REGENESIS

# SAFETY DATA SHEET



Product identifier	RegenOx® Part A
Other means of identification	None.
Recommended use	Soil and Groundwater Remediation.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/I	Distributor information
Company Name	REGENESIS
Address	1011 Calle Sombra
	San Clemente, CA 92673 USA
General information	949-366-8000
E-mail	CustomerService@regenesis.com
Emergency phone number	For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:
USA, Canada	1-800-424-9300
International	+1 703-741-5970
2. Hazard(s) identification	

Physical hazards	Oxidizing solids	Category 2
Health hazards	Acute toxicity, oral Serious eye damage/eye irritation	Category 4 Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 2
OSHA defined hazards	Not classified.	

Label elements



Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Harmful if swallowed. Causes serious eye damage. Toxic to aquatic life.
Precautionary statement	
Prevention	Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/eye protection/face protection. Avoid release to the environment.
Response	If swallowed: Call a poison center/doctor if you feel unwell. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Rinse mouth. In case of fire: Use appropriate media to extinguish.
Storage	Store away from incompatible materials.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

#### 3. Composition/information on ingredients

#### Mixtures

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Chemical name	CAS number	%	_
Sodium carbonate peroxyhydrate	15630-89-4	≥95	_
Silicic acid, sodium salt, sodium	1344-09-8	<1	_

silicate	
Composition comments	All concentrations are in percent by weight unless otherwise indicated.
4. First-aid measures	
Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	If on clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Dusts may irritate the respiratory tract, skin and eyes.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.
5. Fire-fighting measures	

#### Water spray, fog (flooding amounts). Suitable extinguishing media Dry chemical, CO2, halon. Foam. Unsuitable extinguishing media Specific hazards arising from Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed. Combustion products may include: the chemical carbon oxides, metal oxides. Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Special protective equipment and precautions for firefighters In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do **Fire fighting** so without risk. Use water spray to cool unopened containers. equipment/instructions Specific methods Cool containers exposed to flames with water until well after the fire is out. General fire hazards May intensify fire; oxidizer. Contact with combustible material may cause fire.

#### 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

#### Rece

eived by OCD: 9/13/2024 2:58:45	PM Page 3
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Collect dust using a vacuum cleaner equipped with HEPA filter. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Ventilate the contaminated area. This product is miscible in water. Stop the flow of material, if this is without risk. Absorb in vermiculite, dry sand or earth and place into containers.
	Large Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Shovel the material into waste container. Minimize dust generation and accumulation. Avoid the generation of dusts during clean-up. Prevent product from entering drains. Following product recovery, flush area with water.
	Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.
	Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.
7. Handling and storage	
Precautions for safe handling	Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Keep away from heat. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Do not get this material in contact with eyes. Do not taste or swallow. When using, do not eat, drink or smoke. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Keep away from heat. Store in a cool, dry place out of direct sunlight. Store at temperatures not exceeding 40°C/104°F. Store in original tightly closed container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see Section 10 of the SDS).

#### 8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits. Provide eyewash station.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Unvented, tight fitting goggles should be worn in dusty areas.

Eye/face protection	onvented, light hung goggles should be worn in dusty areas.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Frequent change is advisable. Rubber, neoprene or PVC gloves are recommended.
Skin protection	
Other	Wear appropriate chemical resistant clothing.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Recommended use: Wear respirator with dust filter.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

#### 9. Physical and chemical properties

Appearance		
Physical state	Solid.	
Form	Powder.	
Color	White.	
Odor	Odorless.	

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Odor threshold	Not available.	
рН	10.5 (3% solution/water)	
Melting point/freezing point	Not available.	
Initial boiling point and boiling range	Not available.	
Flash point	Not available.	
Evaporation rate	Not available.	
Flammability (solid, gas)	May intensify fire; oxidizer.	
Upper/lower flammability or explosive limits		
Explosive limit - lower (%)	Not available.	
Explosive limit - upper (%)	Not available.	
Vapor pressure	Not available.	
Vapor density	Not available.	
Relative density	Not available.	
Solubility(ies)		
Solubility (water)	14.5 g/100g water @ 20 °C (minimum)	
Partition coefficient (n-octanol/water)	No data available.	
Auto-ignition temperature	Not available.	
Decomposition temperature	122 °F (50 °C)	
Viscosity	Not available.	
Other information		
Bulk density	0.9 - 1.2 g/ml	
Explosive properties	Not explosive.	
Oxidizing properties	May intensify fire; oxidizer.	

#### **10. Stability and reactivity**

Reactivity	Greatly increases the burning rate of combustible materials.
Chemical stability	Product may be unstable at temperatures above: 50°C/122°F. Decomposes on heating.
Possibility of hazardous reactions	Reacts slowly with water.
Conditions to avoid	Moisture. Heat. Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials.
Incompatible materials	Acids. Bases. Salts of heavy metals. Reducing agents. Combustible material. Water.
Hazardous decomposition products	Oxygen. Steam. Heat.

#### 11. Toxicological information

#### Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system.
Skin contact	Dust or powder may irritate the skin.
Eye contact	Causes serious eye damage.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Dusts may irritate the respiratory tract, skin and eyes.
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#### Information on toxicological effects

Acute toxicity

Harmful if swallowed.

