl}_2$  in the alloy is required after production, hence no AC category.

## 6. Product characteristics

$\text{MnCl}_2$  in metal alloy production (e.g. magnesium alloys, aluminium alloys)

## 7. Maximum annual tonnes

Up to 150 tonnes of Manganese dichloride will be used for the metal alloy production per year in the EU.

## 8. Duration and frequency of exposure

Manganese chloride may be used in the production of metal alloys, in batch processes, on up to 330 to 360 days per year 24 hours a day.

Exposure duration for PROC 4 and PROC 23b can be greater than 4 hours, but for handling  $\text{MnCl}_2$  (PROC 8a), exposure duration should be kept below 4 hrs when the same worker is working within the same facility where exposure from PROC 4 or PROC 23b can occur (i.e. cumulative exposure possible).

## 9. Technical conditions and measures to reduce or avoid human exposure

In all cases, LEV (90% efficacy) should be used.

## 10. Conditions and measures related to personal protection, hygiene and health protection

During exposure to MnCl<sub>2</sub> flake used in metal alloy production, workers should wear gloves (80% protection) for PROC 4 or PROC 23b and gloves (95% protection) for PROC 8a.

## 11. Emission values of substances for various elements of the environment

### Summary of the releases to the environment

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation (kg/d)	Justification
Tier 1	Emission to air during episode	30	20.5	based on tonnage of 150 and ERC1 Default release of 5%
	Emission to wastewater during episode	36	19.7	Release prior to STP based on tonnage of 150 and ERC1 Default release of 6%.
	Emission to surface water	---	25.5	Regional loss to freshwater
	Emission to industrial soil	---	0.0411	based on tonnage of 150 and ERC1 Default release of 0.01%
	Emission to agricultural soil	---	0.0411	based on tonnage of 150 and ERC1 Default release of 0.01%
Tier 2	Emission to air during episode	0	0	based on tonnage of 150 and refined emissions of 0% to air
	Emission to wastewater during episode	0	0	based on tonnage of 150 and refined emissions of 0% to water
	Emission to surface water	0	0	based on tonnage of 150 and refined emissions of 0% to water
	Emission to industrial soil	0	0.0411	based on tonnage of 150 and ERC1 Default release of 0.01%
	Emission to agricultural soil	0	0.0411	based on tonnage of 150 and ERC1 Default release of 0.01%

## 12. Technical conditions and measures to reduce or avoid environmental exposure

Wet waste from the manufacturing processes should be collected/retained in a double plastic lined collecting pond on site.

MnCl<sub>2</sub> is manufactured at a facility where the wet waste from the manufacturing processes is collected in a very large collecting pond on site. This is double plastic lined and has a capacity of 100,000 tonnes. Direct relevant emissions of MnCl<sub>2</sub> to waste water can therefore be excluded for this location.

## 13. Exposure concentration in sewage treatment plants (STP)

### Predicted Exposure Concentrations (PEC) in sewage

Assessment	Compartment	Value	Justification
Tier 1	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	14.4	EUSES-Output
	Concentration in sewage sludge (in mg/kg d.w.)	9.09E+03	EUSES-Output
Tier 2	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	Not relevant, no local exposure	EUSES-Output
	Concentration in sewage sludge (in mg/kg d.w.)	Not relevant, no local exposure	EUSES-Output

## 14. Waste management measures

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be treated in a sewage treatment plant prior to discharge into the environment, characterized by purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

### Shortcuts included in the document:

PEC – Predicted Exposure Concentrations

STP – Sewage Treatment Plant

LEV – Local Exhaust Ventilation

ES – Exposure Scenario

## **EXPOSURE SCENARIO No. 7:**

### **Use as laboratory reagent**

#### **1. Sector of Use (SU)**

SU 1: Agriculture, forestry, fishery

SU 3: Industrial manufacturing

SU 4: Manufacture of food products

SU 5: Manufacture of textiles, leather, fur

SU 6: Manufacture of pulp, paper and paper products

SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)

