

MATERIAL SAFETY DATA SHEET
(ISO 11014-1 / ANSI Z 400.1-1998 / 2001/58/EC)



Carbon Black

Revision Date: 08/06/2010
Supersedes: 03/29/2010

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

Product information:

Product name (as used on product label): Carbon Black – Grades N-120, N-234, N-326, N-330, LH30, N-339, N-351, N-550, N-650, N-660, N-683, N-762, N-774, IRB #8, CL-08

Manufacturer/supplier: CONTINENTAL CARBON COMPANY
16850 PARK ROW
HOUSTON, TX, 77084

Phone number (Monday – Friday, 7:30 AM to 4 PM): 281-647-3858;
Cellular 713-501-0617

If calling from outside United States use country code (01)
Optional emergency number(s):

CHEMTREC: 1-800-424-9300 (US)
CANUTEC: 613-996-6666 (Canada)

Use of substance/preparation

Used as filler in rubber products, pigment in polymers and printing inks.

REACH Regulation (EC) No. 1907/2006, Continental Carbon Registry No. A5736998-02
REACH Dossier Registration Reference No. 01-2119384822-32-0018, on 29/01/2010

2. HAZARDS IDENTIFICATION

2.1 Emergency Overview [EU: Most Important Hazards]

A black, odorless, insoluble, powder that can burn or smolder at temperatures greater than 572°F (>300°C). Hazardous products of decomposition can include carbon monoxide, carbon dioxide, and oxides of sulfur. May cause reversible mechanical irritation to the eyes and respiratory tract especially at concentrations above the occupational exposure limit. Some grades of carbon black are sufficiently electrically non-conductive to allow a build-up of static charge during handling. Take measures to prevent the build-up of electrostatic charge.

2.2 OSHA Regulatory Status

EU: Not defined as a dangerous substance or preparation according to Council Directive 67/548/EEC and its various amendments and adaptations

WHMIS: This material is classified as D2A under Canadian Worker Hazardous Materials Information System (WHMIS) criteria.

OSHA: Classified as hazardous.

2.3 Potential Health Effects

Routes of Exposure - Inhalation, Eye, Skin

Note: ingestion of carbon black is not considered a likely route of exposure.

Acute Effects

Acute Inhalation:

Temporary discomfort to upper respiratory tract may occur due to mechanical irritation when exposures are well above the occupational exposure limit.

Acute Ingestion:

No evidence of adverse effects from available data.

Acute eye:

High dust concentrations may cause mechanical irritation to eye.

Acute skin:

May cause mechanical irritation, soiling, and skin drying.

Sensitization

No cases of sensitization in humans have been reported.

Chronic Effects

Long-term exposure below the current occupational exposure limit of 3.5 mg/m³ (when measured as 'total' dust) may result in a small loss in one aspect of lung function (FEV₁) over a working lifetime.

IARC listed; *Group 2B (possibly carcinogenic to humans)*. Not listed as a carcinogen by NTP, ACGIH, OSHA or the European Union.

There are no known human carcinogenic effects related to the PAH content of carbon blacks. Recent research has shown that the PAH content of carbon blacks is not released in biological fluids and thus not available for biological activity.

2.4 Potential Environmental Effects

No significant environmental hazards are associated with carbon black release to the environment. Carbon black is not soluble in water. See Section 12.



3. COMPOSITION/INFORMATION ON INGREDIENTS

Component(s)

Carbon Black, amorphous (>98%)

Chemical formula: C

CAS number: 1333-86-4

European Inventory of Existing Chemical Substances (EINECS) number: 215-609-9

EU Classification: Not Classified

4. FIRST-AID MEASURES

4.1 First aid procedures

Inhalation

Take affected persons out in fresh air. If necessary., restore normal breathing through standard first aid measures

Skin

Wash skin with mild soap and water. If symptoms develop, seek medical attention.

Eye

Rinse eyes thoroughly with large volumes of water keeping eyelid open. If symptoms develop, seek medical attention.

Ingestion

Do not induce vomiting. If conscious, give several glasses of water, rinse mouth with water. Never give anything by mouth to an unconscious person.

Note to physicians

Treat symptomatically.

