Paperwork Reduction Act

Cover Letter

Dear Sir/Madam,

HydroGraph respectfully submits this Pre-Manufacture Notice (PMN) for the consolidated chemicals FGA-1 and FGA-2. FGA-1 is a few-layer, non-functionalized, turbostratic graphene in a powdered form of aggregated nano-platelets with an average of 6 layers. FGA-2 is a similar non-functionalized turbostratic graphene power with up to 32 layers in a powdered form of aggregated nano-platelets.

The HydroGraph Hyperion method of graphene synthesis process provides several advantages over other graphene manufacturing methods.

The HydroGraph Hyperion graphene production technology uses commercially available acetylene and oxygen gases reacted in a way to use the chemical energy inherent in the acetylene to produce high-purity (99.8% pure) consistently structured graphene nano-platelet aggregates (the PMN substance). The HydroGraph Hyperion process is exothermic, it gives energy rather the industry standard of consuming energy for production.

Hydrograph's ability to economically produce tonnage amounts of high-quality graphene is essential to support the Federal Government's implementation of Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability by its use in end markets such as batteries for electric vehicles. The modular Hyperion production process is scaled to produce the desired amount of the PMN substance at the rate and the time needed for incorporation into the specific end product, thus eliminating the stockpiling of excess inventory and consequent unnecessary handling of the PMN substance.

The HydroGraph Hyperion process is preferable regarding risk to human health and the environment considering alternative methods of graphene production:

* Chemical vapor deposition (CVD) requires the use of metal catalysts which must be removed from the final product by strong acids and the high temperature decomposition of hydrocarbon gases resulting in Green House Gas (GHG) emissions as well as emissions of regulated air pollutants, to produce graphene with higher cost and more emissions than the production of the PMN substance.

* Laser/plasma techniques require large amounts of energy from the grid to ablate the target and produces a relatively large amount of waste relative to the graphene/graphite and this method may generate air pollutants depending on the process parameters.

* Liquid phase exfoliation requires the use of solvents that present toxicity and flammability hazards and requires careful attention to solvent recycling and waste management to produce graphene of moderate quality.

* Electrochemical exfoliation may result in a mixture of graphene and other carbon-based materials, and the quality of the graphene may not be as high as other methods.

* Several variations of Hummer's method which requires the production of graphite oxide and further reduction to graphene using corrosive and toxic chemicals.

* Various forms of mechanical exfoliation from mined or synthesized graphite produces labor-intensive, low-quality graphene / graphite.

The HydroGraph Hyperion method generates no waste materials. The Hyperion reaction converts the carbon in the acetylene to graphene nano-platelet aggregates while the gaseous by-products of carbon monoxide and hydrogen may be captured and either used as a syngas product or further processed into hydrogen and carbon monoxide gas as individual commercial products.

The Hyperion production process for the PMN substance does not require graphite as a starting material and avoids all the environmental burdens created by mining natural graphite or the production of synthetic graphite from petroleum coke and coal tar pitch.

The Hyperion process is totally enclosed during production of the PMN substance and the only potential for occupational exposure is during maintenance, testing, and packaging tasks. Since metallic catalysts are not used, the potential toxicity of the PMN substance is reduced. The National Institute of Occupational Safety and Health (NIOSH) conducted an occupational exposure assessment at the Kansas manufacturing facility on August 30 and 31, 2023. NIOSH collected personal breathing zone air samples on four volunteer operators during representative tasks. Elemental carbon (EC) was used as a surrogate for graphene and compared to a minimum safety guideline of 18 micrograms EC per cubic meter of air (18 ug/m3) as an 8-hour Time Weighted Average. NIOSH found that the personal samples collected to assess EC at the inhalable aerosol size fraction during the two-day site visit ranged from 0.27 ug/m3 to 5.91 ug/m3 while respirable exposures ranged from one negative value after background correction to 6.75 ug/m3; all measurements were well below the minimum safety guideline. The NIOSH recommendations noted in the report have been implemented by HydroGraph. The NIOSH report is an attachment to this PMN for consideration by EPA during the review of this PMN.

The Hyperion process and the PMN substance itself both support the Federal government in implementing Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability. The PMN substance is intended for use in high value end markets which require a high-purity few-layer graphene material that can be produced in annual tonnage amounts with scalable production increases by using adequate numbers of modular Hyperion units. The Hyperion process requires minimal energy to initiate the reaction to create the graphene nano-platelets which derives its energy from the chemical energy inherent in acetylene. The production process does not require corrosive or toxic chemicals nor metallic catalysts that require strong acids for removal from the product.

The higher quality of the PMN substance produced by the Hyperion units has been shown to increase the charging rate of the cathode side of lead-acid batteries for electric vehicles by 47% in tests conducted by a prospective customer.

The improvement in lubrication properties of the PMN substance has been shown to reduce friction by at least 40% resulting in less heat and less wear on parts in many end products, including electric vehicles.

The HydroGraph graphene nano-platelet aggregate substances described in this PMN offer numerous benefits to society for clean energy production and reductions in energy usage while also providing environmental safety and health benefits. HydroGraph stands available to answer questions or provide clarity where desired by EPA. HydroGraph respectfully requests EPA to approve this PMN or notify it that the PMN substances are already listed on the TSCA Chemical Inventory.

References:

US Patent 9,440,857 B2 Sorensen et. al., Process for High-Yield Production of Graphene via Detonation of Carbon-Containing Material. Sep. 13, 2016

Form Approved. OMB No. 2070-0012 Expires 12/31/2025

U.S. ENVIRONMENTAL PROTECTION AGENCY			AGENCY USE ONLY	
EPA	PREMANUFACTURE NOTICE FOR NEW CHEMICAL SUBSTANCES		Date of receipt:	09/24/2024
When completed, send this form to:	If sending by Courier: Office of Pollution Prevention and Toxics Document Control Office (7407M) US EPA, 1201 Constitution Ave NW WASHINGTON, D.C. 20460 Contact Numbers: 202-564-8930/8940	If sending by US Mail: Office of Pollution Prevention and Toxics Document Control Office (7407M) US EPA, 1200 Pennsylvania Ave NW WASHINGTON, D.C. 20460	Submission Report Number	

Total Number of Pages	TS Number
84	SJ809L

GENERAL INSTRUCTIONS

- You must provide all information requested in this form to the extent that it is known to or reasonably ascertainable by you. Make reasonable estimates if you do not have actual data.
- Before you complete this form, you should read the "Instructions Manual for Premanufacture Notification" (the Instructions Manual is available from the Toxic Substances Control Act (TSCA) Information Service by calling 202-554-1404, or faxing 202-554-5603).
- If a fee has been remitted for this notice (40 CFR 700.45), indicate in the boxes above the TS fee identification number you have generated. Remember, your fee ID number must also appear on your corresponding fee remittance. For mailing address information see the Help instructions in the e-PMN tool.

Part I – GENERAL INFORMATION

You must provide the currently correct Chemical Abstracts (CA) Name of the new chemical substance, even if you claim the identity as confidential. You may authorize another person to submit chemical identity information for you, but your submission will not be complete and the review will not begin until EPA receives this information. A letter in support of your submission should reference your TS fee identification number. For all Section 5 Notice submissions (paper or electronic) you must submit an original notice including all test data; if you claimed any information as confidential, an original sanitized copy must also be submitted.

Part II – HUMAN EXPOSURE AND ENVIRONMENTAL RELEASE

If there are several manufacture, processing, or use operations to be described in Part II, sections A and B of this notice, reproduce the sections as needed.

Part III – LIST OF ATTACHMENTS

For paper submissions, attach additional sheets if there is not enough space to answer a question fully. Label each continuation sheet with the corresponding section heading. In Part III, list these attachments, any test data or other data and any optional information included in the notice.

OPTIONAL INFORMATION

You may include any information that you want EPA to consider in evaluating the new substance. On page 11 of this form, space has been provided for you to describe pollution prevention and recycling information you may have regarding the new substance. "Binding" boxes are included throughout this form for you to indicate your willingness to be bound to certain statements you make in this section, such as use, production volume, protective equipment . . . The intention is to reduce delays that routinely accompany the development of consent orders or Significant New Use Rules. Checking a "binding" box in a PMN does not by itself prohibit the submitter from later deviating from the information (except chemical identity) reported in the form; however, in the case of exemption applications (such as TMEA, LVE, LOREX) certain information provided in such notifications is binding on the submitter when the Agency approves the exemption application, especially if the production volume "binding" box is chosen in a LVE.