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Components	Species	Test Results		
Silicic acid, sodium salt, sodium s	llicate (CAS 1344-09-8)			
Acute				
	Maura	1100 mg/kg		
LD50	Mouse			
		1.1 g/kg		
Skin corrosion/irritation	Prolonged skin contact may cause tem	Prolonged skin contact may cause temporary irritation.		
Serious eye damage/eye rritation	Causes serious eye damage.			
Respiratory or skin sensitizatio	n			
Respiratory sensitization	Not a respiratory sensitizer.			
Skin sensitization	This product is not expected to cause s	kin sensitization.		
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.			
Carcinogenicity	Not classifiable as to carcinogenicity to humans.			
IARC Monographs. Overall Not listed. NTP Report on Carcinogen: Not listed.	Evaluation of Carcinogenicity s			
OSHA Specifically Regulate	ed Substances (29 CFR 1910.1001-1053			
Not listed.	<b>T</b> 1:			
Reproductive toxicity	I his product is not expected to cause reproductive or developmental effects.			
Specific target organ toxicity - single exposure	Not classified.			
Specific target organ toxicity - epeated exposure	Not classified.			
Aspiration hazard	Not an aspiration hazard.			
12. Ecological information	า			
Ecotoxicity	Toxic to aquatic life.			
Components	Species	Test Results		
Silicic acid, sodium salt, sodiu	um silicate (CAS 1344-09-8)			
Aquatic				
Acute				

Crust	acea	EC50	Water flea (Ceriodaphnia dubia)	>= 0.28 - <= 0.57 mg/l, 48 hours
Fish		LC50	Western mosquitofish (Gambusia affinis)	1800 mg/l, 96 hours
Persistence a	nd degradability	Decomposes in the presence of water. The product contains inorganic compounds which are not biodegradable.		
Bioaccumula	tive potential	The product do	es not contain any substances expected to	o be bioaccumulating.
Mobility in so	il	This product is	water soluble and may disperse in soil.	
Other adverse	e effects	None known.		

#### 13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

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#### 14. Transport information

DOT		
UN number	UN3378	
UN proper shipping name	Sodium carbonate per	oxyhydrate
Transport hazard class(es)		
Class	5.1	
Subsidiary risk	-	
Label(s)	5.1	
Packing group	III	
Environmental hazards		
Marine pollutant	No.	
Special precautions for user	Read safety instruction	s. SDS and emergency procedures before handling.
Special provisions	B120, IB8, IP3, T1, TP	33
Packaging exceptions	152	
Packaging non bulk	213	
Packaging bulk	240	
IATA		
LIN number	LINI3378	
UN proper shipping name	Sodium carbonate per	ovvhvdrate
Transport bazard class(es)		oxynydiate
	5 1	
Class Subsidiary risk	5.1	
Subsidiary risk	-	
Facking group	III No	
Environmental hazards	NU.	
ERG Code	Dead cafety instruction	s SDS and amorganesy procedures before handling
IMDG		s, SDS and emergency procedures before nandling.
UN number	UN3378	
UN proper shipping name	SODIUM CARBONATI	E PEROXYHYDRATE
Transport hazard class(es)		
Class	5.1	
Subsidiary risk	-	
Packing group	III	
Environmental hazards		
Marine pollutant	No.	
EmS	F-A, S-Q	
Special precautions for user	Read safety instruction	s, SDS and emergency procedures before handling.
Transport in bulk according to	Not applicable.	
Annex II of MARPOL 73/78 and the IBC Code		
15. Regulatory information		
US federal regulations	This product is a "Haza Standard, 29 CFR 191	ardous Chemical" as defined by the OSHA Hazard Communication 0.1200.
TSCA Section 12(b) Exp	ort Notification (40 CF	R 707. Subpt. D)
Not regulated	(	,
CERCLA Hazardous Sub	stance List (40 CFR 3	02.4)
Not listed.		
SARA 304 Emergency re	lease notification	
Not regulated.		
OSHA Specifically Regu	ated Substances (29 0	CFR 1910.1001-1053)
Not listed.		
Toxic Substances Control Ac	ct (TSCA)	All components of the mixture on the TSCA 8(b) inventory are designated "active".
Superfund Amendments and Per	uthorization Act of 10	86 (SARA)
SARA 302 Extremely hazard	ous substance	

Not listed.

SARA 311/312 Hazardous Yes chemical

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Classified hazard	
categories	

Oxidizer (liquid, solid, or gas) Acute toxicity (any route of exposure) Serious eye damage or eye irritation

SARA 313 (TRI reporting) Not regulated.

#### Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act Not regulated. (SDWA)

#### **US** state regulations

#### US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not listed.

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

#### US. Rhode Island RTK

Not regulated.

#### **California Proposition 65**

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

#### **International Inventories**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s) A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

#### 16. Other information, including date of preparation or last revision

Issue date	26-March-2015
Revision date	15-July-2022
Version #	03
HMIS® ratings	Health: 3 Flammability: 0 Physical hazard: 2 Personal protection: E

Disclaimer

**NFPA** ratings

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.