5. FIRE-FIGHTING MEASURES

5.1 Flammable Properties

It may not be obvious that carbon black is burning unless the material is stirred and sparks are apparent. Carbon black that has been on fire should be observed closely for at least 48 hours to ensure no smoldering material is present.

Carbon blacks containing more than 8% volatile materials may form an explosive dust-air mixture. Manufactured carbon blacks do not exceed 8% volatile materials content (unless otherwise noted by the supplier on package and MSDS). See Section 9, Chemical and Physical Properties.

5.2 Extinguishing Media

Use foam, carbon dioxide (CO₂), dry chemical, or water fog. DO NOT USE high pressure water stream as this may spread burning powder (burning powder will float).

5.3 Protection of Firefighters

Wear full protective fire fighting gear (Bunker gear) including self-contained breathing apparatus (SCBA). Special hazards arising from the chemical (e.g. nature of any hazardous combustion products) include carbon monoxide (CO), carbon dioxide (CO₂), and oxides of sulfur. NOTE: Wet carbon black produces slippery walking surfaces.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions

Wear appropriate personal protective equipment and respiratory protection. See

6.2 Environmental Precautions

Carbon black poses no significant environmental hazards. As a matter of good practice, minimize contamination of sewage water, soil, groundwater, drainage systems, or bodies of water.

6.3 Methods for Containment

Carbon black is not a hazardous substance under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 40 CFR 302), or the Clean Water Act (40 CFR 116), or a hazardous air pollutant under the Clean Air Act Amendments of 1990 (CAAA-90, 40 CFR 63).

6.4 Methods for Cleaning Up

Small spills should be vacuumed when possible. Dry sweeping is not recommended except with HEPA equipped machinery. A vacuum equipped with HEPA (high efficiency particulate air) filtration is recommended. If necessary, light water spray will reduce dust for dry sweeping but over-wetting may produce very slippery walking surfaces. Large spills may be shoveled into containers. See Section 13.

7. HANDLING AND STORAGE

7.1 Handling

Avoid dust exposures above the occupational exposure limit. Use local exhaust ventilation to control exposures to below occupational exposure limit. Avoid contact with skin and eyes. If exposed, wash to avoid mechanical irritation and soiling.

Carbon black is electrically conductive and may cause electrical shorts. Carbon black is capable of penetrating electrical equipment unless tightly sealed. Ensure equipment is tightly sealed.

If hot work (welding, torch cutting, etc.) is required the immediate work area must be cleared of carbon black product and dust.

7.2 Storage

Store in dry place away from ignition sources and strong oxidizers.



Before entering closed vessels and confined spaces containing carbon black test for adequate oxygen percent content, flammable gases and potential toxic air contaminants (e.g., CO, SO₂). Follow safe practices when entering confined spaces.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Exposure Limit Values

Country	Occupational Exposure Limit, mg/m ³
Australia	3.0 TWA
Canada	3.5 TWA
France	3.5 TWA
Germany - MAK	1.0 TWA (respirable) ^A
	4.0 TWA (inhalable) ^A
TRGS 900	3.0 TWA (respirable) ^B
	6.0 TWA (respirable) ^C
	10.0 TWA (inhalable) ^D
Italy	3.5 TWA
Korea	3.5 TWA
Spain	3.5 TWA
United Kingdom – OES	3.5 TWA (inhalable)
STEL	7.0 10 minutes
United States - OSHA-PEL	3.5 TWA
ACGIH-TLV	3.5 TWA
NIOSH -REL	3.5 TWA (see Section 11)

TWA = 8-hour time-weighted-average, except as noted. MAK = Maximale Arbeitsplatz-Konzentration (maximum workplace concentration) (advisory). TRGS = Technische Regeln für Gefahrstoffe (regulatory limits). OES = occupational exposure standard. STEL = short-term exposure limit. OSHA-PEL = Occupational Safety and Health Administration - permissible exposure limit. American Conference of Governmental Industrial Hygienists– Threshold Limit Value. NIOSH-REL = National Institute of Occupational Safety and Health - recommended exposure limit. ^A annual average. ^B applies to all activities except those exempted, consult regulatory agency. ^C applies to certain exempt industries, consult regulatory authority. ^D effective April 2004, consult regulatory agency.

8.2 Engineering Controls

Use process enclosures and/or exhaust ventilation to keep airborne dust concentrations below the occupational exposure limit.