CONFIDENTIALITY CLAIMS

You may claim any information in this notice as confidential. To assert a claim on the form, mark (X) the confidential box next to the information that you claim as confidential. To assert a claim in an attachment, circle or bracket the information you claim as confidential. If you claim information in the notices as confidential, you must also provide a sanitized version of the notice, (including attachments). For additional instructions on claiming information as confidential, read the Instructions Manual.

TEST DATA AND OTHER DATA

You are required to submit all test data in your possession or control and to provide a description of all other data known to or reasonably ascertainable by you, if these data are related to the health and environmental effects on the manufacture, processing, distribution in commerce, use, or disposal of the new chemical substance. Standard literature citations may be submitted for data in the open scientific literature. Complete test data (written in English), not summaries of data, must be submitted if they do not appear in the open literature. You should clearly identify whether test data is on the substance or on an analog. Also, the chemical composition of the tested material should be characterized. Following are examples of test data and other data. Data should be submitted according to the requirements of §720.50 of the Premanufacture Notification Rule (40 CFR Part 720).

Test Data (Check Below any included in this notice)

☐	Environmental fate data	☒	Other Data
☐	Health effects data	☐	Risk Assessments
☐	Environmental effects data	☐	Structure/activity relationships
☒	Physical/Chemical Properties (A physical and chemical properties worksheet is located on the last page of this form.)		
☐	Test data not in the possession or control of the submitter		

TYPE OF NOTICE (Check Only One)

☒	**PMN** (Premanufacture Notice)
☐	**SNUN** (Significant New Use Notice)
☐	**TMEA** (Test Marketing Exemption Application)
☐	**LVE** (Low Volume Exemption) @ 40 CFR 723.50(c)(1)
☐	**LOREX** (Low Release/Low Exposure Exemption) @ 40 CFR 723.50(c)(2)
☐	**LVE** Modification
☐	**LOREX** Modification
☐	**Mock Submission**
☐	Mark (X) if pending Letter of Support
Y	IS THIS A CONSOLIDATED PMN (Y/N)?
2	# of chemicals or polymers (Prenotice Communication # required, enter # on p. 3).
☒	Mark (X) if any information in this notice is claimed as confidential.

The public reporting and recordkeeping burden for this collection of information is estimated to average 93 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed EPA Form 7710-25 to this address.

CERTIFICATION -- A printed copy of this signature page, with original signature, must be submitted with CD or paper submission.

I hereby certify to the best of my knowledge and belief that all information entered on this form is complete and accurate. I further certify that, pursuant to 15 U.S.C. § 2613(c), for all claims for protection for any confidential information made with this submission, all information submitted to substantiate such claims is true and correct, and that it is true and correct that the person submitting the claim has:

(i) taken reasonable measures to protect the confidentiality of the information;

(ii) determined that the information is not required to be disclosed or otherwise made available to the public under any other Federal law

(iii) a reasonable basis to conclude that disclosure of the information is likely to cause substantial harm to the competitive position of the person; and

(iv) a reasonable basis to believe that the information is not readily discoverable through reverse engineering.

Any knowing and willful misrepresentation is subject to criminal penalty pursuant to 18 U.S.C. § 1001.

Additional Certification Statements:

If you are submitting a PMN, SNUN, LoREX, LVE, or TMEA, check the following Fees Certification statement that applies:

- [X] The Company named in Part I, Section A is a "small business concern" as defined under 40 CFR 700.43 and will remit the fee as specified in 40 CFR 700.45(c).
- [ ] The Company named in Part I, Section A will remit the fee as specified in 40 CFR 700.45(c).
- [ ] This joint submission includes at least one Company which is a "small business concern" and at least one Company which is not a "small business concern," as defined under 40 CFR 700.43. The fee will be remitted with the joint submission. Any remaining balance due for this joint submission is to be paid by the secondary submitter(s).
- [ ] The company named in Part I, Section A is submitting a sustainable futures TME. The company has graduated from EPA's Sustainable Futures program and is therefore exempt from fees for this sustainable futures TME.

If you are submitting a **Low Volume Exemption (LVE)** application in accordance with 40 CFR 723.50(c)(1) or a **Low Release and Low Exposure Exemption (LoRex)** application in accordance with 40 CFR 723.50(c)(2), check the following certification statements:

- [ ] The manufacturer submitting this notice intends to manufacture or import the new chemical substance for commercial purposes, other than in small quantities solely for research and development, under the terms of 40 CFR 723.50.
- [ ] The manufacturer is familiar with the terms of this section and will comply with those terms; and
- [ ] The new chemical substance for which the notice is submitted meets all applicable exemption conditions.
- [ ] If this application is for an LVE in accordance with 40 CFR 723.50(c)(1), the manufacturer intends to commence manufacture of the exempted substance for commercial purposes within 1 year of the date of the expiration of the 30 day review period.

				Confidential
Signature and title of Authorized Official (Original Signature Required)	*ES/Stephen Corkill*	Date	09/24/2024	☐

Part I -- GENERAL INFORMATION

Section A – SUBMITTER IDENTIFICATION

Mark (X) the "Confidential" box next to any subsection you claim as confidential

1a.	Person Submitting Notice (in U.S.)					Confidential
Name of Authorized Official	(first) Stephen		(last) Corkill			
Position	Not Applicable					
Company	HydroGraph					☐
Mailing Address (number & street)	809 Levee Drive					
City	Manhattan	State	KS	Postal Code	66502	
email	stephen.corkill@hydrograph.com					

b.	Agent (if Applicable)					Confidential
Name of Authorized Official	(first) John		(last) Baker			
Position	Principal Consultant					
Company	The Graphene Council					☐
Mailing Address (number & street)	14 S. Lace Arbor Drive					
City	The Woodlands	State	TX	Postal Code	77382	
e-mail	jbaker@thegraphenecouncil.org		Telephone (include area code)		8324523347	

c.	Joint Submitter (if applicable)					Confidential
If you are submitting this notice as part of a joint submission, mark (X)					☐	
Name of Authorized Official	(first)		(last)			
Position						
Company						☐
Mailing Address (number & street)						
City		State		Postal Code		
e-mail			Telephone (include area code)			

2.	Technical Contact (in U.S.)					Confidential
Name of Authorized Official	(first) John		(last) Baker			
Position	Principal Consultant					
Company	The Graphene Council					☐
Mailing Address (number & street)	14 S. Lace Arbor Drive					
City	The Woodlands	State	TX	Postal Code	77382	
e-mail	jbaker@thegraphenecouncil.org		Telephone (include area code)		8324523347	

			Mark (X) if none	Confidential
3.	If you have had a prenotice communication (PC) concerning this notice and EPA assigned a PC Number to the notice, enter the number.	PC-23-0056	☐	☐
4.	If you previously submitted an exemption application for the chemical substance covered by this notice, enter the exemption number assigned by EPA. If you previously submitted a PMN for this substance enter the PMN number assigned by EPA (i.e. withdrawn or incomplete).		☒	☐
5.	If you have submitted a notice of Bona fide intent to manufacture or import for the chemical substance covered by this notice, enter the notice number assigned by EPA.		☒	☐

6.	Type of Notice – Mark (X)						
1.	Manufacture Only ☒	Binding Option ☐	2.	Import Only ☐	Binding Option ☐	3. Both ☐	

Continuation Sheet

ID	P3SB1bC2	Field	Part I, Section A, 1.b Agent

First Name: Stephen
Last Name: Corkill
Position:
Company Name: HydroGraph
Address: 809 Levee Drive, Suite H
City: Manhattan
State: KS
Postal Code: 66502
Country: US
Email: stephen.corkill@hydrograph.com
Telephone: 7854108771
CBI: N

Continuation Sheet

ID	P3SB1bC2	Field	Part I, Section A, 2

First Name: Stephen
Last Name: Corkill
Position: VP Operations
Company Name: HydroGraph
Address: 809 Levee Drive, Suite H
City: Manhattan
State: KS
Postal Code: 66502
Country: US
Email: stephen.corkill@hydrograph.com
Telephone: 7854108771
CBI: N

Part I – GENERAL INFORMATION -- Continued

Section B – CHEMICAL IDENTITY INFORMATION: You must provide a currently correct Chemical Abstracts (CA) name of the substance based on current CA index nomenclature rules and conventions.

