Completion Report

soilfix
GROUND RISK SOLUTIONS

The Mannings, Ham Road, Shoreham

In-situ Injection Works

Real Places Limited



Soilfix Limited
10 St. Martin's
Industrial Park,
Avonmouth,
Bristol BS11 0RS
Tel: 0117 982 0025
info@soilfix.co.uk

Document Type: **Contractors Completion Report**

Description: **In Situ Injection Works**

Site: **Land at The Mannings**
Ham Road
Shoreham
BN43 6PA

Prepared by: **Daniel Mortimer-Simons**
Soilfix Limited
Unit 10 St Martins Industrial Park
Bristol
BS11 0RS
Tel. (01179) 820025

Client: **Real Places Ltd**

Document Control

Document Ref	Revision	Date	Detail	Author	Reviewed by	Approved by
C496.RPL	First Issue	13/07/2022		D M-Simons	P. Hazlehurst	P. Hazlehurst
			Signatures:	[redacted]		

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1 Introduction

1.1 Overview

Soilfix Limited (Soilfix) were appointed by Real Places Ltd (RPL) to carry out site remediation at The Mannings, Ham Road, Shoreham, BN43 6PA ("the site").

The site covers an area of approximately 0.3 Ha with the Soilfix work area comprising approximately 0.05 Ha. The primary remediation area was below the car park associated with the former residential buildings on site, which had been demolished prior to the commencement of Soilfix works.

The works were conducted as part of RPL's plans to redevelop the site with new residential housing.

This document is intended to provide a factual Completion Report to document the remediation works carried out by Soilfix.

This report is also intended to fulfil the requirements for compiling Health and Safety File information required under the Construction (Design & Management) Regulations (CDM) 2015, to document all works completed so future contractors can understand potential residual risks to health & safety. To support this requirement, a statement of residual features / risks to ongoing construction works is included.

Methods of work were in accordance with Soilfix's Remediation Implementation Plan (RIP).

Roles and responsibilities on the project are summarised in Table 1.

Table 1- Roles & Responsibilities

Name of party	Function / Interest
Real Places Ltd	D&B Contractor / Principal Contractor
Soilfix Limited (Soilfix)	Specialist Remediation Sub-contractor
Ridge and Partners LLP	Environmental Consultant
Adur and Worthing Council	Environmental Health Department
Environment Agency (EA)	Controlled Waters / Waste Management Regulator

Drawings relating to the site works are included in Appendix A.

A photographic summary of key stages of the works are included in Appendix B.

2 Project Background

2.1 Site Location and Description

The site address is: **Land at The Mannings**

Surry St

Ham Road

Shoreham

BN43 6RP

National Grid Reference: **521902, 105181**

2.2 Historical Information

Historical maps of the site dating back to the 1870's indicate that the site has been occupied with buildings associated with the Steyning Union workhouse, which was subsequently redeveloped with an infirmary and chapel by the late 1890's.

In the early 1900's the infirmary was used as a children's home with workhouse buildings demolished.

A police station and new residential buildings were then constructed in the 1970s.

The Soilfix works area is currently covered by hardstanding / tarmac and is located in the car park area of a previous residential housing area. The housing previously on the site had been demolished prior to the commencement of Soilfix works on site.

2.3 Previous Investigations and Sources of Information

The following information was consulted in completing the works:

- Geo environmental appraisal report by Clancy Consulting (Report 10/1380/004),
- Various drawings and plans provided by Ridge Consultants and Real Places
- Soilfix Remediation Implementation Plan (RIP) – Report C496.RPL RIP dated Dec-2021

2.4 Relevant Pollution Linkages

Based on the site investigation data, Soilfix identified three relevant pollutant linkages at the site (see Table 2 below). The objective of the remediation is to reduce the risks associated with these pollutant linkages to acceptable levels.

Table 2 Summary of Pollutant Linkages

Pollutant Linkage	Proposed Measures
PL1 – Elevated concentrations of petroleum hydrocarbons in saturated zone. Dermal contact and ingestion (of any soils brought to surface during remediation and/or construction)	Potential for site workers to be exposed to contamination can be mitigated by appropriate risk assessment and safe working procedures (appropriate PPE and hygiene).
PL2 – Elevated concentrations of petroleum hydrocarbons – migration of contaminants within groundwater into the underlying aquifer the site.	In-situ injection works have been proposed which will degrade existing hydrocarbon contamination, with an oxygen release compound included in the injected media to produce enhanced natural attenuation.
PL3 – Elevated concentrations of petroleum hydrocarbons in soils – leaching of contaminants in shallow soils to groundwater.	In-situ injection works have been proposed which will degrade existing hydrocarbon contamination, with an oxygen release compound included in the injected media to produce enhanced natural attenuation.

2.5 Design Principles of Chemox / Oxygen Release

The following design calculations have been derived, based upon available site information:

	Value	Unit	Comment
Area of Treatment	266	m x m	customer supplied
Treatment Zone Thickness	1	m	customer supplied
Treatment Volume	266	m3	calculated value
Porosity	30	%	default value
Ground Water Volume	80	m3	calculated value
Soil Density	1800	kg/m3	default value
Soil Mass	478.8	metric ton	calculated value
Soil Oxidant Demand	1.0	g Klozur CR / kg soil	Estimated value
Total COC Mass (Soil / Water)	72.6	Kg	
Total Klozur Demand	4,349	Kg	X1.5 factor of safety applied

2.5.1 Direct-push Injection of Klozur CR

The Klozur CR powder is supplied pre-mixed in sealed plastic tubs, therefore will be stored in an enclosed area surrounded by Heras fencing to prevent tampering at all times. The pre-determined amount of powder (144kgs per point) is carefully mixed with water in a tank using a high shear impellor to provide a 20%w/w solids content (liquid) slurry. A total of 500 to 650 litres of slurry is targeted for injection at each location to provide a sufficient dosage, equivalent to 25% of the total porosity of the surrounding formation.