8.3 Personal Protective Equipment

Respiratory

Approved respirators should be used where airborne concentrations are expected to exceed

occupational exposure limits.

8.3.2 Hand Protection

Wash hands and other exposed skin with mild soap. Use of a barrier cream may help to prevent skin drying. General protective gloves may be used to protect hands from carbon black soiling.

8.3.3 Eye Protection

Wear safety glasses or goggles.

8.3.4 Skin Protection

Wear general protective clothing to minimize skin contact. Work clothes should NOT be taken home and should be washed daily.

8.3.5 General Hygiene Considerations

Emergency eyewash and safety shower should be in close proximity. Wash hands and face thoroughly with mild soap before eating and drinking.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:	powder or pellet
9.2 Color:	black
9.3 Odor	odorless
9.4 Odor threshold:	not applicable
9.5 Melting point/range	not applicable
9.6 Boiling point/range	not applicable
9.7 Vapor pressure	not applicable
9.8 Evaporation rate	not applicable
9.9 Density: (20°C)	1.7 – 1.9 g/ml
9.10 Bulk density:	1.25-40 lb/ft ³ , 20-640 kg/m ³
Pellets	200-680 kg/m ³
Powder (fluffy)	20-380 kg/m ³
9.11 Solubility (in Water):	insoluble
9.12 pH value: (ASTM 1512)	>7 [50 g/l water, 68°F (20°C)]
9.13 Partition coefficient (n-octanol/water):	not applicable
9.14 Viscosity:	not applicable
9.15 Decomposition temperature:	572°F (300°C)
9.16 Flammable and Explosive Properties	
>Flashpoint	not applicable
>Flammability Classification (as defined by OSHA 1910.1200):	not applicable
>Explosive Limits (dust):	
-Furnace black: (VDI 2263)	
Lower :	50 g/m ³
-Thermal black: (VDI 2263)	
Lower:	375 g/m ³

Upper:	not determined
>Dust Explosion Class (VDI 2263, EC 84/449)	ST 1
-Maximum Absolute Explosion Pressure	10 bar
-Maximum Rate of Pressure Rise ¹	30-100 bar/sec.
>Spontaneous Ignition (Autoignition)	>284°F (>140°C)
>Minimum Ignition Temperature (VDI 2263)	
-BAM Furnace	>932°F (>500°C)
-Godbert-Greenwald Furnace	>600°F (>315°C)
>Minimum Ignition Energy	>10 J
>Burn Rate (VDI 2263, EC 84/449)	>45 seconds
(not classifiable as “Highly Flammable”, or “Easily Ignitable”)	

10. STABILITY AND REACTIVITY

- 10.1 Stability: stable under normal ambient conditions
- 10.2 Conditions to avoid: prevent exposure to high temperatures and open flames.
- 10.3 Materials to avoid: strong oxidizers such as chlorates, bromates, and nitrates.
- 10.4 Hazardous decomposition products: carbon monoxide, carbon dioxide, organic products of decomposition, oxides of sulfur (sulfoxides) form if heated above decomposition temperature.
- 10.5 Hazardous polymerization: will not occur.

11. TOXICOLOGICAL INFORMATION

- 11.1 Acute toxicity:
- Acute oral toxicity: LD₅₀ (rat), > 8000 mg/kg
- Primary skin irritation:
- rabbit: non-irritative, index score 0.6/8 (4.0 = severe edema)
- Primary eye irritation
- rabbit: non-irritative, Draize score 10-17/110
(100 = maximally irritating)
- 11.2 Subchronic toxicity:
- Rat, inhalation, duration 90 days, NOAEL - 1.0 mg/m³ (respirable)
- Target organ: lungs
- Effect: inflammation, hyperplasia, fibrosis

11.3 Chronic toxicity:

Rat, oral, duration 2 years

Effect: no tumors

Mouse, oral, duration 2 years

Effect: no tumors

Mouse, dermal, duration 18 months

Effect: no skin tumors

Rat, inhalation, duration 2 years

Target organ: lungs.