Mark (X) the "Confidential" box next to any item you claim as confidential

Complete either item 1 (Class 1 or 2 substances) or 2 (Polymers) as appropriate. Complete all other items.

If another person will submit chemical identity information for you (for either Item 1 or 2), mark (X) the box at the right. Identify the name, company, and address of that person in a continuation sheet. ☐

1. Class 1 or 2 chemical substances (for definitions of class 1 and class 2 substances, see the Instructions Manual)

a. Class of substance - Mark (X)	Class 1	Class 2	CBI
	☐	☒	☐

b. Chemical name (Currently correct Chemical Abstracts (CA) Name that is consistent with TSCA Inventory listings for similar substances. For Class 1 substances a CA Index Name must be provided. For Class 2 substances either a CA Index Name or CA Preferred Name must be provided, which ever is appropriate based on current CA index nomenclature rules and conventions). ☐

few layer, non-functionalized, turbostratic graphene in a powdered form of aggregated nano-platelets from carbon-rich gas explosion synthesis

CAS Registry Number (if a number already exists for the substance)

c. Please identify which method you used to develop or obtain the specified chemical identity information reported in this notice: (check one).

Method 1 (CAS Inventory Expert Service - a copy of the Identification report obtained from the CAS Inventory Expert Services must be submitted as an attachment to this notice) ☒

IES Order Number: XXXXX

Method 2 (Other Source) ☐

Enter Attachment filename for Part I, Section B, 1. c.: Original Document: 15 Method Attachment for FGA... ☐

d. Molecular formula: C ☐

e. For a class 1 substance, provide a complete and correct chemical structure diagram. For a class 2 substance, provide a correct representative or partial chemical structure diagram, as complete as can be known, if one can be reasonably ascertained. ☐

See Attachment (Original Document: 22 FGA-1structuraldiagram.pdf
)

Enter Attachment filename for Part I, Section B, 1. e. ☐

PMN Page 4a

For a class 2 substance - (1) List the immediate precursor substances with their respective CAS Registry Numbers. (2) Describe the nature of the reaction or process. (3) Indicate the range of composition and the typical composition (where appropriate).	Confidential

e. (1) List the immediate precursor substance names with their respective CAS Registry Numbers. [X]

XXXX

Enter Attachment filename for Part I, Section B, 1. e. (1)		☐

e. (2) Describe the nature of the reaction or process. [X]

XXXX

Enter Attachment filename for Part I, Section B, 1. e. (2)		☐

e. (3) Indicate the range of composition and the typical composition (where appropriate). ☐

atomic %: 99.8% Carbon, 0.15% Hydrogen, 0.05% Oxygen.

Enter Attachment filename for Part I, Section B, 1. e. (3)	Original Document: 17 20240207-02FGA-1CandNanal...	☐

Part I -- GENERAL INFORMATION – Continued

Section B -- CHEMICAL IDENTITY INFORMATION -- Continued

2. Polymers (For a definition of polymer, see the Instructions Manual.) | Confidential

a. Indicate the number-average weight of the lowest molecular weight composition of the polymer you intend to manufacture. Indicate maximum weight percent of low molecular weight species (not including residual monomers, reactants, or solvents) below 500 and below 1,000 absolute molecular weight of that composition. ☐

Describe the methods of measurement or the basis for your estimates:

GPC ☐ | **Other** (Specify Below) ☐

Specify Other:

(i) lowest number average molecular weight:	(ii) maximum weight % below 500 molecular weight:	(iii) maximum weight % below 1000 molecular weight:

Enter Attachment filename for Part I, Section B, 2. a. ☐

b. You must make separate confidentiality claims for monomer or other reactant identity, composition information, and residual information. Mark (X) the "Confidential" box next to any item you claim as confidential

(1) - Provide the specific chemical name and CAS Registry Number (if a number exists) of each monomer or other reactant used in the manufacture of the polymer.
(2) - Mark (X) this column if entry in column (1) is confidential.
(3) - Indicate the typical weight percent of each monomer or other reactant in the polymer.
(4) - Choose "yes" from drop down menu if you want a monomer or other reactant used at two weight percent or less to be listed as part of the polymer description on the TSCA Chemical Substance Inventory.
(5) - Mark (X) this column if entries in columns (3) and (4) are confidential.
(6) - Indicate the maximum weight percent of each monomer or other reactant that may be present as a residual in the polymer as manufactured for commercial purposes.
(7) - Mark (X) this column if entry in column (6) is confidential.

Monomer or other reactant specific chemical name (**1**)	CBI (**2**)	Typical composition (**3**)	Include in identity (**4**)	CBI (**5**)	Max residual (**6**)	CBI (**7**)
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						

Mark (X) this box if the data continues on the next page. ☐

PMN Page 5a

c. Please identify which method you used to develop or obtain the specified chemical identity information reported in this notice (check one).				CBI
Method 1 (CAS Inventory Expert Service - a copy of the identification report obtained from CAS Inventory Expert Service must be submitted as an attachment to this notice) ☐	IES Order Number		**Method 2** (other source) ☐	
Enter Attachment filename for Part I, Section B, 2. c.				☐

d. The currently correct Chemical Abstracts (CA) name for the polymer that is consistent with TSCA Inventory listings for similar polymers.	☐

CAS Registry Number (if a number already exists for the substance)		

e. Provide a correct representative or partial chemical structure diagram, as complete as can be known, if one can be reasonably ascertained.	☐

Enter Attachment filename for Part I, Section B, 2. e.		☐

Part I -- GENERAL INFORMATION -- Continued

Section B -- CHEMICAL IDENTITY INFORMATION -- Continued

3. Impurities
   (a) - Identify each impurity that may be reasonably anticipated to be present in the chemical substance as manufactured for commercial purpose. Provide the CAS Registry Number if available. If there are unidentified impurities, enter "unidentified."
   (b) - Estimate the maximum weight % of each impurity. If there are unidentified impurities, estimate their total weight %.

Impurity (a)	CAS Registry Number (a)	Maximum Percent % (b)	Confi-dential
Oxygen	7782-44-7	0.05	

Mark (X) this box if the data continues on the next page. ☐

Enter Attachment filename for Part I, Section B, 3. ☐

4. Synonyms - Enter any chemical synonyms for the new chemical identified in subsection 1 or 2.
FGA-1 Fractal Graphene Aggregate, Graphene, Turbostratic Graphene, Few layer graphene, Fractal Graphene, ☐

Enter Attachment filename for Part I, Section B, 4. Original Document: 1 Form-F-18-FGA-1-Fractal-G... ☐

5. Trade identification - List trade names for the new chemical substance identified in subsection 1 or 2.
Fractal Graphene, Fractal Graphene Aggregate, FGA-1 Fractal Graphene Aggregate, ☐

Enter Attachment filename for Part I, Section B, 5. ☐

6. Generic chemical name - If you claim chemical identify as confidential, you must provide a generic name for your substance that reveals the specific chemical identity of the new chemical substance to the maximum extent possible. Refer to the TSCA Chemical Substance Inventory, 1985 Edition, Appendix B for guidance on developing generic names.

Enter Attachment filename for Part I, Section B, 6.

7. Byproducts - Describe any byproducts resulting from the manufacture, processing, use, or disposal of the new chemical substance. Provide the CAS Registry Number if available.

Byproduct (1)	CAS Registry Number (2)	Confi-dential
Hydrogen	1333-74-0	
Carbon monoxide	630-08-0	

Mark (X) this box if the data continues on the next page. ☐

Part I – GENERAL INFORMATION -- Continued

Section B – CHEMICAL IDENTITY INFORMATION: You must provide a currently correct Chemical Abstracts (CA) name of the substance based on current CA index nomenclature rules and conventions.

Mark (X) the "Confidential" box next to any item you claim as confidential

Complete either item 1 (Class 1 or 2 substances) or 2 (Polymers) as appropriate. Complete all other items.

