KARMANTERRA

Karmanterra LLC
2011 Palomar Airport Rd. Ste. 101
Carlsbad, CA 92011
hello@karmanterra.com
May 12, 2025

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration (PHMSA)
Office of Hazardous Materials Safety
East Building, PHH-30
1200 New Jersey Avenue, SE
Washington, DC 20590-0001

Subject: Request for Classification Review Based on UN Test N.4 for Karmanterra Biocarbon

To Whom It May Concern,

We respectfully request that the Pipeline and Hazardous Materials Safety Administration (PHMSA) review the classification status of our material, Pine-derived Biocarbon, currently classified under UN1361, Division 4.2 (Spontaneously Combustible Substances).

We have conducted a UN Test N.4 (Self-Heating Substances) through an independent, ISO/IEC 17025–accredited laboratory to evaluate the self-heating properties of our material in accordance with the UN Manual of Tests and Criteria, Section 33.3.1.6.3. The test results demonstrate that our product does not exhibit self-heating behavior as defined under 49 CFR § 173.124(b)(2).

Enclosed for PHMSA Review:
- A certified copy of the UN N.4 test report from Stonehouse Process Safety, Inc. including methods, results, and conclusions.
- A detailed Material Safety Data Sheet (MSDS) for the tested material.
- Technical Data Sheet (TDS)
- Photographs and 3rd party Certificate of Analysis

We believe the evidence supports removal of our material from the Division 4.2 hazardous materials classification under the HMR and request that PHMSA issue a letter of interpretation or written determination confirming the revised classification. This documentation will be used for both domestic and international regulatory purposes, including compliance with IMDG and IATA shipping protocols.

Please contact us if additional documentation, clarification, or a site visit is needed. We appreciate your consideration and look forward to your guidance on the next steps.

Sincerely,

Mark Samuels, President | 949.439.0960 | mark@karmanterra.com

Stonehouse
Process Safety

Report

Dust Deflagration Testing

on a sample of

Karmanterra Biocarbon

Client

Mark Samuels
President
Karmanterra LLC
2011 Palomar Airport Rd.
Suite 101
Carlsbad, CA 92011

Project Number: 181899
Report Number: 181899/T/0425
Report Date: April 29th, 2025

Report Prepared By: Hunter Stoda, Laboratory Technician
Report Approved By: Heather Calabro, Laboratory Manager

Stonehouse Process Safety, Inc.
11D Princess Road
Lawrenceville, New Jersey 08648
Call: 609 455 0001
info@stonehousesafety.com
www.stonehousesafety.com
ISO/IEC 17025:2017 Accredited

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SECTION A

Sample Characteristics and Identifiers

Client name/ location	Karmanterra LLC / Carlsbad, CA 92011
Sample name/ chemical composition	Karmanterra Biocarbon
Known previous test history	N/A
Origin of sample	Karmanterra LLC
Location where sample was collected	Karmanterra HQ
Stonehouse ID/ other identifiers	181899
Client Batch/ Lot Number	KT-BIO-041825
Date sample collected	N/A
Date/Time sample received	04/22/2025 / 4:25 pm
Container description	Resealable Plastic Bag
Moisture/ volatile content	Sample was tested as received (LOD* 46.85%)
Particle size information	Sample was tested as received (0.00% <75µm)

*Loss on Drying

Sieve Particle Size Data as Received and Tested: Karmanterra Biocarbon Sample		
Sieve Number	Mesh Size (microns)	% Retained on Screen
35	500	77.69%
200	75	22.31%
Bottom Pan	-	0.00%

NOTE: 0.00% of the sample as received was less than 75µm. Per the request of the client, the sample was tested as received.

Figure 1. Karmanterra Biocarbon Sample as Received

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Process Safety

Summary of Results and Important Remarks

Karmanterra Biocarbon Sample		
Test Screening- Unit	**Results**	**Comments**
Self-Heating Substances - UN N.4 Series – 100mm cube basket at 140˚C	Not self-heating	No significant self-heating behavior observed at 140°C in a 100mm cube basket

The Karmanterra Biocarbon sample tested in a 100mm cube basket did not exhibit significant self-heating behavior at a temperature of 140°C within 24 hours and is therefore NOT classified as a self-heating material of Division 4.2, under the test conditions.