Slurry injection will be carried out using a tracked direct-push probing rig that advances stainless steel rods (to prevent corrosion) fitted with either a sacrificial cone or proprietary injection tip. Slurry is injected through the rods incrementally within the formation 'bottom up' using a hydraulic piston pump. As injection progresses, the rod is gradually increased to provide a uniform injection across the maximum smear zone thickness (and to find potentially permeable lenses). Due to the relatively low permeability of the formation, higher injection pressures may be required to disperse the slurry.

Further details are included in Soilfix's Remediation Implementation Plan.

2.6 Remedial Objectives / Targets

> The overall objective of the remediation works is to facilitate the proposed residential re-development of the site.

No formal remedial targets have been set, however in light of the target geology Soilfix have proposed working to a betterment target of between 65 and 75% when compared to mean average pre-remediation TPH concentrations in groundwater. Positive indicators of ongoing bioremediation (that will continue beyond the proposed monitoring period) should also be demonstrated to support ongoing betterment of residual TPH concentrations within the identified source zone.

Further details are included in Soilfix's Remediation Strategy.

Post remediation monitoring will be undertaken by the clients consultant.

2.7 Summary of Scope of Works

Works completed by Soilfix are summarised as follows:

- Pre-commencement injection trial to validate direct push methodology proposed;
- Service clearance of injection locations using Cat & Genny;
- Breaking out/coring of the surface hardstanding;
- Completion of 30 No. In-situ direct push injections using Klozur CR.

Drawings relating to the site works are included in Appendix A.

3 Site works

In order to validate the direct push method chosen, an injection trial was completed on Monday 7th March. Two direct push locations were successfully completed using the Klozur amendment, with no issues encountered during the works of any daylighting of product.

Following successful completion of the trial, the remaining 28 No. direct push injections were completed during w/c 13th June.

Each injection location was set out on site and cleared for services using a CAT & Genny by the Soilfix engineer prior to commencement. The principal contractor also confirmed that there were no known live services in the work area. Drawing SF01 Rev 1 included in Appendix A shows the injection locations.

Following setting out, the locations were broken out and the injection rods installed to the a depth of 6m. Injection commenced at a depth of 6m with the rods raised incrementally 0.5m, injecting a proportionate volume of Klozur at each horizon up to 4m.

Further details of the injection methodology area set out in the Remediation Strategy.

A total of 144kg Klozur, made into 600 liters of slurry was injected at each injection location. The injection logs including details of the volumes and any comments by the engineer supervising the work are included in Appendix C.

All injection locations were completed successfully. Daylighting was observed during injection in 5 of the locations, however this was resolved by decreasing the injection pressure from 5bar down to 1 bar.

Some minor daylighting was observed post injection in 2 of the injection locations.

One injection location was slightly moved and repeated due to an issue with the injection equipment during installation of the injection rods, following which it was successfully completed.

Post injection groundwater performance monitoring following completion of the injection works is to be undertaken by the clients consultant.

3.1 Summary of Waste Streams

The following waste streams were generated during the remediation works:

- Tarmac/concrete from breaking out hardstanding areas for injection location core holes; and
- General waste materials (packaging etc).

3.2 Disposal of Waste

All off-site disposal was undertaken in accordance with full Duty of Care, with all waste materials removed by suitably licenced hauliers to permitted treatment facilities.

A summary of all wastes removed from site during the remediation works along with its disposal destination is provided in Table 3.

Copies of all waste transfer / consignment notes are included in Appendix D.

Waste carriers licenses are included in Appendix E.

Environmental permits for each facility issued under the Environmental Permitting (England and Wales) Regulations 2007 are included as Appendix F.

Table 3 - Summary of Waste Disposal

Waste Stream	Source Areas	Haulier	Disposal Locations	No Loads	Tonnes (Approx.)	Vol. (m^3) (Approx.)
General waste / packaging	N/A	Rabbit Skip Hire	Units 1-2, 37 Chartwell Road Lancing Business Park Lancing West Sussex BN15 8TU	1	1.14	10

4 Residual Site Features / Risks Remaining after Soilfix's Works

The following residual features and risks remain following completion of Soilfix's works which future land owners / developers should be aware of:

- Presence of residual amounts of the remedial product Klozur CR in the injection horizon of the remediation area (4-6mbgl). The Material Safety Data Sheet (MSDS) for Klozur CR is included in Appendix G;
- Injection locations broken out and backfilled with arisings are no longer level with the surrounding slab and could present a trip hazard. Soilfix understand the remaining hardstanding areas are to be broken out following completion of the injection works.

Details of the residual features and risks outlined above should be included in the sites Health and Safety File as a record of the site condition on completion of Soilfix works, and to inform safe working procedures for future intrusive works in these areas of the site.