Site Closure Achieved at Colorado Service Station

Benzene Levels Reduced to Below 5 PPB in Clay Soils through Use of ORC® Advanced

# **Project Highlights**

- Benzene concentrations remained on-site despite previous excavation efforts.
- Enhanced aerobic biodegradation using ORC Advanced produced a 99.8% reduction over 12 months
- Benzene reduced to below detection limits.
- "No Further Action" letter granted in October 2010.



*Benzene concentrations persisted despite excavation efforts on-site.* 

# **Project Summary**

Three underground storage tanks (USTs) were removed at a former tire store as part of corrective measures. Roughly 108 cubic yards of soils were excavated to reduce contamination levels. However, the excavation did not extend below the groundwater interface and residual sorbed contaminant mass remained, resulting in a lingering benzene plume. The client was interested in an in situ approach to reduce the remaining benzene contamination to below the Tier 1 risk based screening level of 5 ppb.

# **Remediation Approach**

A direct-push injection of Oxygen Release Compound Advanced (ORC<sup>®</sup> Advanced) was chosen to reduce remaining soil and groundwater contamination at the location of the former excavation and well BW-1. Maximum TVPH and benzene concentrations in the prior two years were as high as 2.4 mg/L and 0.48 mg/L, respectively. Due to tighter soils, a 7-foot-on-center grid pattern with 15 injection points was implemented on-site. ORC Advanced was injected from approximately 6 to 13 feet below ground surface with about 1 foot of the injection interval extending above groundwater in the event of rising water levels. A total of 725 pounds of ORC Advanced was injected for this project.

Site Type: Service Station

PROJECT PROFILE

**Contaminant of Concern:** Petroleum Hydrocarbons

Concentration: Benzene – 460 ppb

**Remediation Approach:** Enhanced Aerobic Biodegradation

Soil Type: Clay, Sandy Clay

Technology Used: ORC Advanced

Despite the relatively tight soils and high potential for contaminant back diffusion, the ORC Advanced treatment resulted in consistent downward trends of benzene contamination. A 96.3% reduction in benzene after only 3 months was observed. By month 12, a 99.8% reduction to below detection limits (<1 ppb) was achieved. The site was granted a no further action letter.

# **Technology Description**

ORC Advanced<sup>®</sup> is a proprietary formulation of food-grade, calcium oxy-hydroxide that produces a controlled-release of molecular oxygen for periods of up to 12 months upon hydration.



# **ORC** Advanced<sup>®</sup> Technical Description

ORC Advanced<sup>®</sup> is an engineered, oxygen release compound designed specifically for enhanced, *in situ* aerobic bioremediation of petroleum hydrocarbons in ground-water and saturated soils. Upon contact with groundwater, this calcium oxyhydroxide-based material becomes hydrated producing a controlled release of molecular oxygen (17% by weight) for periods of up to 12 months on a single application.

ORC Advanced decreases time to site closure and accelerates degradation rates up to 100 times faster than natural degradation rates. A single ORC Advanced application can support aerobic biodegradation for up to 12 months with minimal site disturbance, no permanent or emplaced above ground equipment, piping, tanks, power sources, etc are needed. There is no operation or maintenance required. ORC Advanced provides lower costs, greater efficiency and reliability compared to engineered mechanical systems, oxygen emitters and bubblers.



Example of ORC Advanced

ORC Advanced provides remediation practitioners with a significantly faster and highly effective means of treating petroleum contaminated sites. Petroleum hydrocarbon contamination is often associated with retail petroleum service stations resulting from leaking underground storage tanks, piping and dispensers. As a result, ORC Advanced technology and applications have been tailored around the remediation needs of the retail petroleum industry and include: tank pit excavations, amending and mixing with backfill, direct-injection, bore-hole backfill, ORC Advanced Pellets for waterless and dustless application, combined ISCO and bioremediation applications, etc.

For a list of treatable contaminants with the use of ORC Advanced, view the Range of Treatable Contaminants Guide

# **Chemical Composition**

- Calcium hydroxide oxide
- Calcium hydroxide

# Properties

- Physical state: Solid
- Form: Powder
- Odor: Odorless
- Color: White to pale yellow
- pH: 12.5 (3% suspension/water)



# **ORC** Advanced<sup>®</sup> Technical Description

# Storage and Handling Guidelines

#### Storage

Store in a cool, dry place out of direct sunlight

Store in original tightly closed container

Store in a well-ventilated place

Do not store near combustible materials

Store away from incompatible materials

Provide appropriate exhaust ventilation in places where dust is formed

# HandlingMinimize dust generation and accumulationKeep away from heatRoutine housekeeping should be instituted to<br/>ensure that dust does not accumulate on surfacesObserve good industrial hygiene practicesTake precaution to avoid mixing with combustiblesKeep away from clothing and other combustible<br/>materialsAvoid contact with water and moistureAvoid prolonged exposure

Wear appropriate personal protective equipment

# Applications

- Slurry mixture direct-push injection through hollow rods or direct-placement into boreholes
- In situ or ex situ slurry mixture into contaminated backfill or contaminated soils in general
- Slurry mixture injections in conjunction with chemical oxidants like RegenOx or PersulfOx
- Filter sock applications in groundwater for highly localized treatment
- Ex situ biopiles

# Health and Safety

Wash thoroughly after handling. Wear protective gloves, eye protection, and face protection. Please review the <u>ORC Advanced Safety Data Sheet</u> for additional storage, usage, and handling requirements.