Please contact Stonehouse to set up a complimentary meeting to discuss how this data applies to your specific operations and processes.

"Our laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISOILAC-IAF Communiqué dated April 2017)"

Stonehouse
Process Safety

SECTION B

Tests, Results, and Interpretations

1. Self-Heating Substances – UN N.4 Series Test on Karmanterra Biocarbon Sample

1.1 Introduction

This test is designed to determine the ability of a substance to undergo oxidative self-heating by exposure of it to air at elevated temperatures in a wire mesh cube. The result of this test is typically used in the classification of a substance as self-heating per UN Class 4, Division 4.2.

1.2 Test Description

A hot air circulating oven capable of controlling the internal temperature at 140 ± 2°C is utilised. In the initial test (with a 100mm³ basket), the oven temperature is raised to 140°C and maintained at this temperature for a test period of 24 hours. The sample basket is filled to the top with the test material in its commercial form, tapped several times, and topped up if any settling is observed. The sample basket is then housed in covers and placed in the centre of the oven at the required test temperature for up to 24 hours or until exothermic decomposition is observed. The sample and oven temperatures are continually monitored and logged with two thermocouples, one placed in the centre of the sample and the other between the sample container and the oven wall. A positive result is obtained if spontaneous ignition occurs or if the temperature of the sample exceeds the oven temperature by 60°C.

1.3 Test Data and Results

Test equipment information is recorded below:

Isothermal Thermal Stability Testing	Test Information
Equipment type	Fan assisted oven
Oven Volume	95 Litre (average)
Test Temperatures	140°C
Thermocouple Type	K-Type
Date completed	04/26/2024
Laboratory operator	Matthew Demetris
Test basket size	100mm³ (with external 150x150x250mm wire cage)

The test results obtained on Karmanterra Biocarbon sample are given in the following tables and graphs below.

Table 1. UN/DoT Test(s) at 140˚C (284˚F) in a 100mm³ basket

ID #	Basket Size (mm³)	Test Temperature (°C)	Test Duration (hours)	Max Sample Temperature (°C)	Sample Mass (g)	Mass Loss (g)	Result
1	100	140	24	142	449.84	222.86	No significant self-heating observed within 24 hours

