TSI-KPS™ Potassium Persulfate
Safety Data Sheet

SECTION 1. IDENTIFICATION

Product name:	Potassium Persulfate or TSI-KPS
CAS-No:	7727-21-1

Manufacturer or supplier's details

Company name of supplier:	Terra Systems, Inc.
Address:	130 Hickman Road Suite 1 Claymont DE 19703
Telephone:	+1 302-798-9553
Fax:	+1 302 798 9554
Emergency telephone:	CHEMTREC US (24h): +1-800-424-9300 CHEMTREC WORLD (24h): +1-703-527-3887
E-mail address of person responsible for the SDS	mlee@terrasystems.net

Recommended use of the chemical and restrictions on use

Recommended use:	Oxidizing agent for soil remediation

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Oxidizing solids:	Category 3
Acute toxicity (Oral):	Category 4
Skin irritation:	Category 2
Eye irritation:	Category 2A
Respiratory sensitization:	Category 1
Skin sensitization:	Category 1
Specific target organ systemic toxicity -single exposure:	Category 3 (Respiratory system)
GHS label elements:	

Hazard pictograms

Signal Word:	**Danger**
Hazard Statements:	H272 May intensify fire; oxidizer. H302 Harmful if swallowed. H315 Causes skin irritation. H317 May cause an allergic skin reaction. H319 Causes serious eye irritation. H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled. H335 May cause respiratory irritation.
Precautionary Statements	**Prevention:** P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking. P220 Keep/Store away from clothing/ combustible materials. P221 Take any precaution to avoid mixing with combustibles. P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray. P264 Wash skin thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P271 Use only outdoors or in a well-ventilated area. P272 Contaminated work clothing must not be allowed out of the workplace. P280 Wear protective gloves/ eye protection/ face protection. P285 In case of inadequate ventilation wear respiratory protection. **Response:** P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTER/doctor.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P370 + P378 In case of fire: Use water spray to extinguish.

Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards
None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture:	Substance
Substance name:	Potassium Persulfate
CAS-No.:	7727-21-1
Chemical nature:	Persulfate Solid

Hazardous ingredients

Chemical name	CAS-No.	Concentration (% w/w)
Potassium Persulfate	7727-21-1	>= 99 - <= 100

SECTION 4. FIRST AID MEASURES

General advice:

Move out of dangerous area.
Show this material safety data sheet to the doctor in attendance.
Do not leave the victim unattended.
Symptoms of poisoning may appear several hours later.
Call a physician immediately.

If inhaled:

Call a physician or poison control center immediately.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
If breathed in, move person into fresh air.

In case of skin contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Wash contaminated clothing before re-use.
If on skin, rinse well with water.
If on clothes, remove clothes.
If symptoms persist, call a physician.

In case of eye contact:

In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed:

Keep respiratory tract clear.
Call a physician immediately.
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed:	Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation.
Protection of first-aiders	First Aid responders should pay attention to self-protection and use the recommended protective clothing
Notes to physician:	Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media:	Water spray, foam
Unsuitable extinguishing media	High volume water jet
Specific hazards during firefighting:	Contact with incompatible materials or exposure to temperatures exceeding SADT may result in a self-accelerating decomposition reaction with release of flammable vapors which may auto-ignite. Cool closed containers exposed to fire with water spray.
Specific extinguishing methods:	Do not use a solid water stream as it may scatter and spread fire. Remove undamaged containers from fire area if it is safe to do so. Use water spray to cool unopened containers. Suppress (knock down) gases/vapors/mists with a water spray jet.

Further information:	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. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Special protective equipment for fire-fighters:	Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:	Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Remove all sources of ignition. Follow safe handling advice and personal protective equipment recommendations. Never return spills in original containers for re-use. Treat recovered material as described in the section "Disposal considerations".
Environmental precautions:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up:	Contact with incompatible substances can cause decomposition at or below SADT. Clear spills immediately. Suppress (knock down) gases/vapors/mists with a water spray jet.

To clean the floor and all objects contaminated by this material, use plenty of water.
Soak up with inert absorbent material. Isolate waste and do not reuse.
Non-sparking tools should be used.
Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.

SECTION 7. HANDLING AND STORAGE

Technical measures:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Advice on protection against fire and explosion:	Avoid dust formation. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from combustible material.
Advice on safe handling:	Do not swallow. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. Take precautionary measures against static discharges. Never return any product to the container from which it was originally removed. Provide sufficient air exchange and/or exhaust in work rooms. Avoid confinement. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Smoking, eating and drinking should be prohibited in the application area. Wash thoroughly after handling.