If another person will submit chemical identity information for you (for either Item 1 or 2), mark (X) the box at the right. Identify the name, company, and address of that person in a continuation sheet. ☐

1. Class 1 or 2 chemical substances (for definitions of class 1 and class 2 substances, see the Instructions Manual)

a. Class of substance - Mark (X)	Class 1	Class 2	CBI
	☐	☒	☐

b. Chemical name (Currently correct Chemical Abstracts (CA) Name that is consistent with TSCA Inventory listings for similar substances. For Class 1 substances a CA Index Name must be provided. For Class 2 substances either a CA Index Name or CA Preferred Name must be provided, which ever is appropriate based on current CA index nomenclature rules and conventions). ☐

few layer, non-functionalized, turbostratic graphene in a powdered form of aggregated nano-platelets from carbon-rich gas explosion synthesis

CAS Registry Number (if a number already exists for the substance)

c. Please identify which method you used to develop or obtain the specified chemical identity information reported in this notice: (check one).

Method 1 (CAS Inventory Expert Service - a copy of the Identification report obtained from the CAS Inventory Expert Services must be submitted as an attachment to this notice) ☒ | IES Order Number XXXXX | **Method 2** (Other Source) ☐

Enter Attachment filename for Part I, Section B, 1. c. — Original Document: 24 MethodAttachmentForFGA2.txt ☐

d. Molecular formula: C ☐

e. For a class 1 substance, provide a complete and correct chemical structure diagram. For a class 2 substance, provide a correct representative or partial chemical structure diagram, as complete as can be known, if one can be reasonably ascertained. ☐

See Attachment (Original Document: 25 FGA-2structuraldiagram.pdf
)

Enter Attachment filename for Part I, Section B, 1. e. ☐

PMN Page 4a

For a class 2 substance - (1) List the immediate precursor substances with their respective CAS Registry Numbers. (2) Describe the nature of the reaction or process. (3) Indicate the range of composition and the typical composition (where appropriate).	Confidential

e. (1) List the immediate precursor substance names with their respective CAS Registry Numbers. [X]

XXXX

Enter Attachment filename for Part I, Section B, 1. e. (1)		☐

e. (2) Describe the nature of the reaction or process. ☐

Commercially available grade ethyne (acetylene) and oxygen are detonated electrically. This uses the chemical energy inherent in the ethyne to produce high purity (99.8%) pure, consistently structured, graphene nano-platelet aggregates. The process is exothermic and does not utilize a catalyst.

Enter Attachment filename for Part I, Section B, 1. e. (2)		☐

e. (3) Indicate the range of composition and the typical composition (where appropriate). ☐

atomic %: 98.6% Carbon, 0.05% Hydrogen, 1.35% Oxygen. No PAHs

Enter Attachment filename for Part I, Section B, 1. e. (3)		☐

Part I -- GENERAL INFORMATION – Continued

Section B -- CHEMICAL IDENTITY INFORMATION -- Continued

2. Polymers (For a definition of polymer, see the Instructions Manual.)	Confidential
a. Indicate the number-average weight of the lowest molecular weight composition of the polymer you intend to manufacture. Indicate maximum weight percent of low molecular weight species (not including residual monomers, reactants, or solvents) below 500 and below 1,000 absolute molecular weight of that composition.	☐

Describe the methods of measurement or the basis for your estimates:

GPC ☐	**Other** (Specify Below) ☐	

Specify Other:

(i) lowest number average molecular weight:	(ii) maximum weight % below 500 molecular weight:	(iii) maximum weight % below 1000 molecular weight:

Enter Attachment filename for Part I, Section B, 2. a. ☐

b. You must make separate confidentiality claims for monomer or other reactant identity, composition information, and residual information. Mark (X) the "Confidential" box next to any item you claim as confidential

(1) - Provide the specific chemical name and CAS Registry Number (if a number exists) of each monomer or other reactant used in the manufacture of the polymer.
(2) - Mark (X) this column if entry in column (1) is confidential.
(3) - Indicate the typical weight percent of each monomer or other reactant in the polymer.
(4) - Choose "yes" from drop down menu if you want a monomer or other reactant used at two weight percent or less to be listed as part of the polymer description on the TSCA Chemical Substance Inventory.
(5) - Mark (X) this column if entries in columns (3) and (4) are confidential.
(6) - Indicate the maximum weight percent of each monomer or other reactant that may be present as a residual in the polymer as manufactured for commercial purposes.
(7) - Mark (X) this column if entry in column (6) is confidential.

Monomer or other reactant specific chemical name (**1**)	CBI (**2**)	Typical composition (**3**)	Include in identity (**4**)	CBI (**5**)	Max residual (**6**)	CBI (**7**)
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						
CAS Registry Number (**1**)						

Mark (X) this box if the data continues on the next page. ☐

PMN Page 5a

c. Please identify which method you used to develop or obtain the specified chemical identity information reported in this notice (check one).					CBI
Method 1 (CAS Inventory Expert Service - a copy of the identification report obtained from CAS Inventory Expert Service must be submitted as an attachment to this notice) ☐	IES Order Number		**Method 2** (other source) ☐		
Enter Attachment filename for Part I, Section B, 2. c.					☐

d. The currently correct Chemical Abstracts (CA) name for the polymer that is consistent with TSCA Inventory listings for similar polymers.	☐

CAS Registry Number (if a number already exists for the substance)		

e. Provide a correct representative or partial chemical structure diagram, as complete as can be known, if one can be reasonably ascertained.	☐

Enter Attachment filename for Part I, Section B, 2. e.		☐

Part I -- GENERAL INFORMATION -- Continued

Section B -- CHEMICAL IDENTITY INFORMATION -- Continued

3. Impurities
   (a) - Identify each impurity that may be reasonably anticipated to be present in the chemical substance as manufactured for commercial purpose. Provide the CAS Registry Number if available. If there are unidentified impurities, enter "unidentified."
   (b) - Estimate the maximum weight % of each impurity. If there are unidentified impurities, estimate their total weight %.

Impurity (a)	CAS Registry Number (a)	Maximum Percent % (b)	Confi-dential
Oxygen	7782-44-7	1.35	

Mark (X) this box if the data continues on the next page. ☐

Enter Attachment filename for Part I, Section B, 3. ☐

4. Synonyms - Enter any chemical synonyms for the new chemical identified in subsection 1 or 2.
FGA-2 Fractal Graphene Aggregate, Graphene, Turbostratic Graphene, Fractal Graphene,

Enter Attachment filename for Part I, Section B, 4. Original Document: 19 FormF-36FGA-2FractalGraph... ☐

5. Trade identification - List trade names for the new chemical substance identified in subsection 1 or 2.
Fractal Graphene, Fractal Graphene Aggregate, FGA-2 Fractal Graphene Aggregate,

Enter Attachment filename for Part I, Section B, 5. ☐

6. Generic chemical name - If you claim chemical identify as confidential, you must provide a generic name for your substance that reveals the specific chemical identity of the new chemical substance to the maximum extent possible. Refer to the TSCA Chemical Substance Inventory, 1985 Edition, Appendix B for guidance on developing generic names.

Enter Attachment filename for Part I, Section B, 6.

7. Byproducts - Describe any byproducts resulting from the manufacture, processing, use, or disposal of the new chemical substance. Provide the CAS Registry Number if available.

Byproduct (1)	CAS Registry Number (2)	Confi-dential
Hydrogen	1333-74-0	
Carbon monoxide	630-08-0	

Mark (X) this box if the data continues on the next page. ☐

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): [X] **1** [ ] **2** [ ] **3** [ ] **4** [ ] **5** [ ] **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
XXXX	[X]	[ ]	XXXX	[X]	[ ]

Enter Attachment filename for Part I, Section C, 1. | CBI [ ]

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
Alternative energy - wind blades and solar panels				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R2>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R3>				XXXX	X	2.0		XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R4>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. [X]

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI [ ]

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

Binding Option Mark (X)

Mark (X) this box if you attach hazard information. [X] [ ]

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
	☐	☐		☐	☐

Enter Attachment filename for Part I, Section C, 1. | CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
See continuation page. id: <P7SC2a1C0R5>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
Flexible electronics and electromagnetic shielding (EMI).				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R7>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R8>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. ☒

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

	Binding Option Mark (X)
Mark (X) this box if you attach hazard information. ☐	☐

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
	☐	☐		☐	☐

Enter Attachment filename for Part I, Section C, 1. | CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
See continuation page. id: <P7SC2a1C0R9>				XXXX	X	0.1		XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R10>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
Oil drilling fluids-added into drilling fluids for cooling and lubrication.				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R12>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. ☒