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REGENESIS

# SAFETY DATA SHEET



Product identifier	Oxygen Release Compound Advanced (OR	C Advanced®)
Other means of identification	None.	
Recommended use	Soil and Groundwater Remediation.	
Recommended restrictions	None known.	
Manufacturer/Importer/Supplier/I	Distributor information	
Company Name	REGENESIS	
Address	1011 Calle Sombra	
	San Clemente, CA 92673 USA	
General information	949-366-8000	
E-mail	CustomerService@regenesis.com	
Emergency phone number	For Dangerous Goods Incidents ONLY (spill, le CHEMTREC 24/7 at:	eak, fire, exposure or accident), call
USA, Canada	1-800-424-9300	
International	+1 703-741-5970	
2. Hazard(s) identification		
Physical hazards	Oxidizing solids	Category 2
Health hazards	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
OSHA defined hazards	Not classified.	

Label elements



Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Causes severe skin burns and eye damage. Causes serious eye damage. May cause respiratory irritation.
Precautionary statement	
Prevention	Keep away from heat. Keep/Store away from clothing/combustible materials. Take any precaution to avoid mixing with combustibles. Do not breathe dust. Avoid breathing vapors. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Wash contaminated clothing before reuse. In case of fire: Use appropriate media to extinguish.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

#### 3. Composition/information on ingredients

Mixtures

WINTUI 62			
Chemical name		CAS number	%
Calcium peroxide		1305-79-9	≥ 75
Calcium hydroxide		1305-62-0	≤ 25
Dipotassium Phosphate		7758-11-4	< 5
Monopotassium Phosphate		7778-77-0	< 5
Composition comments	All concentrations are in percent by weigh	t unless otherwise indicated.	
4. First-aid measures			
Inhalation	Remove victim to fresh air and keep at re center or doctor/physician if you feel unwo	st in a position comfortable for brea ell.	thing. Call a poison
Skin contact	If on clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.		
Eye contact	Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.		
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.		
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.		
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.		
General information	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.		
5. Fire-fighting measures			
Suitable extinguishing media	Water spray, fog (flooding amounts). Foa	m. Dry chemical powder. Carbon d	ioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.		
Specific hazards arising from the chemical	Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed. Combustion products may include: metal oxides.		
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and fu	ull protective clothing must be worn	in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not bre so without risk. Use water spray to cool u	athe fumes. Move containers from nopened containers.	fire area if you can do
Specific methods	Cool containers exposed to flames with w	ater until well after the fire is out.	
General fire hazards	May intensify fire; oxidizer. Contact with o	ombustible material may cause fire	2.
6. Accidental release meas	sures		

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of dust. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Ventilate the contaminated area. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Minimize dust generation and accumulation. Collect dust using a vacuum cleaner equipped with HEPA filter. Wear appropriate protective equipment and clothing during clean-up. Stop the flow of material, if this is without risk.
	Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water.
	Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Clean surface thoroughly to remove residual contamination.
	Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.
7. Handling and storage	
Precautions for safe handling	Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Keep away from heat. Provide appropriate exhaust ventilation at places where dust is formed. Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not get this material in contact with eyes. Avoid breathing dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Avoid contact with water and moisture.
Conditions for safe storage, including any incompatibilities	Store locked up. Keep away from heat. Store in a cool, dry place out of direct sunlight. Store in tightly closed container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see Section 10 of the SDS).

#### 8. Exposure controls/personal protection

#### **Occupational exposure limits**

Components	Туре	Value	Form
Calcium hydroxide (CAS 1305-62-0)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
US. ACGIH Threshold Lim	it Values		
Components	Туре	Value	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
US. NIOSH: Pocket Guide	to Chemical Hazards		
Components	Туре	Value	
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3	
Biological limit values	No biological exposure limits noted for	or the ingredient(s).	
Appropriate engineering controls	Good general ventilation should be us applicable, use process enclosures, I maintain airborne levels below recom established, maintain airborne levels sufficient to maintain concentrations of (OEL), suitable respiratory protection operation which may generate dusts, below the recommended exposure lir	sed. Ventilation rates should b ocal exhaust ventilation, or oth mended exposure limits. If ex to an acceptable level. If engi of dust particulates below the must be worn. If material is g use appropriate local exhaus nits. Provide eyewash station	e matched to conditions. If her engineering controls to posure limits have not been heering measures are not Occupational Exposure Limit round, cut, or used in any t ventilation to keep exposures and safety shower.
ndividual protection measure	s, such as personal protective equipm	ent	
Eye/face protection	Use dust-tight, unvented chemical sa	fety goggles when there is po	tential for eye contact.
Skin protection			
Hand protection	Recommended gloves include rubber	r, neoprene, nitrile or viton. Fro	equent change is advisable.
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Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Recommend use: Wear respirator with dust filter.	rator led
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.	
General hygiene considerations	Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.	ated ng