	For personal protection see section 8. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used. Protect from contamination. Protect from moisture.
Conditions for safe storage:	Avoid impurities (e.g. rust, dust, ash), risk of decomposition. Electrical installations / working materials must comply with the technological safety standards. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in original container. Keep containers tightly closed in a cool, well-ventilated place. Keep in a dry place. Store in accordance with the particular national regulations.
Materials to avoid:	Keep away from strong acids, bases, heavy metal salts and other reducing substances.
Recommended storage temperature:	< 30 °C (< 86 °F)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Potassium persulfate	7727-21-1	TWA	0.1 mg/m3 (persulfate)	ACGIH

Engineering measures: Minimize workplace exposure concentrations.

Personal protective equipment

Respiratory protection:	In the case of dust or aerosol formation use respirator with an approved filter.
Filter type:	Filter type P
Hand protection	
Material:	butyl-rubber
Break through time:	>= 480 min
Glove thickness:	0.5 mm
Remarks:	Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove Wash hands before breaks and at the end of workday.
Eye protection:	Tightly fitting safety goggles Please wear suitable protective goggles. Also wear face protection if there is a splash hazard. Ensure that eyewash stations and safety showers are close to the workstation location.
Skin and body protection:	Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential.
Hygiene measures:	Keep away from food and drink. When using do not eat or drink. When using do not smoke. Wash hands before breaks and immediately after handling the product.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	solid
Color:	white
Odor:	not significant
Odor Threshold:	No data available

pH:	4.0 SU Concentration: 10 g/l
Melting point/freezing point:	Decomposition: Decomposes below the melting point.
Initial boiling point and boiling range:	Not applicable
Flash point:	Not applicable
Evaporation rate:	Not applicable
Flammability (solid, gas):	Not expected to form explosive dust-air mixtures.
Upper explosion limit:	No data available
Lower explosion limit:	No data available
Vapor pressure:	Not applicable
Relative vapor density	Not applicable
Bulk density:	1,100 kg m^3
Solubility(ies) Water solubility:	60 g/l (25 °C) soluble
Partition coefficient: n-octanol/water:	Not applicable
Self-Accelerating decomposition temperature (SADT):	170 °C Method: UN-Test H.4 SADT-Self Accelerating Decomposition Temperature. Lowest temperature at which the tested package size will undergo a self-accelerating decomposition reaction.
Viscosity, dynamic:	Not applicable
Viscosity, kinematic:	Not applicable
Explosive properties:	Not explosive
Oxidizing properties:	The substance or mixture is classified as oxidizing with the category 3.

SECTION 10. STABILITY AND REACTIVITY

Reactivity:	Stable under recommended storage conditions.
Chemical stability:	Stable under recommended storage conditions.
Possibility of hazardous reactions:	Avoid moisture. Even small amounts of moisture or impurities can noticeably reduce the self-accelerating decomposition temperature (SADT).
Conditions to avoid:	Contact with incompatible substances can cause decomposition at or below SADT. Even small amounts of moisture or impurities can noticeably reduce the self-accelerating decomposition temperature (SADT).

Incompatible materials:	Accelerators, strong acids and bases, heavy metals and heavy metal salts, reducing agents
Hazardous decomposition products:	Irritant, caustic, flammable, noxious/toxic gases and vapors can develop in the case of fire and decomposition

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity Harmful if swallowed.

Product:

Acute oral toxicity: LD50 (Rat): 1,130 mg/kg

Ingredients:

Potassium persulfate:

Acute oral toxicity: LD50 (Rat, male): 742 mg/kg
Method: OECD Test Guideline 401
Assessment: The component/mixture is moderately toxic after single ingestion.
Remarks: Based on test data

Acute inhalation toxicity: LC50 (Rat): > 5.1 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The substance or mixture has no acute inhalation toxicity
Remarks: Expert judgment

Acute dermal toxicity: LD50 (Rat): > 2,000 mg/kg
Assessment: The substance or mixture has no acute dermal toxicity
Remarks: Expert judgment

Skin corrosion/irritation Causes skin irritation.

Product: Remarks: May cause skin irritation and/or dermatitis.

Ingredients:
Potassium persulfate: Result: Skin irritation

Serious eye damage/eye irritation
Causes serious eye irritation.
Product: Remarks: May cause irreversible eye damage.

Ingredients:
Potassium persulfate: Species: Rabbit
Result: Eye irritation.
Method: OECD Test Guideline 405

Respiratory or skin sensitization
Skin sensitization May cause an allergic skin reaction.

Respiratory sensitization May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Product:

Assessment: May cause sensitization by skin contact.
Assessment: Probability of respiratory sensitization in humans based on animal testing
Remarks: Causes sensitization.