Appendices

Appendix A - Drawings



LEGEND

Injection Location completed during Trial

Proposed Injection Location for main phase

Indicative contamination area from Ridge SI

Rev.	Description	Date
E		
D		
C		
B	Updated numbering following site works	13.07.22
A	Original Issue	30.03.22

soilfix GROUND RISK SOLUTIONS

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☎: +44 (0) 117 982 0025 (Bristol)
✉: info@soilfix.co.uk
💻: www.soilfix.co.uk

Site Address:

Ham Road, Shoreham

Title: In-situ Injection Locations

Client: Real Places Ltd

Drawn:	Checked:	Appvd:	Rev:
DS	DS	PH	B
Contract: C496.RPL	Dwg No: SF-01	Scale: NTS	A3

Appendix B - Photographic Log



Photo 1:
COSHH store for chemicals. Empty water IBCs awaiting Collection following completion of works



Photo 2:
Injection location following completion of coring, hand digging and service clearance



Photo 3:
Injection rig installing injection rods to required depth



Photo 4:
Injection zone of in-situ injection tip



Photo 5:
Klozur being injected



Photo 6:
Injection location after backfill with arisings

Appendix C - Injection Logs

soilfix
GROUND RISK SOLUTIONS

10 St. Martins Industrial Park, Avonmouth, Bristol BS11 0RS
23 Bellingham Lane, Rayleigh, Essex, SS6 7ED

Form SF040 Direct Push Injection Record Sheet – Klozur CR

Project Address: Ham Road, Shoreham

Contract No : C496 Site Supervisor: Sam Laliberte

Date	Injection Point	Injection Depth Interval (mbgl)	Quantity RegenOx A & Petrocleanze Injected (kg)	Approx. Volume Water Injected (L)	Time Injection Started	Time Injection Stopped	Observations/Notes
13/06/2022	DP01	4 - 6	144	500	09:43	10:25	No Daylighting. Set at 5bar
13/06/2022	DP02	4 - 6	144	500	10:52	11:27	No Daylighting. Set at 5bar
13/06/2022	DP03	4 - 6	144	500	12:01	12:33	No Daylighting. Set at 5bar
13/06/2022	DP04	4 - 6	144	500	01:09	01:52	Put in at 5bar, daylighting out of borehole at 01:35. Turned pressure down to 1bar. No further daylighting.
13/06/2022	DP07	4 - 6	144	500	2:31	02:59	No Daylighting. Set at 5bar
13/06/2022	DP05	4 - 6	144	500	03:33	04:03	No Daylighting. Set at 5bar
14/06/2022	DP08	4 - 6	144	500	08:53	09:20	No Daylighting. Set at 5bar
14/06/2022	DP09	4 - 6	144	500	10:10	10:35	No Daylighting. Set at 5bar
14/06/2022	DP06	4 - 6	144	500	11:06	11:40	No Daylighting. Set at 5bar

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10 St. Martins Industrial Park, Avonmouth, Bristol BS11 0RS
23 Bellingham Lane, Rayleigh, Essex, SS6 7ED

Form SF040 Direct Push Injection Record Sheet – Klozur CR

Project Address: Ham Road, Shoreham

Contract No : C496 Site Supervisor: Sam Laliberte

14/06/2022	DP10	4 - 6	144	500	12:50	01:22	No Daylighting. Set at 5bar
14/06/2022	DP11	4 - 6	144	500	02:02	02:35	Set at 5bar. Daylighted slightly in DP10 after rig was turned off
14/06/2022	DP13	4 - 6	144	500	03:20	03:49	No Daylighting. Set at 5bar
15/06/2022	DP15	4 - 6	144	500	08:39	09:01	No Daylighting. Set at 5bar
15/06/2022	DP12	4 - 6	144	500	09:44	10:15	No Daylighting. Set at 5bar
15/06/2022	DP14	4 - 6	144	500	11:15	12:06	No Daylighting. Set at 5bar
15/06/2022	DP16	4 - 6	144	500	12:55	01:22	No Daylighting. Set at 5bar
15/06/2022	DP17	4 - 6	144	500	01:54	02:42	No Daylighting. Set at 5bar
15/06/2022	DP19	4 - 6	144	500	03:10	-	End of direct push snapped off. Had to redo at DP19a. (see drawing).
15/06/2022	DP20	4 - 6	144	500	03:40	03:59	No Daylighting. Set at 5 bar
16/06/2022	DP19a	4 - 6	144	500	09:11	09:50	No Daylighting. Set at 1bar

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GROUND RISK SOLUTIONS

10 St. Martins Industrial Park, Avonmouth, Bristol BS11 0RS
23 Bellingham Lane, Rayleigh, Essex, SS6 7ED

Form SF040 Direct Push Injection Record Sheet – Klozur CR

Project Address: Ham Road, Shoreham

Contract No : C496 Site Supervisor: Sam Laliberte

16/06/2022	DP21	4 - 6	144	500	10:31	11:15	No Daylighting. Set at 5bar
16/06/2022	DP18	4 - 6	144	500	11:40	12:08	No Daylighting. Set at 5bar
16/06/2022	DP24	4 - 6	144	500	01:22	02:02	No Daylighting. Set at 5bar
16/06/2022	DP22	4 - 6	144	500	02:27	03:01	No Daylighting. Set at 5bar
16/06/2022	DP23	4 - 6	144	500	03:22	03:47	Set at 5bar, Daylighted slightly after injection completed
17/06/2022	DP26	4 - 6	144	500	09:10	09:38	09:31 – Daylighted out of DP22. Lowered to 1bar and Daylighting stopped.
17/06/2022	DP28	4 - 6	144	500	10:10	10:45	No Daylighting. Set at 5bar
17/06/2022	DP27	4 - 6	144	500	11:26	11:51	No Daylighting. Set at 5bar
17/06/2022	DP25	4 - 6	144	500	12:29	01:13	Daylighting at 12:52. Lowered pressure to 1bar, which stopped the daylighting.