Graph 1: Self-Heating Test in a 100mm³ Basket @ 140°C

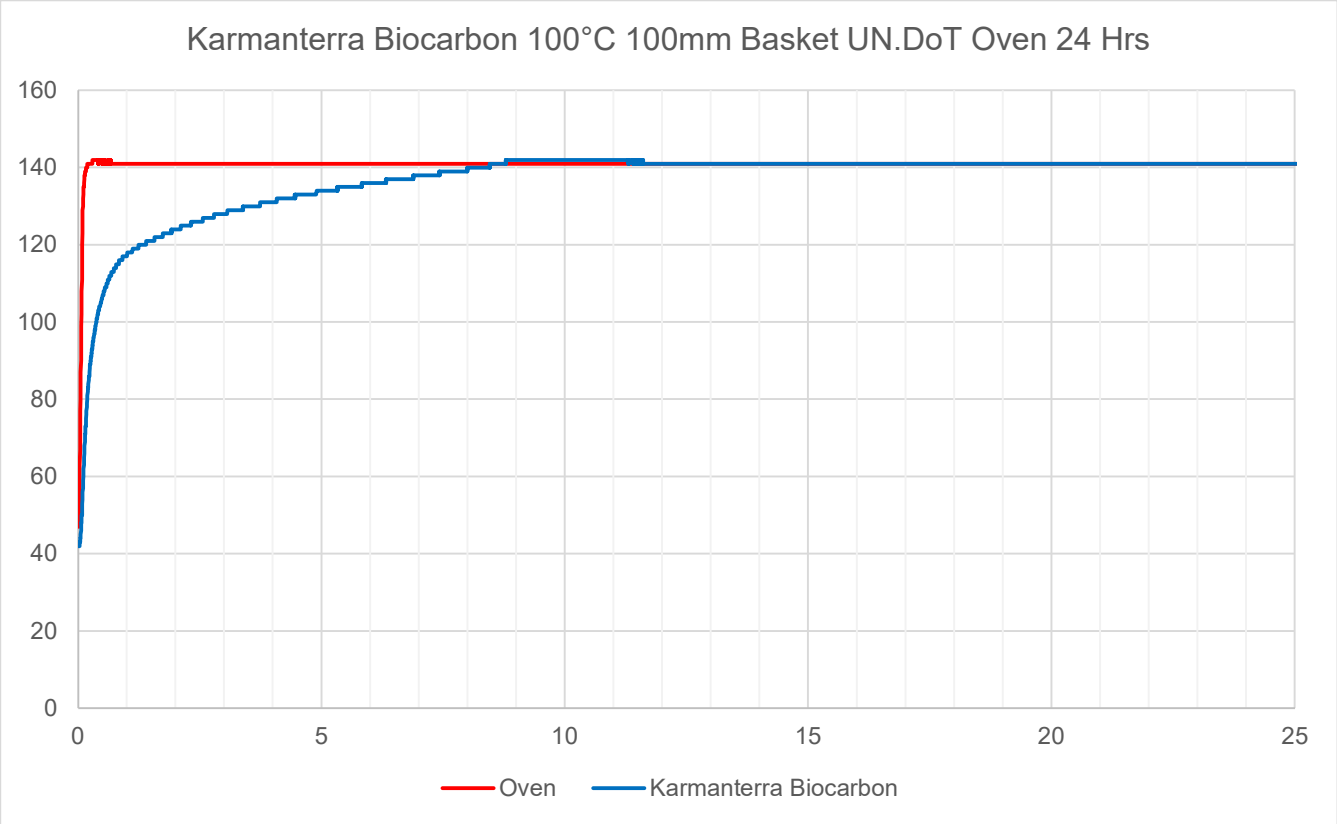

Figure 2. Sample after Testing in the Oven

1.4 Results summary

The Karmanterra Biocarbon sample tested did not exhibit significant self-heating behavior after 24 hours at an isothermal temperature of 140°C in a 100mm³ basket.

- **The material <u>IS</u> <u>NOT</u> classified as a Self-heating substance of Division 4.2.**

1.5 Important Remarks

When tested at an isothermal temperature of 140°C in a 100mm^3 basket, the sample did not exhibit significant self-heating behavior during the test within 24 hours.

The process of self-heating is strongly dependent on factors such as the sample size and the duration of thermal exposure. A larger test sample will lead to self-heating at lower temperatures. A self-heating temperature determined in a fan-assisted oven is not to be used in all circumstances as a safe limit for the operation of thermal processes but is useful as a reference for the comparison of the thermal behavior of different substances.

We encourage you to contact Stonehouse for a complimentary discussion on the particular applicability of this data to your specific operations/processes.

1.6 General Comments

This test is designed to determine the relative self-heating onset temperature of a material in a hot air-stream. It is applied to products which are subjected to elevated temperatures in an air stream.

A substance is classified as a self-heating substance of UN Class 4, Division 4.2 if a positive test result is observed in a 100mm³ basket at 140°C. A positive result is defined as a sample temperature rise of 60°C (or more) above the oven temperature during a 24-hour period. From this point the following packing groups are then assigned to the sample:

Packaging Group II	Assigned to any substance which gives a positive test result in a 25mm^3 basket at 140°C.
Packaging Group III	Assigned to any substance which: a. gives a positive test result in a 100mm^3 basket at 140°C and a positive test result in a 100 mm basket at 100°C b. gives a positive test result in a 100mm^3 basket at 140°C and a negative test result in a 100 mm basket at 120°C and is to be transported in packages of more than 3 m3 volume c. gives a positive test result in a 100mm^3 basket at 140°C and a negative test result in a 100mm^3 basket at 100°C and is to be transported in packages of more than 450L volume
Not Division 4.2	Assigned to any substance which: a. gives a negative test result in a 100mm^3 basket at 140°C. b. gives a positive test result in a 100mm^3 basket at 140°C and a negative test result in a 100 mm basket at 120°C and is to be transported in packages of less than 3m^3 volume c. gives a positive test result in a 100mm^3 basket at 140°C and a negative test result in a 100mm^3 basket at 100°C and is to be transported in packages of less than 450L volume

SECTION C

Warranties, Indemnification, and Limitation of Liability

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- The Client shall not be responsible for any loss, destruction or damage of whatsoever nature (including injury or death) incurred by STONEHOUSE, its employees or third parties, related to the performance by STONEHOUSE of the Project, except to the extent that the same can be shown to be due to gross negligence or willful misconduct on the part of the Client or its employees or as otherwise specified in these Terms and Conditions. STONEHOUSE shall indemnify and hold the Client harmless accordingly with respect to any and all such losses, claims, demands, costs, liabilities or damages relating thereto.

