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MATERIAL SAFETY DATA SHEET: HiPco SWNT (Wet Cake)

Section 1: Product and Company Identification	
Product Description:	HiPco Single-walled nanotube wet cake
Manufacturer:	NanoIntegris Technologies
Address:	3765 La Verendrye Boisbrian, QC, J7H 1R8 Canada
Emergency Contact:	866-650-0482
General Contact:	450-434-NANO
Date Prepared:	.August 15, 2015
Prepared by:	Jefford J. Humes

Section 2: Hazards Identification	
Emergency Overview:	May be harmful if swallowed. Avoid eye contact.
Symptoms of Overexposure:	None expected.
Skin Contact:	May cause dermatitis.
Eye Contact:	May cause irritation, redness, and pain. Corneal injury may occur.
Ingestion:	May cause gastrointestinal irritation, nausea, and vomiting.
Chronic Effects:	None expected.
Medical Conditions Aggravated by Exposure:	Preexisting skin conditions may be aggravated by exposure to powder.
Suspected Carcinogen:	No.

Section 3: Composition and Information on Ingredients		
Ingredient	CAS#	Weight Percent
Water	7732-18-5	83.5%
Carbon nanotubes	308068-56-6	9.3%
Ethyl Alcohol	64-17-5	7.2%

Section 4: First Aid Measures

Ingestion (Swallowed)	Do NOT induce vomiting. Call local physician or poison control center.
Eye Contact:	Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists.
Skin Contact:	Wash with soap and water. If irritation develops and persists, get medical attention.
Inhalation (Breathing):	If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

Section 5: Fire Fighting Measures

Extinguishing Media:	Use water fog, dry chemical, carbon dioxide or foam. Water jet or flooding amounts of water are allowable.
Special Fire Fighting Procedures:	It is recommended but not necessary for firefighters to wear positive pressure self-contained breathing apparatus, full protective clothing, and NIOSH-approved self-contained breathing apparatus (SCBA). Cool fire-exposed containers with water.
Unusual Fire and Explosion Hazards:	Sealed container may rupture when heated.

Section 6: Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly with soap and water. Report spills to authorities as required.

Section 7: Handling and Storage

Handling:	Minimize breathing of vapors and avoid prolonged or repeated contact with skin. Wear proper protective equipment. If ventilation is not efficient, wear proper respiratory equipment. Detailed information on handling carbon nanotubes may be found at the ASTM Standard E 2535-07, "Standard Guide for Handling Unbound Engineer Nanoscale Particles in Occupational Settings," ASTM International, www.astm.org
Storage:	Store in cool, dry, well-ventilated area away from all sources of ignition. "Empty" containers may retain product residue and can be hazardous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Waste Disposal Method:	Follow applicable Federal, state, and local regulations. A qualified environmental professional should determine waste characterization, disposal, and treatment methods.

Section 8: Exposure Controls/ Personal Protection

Chemical	Occupational Exposure Limits
Carbon nanotubes	15mg/m ³ TWA (total dust) 5 mg/m ³ TWA (respirable fraction)
Ethyl Alcohol	1000 ppm TWA, 1900 mg/m ³ TWA 3300 ppm IDLH
The Following Controls are Recommended for Normal Consumer Use of this Product	
Engineering Controls:	Use in a well-ventilated area. Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Section 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Personal Protection:	
Eye Protection:	Avoid eye contact. Always pour away from your face.
Skin Protection:	Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection:	None needed for normal use with adequate ventilation.
For Bulk Processing or Workplace Use the Following Recommended Controls:	
Engineering Controls:	Use adequate general and local exhaust ventilation to maintain exposure levels below that of occupational exposure limits.
Personal Protection:	
Eye Protection:	Safety goggles recommended where eye contact is possible.
Skin Protection:	Wear chemical resistant gloves.
Protective Clothing/ equipment:	Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with, contact lenses.
Respiratory Protection:	None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form, and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice. Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear an MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or non-routine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. <i>Warning: air-purifying respirators do not protect workers in oxygen-deficient atmospheres.</i> If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.
Work/ Hygiene Practices:	Wash with soap and water after handling.

Section 9: Physical and Chemical Properties	
Boiling Point:	~100 °C
Vapor Pressure:	~18.7 mm Hg at 21 °C
Solubility in Water	Complete
Appearance:	Clumped black powder
Odor:	Mild scent of alcohol
Specific Gravity	~1.00 @ 21°C
Melting Point	~0.0 °C
Evaporation rate	~1.958x10 ⁻⁴ @ 21°C
Flash Point:	~120 °C @ 1.1 atm

Section 10: Stability and Reactivity	
Stability:	Stable
Hazardous Polymerization:	Will not occur.
Conditions to Avoid:	Avoid excessive heat, sparks, flames, and other sources of ignition. Extremely cold temperatures. Do not puncture or incinerate storage container.
Incompatibilities:	Strong oxidizing or reducing agents, strong acids or bases, mineral acids.
Hazardous Decomposition Products:	No data is currently available.