Appendix D - Waste transfer notes

CREATING ENERGY FROM WASTE ®

Unit 1-2, 37 Chartwell Road
Lancing Business Park
Lancing
West Sussex BN15 8TU
Telephone: 01903 762020
Email: info@rabbitgroup.co.uk
www.rabbitgroup.co.uk

Duty of Care - Controlled Waste Transfer Note

Waste Carrier Licence:

Waste Management Licence:

Annual Waste Transfer Note - valid for 12 months from:

Date: 21/06/2022

Job Number: 159521

Waste Producer

SOILFIX GROUND RISK SOLUTIONS
C496 The Mannings, Ham Road, Shoreham, BN43 6PA

Grade & EWC

Mixed construction and demolition waste - 170904

SIC Code: 41100

Order Details
FIN 16 (ROLO)

PO:

Contact: 01179820025

Time On Site 09:13 **Time Off Site** 09:20

Load Details:

Driver Notes
Call before collection 07936949100

[redacted]

Waste Producer Signature

Print Name sam

Signing represents total acceptance of all the Terms and Conditions

I (the customer) do hereby declare that the service contracted for as defined above has been carried out to my complete satisfaction. I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the Waste (England and Wales) Regulations 2011. Signing represents acceptance of the Terms and Conditions.

Waste Carrier

RABBIT WASTE MANAGEMENT LTD
Units 1 - 2, 37 Chartwell Road, Lancing Business Park, Lancing, BN15 8TU

Registration Number:

Vehicle Registration: RK19OMT

Driver Name: Sam Lean

Carrier Signature [redacted]

Waste Receiver

RABBIT WASTE MANAGEMENT LTD
Units 1 - 2, 37 Chartwell Road, Lancing Business Park, Lancing, BN15 8TU

Registration Number:

Receiver Signature [redacted]

RABBIT WASTE MANAGEMENT LTD
Units 1 - 2, 37 Chartwell Road,
Lancing Business Park, Lancing, BN15
8TU
tel: 01903 762020
VAT Reg: 191 1293 16
Company Reg: 07178740

ID:159521 Date:21-06-22

WASTE PRODUCER:
SOILFIX GROUND RISK SOLUTIONS
C496 The Mannings, Ham Road, Shoreham,
BN43 6PA
Service: FIN
Container: 16 (ROLO)
SIC Code: 41100

WEIGHTS:
Ticket Ref: .
GROSS: 17.100 T | 21-06-22 09:36
TARE: 15.960 T | 21-06-22 09:36
NET: 1.140 T

Mixed construction and demolition
waste 170904
1.140 T

CARRIER/HAULIER:
RABBIT WASTE MANAGEMENT LTD
Units 1 - 2, 37 Chartwell Road,
Lancing Business Park, Lancing, BN15
8TU
Carrier Reg: CBDU185871
Vehicle Reg: RK19OMT

WASTE RECEIVER:
RABBIT WASTE MANAGEMENT LTD
Units 1 - 2, 37 Chartwell Road,
Lancing Business Park, Lancing, BN15
8TU
Permit: EPR/CB3005MB

I (the customer) do hereby declare
that the service contracted for as
defined above has been carried out to
my complete satisfaction. I confirm
that I have fulfilled my duty to apply
the waste hierarchy as required by
Regulation 12 of the Waste (England
and Wales) Regulations 2011. Signing
represents acceptance of the Terms and
Conditions.

CARRIER:



Print name: Sam Lean

WASTE RECEIVER:



Print name: Kerry

Appendix E - Waste Carriers Licenses

Certificate of Registration under the Waste (England and Wales) Regulations 2011

Regulation authority

Name	Environment Agency
Address	National Customer Service Centre 99 Parkway Avenue Sheffield S9 4WF
Telephone number	03708 506506

The Environment Agency certify that the following information is entered in the register which they maintain under regulation 28 of the Waste (England and Wales) Regulations 2011.

Carriers details

Name of registered carrier	Rabbit Waste Management Ltd
Registered as	an upper tier waste carrier, broker and dealer
Registration number	CBDU185871
Address of place of business	Rabbit Waste Management Ltd Unit 1-2, 37 Chartwell Road Lancing Business Park Lancing BN15 8TU
Telephone number	01903 762020
Date of registration	Wednesday 8th July 2020
Expiry date of registration (unless revoked)	Saturday 5th August 2023

Making changes to your registration

Your registration will last 3 years and will need to be renewed after this period. If any of your details change, you must notify us within 28 days of the change.

Appendix F - Waste facility environmental permit

Notice of transfer with introductory note

The Environmental Permitting (England & Wales) Regulations 2010

Rabbit Waste Management Limited

Units 1-2, 37 Chartwell Road
Lancing Business Park
Lancing
West Sussex
BN15 8TU

Transfer application number

EPR/CB3005MB/T001

Permit number

EPR/CB3005MB

Units 1-2, 37 Chartwell Road

Permit number EPR/CB3005MB

Introductory note

This introductory note does not form a part of the notice.

The following notice gives notice of the transfer of an environmental permit to a new operator (the transferee).

The environmental permit is transferred in full from Sussex Waste Recycling Limited to Rabbit Waste Management Limited.

The status log of a permit sets out the permitting history, including any changes to the permit reference number.