- Should a party be deemed liable to the other party, by way of indemnity or by reason of breach of contract or otherwise, STONEHOUSE's liability shall in aggregate not exceed the price for the Project. Client hereby acknowledges and agrees it to be sufficient that STONEHOUSE's sole liability and Client's sole remedy for a breach of warranty hereunder shall be limited to re-performance of the Services or a refund of fees paid for such Services if STONEHOUSE, in its sole discretion determines it cannot re-perform such the applicable Services. In any event, neither party shall be liable to the other party for any consequential, indirect, special, incidental or exemplary damages of any nature whatsoever that may be suffered by the other party.

MATERIAL SAFETY DATA SHEET

SECTION 1 – PRODUCT IDENTIFICATION

Product Name: Biocarbon

Manufacturer:
Karmanterra LLC
2011 Palomar Airport Rd. Ste. 101
Carlsbad, CA 92011

Contact: hello@karmanterra.com
Emergency Phone: 911
Poisons Information: 1-800-222-1222

Chemical Name & Synonyms: Biochar, Biocoke, Biocarbon
Chemical Family: Carbon, animal or vegetable origin (non-activated)
Dangerous Goods code: UN 1361, Hazard Class 4.2
Poison Schedule Number: Not assigned
Recommended Use: Biogenic Fuel. Agricultural soil amendment, ingredient in compost.

SECTION 2 – HAZARDOUS IDENTIFICATION

Hazardous Ingredients: carbonaceous particles, natural fungal spores, bacteria.

THIS PRODUCT MAY CONTAIN MICRO-ORGANISMS

Risk Phrases:

R20/R37	Harmful by inhalation and irritating to the respiratory system
R36/R37	Irritating to eyes and skin
R42	May cause sensitization by inhalation

Safety Phrases:

S02	Keep out of reach of children
S22	Do not breathe dust
S24/S25	Avoid contact with skin and eyes
S36/S37/S39	Wear suitable protective clothing, gloves and eye/face protection
S50	Do not mix with oxidizing agents

Hazard Classification:
Flammable Solid (Category 2)
Acute Toxicity, Inhalation (Category 5)
Serious Eye Damage/Irritation (Category 2B)
Aspiration Hazard (Category 2)
Self-reactive Substances (Type F)

Signal Word(s): WARNING

Pictograms:

Hazard Statement(s):

H228	Flammable Solid
H333	May be harmful if inhaled
H320	Causes eye irritation
H305	May be harmful if swallowed and enters airways
H242	Heating may cause a fire

Precautionary Statements:

P210	Keep away from heat/sparks/open flames/hot surfaces - No smoking
P261	Avoid breathing dust
P281	Use personal protective equipment as required

Description of other hazards:

Material may be considered pyrophoric with moisture <10% at temperatures >400°C where material may smolder.

Dry material presents dust hazard, and appropriate personal protective equipment should be utilized to mitigate irritation associated with dust.

SECTION 3 – COMPOSITION / INGREDIENTS INFORMATION

Constituent	**CAS Number:**	**Proportion:**
Carbon (wood derived)	7440-44-0	80 – 95 wt% dry basis
Minerals (wood derived)	N/A	5 – 10 wt% dry basis
Other		< 5 wt%
Water		Variable

SECTION 4 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Black colored mix of pellets, identifiable particles, and powder of plant matter up to 60mm size.	**Solubility in water:**	Leaches subcomponents to a minor and variable extent.
		Evaporation Rate:	N/A
Odor:	Low odor, may exhibit an earthy character.		
pH at concentration:	7.16 - 11.41	**Vapor Density:**	Not volatile
Boiling Point:	N/A	**Percent volatiles:**	Non-volatile to 180C
Melting Point:	Not applicable (carbon sublimes)	**Molecular Weight:**	N/A
Flash Point:	-	**FP Test Method:**	-
Vapor Pressure:	-	**Autoignition Temperature:**	Not determined but dust

Specific gravity:	0.20 - 0.80	**Lower Explosive Limit (LEL):** **Upper Explosive Limit (UEL):**	explosion risk exists if allowed to dry.