Effect: inflammation, fibrosis, tumors

Note: Tumors in the rat lung are considered to be related to the “particle overload phenomenon” rather than to a specific chemical effect of carbon black itself in the lung. These effects in rats have been reported in many studies on other poorly soluble inorganic particles and appear to be rat specific. Tumors have not been observed in other species (i.e., mouse and hamster) for carbon black or other poorly soluble particles under similar circumstances and study conditions.

11.4 Sensitization:

No evidence of sensitization was found in animals.

No cases of sensitization in humans have been reported.

11.5 Carcinogenicity

In 2006 IARC re-affirmed its 1995 classification of carbon black as, *Group 2B* (*possibly carcinogenic to humans*).

In 1995 IARC concluded, “There is *inadequate evidence* in humans for the carcinogenicity of carbon black.” Based on rat inhalation studies IARC concluded that there is, “*sufficient evidence* in experimental animals for the carcinogenicity of carbon black,” IARC’s overall evaluation was that, “Carbon black is *possibly carcinogenic to humans (Group 2B)*”. This conclusion was based on IARC’s guidelines which require such a classification if one species exhibits carcinogenicity in two or more studies.

11.6 Mutagenic effects

In Vitro

Carbon black is not suitable to be tested in bacterial (Ames test) and other *in vitro* systems because of its insolubility. When tested, however, results for carbon black showed no mutagenic effects. Organic solvent extracts of carbon black can, however, contain traces of polycyclic aromatic hydrocarbon (PAHs). A study to examine the bioavailability of these PAHs showed that PAHs are very tightly bound to carbon black and not bioavailable.

In Vivo

In an experimental investigation, mutational changes in the *hprt* gene were reported in alveolar epithelial cells in the rat following inhalation exposure to carbon black. This observation is believed to be rat specific and a consequence of “lung overload” which led to chronic inflammation and release of oxygen species. (see Chronic toxicity above). This is thus considered to be a secondary genotoxic effect and thus carbon black itself would not be considered to be mutagenic.

11.7 Reproductive effects:

No effects have been reported in long-term animal studies.

11.8 Epidemiology:

Results of epidemiological studies of carbon black production workers suggest that cumulative exposure to carbon black may result in small decrements in lung function. A recent U.S. respiratory morbidity study suggested a 27 ml decline in FEV₁ from a 1 mg/m³ (inhalable fraction) exposure over a 40-year period. An older European investigation suggested an exposure to 1 mg/m³ (inhalable fraction) of carbon black over a 40-year working-lifetime will result in a 48 ml decline in FEV₁. However, the estimates from both studies were only of borderline statistical significance. Normal age related decline over a similar period of time would be approximately 1200 ml.

The relationship between symptoms and exposure to carbon black is even less clear. In the U.S. study, 9% of the highest exposure group (in contrast to 5% of the unexposed group) reported symptoms consistent with chronic bronchitis. In the European study, methodological limitations in the administration of the questionnaire limit the conclusions that can be drawn about reported symptoms. This study, however, indicated a link between carbon black and small opacities on chest films, with negligible effects on lung function.

A study of carbon black workers in the U.K. (Sorahan *et al.* 2001) found an increased risk of lung cancer in two of the five plants studied; however, the increase was not related to the dose of carbon black. Thus, the authors did not consider the increased risk in lung cancer to be due to carbon black exposure. A German study of carbon black workers at one plant (Wellmann *et al.* 2006, Morfeld *et al.* 2006(b)) found a similar increase in lung cancer risk but, like the 2001 U.K. study, found no association with carbon black exposure. In contrast, a large U.S. study (Dell *et al.* 2006) of 18 plants showed a reduction in lung cancer risk in carbon black production workers. Based upon these studies, the February 2006 Working Group at IARC concluded that the human evidence for carcinogenicity was inadequate (Baan *et al.* 2006)

Since this IARC evaluation of carbon black, Sorahan and Harrington (2007) re-analyzed the U.K. study data using an alternative exposure hypothesis and found a positive association with carbon black exposure in two of the five plants. The same exposure hypothesis was applied by Morfeld and McCunney (2007) to the German cohort; in contrast, they found no association between carbon black exposure and lung cancer risk and, thus, no support for the alternative exposure hypothesis used by Sorahan and Harrington. Overall, as a result of these detailed investigations, no causative link between carbon black exposure and cancer risk in humans has been demonstrated. This view is consistent with the IARC evaluation in 2006.