Status log of the permit		
Description	**Date**	**Comments**
Permit determined EAWML 10115	06/11/00	Original permit issued to Sussex Waste Recycling Limited.
EPR number assigned		EPR/EP3095HF.
Application EPR/CB3005MB/T001 (full transfer of permit EPR/EP3095HF)	Duly made 10/09/14	Application to transfer the permit in full to Rabbit Waste Management Limited.
Transfer determined EPR/CB3005MB	19/09/14	Full transfer of permit complete.

End of introductory note

Notice of transfer

The Environmental Permitting (England and Wales) Regulations 2010

The Environment Agency in exercise of its powers under regulation 21 of the Environmental Permitting (England and Wales) Regulations 2010 transfers

Permit number

EPR/EP3095HF

to

Rabbit Waste Management Limited ("the operator")

whose registered office is

37 Frederick Place
Brighton
United Kingdom
BN1 4EA

company registration number 07178740

to operate a regulated facility at

Units 1-2, 37 Chartwell Road
Lancing Business Park
Lancing
West Sussex
BN15 8TU

from Sussex Waste Recycling Limited.

The notice shall take effect from 19/09/2014

The number of the new permit granted to Rabbit Waste Management Limited is EPR/CB3005MB

Name	Date
Alan Whitley	**19/09/2014**

Authorised on behalf of the Environment Agency

Appendix G - Klozur CR MSDS

SAFETY DATA SHEET
Klozur® CR

SDS # : 7775-27-1--2
Revision date: 2021-10-13
Version 1.02

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product Identifier

Product Name Klozur® CR

Alternate Commercial Name KLOZUR® CR 2018

Pure substance/mixture Mixture

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use: In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications

Restrictions on Use No uses to be advised against were identified

1.3. Details of the supplier of the safety data sheet

Manufacturer/Supplier

Evonik Active Oxygens, LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: Product-regulatory-services@evonik.com

Responsible Persons

Evonik Operations GmbH
Rellinghauser Str. 1-11
45128 Essen
Germany
Tel: +49 6181 59 4787
E-mail: sds-hu@evonik.com

1.4. Emergency telephone numbers

24-Hour Health Emergency: +49 2365 49 2232

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Acute oral toxicity	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Respiratory sensitization	Category 1
Skin sensitization	Category 1
Specific target organ systemic toxicity (single exposure)	Category 3
Oxidizing Solids	Category 3

For the full text of the H- and EUH- phrases mentioned in this Section, see Section 16.

2.2. Label Elements



Signal word: DANGER

Hazard Statements
H302 - Harmful if swallowed
H315 - Causes skin irritation
H318 - Causes serious eye damage
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction
H335 - May cause respiratory irritation
H272 - May intensify fire; oxidizer

Precautionary statements
P220 - Keep/Store away from clothing/ combustible materials
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P405 - Store locked up

2.3. OTHER INFORMATION

General Hazards
Risk of decomposition by heat or by contact with incompatible materials

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Chemical name	EC-No	CAS-No	Weight %	Classification according to Regulation (EC) No. 1272/2008 [CLP]	REACH registration number
Sodium Persulfate	231-892-1	7775-27-1	40-60	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Resp. Sens. 1 (H334) Skin Sens. 1 (H317) STOT SE 3 (H335) Ox. Sol. 3 (H272)	01-2119495975-15-0001
Calcium Peroxide	215-139-4	1305-79-9	35 - 40	Eye corr. 1 (H318) STOT SE 3 (H335) Ox. Sol. 2 (H272)	see 930-930-0
Calcium Hydroxide	215-137-3	1305-62-0	10 - 15	Skin corr. 1 (H314) eye. corr. 1 (H318) STOT SE 3(H335)	see 930-930-0
Reaction mass of calcium dihydroxide and calcium peroxide	930-930-0	1305-79-9	40 - 60	Eye corr. 1 (H318) STOT SE 3 (H335) Ox Sol 2 (H272) Aquat. chron. 3 (H412)	01-2120782995-32-0000

For the full text of the H- and EUH- phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

4.1. Description of first-aid measures

General Advice Remove from exposure, lie down. Show this material safety data sheet to the doctor in attendance.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician. In case of contact, immediately flush eyes with plenty of water. If symptoms persist, call a physician.

Inhalation Remove from exposure, lie down. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately. Rinse mouth. Drink 1 or 2 glasses of water.

4.2. Most important symptoms and effects, both acute and delayed

Itching; Redness; Coughing and/ or wheezing

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Indication of immediate medical attention and special treatment needed, if necessary Treat symptomatically.

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
Water, Cool containers with flooding quantities of water until well after fire is out

Extinguishing media which shall not be used for safety reasons

Do NOT use water jet.

5.2. Special hazards arising from the substance or mixture

Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases
In case of fire, formation of sulphur oxides, nitrogen oxides, toxic pyrolysis products.

5.3. Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

OTHER INFORMATION
The product is not combustible. Contact with combustible materials may intensify fires. Adjust fire fighting measures to surrounding fire, if possible. Cool endangered containers with water spray and move out of danger area. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Keep off any unprotected persons. Avoid contact with the skin and the eyes. Avoid breathing dust. Wear personal protective equipment.

6.2. Environmental Precautions

Knock down dust with water spray. Recover the product in solid form, if possible. Local authorities should be advised if significant spillages cannot be contained.