9. Physical and chemical p	properties
Appearance	
Physical state	Solid.
Form	Powder.
Color	White to pale yellow.
Odor	Odorless.
Odor threshold	Not available.
рН	12.5 (3% suspension/water)
Melting point/freezing point	Not applicable, material is a solid.
Initial boiling point and boiling range	Not applicable, material is a solid.
Flash point	Property has not been measured.
Evaporation rate	Not available.
Flammability (solid, gas)	Oxidizer.
Upper/lower flammability or expl	osive limits
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not applicable, material is a solid.
Vapor density	Not applicable, material is a solid.
Relative density	Property has not been measured.
Solubility(ies)	
Solubility (water)	Slightly soluble
Partition coefficient (n-octanol/water)	Not applicable, product is a mixture. Not applicable, product is a mixture.
Auto-ignition temperature	Property has not been measured.
Decomposition temperature	527 °F (275 °C)
Viscosity	Not applicable, material is a solid.
Other information	
Bulk density	0.5 - 0.9 g/ml
Density	Property has not been measured.
Explosive limit	Non-explosive.
Explosive properties	Not explosive.
Kinematic viscosity	Not applicable, material is a solid.
Oxidizing properties	May intensify fire; oxidizer.
10. Stability and reactivity	
Reactivity	Greatly increases the burning rate of combustible materials.
Chemical stability	Decomposes on heating. Product may be unstable at temperatures above: 275°C/527°F.
Possibility of hazardous reactions	Reacts slowly with water.
Conditions to avoid	Moisture. Heat. Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials.
Incompatible materials	Acids. Bases. Combustible material. Reducing agents. Salts of heavy metals.

Oxygen Release Compound Advanced (ORC Advanced®)

930769 Version #: 02 Revision date: 15-July-2022 Issue date: 14-February-2020

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Hazardous decomposition Oxygen. Hydrogen peroxide (H2O2). Steam. Heat. products

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#### 11. Toxicological information

Information on likely routes of	exposure
Inhalation	Dust may irritate respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Ingestion	Causes digestive tract burns.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Dusts may irritate the respiratory tract, skin and eyes.

#### Information on toxicological effects

Acute toxicity	Not known.		
Components	Species	Test Results	
Calcium hydroxide (CAS 1305-62	2-0)		
Acute			
Dermal			
LD50	Rabbit	> 2500 mg/kg, 24 Hours	
Inhalation			
LC50	Rat	6.04 mg/l, 4 hours	
Oral			
LD50	Rat	> 2000 mg/kg	
Skin corrosion/irritation	Causes severe skin burns and eye damage.		
Serious eye damage/eye irritation	Causes serious eye damage.		
Respiratory or skin sensitizatio	'n		
Respiratory sensitization	Not a respiratory sensitizer.		
Skin sensitization	This product is not expected to cause skin sensitization.		
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.		
Carcinogenicity	Not classifiable as to carcinogenicity to humans.		
IARC Monographs. Overall	Evaluation of Carcinogenicity		
Not listed.			
NTP Report on Carcinogen	S		
Not listed.			
OSHA Specifically Regulate	ed Substances (29 CFR 1910.1001-1)	053)	
Not listed.	This product is not expected to source correductive or developmental effects		
Specific target ergen toxicity	May aquee reeniratory irritation	se reproductive or developmental enects.	
single exposure	May cause respiratory initiation.		
Specific target organ toxicity - repeated exposure	Not classified.		
Aspiration hazard	Not an aspiration hazard.		
12. Ecological information	n		
Ecotoxicity	The product is not classified as envi possibility that large or frequent spil	ironmentally hazardous. However, this does not exclude the Is can have a harmful or damaging effect on the environment.	
Components	Species	Test Results	
Calcium hydroxide (CAS 130	5-62-0)		

Aquatic			
Algae	EC50	Algae	184.57 mg/l, 72 hours

Oxygen Release Compound Advanced (ORC Advanced®)

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<i>Circa by CCD</i> . <i>Fillimont</i> <b>m</b> .00.1	1 4 5 0 1 7 0 1
Persistence and degradability	Decomposes in the presence of water. The product contains inorganic compounds which are not biodegradable.
Bioaccumulative potential	The product does not contain any substances expected to be bioaccumulating.
Mobility in soil	This product has very low solubility in water and low mobility in the environment.
Other adverse effects	None known.
13. Disposal consideratio	ns
Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of

	contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

#### 14. Transport information

DOT		
UN number		UN1457
UN proper shippi	ng name	Calcium peroxide
Transport hazard	class(es)	
Class		5.1
Subsidiary ri	sk	-
Label(s)		5.1
Packing group		II
Environmental ha	azards	
Marine pollut	ant	No.
Special precaution	ons for user	Read safety instructions, SDS and emergency procedures before handling.
Special provision	S	IB6, IP2, T3, TP33, W100
Packaging excep	tions	152
Packaging non b	ulk	212
Packaging bulk		242
ΙΑΤΑ		
UN number		UN1457
UN proper shippi	ng name	Calcium peroxide
Transport hazard	class(es)	
Class		5.1
Subsidiary ri	sk	-
Packing group		II
Environmental ha	azards	No.
ERG Code		5L
Special precaution	ons for user	Read safety instructions, SDS and emergency procedures before handling.
IMDG		
UN number		UN1457
UN proper shippi	ng name	CALCIUM PEROXIDE
Transport hazard	class(es)	
Class		5.1
Subsidiary ri	sk	-
Packing group		11
Environmental ha	azards	
Marine pollut	ant	No.
EmS		F-G, S-Q
Special precaution	ons for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk acc	ording to	Not applicable.
Annex II of MARPOL	73/78 and	
the IBC Code		