12. ECOLOGICAL DATA

12.1 Aquatic Data:

12.1.1 Acute fish toxicity: LC50 (96 h) > 1000 mg/l,
Species: *Brachydanio rerio* (zebra fish),
Method: OECD Guideline 203

12.1.2 Acute invertebrate toxicity
EC50 (24 h) > 5600 mg/l.
Species: *Daphnia magna* (water flea),
Method: OECD Guideline 202

12.1.3 Acute algae toxicity:
EC 50 (72 h) >10,000 mg/l
NOEC 50 ≥10,000 mg/l
Species: *Scenedesmus subspicatus*,
Method: OECD Guideline 201

12.1.4 Activated sludge,
EC0 (3 h) >= 800 mg/l.
Method: DEV L3 (TTC test)

12.2 Environmental fate:

12.2.1 Mobility

Not soluble in water. Not expected to migrate.

12.2.2 Known or predicted distribution

Not soluble in water. Expected to remain on soil surface.

12.3 Bioaccumulation Potential

Bioaccumulation is not expected due to physicochemical properties of the substance.

13. DISPOSAL CONSIDERATIONS

13.1 Product can be burned in suitable incineration plants or disposed of in a suitable landfill in accordance with the regulations issued by the appropriate federal, provincial, state and local authorities.

EU: EU Waste Code No. 61303 per Council Directive 75/422/EEC

U.S.: Not a hazardous waste under U.S. RCRA, 40 CFR 261.

Canada: Not a hazardous waste under provincial regulations.

U.N.: United Nations (no U.N. Number)



13.2 Container/Packaging. Return reusable containers to manufacturer. Paper bags may be incinerated, or recycled, or disposed of in an appropriate landfill in accordance with national and local laws.

14. TRANSPORT INFORMATION: Carbon black is not restricted for transport by the following regulations:

- >Canadian Transport of Dangerous Goods (TDG)
- >European Carriage of Dangerous Goods by Rail (RID), by Road (ADR), or on the Rhine (ADNR)
- >International Air Transport Association (IATA)
Note: listed as “carbon black, non-activated, mineral origin”
- >International Civil Air Organization-Technical Instructions (ICAO-TI)
Note: listed as “carbon black, non-activated, mineral origin”
- >International Maritime Dangerous Goods Code (IMDG)
Note: listed as “carbon black, non-activated, mineral origin”
- >United Nations Recommendations on the Transport of Dangerous Goods
- >United States Department of Transportation Hazardous Materials Regulations (DOT)
- >International Civil Air Organization-Technical Instructions (ICAO-TI)
Note: listed as “carbon black, non-activated, mineral origin”
- >International Maritime Dangerous Goods Code (IMDG)
Note: listed as “carbon black, non-activated, mineral origin”
- >United Nations Recommendations on the Transport of Dangerous Goods
- >United States Department of Transportation Hazardous Materials Regulations (DOT)

15. REGULATORY INFORMATION

15.1 European Union – Label Information

Carbon black is not defined as a dangerous substance or preparation according to Council Directive 67/548/EEC and its various amendments and adaptations.

Symbol – none required.

15.2 Germany – water classification

WGK Number (Kenn-Nr): 1742

WGK Class (Wassergefährdungsklasse): nwg (non-hazardous to waters)

15.3 Canada (See label information Section 16.4)



Worker Hazardous Material Information System (WHMIS), Classification D2A.

Statement of Equivalence

“This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and MSDS contains all the information required by the Controlled Products Regulations.”

Ingredients Disclosure List

Contains carbon black. See Section 2.

15.4 United States

Carbon black is on the Chemical Hazard Information Profile (CHIP) list under TSCA.

Superfund Amendments and Reauthorization Act (SARA) Title III

Section 313 Toxic Substances: Does not contain any components subject to this section.

Toxic Release Inventory (TRI)

Under EPA's Toxics Release Inventory (TRI) program the reporting threshold for 21 Polycyclic Aromatic Compounds (PACs) has been lowered to 100 pounds per year manufactured, processed, or otherwise used. (64 CFR 58666, Oct. 29, 1999) The 100 pounds/yr applies to the cumulative total of 21 specific PACs. Carbon black may contain certain of these PACs and the user is advised to evaluate their own TRI reporting responsibilities.