6.3. Methods and materials for containment and cleaning up

Do not return product to the original storage container/tank due to risk of decomposition. Vacuum, shovel or pump waste into a drum and label contents for disposal. Store in closed container. Do not allow material to enter storm or sanitary sewer system. Clean up spill area and treat as special waste

Never add other substances or combustible waste to product residues. Containers of contaminated waste material should be monitored for signs of decomposition (fuming or smoking).

6.4. Reference to other sections.

Dispose of waste as indicated in Section 13

7. HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Wear personal protective equipment. Use only in area provided with appropriate exhaust ventilation. Avoid dust formation. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Avoid contact with skin and eyes. Avoid breathing dust. Remove and wash contaminated clothing before re-use. Reference to other sections.

Additional information
Use clean plastic or stainless steel scoops only

7.2. Conditions for safe storage, including any incompatibilities

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat. Do not store near combustible materials. Avoid contamination of opened product. Keep away from food, drink and animal feedingstuffs. Avoid formation and deposition of dust.

Materials to avoid
Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials.

7.3. Specific end uses

Refer to Section 1 and the Annex.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure Limits Ingredients with workplace control parameters

Chemical name	European Union	The United Kingdom	Ireland
Sodium Persulfate 7775-27-1			TWA 0.1 mg/m ^{3} STEL 0.3 mg/m ^{3} Sensitizer
Calcium Hydroxide 1305-62-0		STEL 4 mg/m ^{3} STEL 15 mg/m ^{3} TWA 1 mg/m ^{3} TWA 5 mg/m ^{3}	TWA 1 mg/m ^{3} STEL 4 mg/m ^{3}
Chemical name	**France**	**Spain**	**Portugal**
Sodium Persulfate 7775-27-1		TWA 0.1 mg/m ^{3}	
Calcium Hydroxide 1305-62-0	TWA 5 mg/m ^{3}	TWA 1 mg/m ^{3} STEL 4 mg/m ^{3}	TWA 5 mg/m ^{3}
Chemical name	**Germany**	**Italy**	**The Netherlands**
Calcium Hydroxide 1305-62-0	AGW 1 mg/m^3		STEL 4 mg/m ^{3} TWA 1 mg/m ^{3}
Chemical name	**Denmark**	**Finland**	**Norway**
Sodium Persulfate 7775-27-1	TWA 2 mg/m ^{3}		
Calcium Hydroxide 1305-62-0	TWA 1 mg/m ^{3} TWA 5 mg/m ^{3}	TWA 1 mg/m ^{3} STEL 4 mg/m ^{3}	TWA 1 mg/m ^{3} STEL 2 mg/m ^{3}
Chemical name	**Sweden**	**Austria**	**Slovenia**
Calcium Hydroxide 1305-62-0	TLV 1 mg/m^3 Binding STEL 4 mg/m ^{3}	STEL 4 mg/m ^{3} TWA 1 mg/m ^{3}	STEL 4 mg/m ^{3} TWA 1 mg/m ^{3}
Chemical name	**Slovakia**	**Switzerland**	**Belgium**
Sodium Persulfate 7775-27-1			TWA 0.1 mg/m ^{3}
Calcium Hydroxide 1305-62-0	TWA 5 mg/m ^{3}	SS-C** TWA 5 mg/m ^{3}	TWA 1 mg/m ^{3} STEL 4 mg/m ^{3}
Chemical name	**Luxembourg**	**Poland**	**Estonia**
Calcium Hydroxide 1305-62-0	TWA 1 mg/m ^{3}	TWA 2 mg/m ^{3} TWA 1 mg/m ^{3} STEL 4 mg/m ^{3}	STEL 4 mg/m ^{3} TWA 1 mg/m ^{3}

		STEL 6 mg/m ³	
Chemical name	**Latvia**	**Lithuania**	**Czech Republic**
Calcium Hydroxide 1305-62-0	TWA 1 mg/m ³ STEL 4 mg/m ³	S* TWA 1 mg/m ³ STEL 4 mg/m ³	TWA 1 mg/m ³ Ceiling 4 mg/m³
Chemical name	**Romania**	**Bulgaria**	**Russia**
Calcium Hydroxide 1305-62-0	STEL 4 mg/m ³ TWA 1 mg/m ³	STEL 4 mg/m ³ TWA 1 mg/m ³	S* MAC 2 mg/m³
Chemical name	**Greece**	**Hungary**	**Croatia**
Calcium Hydroxide 1305-62-0	TWA 1 mg/m ³ STEL 4 mg/m ³	STEL 4mg/m ³ TWA 1mg/m ³	STEL 4 mg/m ³ TWA 1 mg/m ³

Derived No Effect Level (DNEL)

DNELs - Workers	Calcium hydroxide: Local, long-term, inhalation: DNEL = 1.0 mg/m ³ Local, acute, inhalation: DNEL = 4 mg/m³

DNELs - General Population				
Sodium Persulfate (7775-27-1)				
Exposure pattern	Route of Exposure	Description	DNEL/DMEL	Most Sensitive Endpoint
Acute - systemic	dermal	LD0	200 mg/kg bw	Acute toxicity
Acute - systemic	Inhalation	LC0	295 mg/m³	Acute toxicity
Acute - systemic	oral	LD0	30 mg/kg bw	Acute toxicity
Acute - local	dermal	LD0	1.124 mg/cm3	Acute toxicity
Acute - local	Inhalation	LC0	295 mg/m³	Acute toxicity
Long term - systemic	dermal	NOAEL	91 mg/kg bw/day	repeated dose toxicity
Long term - systemic	Inhalation	NOAEC	1.03 mg/m³	repeated dose toxicity
Long term - systemic	oral	NOAEL	9.1 mg/kg bw/day	repeated dose toxicity
Long term - local	dermal	NOAEL	0.051 mg/cm3	repeated dose toxicity
Long term - local	Inhalation	NOAEC	1.03 mg/m³	repeated dose toxicity

Calcium Hydroxide (1305-62-0)				
Exposure pattern	Route of Exposure	Description	DNEL/DMEL	Most Sensitive Endpoint
Long term - local	Inhalation	DNEL	1.0 mg/m³	
Acute - local	Inhalation	DNEL	4.0 mg/m³	

8.2. Exposure Controls

Engineering measures Ensure adequate ventilation.