SECTION 5 – STABILITY AND REACTIVITY DATA

Chemical Stability:	Stable unless released as a dust. Avoid moisture and heat to prevent self-heating and combustion.
Hazardous Polymerization:	Will not occur.
Incompatible Materials:	Will react with strong oxidizing agents.
Conditions to avoid	Dust formation, temperatures above 180C
Hazardous Decomposition products:	Carbon monoxide and hydrocarbons.

SECTION 6 – FIRST AID MEASURES

Swallowed:
If a minor amount has been accidentally swallowed, then, if conscious, give large amounts of water and then dilute stomach contents by giving large amounts of water.

Seek medical attention. Do not attempt to induce vomiting or give anything by mouth to an unconscious person. If person vomits place person on their side in recovery position.

Eye:
Flush eye with running water for a minimum of 15 minutes. Seek medical attention promptly if irritation persists or any loss of vision occurs.

Skin:
Wash contaminated skin with soap and water. Launder contaminated clothing before re-use. Seek medical attention if swelling, redness, itching, blistering or irritation persists.

Inhaled:
Remove promptly to fresh air. Seek medical attention if coughing or difficulty breathing persists.
Treat unconsciousness by placing the person in the coma position. Apply artificial respiration if breathing stops.

Notes to doctor: Treat symptomatically.

SECTION 7 – FIRE FIGHTING MEASURES

Specific Hazards:
Dusts may be an explosion hazard if mixed with air at critical proportions in the presence of an ignition source.
Product will help to sustain a fire present in nearby materials.

Extinguishing Media:
Fire Class A (combustible solids). Use water spray, dry chemical, carbon dioxide or chemical foam; unless another there is a risk of an additional class of fire risk becoming involved (eg. flammable liquids) – if so respond according to the requirements of that material.

Fire Fighting Procedures:
Use water to cool exposed containers. If safe to do so, remove containers from path of fire. For major fires or where the atmosphere is either oxygen deficient or contains unacceptable levels of combustion products, fire-fighters must wear self-contained breathing apparatus with full face-mask and protective clothing.
Risk of re-ignition for up to 72 hours after extinguishing, due to ability to retain heat.

Hazardous Decomposition products:
Carbon monoxide, toxic hydrocarbons, nitrous oxides and sulphur oxides.

SECTION 8 – HANDLING AND STORAGE

Handling:
Avoid dust release during storage and handling, by dampening as necessary. Handle away from oxidizing agents (Class 5 materials).

Storage:
In bulk, store below 80C and cover to limit dust release. Not to be stored with oxidizing agents. If bagged, store in UN certified 13H3 or 13H4 and comply with Packing Group III requirements.

SECTION 9 – EXPOSURE CONTROL AND PERSONAL PROTECTION

Exposure Standards:
The dust and mist (bioaerosols) from this product are classified as a “Hazardous Substance Non- Dangerous Goods”. Recommend TWA 2 mg/m3 (respirable dust), based on NOHSCA limits for related dust materials and carbon black.

Ventilation:
Local exhaust ventilation and/or mechanical (general) exhaust are recommended where airborne concentrations are expected to exceed exposure limits;

Personal Hygiene:
Protective clothing (gloves, coveralls, boots, etc.) should be worn to prevent excessive skin contact. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

Eye Protection:
Avoid eye contact by wearing safety glasses with side shields or a face shield (AS/NZS 1336) whenever there is a risk of dust or product getting into the eyes. Potable water and/or eye-wash facilities should be provided in all areas where product is handled.

Skin Protection:
Avoid chronic skin contact by the use of gloves and full length clothing.

Respiratory Protection:
If engineering controls are not practical then respiratory devices may need to be worn. Avoid breathing dust released from the product. Wear a P2 respirator suitable for particulate and conforming with Australian Standards AS/NZS 1715 and AS/NZS 1716 when exposed to the dust. These standards should be followed in the selection, fit-testing, use, storage and maintenance of the respirators.

SECTION 10 – TOXICOLOGICAL AND EPIDEMIOLOGICAL DATA

Swallowed:
Unlikely under normal conditions of use, but could cause abdominal discomfort and nausea, and throat irritation.