#### 15. Regulatory information

US federal regulations	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.		
TSCA Section 12(b) Exp	ort Notification (40 CF	FR 707, Subpt. D)	
Not regulated. CERCLA Hazardous Sul	bstance List (40 CFR 3	302.4)	
Not listed. SARA 304 Emergency re	elease notification		
Not regulated.			
OSHA Specifically Regu	llated Substances (29	CFR 1910.1001-1053)	
Not listed.			
Toxic Substances Control A	ct (TSCA)	All components of the mixture on the TSCA 8(b) "active".	inventory are designated
Superfund Amendments and Re SARA 302 Extremely hazard	authorization Act of 1 lous substance	986 (SARA)	
Not listed.			
SARA 311/312 Hazardous chemical	Yes		
Classified hazard	Oxidizer (liquid, solid,	or gas)	
categories	Skin corrosion or irrita	ation or eve irritation	
	Specific target organ	toxicity (single or repeated exposure)	
SARA 313 (TRI reporting) Not regulated.			
Other federal regulations			
Clean Air Act (CAA) Section	112 Hazardous Air Po	ollutants (HAPs) List	
Not regulated. Clean Air Act (CAA) Section	112(r) Accidental Rel	ease Prevention (40 CFR 68.130)	
Not regulated.			
Safe Drinking Water Act (SDWA)	Not regulated.		
US state regulations			
US. Massachusetts RTK - Su	ubstance List		
Calcium hydroxide (CAS US. New Jersey Worker and	1305-62-0) Community Right-to-	Know Act	
Calcium hydroxide (CAS Calcium peroxide (CAS 1 US Pennsylvania Worker ar	1305-62-0) 305-79-9) od Community Right-tr	o-Know I aw	
Calcium hydroxide (CAS US. Rhode Island RTK	1305-62-0)		
Calcium hydroxide (CAS	1305-62-0)		
California Proposition 65			
California Safe Drinking V is not known to contain ar more information go to wy	Vater and Toxic Enforce ny chemicals currently li ww.P65Warnings.ca.go	ement Act of 1986 (Proposition 65): This material isted as carcinogens or reproductive toxins. For v.	
International Inventories			
Country(s) or region	Inventory name		On inventory (yes/no)*
Australia	Australian Inventory of	of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances	s List (DSL)	Yes
Canada	Non-Domestic Substa	ances List (NDSL)	No
China	Inventory of Existing (	Chemical Substances in China (IECSC)	Yes
Europe	European Inventory o Substances (EINECS	f Existing Commercial Chemical	Yes
Europe	European List of Notif	fied Chemical Substances (ELINCS)	No
Japan	Inventory of Existing a	and New Chemical Substances (ENCS)	Yes
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Country(s) or region	Inventory name On inventory (	yes/no)*
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes
*A "Voe" indicatos that all compo	nearts of this product comply with the inventory requirements administered by the governing country( $c$ )	

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s) A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

#### 16. Other information, including date of preparation or last revision

Issue date	14-February-2020
Revision date	15-July-2022
Version #	02
HMIS® ratings	Health: 3 Flammability: 0 Physical hazard: 2

**NFPA** ratings



Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

# EXCAVATION WITH REGENOX SUCCESSFULLY TREATS LARGE PHC PLUME

# CASE STUDY: Successful Remediation Makes Way For Urban Medical Center







After previous consultants attempted remediation without success, C&S created a remediation strategy that successfully reduced the plume.



The combined remedy approach of excavation and ISCO exceeded the remediation goals.



The NYSDEC Brownfield Cleanup Program provided tax credits which made remediation and redevelopment possible.

# **Overview**

# Acre-Sized Petroleum Plume Successfully Treated With Excavation and RegenOx

A former gas station site in Buffalo, New York required remediation due to leaking underground storage tanks. As part of the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program, C&S Consulting designed a complex remediation program to ensure a quick and affordable solution. Petroleum contamination extended from 10 to 40 feet below grade. The site was excavated to 26 feet below ground surface to remove residual contamination and to enable equipment staging and material handling areas to support the deeper excavation area. Together with REGENESIS®, C&S designed an *in situ* remediation strategy to target the residual contaminant plume. RegenOx<sup>®</sup> *in situ* chemical oxidant was chosen because of its ability to target petroleum hydrocarbons and its non-corrosive properties.