Personal protective equipment

Respiratory Protection P2 Dust mask when airborne dust concentrations elevated.
Eye/Face Protection Eye protection recommended: Tightly fitting safety goggles
Skin and Body Protection Wear suitable protective clothing.
Hand Protection Protective gloves: Neoprene gloves, Polyvinylchloride, Natural Rubber

Hygiene measures Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash hands before breaks and after shifts. Keep work clothes separate, remove contaminated clothing - launder after open handling of product.

Environmental exposure controls Prevent product from entering drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance Fine granules

Color	Off-white
Physical State	Solid
Odor	odorless
Odor threshold	Not applicable
pH	11.2 (1% solution)
Flash point	Not flammable No information available
Melting Point/Range	Decomposes on heating Decomposes
Freezing Point	Not applicable
Boiling Point/Range	Decomposes
Autoignition temperature	Product is not self-ignitable.
Explosive properties	Not explosive
Vapor pressure	No information available
Vapor density	No information available
Relative Density	(5 to 30 % slurries) 1.0-1.9
Partition coefficient	No information available (inorganic)
Water solubility	slightly soluble
Viscosity	No information available (Solid)
Evaporation Rate	No information available > 100 °C (assume)

9.2. OTHER INFORMATION

Bulk Density	830 kg/m ^{3} 51.8 lb/cu ft (loose)

10. STABILITY AND REACTIVITY

10.1. Reactivity

Strong oxidizer

10.2. Chemical Stability

Stable under recommended storage conditions. Unstable if heated. Unstable on exposure to moisture. Unstable in presence of contamination.

10.3. Possibility of Hazardous Reactions

Contains a strong oxidizer and will react violently with flammable or reducing agents. Oxidizable material can be ignited by grinding and may become explosive.

10.4. Conditions to avoid

Heat. (decomposes at temperatures >100 °C); Moisture.

10.5. incompatible materials

Acids, Bases, Halides, Oxidizing agents, Strong reducing agents, Combustible materials.

10.6. Hazardous Decomposition Products

Incomplete combustion and thermolysis produces potentially toxic gases such as carbon monoxide and carbon dioxide.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity

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LD50 Dermal	No data available for the formulation. > 10,000 mg/kg (rabbit) Sodium Persulfate
LD50 Oral	No data available for the formulation. 895 mg/kg (rat) Sodium Persulfate

LC50 Inhalation No data available for the formulation. = > 5.1 mg/L (4-hr) (rat) Sodium Persulfate

Skin Contact Irritating to skin. Persulfates in general, specifically diammonium persulfate and dipotassium persulfate, exhibited skin irritation properties in human case reports, following occupational exposure and consumer use. Slightly or non-irritating (rabbit).

Eye Contact Corrosive to the eyes and may cause severe damage including blindness.

Inhalation May cause irritation of respiratory tract. Respiratory irritation has been seen in workers exposed to persulfates. In animals, diammonium persulfate, produced pathological respiratory irritation in a subchronic study. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Ingestion May be harmful if swallowed.

Chronic toxicity

Sensitization Sensitizing to skin and respiratory system. Positive in a local lymph node assay. (based on components).

Target organ effects Eyes. Skin. Respiratory System.

Carcinogenicity Not recognized as carcinogenic by Research Agencies (IARC, NTP, OSHA, ACGIH).

Mutagenicity This product is not recognized as mutagenic by Research Agencies

Reproductive toxicity Diammonium persulfate did not affect fertility or the developing fetus in animal studies (NOAEL: 250 mg/kg bw).

12. ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects

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Sodium Persulfate (7775-27-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Sodium Persulfate	96 h LC50	Rainbow trout	163	mg/L
Sodium Persulfate	48 h LC50	Daphnia magna	133	mg/L
Sodium Persulfate	96 h LC50	Grass shrimp	519	mg/L
Sodium Persulfate	72 h EC50	Algae Selenastrum capricornutum	116	mg/L

Chemical name	Toxicity to algae	Toxicity to fish	Toxicity to Microorganisms	Toxicity to daphnia and other aquatic invertebrates
Calcium Hydroxide		96 h LC50: = 160 mg/L (Gambusia affinis) static		

12.2. Persistence and degradability

Biodegradability does not pertain to inorganic substances.

12.3. Bioaccumulative potential

Does not bioaccumulate.

12.4. Mobility in soil

Dissociates into ions.

12.5. Results of PBT and vPvB assessment

PBT/vPvB assessment is not required for inorganic substances.

12.6. Other Adverse Effects

None known.