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

	Binding Option Mark (X)
Mark (X) this box if you attach hazard information. ☐	☐

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
	☐	☐		☐	☐

Enter Attachment filename for Part I, Section C, 1. | CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
See continuation page. id: <P7SC2a1C0R13>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R14>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
Construction materials including concrete, asphalt, and other engineered materials.				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. ☒

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

	Binding Option Mark (X)
Mark (X) this box if you attach hazard information. ☐	☐

Continuation Sheet

ID	P7SC2a1C0R2	Field	Part I, Section C, 2.a.(1) Category of Use, Row 2

Lubrication includes greases and oils and can be dry or liquid. Applications includes:
a. Automotive: Lubricants are widely used in engines, transmissions, and differentials of vehicles to reduce friction and wear between moving parts, thereby improving fuel efficiency and engine performance.
b. Industrial machinery: Lubricants are employed in various industrial machines, such as pumps, compressors, turbines, gearboxes, and hydraulic systems, to ensure smooth operation and prevent equipment failure.
c. Bearings: Lubricants are critical for the proper functioning of bearings, reducing friction and minimizing wear in rotating equipment like motors and wheels.
d. Aerospace: In the aerospace industry, lubricants are used in aircraft engines, landing gears, and other critical components to ensure safe and efficient operation
e. Marine: Lubricants are used in marine engines and equipment to reduce friction and protect against corrosion in harsh marine environments.
f. Railroad: Lubricants are applied to rail tracks and wheels to reduce friction and wear, improving the efficiency and safety of train operations
g. Power generation: Lubricants are used in power plants to maintain the performance and longevity of turbines, generators, and other rotating equipment.
h. Metalworking: Lubricants are used in metal cutting and forming processes, such as machining, drilling, and stamping, to reduce friction, heat, and tool wear.
i. Mining and construction: Lubricants are applied to heavy machinery used in mining and construction to protect against wear, extend equipment life, and minimize downtime
j. Agricultural equipment: Lubricants are applied to tractors, harvesters, and other agricultural machinery to reduce friction and maintain proper functioning.
k. Household appliances: Lubricants are used in various household appliances, such as fans, motors, and hinges, to ensure smooth and quiet operation.

Continuation Sheet

ID	P7SC2a1C0R3	Field	Part I, Section C, 2.a.(1) Category of Use, Row 3

Coatings - not spray applications - for:
a. Paints and architectural coatings: Used in buildings, homes, and infrastructure for both decorative and protective purposes. They improve the appearance of surfaces, provide weather resistance, and protect against UV radiation.
b. Automotive coatings: Applied to cars, trucks, motorcycles, and other vehicles to provide a protective layer against environmental elements and improve their appearance. They also offer resistance to scratches and help prevent corrosion.
c. Marine coatings and anti-corrosion coatings: Protect ships, boats, and offshore structures from the corrosive effects of saltwater and harsh marine environments.
d. Anti-fouling coatings: Applied to ship hulls and underwater structures to prevent the attachment of marine organisms like barnacles and algae, reducing drag and improving fuel efficiency.
e. Industrial coatings: Various industries use coatings to protect machinery, equipment, and infrastructure from wear, abrasion, and chemical exposure. Industrial coatings may also provide thermal insulation and electrical resistance.
f. Electronic coatings: Electronic components are often coated to protect them from moisture, dust, and other environmental contaminants. These coatings also offer electrical insulation and improve the performance and reliability of electronic devices.
g. Aerospace coatings: Aircraft and spacecraft require coatings that provide protection against extreme temperatures, UV radiation, and atmospheric conditions while also meeting strict weight and performance requirements.

Continuation Sheet

ID	P7SC2a1C0R4	Field	Part I, Section C, 2.a.(1) Category of Use, Row 4

Biosensors Are analytical devices that combine a biological component with a transducer to detect and measure the presence or concentration of specific biological or chemical substances. Biosensors offer several advantages, including high sensitivity, specificity, rapid response, and the potential for miniaturization and point-of-care applications. Biosensors have a wide range of applications in various fields, including medical diagnostics, environmental monitoring, and biotechnology. There are several types of biosensors based on the biological component used and the transduction method employed:

a. Optical biosensors: Optical biosensors use light-based detection methods to measure changes in light properties caused by the interaction between the biological component and the target analyte. Surface plasmon resonance (SPR) and fluorescence-based biosensors are examples of optical biosensing techniques.

b. Electrochemical biosensors: Electrochemical biosensors measure changes in electrical properties resulting from the interaction between the biological component and the analyte. These sensors are commonly used due to their high sensitivity and simplicity.

c. Piezoelectric biosensors: Piezoelectric biosensors detect changes in mass or viscoelastic properties that occur when the biological component interacts with the analyte. These changes are converted into electrical signals by the piezoelectric transducer.

Continuation Sheet

ID	P7SC2a1C0R5	Field	Part I, Section C, 2.a.(1) Category of Use, Row 5

Energy Storage: Applied to both the cathode and anode side of batteries to improve charge acceptance, charge rate, and charge capacity. Is applied to various types of batteries including:

a. Lead acid batteries

b. Lithium ion

c. Lithium air

d. Lithium sulfur

e. Super capacitors

Continuation Sheet

ID	P7SC2a1C0R7	Field	Part I, Section C, 2.a.(1) Category of Use, Row 7

Resins-To be applied as part of the formulation, for example as an additive or ingredient. Can be done so in dry form or mixed in a dispersion such as an epoxy any polyester base dispersion. Sub-applications can includes:

a. Adhesives and Sealants: providing strong bonding properties between materials.

b. Paints: enabling them to adhere to surfaces and providing protection, and durability.

c. Composite Materials: create high-strength composite materials.

d. Plastics and Polymers: forms the basis for many types of plastics and polymers, such as polyethylene, polypropylene, polystyrene, and more.

e. Electronics: Resins are used in electronic components for encapsulation, potting, and coating to protect them from moisture, dust, and mechanical stress.

f. 3D Printing: Resins are utilized in stereolithography and other resin-based 3D printing.

g. Casting and Molding various objects, including prototypes, and industrial parts.

h. Flooring and Surfacing: used in self-leveling flooring systems due to their durability and chemical resistance.

i. Textiles and Fibers: to provide water repellency and other functional properties.

Continuation Sheet

ID	P7SC2a1C0R8	Field	Part I, Section C, 2.a.(1) Category of Use, Row 8

Thermosets a. Automotive parts: Used to manufacture various automotive components, such as brake pads, engine mounts, electrical connectors, and interior trim, due to their excellent heat resistance and mechanical properties.
b. Aerospace components: The aerospace industry employs thermosets for manufacturing lightweight yet durable components
c. Pipe and tank linings: Thermoset linings are used to protect pipes and tanks from corrosion and chemical degradation in industrial applications.
d. Insulation materials: Thermoset foams, such as polyurethane foam, are utilized for thermal and acoustic insulation in buildings, appliances, and transportation.
e. Molding and casting applications: Thermoset materials are used in compression molding, transfer molding, and casting processes to create a wide range of components and products.

Continuation Sheet

ID	P7SC2a1C0R9	Field	Part I, Section C, 2.a.(1) Category of Use, Row 9

Thermoplastics
a. Packaging: Thermoplastics like polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), and polystyrene (PS) are extensively used in packaging materials, such as bottles, containers, bags, and films.
b. Consumer goods: Thermoplastics find application in a wide range of consumer products, including household appliances, and electronics casings.
c. Automotive: Thermoplastics are used in the automotive industry for manufacturing interior and exterior components, such as dashboards, bumpers, door panels, and trim.
d. Construction: Thermoplastics are used in the construction sector for various applications, including pipes, fittings, roofing membranes, window profiles, and insulation materials.
e. Textiles: Thermoplastic fibers, such as polyester and nylon, are used in the production of clothing, upholstery, and other textile products.
f. 3D printing: Thermoplastic materials are commonly used in additive manufacturing or 3D printing due to their ability to be melted and solidified repeatedly, making them suitable for producing complex shapes.
g. Electrical and telecommunications: Thermoplastics are utilized in the production of electrical connectors, cable insulation, and telecommunications equipment enclosures.
h. Sports equipment: Thermoplastics are employed in various sports equipment, such as ski boots, bike helmets, and protective gear, due to their lightweight and impact-resistant properties.