Successful remediation enabled the construction of a 350,000 sq. ft. \$110 million facility at the Buffalo Niagara Medical Campus.



RegenOx was chosen due to its noncorrosive properties and its ability to successfully remediate the petroleum contaminant plume.

# Background Uniquely Challenging Site Conditions

The former gas station site had leaking underground storage tanks for over 20 years. This resulted in a contaminant plume larger than an acre. Previous remediation attempts were unsuccessful at reducing the size of the large plume. The site is located in an area of Buffalo, New York that has recently been revitalized and redeveloped into a prominent medical corridor. As a way to encourage private-sector cleanup and redevelopment of brownfields across New York State, the Brownfield Cleanup Program offers tax credits to offset the costs of remediation. This Brownfield site qualified for the program, making the remediation possible. The remediation of this site was a crucial component in the redevelopment of the former gas station into the Conventus Center For Collaborative Medicine.





# Timeline

Remediation Efforts Using Excavation and RegenOx Accelerated Redevelopment



**January 2013** Soil remediation process begins



# October 2013 Soil remediation efforts are completed



# December 2015

RegenOx applied as part of groundwater treatment



# June 2016

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Conventus has surpassed the original goal of Gold, and has been LEED Certified at the Platinum level. Only 3% of Core & Shell LEED registered projects worldwide, achieve Platinum Level certification



#### Treatment

# RegenOx Was Applied to the Remaining Contamination to Reduce the Size of the Plume

The acre-sized contaminant plume was first treated through excavation and then with the *in situ* chemical oxidant RegenOx. The site was excavated to 26 feet below ground surface to remove a large portion of the contaminated soil and to install 2 floors of underground parking for the future site redevelopment. Saturated running sands destabilized the deep excavation and required development of an innovative method of deep excavation in "cells" to control the excavation integrity. As a result, 30 percent of the below grade soil conditions were stabilized with flowable fill to allow construction of the parking garage and building. This technique was one of the most important factors in the project's success, helping exceed the remediation goals and generating additional tax credits.

The underground parking walls are sheeted with steel shoring which limited the options for remediation. RegenOx was applied to the remaining contamination to reduce the size of the plume. Additional barriers including a VI barrier, an SVI system, and ventilation in the underground parking structure are in place to ensure that patrons are not at risk from any of the contaminant plume.



# **Treatment Process**



RegenOx was applied to the remaining contamination to reduce the size of the plume.





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# Technology Used RegenOx



RegenOx<sup>®</sup> *in situ* chemical oxidation (ISCO) directly oxidizes contaminants while its catalytic component generates highly oxidizing free radicals that rapidly destroy target contaminants, including petroleum hydrocarbons and chlorinated compounds. RegenOx is an injectable, two-part ISCO reagent that combines a solid sodium percarbonate based alkaline oxidant (Part A), with a liquid mixture of sodium silicates, silica gel and ferrous sulfate (Part B), resulting in a powerful contaminant destroying technology. The chemical oxidation reactions can continue to propagate in the presence of RegenOx for periods of up to 30 days on a single injection.





## **Results**

# Site Successfully Redeveloped to Make Way for Major Medical Center

C&S completed the remedial investigation, design, and oversight for the remediation of the former gas station site. As a result of the excavation and *in situ* application of RegenOx, the site was successfully redeveloped into the Conventus Center For Collaborative Medicine, a 350,000-square-foot, \$110 million facility at the Buffalo Niagara Medical Campus. The project received a Platinum Engineering Excellence Award from ACEC-New York.



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An ACEC New York hallmark for over 50 years, the Engineering Excellence Awards – the Academy Awards" of the consulting engineering industry—are held annually in the spring to honor member firms for design achievements of superior skill and ingenuity.

Each year, over 60 firms submit projects that are judged on a rigorous set of criteria, which includes complexity, innovation and value to society. In addition to celebrating among peers, the EEA helps to publicize the many significant contributions consulting engineers make to the built environment throughout the world.









499 Col. Eileen Collins Blvd. Syracuse, NY 13212 Tel: (315) 455-2000



# The Consultant About C&S:

C&S' versatile group of experts work as an integrated team, identifying and implementing well-rounded, comprehensive, and resilient solutions. Working together, C&S plans, designs, constructs, and maintains the built and natural environment. The C&S staff of nearly 500 has the expertise to handle almost any challenge.

The team manages an incredible range of project types and specialties, drawing on significant in-house resources. The C&S team collaborates and combines its collective knowledge to deliver the best solutions to each client. Coordinating projects from inception through construction provides a continuity of service that clients rely on. C&S works with local, state, and federal government; the private sector; industry; developers; and the military throughout the United States and the world with a deep bench of services.

# About The Project Manager

Cody Martin is a Project Environmental Scientist with C&S Engineers, Inc., a leading environmental services company and valued REGENESIS client. Cody received his Bachelor of Science in Anthropology and a Master's of Science in Geographic Information Systems (GIS) from the University of Buffalo. In his current position with C&S Engineers, Martin's responsibilities focus primarily on Brownfield Cleanup Program (BCP) sites, a state program regulated by the New York State Department of Environmental Conservation (NYSDEC). In his role, Martin designs the remedial investigation and remedial action plans as well as documents and oversees cleanup activities.