SU 9: Manufacture of fine chemicals

SU 10: Formulation [mixing] of preparations and/or re-packaging

SU 12: Manufacture of plastics products, including compounding and conversion

SU 13: Manufacture of other non-metallic mineral products, e.g. plasters, cement

SU 14: Manufacture of basic metals

SU 19: Building and construction work

SU 20: Health services

#### **2. Process Category (PROC)**

PROC 15: Use a laboratory reagent

#### **3. Product category (PC)**

PC 7: Base metals and alloys

PC 9a: Coatings and paints, thinners, paint removers

PC 12: Fertilizers

PC 15: Non-metal surface treatment products

PC 21: Laboratory chemicals

PC 23: Leather tanning, dye, finishing, impregnation and care products

PC 27: Plant protection products

PC 34: Textile dyes, finishing and impregnating products

PC 36: Water softeners

PC 37: Water treatment chemicals

PC 39: Cosmetics

#### **4. Environmental Release Category (ERC)**

ERC 8b: Wide dispersive indoor use of reactive substances in open systems

#### **5. Processes, tasks, activities included in the scenario**

The analysis of samples containing manganese chloride may be required. The laboratory staff has to prepare the samples and analyse them with appropriate analytical equipment. After the analysis,



the equipment has to be cleaned (covered in ES 3). Further, manganese chloride is supplied to chemical laboratories and schools for testing and experiments.

**6. Product characteristics**

Manganese chloride, samples containing manganese chloride

**7. Maximum annual tonnes**

Up to 150 tonnes of Manganese dichloride will be used for the metal alloy production per year in the EU.

**8. Duration and frequency of exposure**

Laboratory work with manganese chloride may occur on 330 to 360 days per year.

**9. Technical conditions and measures to reduce or avoid human exposure**

No LEV is needed.

**10. Conditions and measures related to personal protection, hygiene and health protection**

No risk mitigation (apart from eye protection) is required by the industrial worker or professional working in small laboratories, for a full shift.

Samples of manganese chloride powder or of aqueous manganese chloride solutions may have to be analysed or they may be used for small-scale experiments (e.g. in schools). The exposure concentration is modelled with PROC 15 (use as laboratory reagent).

The laboratory staff may experience inhalation exposure to dusts during the handling of manganese chloride, only if inhalable particles have been produced during transport of flakes. No measured long-term occupational exposure concentrations are available.

During the handling and use of aqueous manganese chloride solutions, no inhalation exposure is expected because the vapour pressure of manganese chloride is very low which makes evaporation of the substance very unlikely.

**11. Emission values of substances for various elements of the environment**

**Summary of the releases to the environment**

Assessment	Compartment	Release from point source (kg/d) (local exposure estimation)	Total release for regional exposure estimation (kg/d)	Justification
Tier 1	Emission to air during episode	5.48E-07	2.74E-04	Based on tonnage of 1 and refined loss to air of 0.1%
	Emission to wastewater during episode	1.1E-05	0.00438	Based on tonnage of 1 and 0.2% loss to water
	Emission to surface water	---	0.0011	Regional loss to freshwater

Emission to industrial soil	n.a.	n.a.	No emission considered according to R.16
Emission to agricultural soil	n.a.	n.a.	

## 12. Technical conditions and measures to reduce or avoid environmental exposure

No specific measures required for the environment

## 13. Exposure concentration in sewage treatment plants (STP)

### Predicted Exposure Concentrations (PEC) in sewage

Assessment	Compartment	Value	Justification
Tier 1	Concentration in sewage (PEC <sub>stp</sub> )(in mg/l)	4.39E-06	EUSES output
	Concentration in sewage sludge (in mg/kg d.w.)	2.77E-03	EUSES output

## 14. Waste management measures

Do not dispose of the product in sewage. Wastewater containing manganese chloride should be treated in a sewage treatment plant prior to discharge into the environment, characterized by purification efficiency better than 90%. The sludge from the treatment process should be collected on a suitable solid waste dump.

### Shortcuts included in the document:

PEC – Predicted Exposure Concentrations

STP – Sewage Treatment Plant

LEV – Local Exhaust Ventilation

ES – Exposure Scenario