Eye:
Can irritate the eyes and cause watering and redness.

Skin:
Prolonged contact with skin may result in slight irritation and redness.

Inhaled:
Inhalation of dust and/or liquid mists (bioaerosols) may irritate, inflame or sensitize the nose, throat and lungs, and may aggravate pre-existing conditions such as asthma and bronchitis.

Chronic exposure: Repeated inhalation of dust and/or liquid mists (bioaerosols) from this product Effects: may result in respiratory irritation, inflammation or sensitization resulting in illnesses ranging from hay fever and asthma to pneumonia (eg Legionnaires disease) and pneumonia like illnesses. The elderly, with pre-existing respiratory diseases and the immunocompromised are at particular risk from these illnesses. All people working with these and other landscaping and horticultural products should ensure that they are adequately protected from tetanus.

SECTION 11 – ECOLOGICAL INFORMATION

Ecotoxicity:
No ecotoxicity data available. Considered low risk.

SECTION 12 – DISPOSAL CONSIDERATIONS

No special disposal requirements; dispose in accordance with local waste and environmental authority requirements.

SECTION 13 – TRANSPORT INFORMATION

DOT regulations: Charcoal/Carbon

Hazard class:	UN1361, 4.2, substance liable to spontaneous combustion
Land transport ADR/RID (cross-border):	N/A
ADR/RID class:	N/A
Maritime transport IMDG:	Class 4.2. Not a marine pollutant
Air transport ICAO-TI and IATA-DGR:	N/A
ICAO/IATA Class:	N/A

SECTION 15 – SPILL OR LEAK PROCEDURES

Containment Procedures:
Ensure area is well ventilated. Vacuum or sweep material and place into a suitable disposable container. Wash area down with water to remove traces of the material.

Disposal:
No special requirements; dispose of waste in accordance with local waste and environmental authority guidelines.

SECTION 14 – REGULATORY INFORMATION

Regulatory Information: **Classification:** The dust and mist (bioaerosols) from this product are classified as a “Hazardous Substance Non-Dangerous Goods”.

Not considered self-heating per N4 testing.

SECTION 16 – SDS PREPARATION DETAILS

Prepared by: Mark Samuels
Email: mark@karmanterra.com

Date: March 24th 2025
Revision: 3.0

KARMANTERRA

TECHNICAL DATA SHEET

BIOCARBON

GUARANTEED ANALYSIS:

Fixed Carbon (cFix)	85-90 %
Ash	2-5 %
Volatiles	8-10 %
Phosphorous	<500 ppm
Sulfur	<300 ppm

pH - 11.2
DERIVED FROM: UNTREATED WOOD
DENSITY: 180kg / Cubic Meter
SBP Certified (REDII Compliant)

DESCRIPTION:

Biocarbon is a biogenic carbon made from residual, untreated wood waste that undergoes a thermal decomposition process during a high-temperature pyrolysis reaction. The resulting material is high in fixed carbon and low in ash and metals which allows it to seamlessly integrate into existing steel and cement manufacturing systems as a zero carbon rated fuel source.

APPLICATION:

Instructions -
Please consult with Karmanterra staff on use case instructions.

WARNINGS:

Store at temperatures above 0C and below 100C
Use only where there is a recognized need
Keep out of reach of children
H319 - Causes serious eye irritation
P264 - Wash face, hands, forearms after handling
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337+P313 - If eye irritation persists: Get medical advice/attention