Continuation Sheet

ID	P7SC2a1C0R10	Field	Part I, Section C, 2.a.(1) Category of Use, Row 10

Hollow glass microspheres 5. Hollow glass microspheres are tiny, spherical particles made from glass with a hollow interior. The graphene PMN substance coats the glass microspheres. These microspheres have diverse properties that make them useful in various applications.

a. Oil and gas drilling: They are used in drilling fluids to reduce weight and improve buoyancy in deep-water drilling operations.

b. Aerospace: Hollow glass microspheres are used in aerospace materials to reduce weight and enhance thermal insulation.

c. Automotive: They are used in automotive components, such as body fillers and lightweight structural parts.

Continuation Sheet

ID	P7SC2a1C0R12	Field	Part I, Section C, 2.a.(1) Category of Use, Row 12

Printed inks

a. Conductive inks: Used for printed electronics and flexible electronics applications. These inks can be used to print circuits, sensors, and other electronic components on flexible substrates, such as plastic or paper. Graphene-based conductive inks offer advantages like high conductivity, low cost, and the ability to be printed using conventional printing techniques like inkjet printing and screen printing.

b. Inkjet printer inks: Used in inkjet printers. Graphene inkjet inks have applications in printed electronics, energy storage devices, and even for creating graphene-coated surfaces for improved mechanical properties.

c. Sensors: Used to print sensors for various applications, including gas sensors, biosensors, and environmental monitoring devices. The high surface area of graphene allows for efficient interaction with analytes, enabling sensitive and selective detection.

Continuation Sheet

ID	P7SC2a1C0R13	Field	Part I, Section C, 2.a.(1) Category of Use, Row 13

Bullet proof armor and glass. The graphene PMN substance will be either coated or embedded depending on performance requirements for military applications and security applications.

Continuation Sheet

ID	P7SC2a1C0R14	Field	Part I, Section C, 2.a.(1) Category of Use, Row 14

Composites consist of combining resins and reinforcing fibers like fiberglass or carbon fiber, create high-strength composite materials used in aerospace, automotive, construction, and sporting goods industries. The graphene PMN substance is embedded in the resin.

a. Aerospace: used due to their high strength-to-weight ratio, which helps reduce the overall weight of aircraft and spacecraft.

b. Automotive: used to manufacture lightweight body panels, frames, and interior components.

c. Wind energy: Commonly employed in wind turbine blades. Their strength and durability make them ideal for withstanding the stresses of wind and weather.

d. Marine: Used to build boat hulls, decks, and other marine components for their resistance to corrosion and ability to withstand harsh marine environments.

e. Construction: Used in the construction of bridges, buildings, and infrastructure components. They can offer improved durability, corrosion resistance, and high strength, making structures more resilient

f. Sports equipment: Widely used in the production of sporting goods like tennis rackets, golf clubs, hockey sticks, and bicycle frames. They provide a balance of strength, flexibility, and lightweight properties.

g. Oil and Gas: Employed in the oil and gas industry for pipelines, offshore platforms, and storage tanks, as they can withstand harsh environmental conditions and corrosion.

h. Consumer goods: Composites find use in various consumer products like furniture, luggage, and sporting equipment due to their design flexibility and durability.

i. Defense: Composites play a significant role in military applications, including armor systems, and lightweight vehicle components.

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

Category of Use: Alternative energy - wind blades and solar panels
Consumer Use: null
Attachments:
Category of Use: Lubrication includes greases and oils and can be dry or liquid. Applications includes:
a. Automotive: Lubricants are widely used in engines, transmissions, and differentials of vehicles to reduce friction and wear between moving parts, thereby improving fuel efficiency and engine performance.
b. Industrial machinery: Lubricants are employed in various industrial machines, such as pumps, compressors, turbines, gearboxes, and hydraulic systems, to ensure smooth operation and prevent equipment failure.
c. Bearings: Lubricants are critical for the proper functioning of bearings, reducing friction and minimizing wear in rotating equipment like motors and wheels.
d. Aerospace: In the aerospace industry, lubricants are used in aircraft engines, landing gears, and other critical components to ensure safe and efficient operation
e. Marine: Lubricants are used in marine engines and equipment to reduce friction and protect against corrosion in harsh marine environments.
f. Railroad: Lubricants are applied to rail tracks and wheels to reduce friction and wear, improving the efficiency and safety of train operations
g. Power generation: Lubricants are used in power plants to maintain the performance and longevity of turbines, generators, and other rotating equipment.
h. Metalworking: Lubricants are used in metal cutting and forming processes, such as machining, drilling, and stamping, to reduce friction, heat, and tool wear.
i. Mining and construction: Lubricants are applied to heavy machinery used in mining and construction to protect against wear, extend equipment life, and minimize downtime
j. Agricultural equipment: Lubricants are applied to tractors, harvesters, and other agricultural machinery to reduce friction and maintain proper functioning.
k. Household appliances: Lubricants are used in various household appliances, such as fans, motors, and hinges, to ensure smooth and quiet operation.
Consumer Use: Possible use in consumer lubrication products and motor oils. The use is expected to be mixed with the other oil additives and to have the same packaging and distribution chain as the current consumer motor oils.
Attachments:
Category of Use: Coatings - not spray applications - for:
a. Paints and architectural coatings: Used in buildings, homes, and infrastructure for both decorative and protective purposes. They improve the appearance of surfaces, provide weather resistance, and protect against UV radiation.
b. Automotive coatings: Applied to cars, trucks, motorcycles, and other vehicles to provide a protective layer against environmental elements and improve their appearance. They also offer resistance to scratches and help prevent corrosion.
c. Marine coatings and anti-corrosion coatings: Protect ships, boats, and offshore structures from the corrosive effects of saltwater and harsh marine environments.
d. Anti-fouling coatings: Applied to ship hulls and underwater structures to prevent the attachment of marine organisms like barnacles and algae, reducing drag and improving fuel efficiency.
e. Industrial coatings: Various industries use coatings to protect machinery, equipment, and infrastructure from wear, abrasion, and chemical exposure. Industrial coatings may also provide thermal insulation and electrical resistance.
f. Electronic coatings: Electronic components are often coated to protect them from moisture, dust, and other environmental contaminants. These coatings also offer electrical insulation and improve the performance and reliability of electronic devices.
g. Aerospace coatings: Aircraft and spacecraft require coatings that provide protection against extreme temperatures, UV radiation, and atmospheric conditions while also meeting strict weight and performance requirements.
Consumer Use: Potential to be in high value paints and coatings for anti-corrosion application on homes and boats and consumer paints.
Attachments:
Category of Use: Biosensors Are analytical devices that combine a biological component with a transducer to detect and measure the presence or concentration of specific biological or chemical substances. Biosensors offer several advantages, including high sensitivity, specificity, rapid response, and the potential for miniaturization and point-of-care applications. Biosensors have a wide range of applications in various fields, including medical diagnostics, environmental monitoring, and biotechnology. There are several types of biosensors based on the biological component used and the transduction method employed:
a. Optical biosensors: Optical biosensors use light-based detection methods to measure changes in light properties caused by the interaction between the biological component and the target analyte. Surface plasmon resonance (SPR) and fluorescence-based biosensors are examples of optical biosensing techniques.