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from residues / unused products	Should not be released into the environment. It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.
Product / Packaging disposal	Dispose of as hazardous waste in compliance with local and national regulations.
Contaminated Packaging	Empty remaining contents. Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

ADR/RID

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S.
Hazard class	5.1
Packing Group	II

IMDG/IMO

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S.
Hazard class	5.1
Packing Group	II
Proper Shipping Name	SODIUM PERSULFATE

ICAO/IATA

UN/ID no	UN 1479
Proper Shipping Name	OXIDIZING SOLID N.O.S.
Hazard class	5.1
Packing Group	II

Transport Symbol



Environmental Hazards	This product contains no chemical substance that is listed as a marine pollutant according to DOT
Special Precautions for users	According to United Nations "Recommendations on the transport of dangerous goods"
Transport in bulk according to MARPOL 73/78 and the IBC Code	See IMDG above

15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

Chemical name	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Sodium Persulfate 7775-27-1	X	X	231-892-1	X	X	X	X	X	X
Calcium Peroxide 1305-79-9	X	X	215-139-4	X	X	X	X	X	X
Calcium Hydroxide 1305-62-0	X	X	215-137-3	X	X	X	X	X	X
Reaction mass of calcium dihydroxide and calcium peroxide 1305-79-9	X	X	215-139-4	X	X	X	X	X	X

Directive 2008/98/EC on waste
Applicable
Major Accidents (Directive 2012/18/EU)
Included for storage of quantities exceeding 50 Tm
CWC (Chemical Weapons Convention) - Annex on Chemicals
Not applicable

15.2. Chemical Safety Report

A Chemical Safety Assessment has been carried out for this substance.

16. OTHER INFORMATION

Full text of H-phrases referred to in sections 2 and 3
H272 - May intensify fire; oxidizer
H302 - Harmful if swallowed
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
H317 - May cause an allergic skin reaction
H335 - May cause respiratory irritation

Issuing Date: 2021-02-17
Restrictions on Use
This product's foreseen or recommended applications are: In situ and ex situ chemical oxidation of contaminants and compounds of concern for environmental remediation applications

Sources of key data used to compile the datasheet
Evonik

Revision date: 2021-10-13
Revision note Manufacturer name changed.

List of Abbreviations and Acronyms
ATE Acute Toxicity Estimate
ADR European Agreement concerning the International Carriage of Dangerous Goods by Road
AND European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
CE50 Concentración Efectiva MediaCEN European Committee for Standardisation
C&L Classification and Labelling
CLP Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
CLV Ceiling Limit Value Par CAS# Chemical Abstracts Service number
CMR Carcinogen, Mutagen, or Reproductive Toxicant
CSA Chemical Safety Assessment
CSR Chemical Safety Report

DNEL Derived No Effect Level
DOT Department of Transportation
DPD Dangerous Preparations Directive 1999/45/EC
DSD Dangerous Substances Directive 67/548/EEC
DU Downstream User
EC European Community
ECHA European Chemicals Agency
EC-Number EINECS and ELINCS Number (see also EINECS and ELINCS)
EEA European Economic Area (EU + Iceland, Liechtenstein and Norway)
EEC European Economic Community
EINECS European Inventory of Existing Commercial Substances
ELINCS European List of notified Chemical Substances
EN European Standard
EQS Environmental Quality Standard
EU European Union
Euphrac European Phrase Catalogue EWC
European Waste Catalogue (replaced by LoW –see below)
FDS Ficha de Datos de Seguridad
GES Generic Exposure Scenario
GHS Globally Harmonized System
IATA International Air Transport Association
ICAO-TI Technical Instructions for the Safe Transport of Dangerous Goods by Air
IMDG International Maritime Dangerous Goods
IMO International Maritime Organization
IMSBC International Maritime Solid Bulk Cargoes
IT Information Technology
IUCLID International Uniform Chemical Information Database
IUPAC International Union for Pure Applied Chemistry
JRC Joint Research Centre
Kow octanol-water partition coefficient
LC50 Lethal Concentration to 50 % of a test population Lethal Dose to 50% of a test population (Median Lethal Dose)
LE Legal Entity
LLV Level Limit Value
LoW List of Wastes (see http://ec.europa.eu/environment/waste/framework/list.htm)
LR Lead RegistrantM/I Manufacturer / Importer MS Member States
MSDS Material Safety Data Sheet
NOEC No observed effect concentration
OC Operational Conditions
OECD Organization for Economic Co-operation and Development
OEL Occupational Exposure Limit
OJ Official Journal
OR Only Representative
OSHA European Agency for Safety and Health at work
PBT Persistent, Bioaccumulative and Toxic substance
PEC Predicted Effect Concentration
PNEC(s) Predicted No Effect Concentration(s)
PPE Personal Protection Equipment
(Q)SAR Qualitative Structure Activity Relationship
RCR Risk Characterization ratio
REACH Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID Regulations concerning the International Carriage of Dangerous Goods by Rail
RIP REACH Implementation Project
RMM Risk Management Measure
SADT Self-accelerating decomposition temperature
SCBA Self-Contained Breathing Apparatus
SDS Safety data sheet
SIEF Substance Information Exchange Forum
SME Small and Medium sized Enterprises
STEL Short-term exposure limit

STOT Specific Target Organ Toxicity (STOT)
RE Repeated Exposure(STOT)
SE Single Exposure Par SVHC Substances of Very High Concern
TSCA Toxic Substances Control Act
TWA Time Weighed Average
UN United Nations
vPvB Very Persistent and Very Bioaccumulative / mPmB Muy Persistente y Muy Bioacumulativo
WGK Wassergefährdungsklassen

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End of Safety Data Sheet