California Safe Drinking Water and Toxics Enforcement Act of 1986 (Proposition 65):

"Carbon black (defined as airborne, unbound particles of respirable size)" is a California Proposition 65 listed substance.

15.5 Inventory Status

All components either are listed on or exempt from the following inventories:

Europe (EU): EINECS (European Inventory of Existing Commercial Chemical Substances), EINECS-RN: 215-609-9.

Australia: AICS (Australian Inventory of Chemical Substances)

Canada: CEPA (Canadian Environmental Protection Act), domestic substance list (DSL).

China: Inventory of Existing Chemical Substances

Japan: MITI (Ministry of International Trade and Industry) List of Existing Chemicals Substances. 10-3074/5-3328 and 10-3073/5-5222 (Section-Structure No./Class Reference No.)

Korea: TCC-ECL (Toxic Chemical Control Law Existing Chemical List) KE-04882

United States: SARA (Super Fund Amendments and Reauthorization Act), Sections

311/312 apply if carbon black is present at any one time in amounts equal to or greater than 10,000 pounds. Under Section 311/312 – MSDS requirements, carbon black is determined to be hazardous according to the following EPA hazard categories:

Immediate health hazard:	No
Delayed (chronic) health hazard:	Yes
Sudden release of pressure hazard:	No
Reactive hazard:	No

16. OTHER INFORMATION

16.1 Polycyclic Aromatic Hydrocarbon (PAH) Content

Manufactured carbon blacks generally contain less than 0.1% of solvent extractable polycyclic aromatic hydrocarbons (PAH). Solvent extractable PAH content depends on numerous factors including, but not limited to, the manufacturing process, desired product specifications, and the analytical procedure used to measure and identify solvent extractable materials.

Questions concerning PAH content of carbon black and analytical procedures should be addressed to your carbon black supplier.

16.2 National Fire Protection Association (NFPA) Rating:

Health:	0
Flammability:	1
Reactivity:	0

0 = minimal, 1 = slight, 2 = moderate, 3 = serious, 4 = severe

16.3 Hazardous Materials Identification System[®] (HMIS[®]) Rating:

Health:	1* (*designates chronic hazard)
Flammability:	1
Physical Hazard:	0

0 = minimal, 1 = slight, 2 = moderate, 3 = serious, 4 = severe

HMIS[®] is a registered trademark of the National Paint and Coatings Association



16.4 WHMIS Label Information:

CARBON BLACK

May cause discomfort to the respiratory tract, skin and eyes. The International Agency for Research on Cancer has classified carbon black as possibly carcinogenic to humans based on laboratory animal inhalation studies. Avoid breathing dust and prolonged contact with skin and eyes. Use only with adequate ventilation. Wear suitable protective clothing, gloves, and eye protection. In case of contact: Wash skin thoroughly with soap and water. Flush eyes with plenty of water. See Material Safety Data Sheet for important additional information.

NOIR DE CARBONE



Avertissement! Puet causer de la gêne aux voies respiratoires, à la peau et aux yeux. Le Centre international de recherche sur le cancer a classé le noir de Carbone parmi les produits qui pourraient être cancérigènes pour l'homme suite à des tests d'inhalation chez le animaux de laboratoire. Éviter de respirer les poussières et un contact prolongé avec la peau et les yeux. N'utiliser qu'avec une ventilation adéquate. Porter des vêtements, des gants et un équipement oculaire de protection appropriés. En cas de contact: Laver la peau soigneusement avec de l'eau et du savon. Rincer les yeux avec beaucoup d'eau. Consulter la fiche de données de sécurité pour toutes des informations additionnelles importantes.

**Continental Carbon Company, 16850 Park Row, Houston, TX 77084
CAS #1333-86-4, Store in cool dry place away from heat and ignition sources
HMIS rating: Health = 1*, Flammability = 1, Reactivity = 0**

16.5 General:

The carbon black industry continues to sponsor research designed to identify adverse health effects from long term exposure to carbon black. This MSDS will be updated, as new safety and health information may become available.

Prepared by: Todd N. Miller _____
Title: Corporate Director – Environment, Health, and Safety
Email: todd.miller@continentalcarbon.com

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