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

b. Electrochemical biosensors: Electrochemical biosensors measure changes in electrical properties resulting from the interaction between the biological component and the analyte. These sensors are commonly used due to their high sensitivity and simplicity.
c. Piezoelectric biosensors: Piezoelectric biosensors detect changes in mass or viscoelastic properties that occur when the biological component interacts with the analyte. These changes are converted into electrical signals by the piezoelectric transducer.
Consumer Use: Graphene used in biosensors will be in sensors used by consumers. The graphene is placed inside the sealed biosensor and should not have human contact. The majority of these sensors are administered and controlled in a Commercial setting
Attachments:
Category of Use: Energy Storage: Applied to both the cathode and anode side of batteries to improve charge acceptance, charge rate, and charge capacity. Is applied to various types of batteries including:
a. Lead acid batteries
b. Lithium ion
c. Lithium air
d. Lithium sulfur
e. Super capacitors
Consumer Use: null
Attachments:
Category of Use: Flexible electronics and electromagnetic shielding (EMI).
Consumer Use: null
Attachments:
Category of Use: Resins-To be applied as part of the formulation, for example as an additive or ingredient. Can be done so in dry form or mixed in a dispersion such as an epoxy any polyester base dispersion. Sub-applications can includes:
a. Adhesives and Sealants: providing strong bonding properties between materials.
b. Paints: enabling them to adhere to surfaces and providing protection, and durability.
c. Composite Materials: create high-strength composite materials.
d. Plastics and Polymers: forms the basis for many types of plastics and polymers, such as polyethylene, polypropylene, polystyrene, and more.
e. Electronics: Resins are used in electronic components for encapsulation, potting, and coating to protect them from moisture, dust, and mechanical stress.
f. 3D Printing: Resins are utilized in stereolithography and other resin-based 3D printing.
g. Casting and Molding various objects, including prototypes, and industrial parts.
h. Flooring and Surfacing: used in self-leveling flooring systems due to their durability and chemical resistance.
i. Textiles and Fibers: to provide water repellency and other functional properties.
Consumer Use: null
Attachments:
Category of Use: Thermosets a. Automotive parts: Used to manufacture various automotive components, such as brake pads, engine mounts, electrical connectors, and interior trim, due to their excellent heat resistance and mechanical properties.
b. Aerospace components: The aerospace industry employs thermosets for manufacturing lightweight yet durable components
c. Pipe and tank linings: Thermoset linings are used to protect pipes and tanks from corrosion and chemical degradation in industrial applications.
d. Insulation materials: Thermoset foams, such as polyurethane foam, are utilized for thermal and acoustic insulation in buildings, appliances, and transportation.
e. Molding and casting applications: Thermoset materials are used in compression molding, transfer molding, and casting processes to create a wide range of components and products.
Consumer Use: null
Attachments:
Category of Use: Thermoplastics
a. Packaging: Thermoplastics like polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), and polystyrene (PS) are extensively used in packaging materials, such as bottles, containers, bags, and films.
b. Consumer goods: Thermoplastics find application in a wide range of consumer products, including household appliances, and electronics casings.
c. Automotive: Thermoplastics are used in the automotive industry for manufacturing interior and exterior components, such as dashboards, bumpers, door panels, and trim.
d. Construction: Thermoplastics are used in the construction sector for various applications, including pipes, fittings, roofing membranes, window profiles, and insulation materials.

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

e. Textiles: Thermoplastic fibers, such as polyester and nylon, are used in the production of clothing, upholstery, and other textile products.
f. 3D printing: Thermoplastic materials are commonly used in additive manufacturing or 3D printing due to their ability to be melted and solidified repeatedly, making them suitable for producing complex shapes.
g. Electrical and telecommunications: Thermoplastics are utilized in the production of electrical connectors, cable insulation, and telecommunications equipment enclosures.
h. Sports equipment: Thermoplastics are employed in various sports equipment, such as ski boots, bike helmets, and protective gear, due to their lightweight and impact-resistant properties.
Consumer Use: Graphene could be added the making of thermoplastics in the production process of making end products that can be use by consumers such as appliances and sports equipment. By the time it reaches consumers it is embedded in the thermoplastic components at a ratio of less that 0.1% of total weight.
Attachments:
Category of Use: Hollow glass microspheres 5. Hollow glass microspheres are tiny, spherical particles made from glass with a hollow interior. The graphene PMN substance coats the glass microspheres. These microspheres have diverse properties that make them useful in various applications.
a. Oil and gas drilling: They are used in drilling fluids to reduce weight and improve buoyancy in deep-water drilling operations.
b. Aerospace: Hollow glass microspheres are used in aerospace materials to reduce weight and enhance thermal insulation.
c. Automotive: They are used in automotive components, such as body fillers and lightweight structural parts.
Consumer Use: null
Attachments:
Category of Use: Oil drilling fluids-added into drilling fluids for cooling and lubrication.
Consumer Use: null
Attachments:
Category of Use: Printed inks
a. Conductive inks: Used for printed electronics and flexible electronics applications. These inks can be used to print circuits, sensors, and other electronic components on flexible substrates, such as plastic or paper. Graphene-based conductive inks offer advantages like high conductivity, low cost, and the ability to be printed using conventional printing techniques like inkjet printing and screen printing.
b. Inkjet printer inks: Used in inkjet printers. Graphene inkjet inks have applications in printed electronics, energy storage devices, and even for creating graphene-coated surfaces for improved mechanical properties.
c. Sensors: Used to print sensors for various applications, including gas sensors, biosensors, and environmental monitoring devices. The high surface area of graphene allows for efficient interaction with analytes, enabling sensitive and selective detection.
Consumer Use: null
Attachments:
Category of Use: Bullet proof armor and glass. The graphene PMN substance will be either coated or embedded depending on performance requirements for military applications and security applications.
Consumer Use: null
Attachments:
Category of Use: Composites consist of combining resins and reinforcing fibers like fiberglass or carbon fiber, create high-strength composite materials used in aerospace, automotive, construction, and sporting goods industries. The graphene PMN substance is embedded in the resin.
a. Aerospace: used due to their high strength-to-weight ratio, which helps reduce the overall weight of aircraft and spacecraft.
b. Automotive: used to manufacture lightweight body panels, frames, and interior components.
c. Wind energy: Commonly employed in wind turbine blades. Their strength and durability make them ideal for withstanding the stresses of wind and weather.
d. Marine: Used to build boat hulls, decks, and other marine components for their resistance to corrosion and ability to withstand harsh marine environments.
e. Construction: Used in the construction of bridges, buildings, and infrastructure components. They can offer improved durability, corrosion resistance, and high strength, making structures more resilient
f. Sports equipment: Widely used in the production of sporting goods like tennis rackets, golf clubs, hockey sticks, and bicycle frames. They provide a balance of strength, flexibility, and lightweight properties.
g. Oil and Gas: Employed in the oil and gas industry for pipelines, offshore platforms, and storage tanks, as they can withstand harsh environmental conditions and corrosion.
h. Consumer goods: Composites find use in various consumer products like furniture, luggage, and sporting equipment due to their design flexibility and durability.

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

i. Defense: Composites play a significant role in military applications, including armor systems, and lightweight vehicle components.
Consumer Use: Graphene could be added the making of composites in the production process of making end products that can be use by consumers such as sports equipment. By the time it reaches consumers it is embedded in the composite components at a ratio of less that 0.1% of total weight.
Attachments:
Category of Use: Construction materials including concrete, asphalt, and other engineered materials.
Consumer Use: null
Attachments:

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
XXXX	☒	☐	XXXX	☒	☐

Enter Attachment filename for Part I, Section C, 1.	Original Document: 18 CAS1034343-98-0CCOrderRes...	CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
Alternative energy: wind blades and solar panels				XXXX	X	XXXX	X	XXXX	XXXX	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R2>				XXXX	X	XXXX	X	XXXX	XXXX	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R3>				XXXX	X	XXXX	X	XXXX	XXXX	XXXX	XXXX		X
Flexible electronics and electromagnetic shielding (EMI).				XXXX	X	XXXX	X	XXXX	XXXX	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. ☒

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b.		CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

Mark (X) this box if you attach hazard information. ☒	Binding Option Mark (X) ☐

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
	☐	☐		☐	☐

Enter Attachment filename for Part I, Section C, 1. | CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
See continuation page. id: <P7SC2a1C0R5>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R6>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R7>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R8>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. ☒

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

	Binding Option Mark (X)
Mark (X) this box if you attach hazard information. ☐	☐

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
	☐	☐		☐	☐

Enter Attachment filename for Part I, Section C, 1. | CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
See continuation page. id: <P7SC2a1C0R9>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
Oil drilling fluids - Added into drilling fluids for cooling and lubrication				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R11>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R12>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. ☒

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

	Binding Option Mark (X)
Mark (X) this box if you attach hazard information. ☐	☐

Part I -- GENERAL INFORMATION -- Continued

Section C -- PRODUCTION, IMPORT, AND USE INFORMATION:

The information on this page refers to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Mark (X) the "Confidential" box next to any item you claim as confidential.

1. Production volume -- Estimate the **maximum** production volume during the first 12 months of production. Also estimate the maximum production volume for any consecutive 12-month period during the first three years of production. Estimates should be on 100% new chemical substance basis. For a Low Volume Exemption application, if you choose to have your notice reviewed at a lower production volume than 10,000 kg/yr, specify the volume and mark (x) in the binding box. If granted, you are bound to this volume.