# WE'RE READY TO HELP YOU FIND THE RIGHT SOLUTION FOR YOUR SITE

# **Global Headquarters**

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REGENESIS

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# RegenOx<sup>®</sup> Technical Description

RegenOx is an advanced chemical oxidation technology that destroys contaminants through powerful, yet controlled chemical reactions. This product maximizes *in situ* chemical oxidation (ISCO) performance through use of a two-part product system; a sodium percarbonate oxidizer complex activated by a patented surface catalyst system. The technology degrades pollutants through direct oxidation, as well as through the generation of a suite of free radical compounds which in turn oxidize recalcitrant contaminants. RegenOX rapidly and effectively destroys a range of target contaminants including petroleum hydrocarbons and chlorinated compounds.

RegenOx is especially effective in destroying target contaminants present in high concentration source areas within the saturated and vadose zones. For petroleum hydrocarbon treatment, RegenOx produces oxygen as a result of its reactions, providing seamless transition from ISCO to enhanced aerobic bioremediation.



Close up of RegenOx

RegenOx produces minimal heat when applied, and continues to destroy contaminants for up to 30 days on a single application. RegenOx is safe for use in direct contact with underground utilities, since it is non-corrosive to concrete and most metals.

#### $C_2CI_4 + 4/3 Na_2CO_3 \bullet 2H_2O_2 + 4NaOH \rightarrow 2CO_2 + 4NaCI + 4H_2O + 4/3 Na_2CO_3$

Free Radical Oxidation via production of:

 Perhydroxyl Radical (HO<sub>2</sub> •)
 Hydroxyl Radical (OH •)
 Superoxide Radical (O<sub>2</sub><sup>-</sup>•)

For a list of treatable contaminants with the use of RegenOx, view the Range of Treatable Contaminants Guide

# Chemical Composition - Part A Oxidant

- Sodium Percarbonate CAS #15630-89-4
- Sodium Carbonate Monohydrate CAS #5968-11-6
- Silicic Acid CAS #7699-11-6
- Silica Gel CAS #63231

# Chemical Composition – Part B Activator Complex

- Silicic Acid, Sodium Salt, Sodium Silicate CAS#1344-09-08
- Silica Gel CAS #63231
- Ferrous Sulfate CAS #7720-78-7
- Water CAS#7732-18-5

### Properties

- Bulk Density Part A 0.9-1.2 g/cm3; Part B 1.39 g/cm3
- pH 10-11 per recommended mixing ratios (3-5% oxidant in solution)
- Solubility Oxidant 14.5 g/100 g water; Activator miscible in water
- Appearance Brown to orange-brown when mixed with water
- Odor Not detectable
- Vapor Pressure None
- Non-hazardous



# RegenOx<sup>®</sup> Technical Description

# Storage and Handling Guidelines

#### Storage

Store in a cool, dry place out of heat/direct sunlight Store at temperatures not to exceed 40°C/104°F

Store in original tightly closed container

Store in a well-ventilated place

Do not store near combustible materials

Store away from incompatible materials

Protect from contamination

Provide appropriate exhaust ventilation in places where dust is formed

HandlingMinimize dust generation and accumulationObserve good industrial hygiene practicesKeep away from clothing and combustible materialsTake any precaution to avoid mixing with<br/>combustiblesAvoid contact with eyesDo not taste or swallowDo not eat, drink or smoke nearbyWear appropriate personal protective equipmentWash hands thoroughly after handlingAvoid release to the environment

# Applications

RegenOx is applied using direct-injection techniques or wells. The application process enables the two- part product to be combined, then pressure-injected into the zone of contamination and moved out into the aquifer media. Application instructions for this product are contained in the <u>RegenOx Application Instructions Guide</u>.

# Health and Safety

Material is relatively safe to handle; however, we recommend avoiding contact with eyes, skin and clothing. OSHA Level D personal protection equipment including vinyl or rubber gloves, eye protection and dust mask are recommended when handling this product. Please review the Material Safety Data Sheet for additional storage, packaging, usage, and handling requirements here: <u>RegenOx Part A SDS</u> and <u>RegenOx Part B SDS</u>.



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District III

1000 Rio Brazos Rd., Aztec, NM 87410 Phone:(505) 334-6178 Fax:(505) 334-6170

District IV

1220 S. St Francis Dr., Santa Fe, NM 87505 Phone: (505) 476-3470 Fax: (505) 476-3462

## **State of New Mexico Energy, Minerals and Natural Resources Oil Conservation Division** 1220 S. St Francis Dr. Santa Fe, NM 87505

CONDITIONS

Action 383557

CONDITIONS		
Operator:	OGRID:	
HILCORP ENERGY COMPANY	372171	
1111 Travis Street	Action Number:	
Houston, TX 77002	383557	
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)	

#### CONDITIONS

Created	Condition	Condition Date
By		
nvelez	Regenesis calcium hydroxide amendment to treat hydrocarbons in-situ for soils and groundwater meets OCD's pre-approval and is accepted for the record.	10/29/2024