Section 11: Toxicological Information (Ethanol)	
Routes of Entry:	Inhalation, Ingestion
Toxicity to Animals:	Fish: Rainbow trout: LC50 = 12900-15300 mg/L; 96 Hr; Flow-through @ 24-24.3°C Rainbow trout: LC50 = 11200 mg/L; 24 Hr; Fingerling (Unspecified) ria: Phytobacterium phosphoreum: EC50 = 34900 mg/L; 5-30 min; Microtox test When spilled on land it is apt to volatilize, biodegrade, and leach into the ground water, but no data on the rates of these processes could be found. Its fate in ground water is unknown. When released into water it will volatilize and probably biodegrade. It would not be expected to adsorb to sediment or bioconcentrate in fish.
Chronic Effects on Humans:	A4 - Not Classifiable as a Human Carcinogen CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Other Toxic Effects on Humans:	May be hazardous in case of ingestion. May be slightly hazardous in case of inhalation.
Special Remarks on Toxicity to Animals:	CAS# 64-17-5: KQ6300000, CAS# 7732-18-5: ZC0110000, LD50/LC50: CAS# 64-17-5: Draize test, rabbit, eye: 500 mg Severe; Draize test, rabbit, eye: 500 mg/24H Mild; Draize test, rabbit, skin: 20 mg/24H Moderate; Inhalation, mouse: LC50 = 39 gm/m ³ /4H; Inhalation, rat: LC50 = 20000 ppm/10H; Oral, mouse: LD50 = 3450 mg/kg; Oral, rabbit: LD50 = 6300 mg/kg; Oral, rat: LD50 = 9000 mg/kg; Oral, rat: LD50 = 7060 mg/kg; CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg;
Special Remarks on other Toxic Effects on Humans:	May cause allergic reaction (dermatitis) Eyes: Causes moderate eye irritation. Inhalation: Material is irritating to mucous membranes and upper respiratory tract. May cause allergic respiratory reaction. Ingestion: Causes gastrointestinal tract irritation with nausea, vomiting, hypermotility, diarrhea, and bloating. May also affect behavior (ataxia, somnolence), and cardiovascular system. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may cause allergic dermatitis. Ingestion: Prolonged or repeated ingestion may affect the liver. Inhalation: Prolonged or repeated inhalation may cause allergic respiratory reaction (asthma)

Section 12: Ecological Information (Ethanol)	
Ecotoxicity:	Fish: Rainbow trout: LC50 = 12900-15300 mg/L; 96 Hr; Flow-through @ 24-24.3°C Rainbow trout: LC50 = 11200 mg/L; 24 Hr; Fingerling (Unspecified) ria: Phytobacterium phosphoreum: EC50 = 34900 mg/L; 5-30 min; Microtox test When spilled on land it is apt to volatilize, biodegrade, and leach into the ground water, but no data on the rates of these processes could be found. Its fate in ground water is unknown. When released into water it will volatilize and probably biodegrade. It would not be expected to adsorb to sediment or bioconcentrate in fish.
BOD5 and COD:	No data is currently available.
Products of Biodegradation:	Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation:	The products of degradation are more toxic.
Special Remarks on the Products of Biodegradation:	No data is currently available.

Section 13: Disposal Considerations

If this product becomes a waste, it would not be expected to meet the criteria of hazardous waste. However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

Section 14: Transport Information

Proper Shipping name:	Not applicable.
Hazard Class(es)	This material is not defined under US DOT regulations as a hazardous substance.
Identification Number:	Not applicable.
Packing Group:	Not applicable.
Hazardous substances:	None known.
Marine Pollutants:	None known.
IMDG Classification:	Not available.
TDG Classification:	Not available.
ICAO/ IATA Classification:	This material is not defined under the US DOT regulations, "Dangerous Chemicals Management Ordinance," or Dangerous Goods Regulations (DGR), and is suitable for all normal transport by air, ground, rail, or water ways.
RID/ADR Classification:	This material is not classified as Dangerous Goods in the hazard communication tool (GHS) or transport conditions (TDG) by the United Nations Economic Commission for Europe (UNECE) and is suitable for all modes of transport.

Section 15: Regulatory Information

U.S. Federal Regulations:	
CERCLA 103 Reportable Quantity:	This product is not subject to CERCLA reporting requirements. Report large volume spills as required under federal, state, and local regulations.
SARA TITLE III:	Not available.
EPA Toxic Substances Control Act (TSCA) Status:	Not applicable.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65):	This product does not contain chemicals regulated under California Proposition 65.
VOC Regulations:	This product complies with the consumer product VOC limits of CARB, the US EPA, and states adopting the OTC VOC rules.
Canadian Environmental Protection Act:	All of the ingredients are listed on the Canadian Domestic Substances List or are exempt from notification.
Canadian WHMIS Classification:	This product is not subject to the criteria of the Controlled Products Regulation (CPR).

Section 16: Other Information

This Product is experimental in nature, may have hazardous properties, and is provided "as is." The information contained in this Material Safety Data Sheet is considered accurate as of the version date. However, no warranty is expressed or implied regarding the accuracy of the data. Since the use of this Product is not within the control of NanoIntegrus, it is the user's obligation to determine the suitability of the Product for its intended application. The user also assumes all risk and liability for safe use of the Product.