Ingredients:
Potassium Persulfate Routes of exposure: Skin contact Species: Guinea pig
Method: OECD Test Guideline 406
Result: May cause sensitization by skin contact.

Routes of exposure: inhalation (dust/mist/fume)
Results. May cause sensitization by inhalation.

Germ cell mutagenicity
Not classified based on available information.

Ingredients:
Potassium Persulfate:
Genotoxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)
Result: negative
Remarks: based on data from similar materials.

Genotoxicity in vivo:	Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Mouse Application Route: Intraperitoneal injection Result: negative Remarks: Based on data from similar materials
Carcinogenicity	Not classified based on available information.
Ingredients:	
Potassium Persulfate:	Species: Mouse Application Route: Skin contact Exposure time: 52 weeks Method: OECD Test Guideline 451 Result: negative Remarks: Based on data from similar materials
IARC	No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
Reproductive toxicity	Not classified based on available information.
Ingredients**:**	
Potassium Persulfate	
Effects on fertility:	Species: Rat Application Route: Ingestion Method: OECD Test Guideline 421 Result: negative Remarks: Based on data from similar materials

STOT-single exposure
May cause respiratory irritation.

Ingredients:

Potassium Persulfate:	Assessment: May cause respiratory irritation.
STOT-repeated exposure	Not classified based on available information.

Repeated dose toxicity

Ingredients:

Potassium Persulfate:	Species: Rat NOAEL: 1,000 mg/kg LOAEL: 3,000 mg/kg Application Route: Ingestion Exposure time: 90 d Method: OECD Test Guideline 408
Aspiration toxicity	Not classified based on available information.

Further information

Product:
Remarks: No data available

Ingredients:
Potassium Persulfate
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ingredients:
Potassium Persulfate

Toxicity to fish:	LC50 (Scophthalmus maximus (turbot)): 107.6 mg/l Exposure time: 96 h Method: OECD Test Guideline 203 Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic Invertebrates:

EC50 (Daphnia magna (Water flea)): 120 mg/l
Exposure time: 48 h
Remarks: Based on data from similar materials

Toxicity to algae:

EC50 (Phaeodactylum): 320 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Based on data from similar materials

NOEC (Phaeodactylum): 32 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Based on data from similar materials

Toxicity to microorganisms:

EC10 (Pseudomonas putida): 36 mg/l
Exposure time: 18 h
Remarks: Based on data from similar materials

Persistence and degradability
No data available

Bioaccumulative potential

Ingredients:
Potassium Persulfate:
Partition coefficient:

n-octanol/water
Remarks: Not applicable

Mobility in soil
No data available

Additional ecological information

No data available

Other adverse effects
Product:
Ozone-Depletion Potential:

Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances

	Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
Additional ecological information	No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of wastes in an approved waste disposal facility.
Contaminated packaging:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum. Dispose of in accordance with local regulations.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number:	UN 15492 Proper shipping name : POTASSIUM PERSULFATE
Class:	5.1
Packing group :	III
Labels:	5.1

IATA-DGR

UN/ID No.:	UN 1492
Proper shipping name:	Potassium Persulfate:
Class:	5.1
Packing group:	III
Labels:	Oxidizer
Packing instruction (cargo aircraft):	563
Packing instruction (passenger aircraft):	559

IMDG-Code

UN number:	UN 1492
Proper shipping name:	Potassium Persulfate:
Class:	5.1
Packing group:	III
Labels:	5.1
EmS Code:	F-A, S-Q
Marine pollutant:	no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

Domestic regulation
49 CFR

UN/ID/NA number:	UN 1492
Proper shipping name:	Potassium persulfate
Class:	5.1
Packing group:	III
Labels:	OXIDIZER
ERG Code:	140
Marine pollutant:	no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know
CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.
SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards: Fire Hazard

	Acute Health Hazard
SARA 302:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act T
his product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act
This product does not contain any Hazardous Substances listed under the U.S. Clean Water Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. Clean Water Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

California Prop. 65	This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

The ingredients of this product are reported in the following inventories:

DSL (CA):	All components of this product are on the Canadian DSL
AICS (AU):	On the inventory, or in compliance with the inventory
NZIoC (NZ):	On the inventory, or in compliance with the inventory
ENCS (JP):	On the inventory, or in compliance with the inventory

ISHL (JP):	On the inventory, or in compliance with the inventory
KECI (KR):	On the inventory, or in compliance with the inventory
PICCS (PH):	On the inventory, or in compliance with the inventory
IECSC (CN):	On the inventory, or in compliance with the inventory
TCSI (TW):	On the inventory, or in compliance with the inventory
TSCA (US):	On TSCA Inventory

TSCA list
No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG – Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC –

Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.