KARMANTERRA

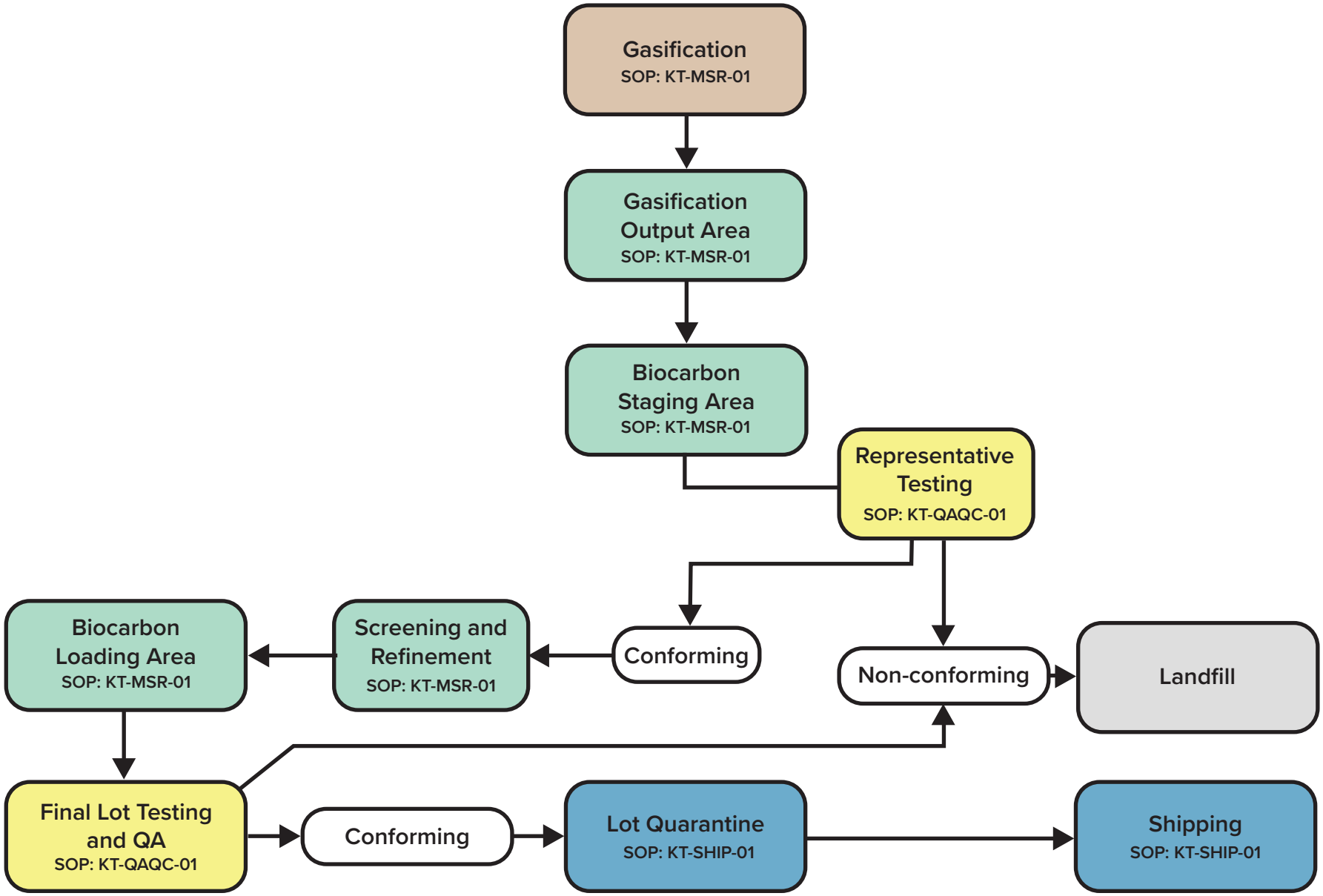
TRANSFORMATIVE MATERIALS

2011 Palomar Airport Rd. Ste. 101
Carlsbad CA 92011
(251) 289-9362

www.karmanterra.com

KARMANTERRA

Biocarbon Production Process Flow Diagram



Client: **Karmanterra LLC**
2011 Palomar Airport Re, Ste 101
Carlsbad, CA 92011
Attn: **Mark Samuels**

Project: **Karmanterra Biocarbon**

Date Received: **April 7, 2025**

Certificate of Analysis

Sample ID	Sample Date and Time	Lab #	Moisture, Total	Volatile Matter		Fixed Carbon		Ash 750	
			D7582 Proximate by Automated TGA System						
			wt%	As Received wt%	Moist. Free wt%	As Received wt%	Moist. Free wt%	As Received wt%	Moist. Free wt%
KT-NBY-BIO-P2-031825+50	3/18/25 1100	T2500594-001	7.65	8.75	9.48	81.48	88.22	2.12	2.30

Sample ID	Sample Date and Time	Lab #				Phosphorus, Total ICP-OES			
						Moist Free mg/kg			
KT-NBY-BIO-P2-031825+50	3/18/25 1100	T2500594-001				463