Maximum first 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)	Maximum 12-month production (kg/yr) (100% new chemical substance basis)	Confidential	Binding Option Mark (X)
	☐	☐		☐	☐

Enter Attachment filename for Part I, Section C, 1. | CBI ☐

2. Use Information -- You must make separate confidentiality claims for the description of the category of use, the percent of production volume devoted to each category, the formulation of the new substance, and other use information. Mark (X) the "Confidential" Box next to any item you claim as confidential.

a. (1) --Describe each intended category of use of the new chemical substance by function and application.
(2),(4),(6),(8), or (10) --Mark (X) this column if entry column (1),(3),(5),(7), or (9) correspondingly are confidential business information (CBI).
(3) --Indicate your willingness to have the information provided in column (1) binding.
(5) --Estimate the percent of total production for the first three years devoted to each category of use.--Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(7) --Estimate the percent of the new substance as formulated in mixtures, suspensions, emulsions, solutions, or gels as manufactured for commercial purposes at sites under your control associated with each category of use.
(9) --Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate. Mark (X) to indicate your willingness to have the use type provided in (9) binding.

Category of use (**1**) (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI (**2**)	Binding Option Mark (X) (**3**)	CBI (**4**)	Production % (**5**)	CBI (**6**)	% in Formulation (**7**)	CBI (**8**)	% of substance expected per use (**9**)					CBI (**10**)
								Site-limited	Consumer*	Industrial	Commercial	Binding Option	
See continuation page. id: <P7SC2a1C0R13>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
See continuation page. id: <P7SC2a1C0R14>				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X
Construction materials including concrete, asphalt, and other engineered materials.				XXXX	X	XXXX	X	XXXX	XXX X	XXXX	XXXX		X

* If you have identified a "consumer" use, please provide on a continuation sheet a detailed description of the use(s) of this chemical substance in consumer products. In addition include estimates of the concentration of the new chemical substance as expected in consumer products and describe the chemical reactions by which this substance loses its identity in the consumer product.

Mark (X) this box if the data continues on the next page. X

b. Generic use description — If you claim any category of use description in subsection 2a as confidential, enter a generic description of that category. Read the Instruction Manual for examples of generic use descriptions.

Enter Attachment filename for Part I, Section C, 2. b. | CBI ☐

3. Hazard Information -- Include in the notice a copy of reasonable facsimile of any hazard warning statement, label, material safety data sheet, or other information which will be provided to any person who is reasonably likely to be exposed to this substance regarding protective equipment or practices for the safe handing, transport, use, or disposal of the new substance. List in part III hazard information you include.

	Binding Option Mark (X)
Mark (X) this box if you attach hazard information. ☐	☐

Continuation Sheet

ID	P7SC2a1C0R2	Field	Part I, Section C, 2.a.(1) Category of Use, Row 2

Coatings - not spray applications - for: a. Paints and architectural coatings: Used in buildings, homes, and infrastructure for both decorative and protective purposes. They improve the appearance of surfaces, provide weather resistance, and protect against UV radiation. b. Automotive coatings: Applied to cars, trucks, motorcycles, and other vehicles to provide a protective layer against environmental elements and improve their appearance. They also offer resistance to scratches and help prevent corrosion. c. Marine coatings and anti-corrosion coatings: Protect ships, boats, and offshore structures from the corrosive effects of saltwater and harsh marine environments. d. Anti-fouling coatings: Applied to ship hulls and underwater structures to prevent the attachment of marine organisms like barnacles and algae, reducing drag and improving fuel efficiency. e. Industrial coatings: Various industries use coatings to protect machinery, equipment, and infrastructure from wear, abrasion, and chemical exposure. Industrial coatings may also provide thermal insulation and electrical resistance. f. Electronic coatings: Electronic components are often coated to protect them from moisture, dust, and other environmental contaminants. These coatings also offer electrical insulation and improve the performance and reliability of electronic devices. g. Aerospace coatings: Aircraft and spacecraft require coatings that provide protection against extreme temperatures, UV radiation, and atmospheric conditions while also meeting strict weight and performance requirements.

Continuation Sheet

ID	P7SC2a1C0R3	Field	Part I, Section C, 2.a.(1) Category of Use, Row 3

Biosensors: Are analytical devices that combine a biological component with a transducer to detect and measure the presence or concentration of specific biological or chemical substances. Biosensors offer several advantages, including high sensitivity, specificity, rapid response, and the potential for miniaturization and point-of-care applications. Biosensors have a wide range of applications in various fields, including medical diagnostics, environmental monitoring, and biotechnology. There are several types of biosensors based on the biological component used and the transduction method employed:

a. Optical biosensors: Optical biosensors use light-based detection methods to measure changes in light properties caused by the interaction between the biological component and the target analyte. Surface plasmon resonance (SPR) and fluorescence-based biosensors are examples of optical biosensing techniques.

b. Electrochemical biosensors: Electrochemical biosensors measure changes in electrical properties resulting from the interaction between the biological component and the analyte. These sensors are commonly used due to their high sensitivity and simplicity.

c. Piezoelectric biosensors: Piezoelectric biosensors detect changes in mass or viscoelastic properties that occur when the biological component interacts with the analyte. These changes are converted into electrical signals by the piezoelectric transducer.

Continuation Sheet

ID	P7SC2a1C0R5	Field	Part I, Section C, 2.a.(1) Category of Use, Row 5

Resins-To be applied as part of the formulation, for example as an additive or ingredient. Can be done so in dry form or mixed in a dispersion such as an epoxy any polyester base dispersion. Sub-applications can includes:

a. Adhesives and Sealants: providing strong bonding properties between materials.

b. Paints: enabling them to adhere to surfaces and providing protection, and durability.

c. Composite Materials: create high-strength composite materials.

d. Plastics and Polymers: forms the basis for many types of plastics and polymers, such as polyethylene, polypropylene, polystyrene, and more.

e. Electronics: Resins are used in electronic components for encapsulation, potting, and coating to protect them from moisture, dust, and mechanical stress.

f. 3D Printing: Resins are utilized in stereolithography and other resin-based 3D printing.

g. Casting and Molding various objects, including prototypes, and industrial parts.

h. Flooring and Surfacing: used in self-leveling flooring systems due to their durability and chemical resistance.

i. Textiles and Fibers: to provide water repellency and other functional properties.

Continuation Sheet

ID	P7SC2a1C0R6	Field	Part I, Section C, 2.a.(1) Category of Use, Row 6

Thermosets

a. Automotive parts: Used to manufacture various automotive components, such as brake pads, engine mounts, electrical connectors, and interior trim, due to their excellent heat resistance and mechanical properties.

b. Aerospace components: The aerospace industry employs thermosets for manufacturing lightweight yet durable components

c. Pipe and tank linings: Thermoset linings are used to protect pipes and tanks from corrosion and chemical degradation in industrial applications.

d. Insulation materials: Thermoset foams, such as polyurethane foam, are utilized for thermal and acoustic insulation in buildings, appliances, and transportation.

e. Molding and casting applications: Thermoset materials are used in compression molding, transfer molding, and casting processes to create a wide range of components and products.

Continuation Sheet

ID	P7SC2a1C0R7	Field	Part I, Section C, 2.a.(1) Category of Use, Row 7

Lubricants includes greases and oils and can be dry or liquid. Applications include
a. Automotive: Lubricants are widely used in engines, transmissions, and differentials of vehicles to reduce friction and wear between moving parts, thereby improving fuel efficiency and engine performance.
b. Industrial machinery: Lubricants are employed in various industrial machines, such as pumps, compressors, turbines, gearboxes, and hydraulic systems, to ensure smooth operation and prevent equipment failure.
c. Bearings: Lubricants are critical for the proper functioning of bearings, reducing friction and minimizing wear in rotating equipment like motors and wheels.
d. Aerospace: In the aerospace industry, lubricants are used in aircraft engines, landing gears, and other critical components to ensure safe and efficient operation
e. Marine: Lubricants are used in marine engines and equipment to reduce friction and protect against corrosion in harsh marine environments.
f. Railroad: Lubricants are applied to rail tracks and wheels to reduce friction and wear, improving the efficiency and safety of train operations
g. Power generation: Lubricants are used in power plants to maintain the performance and longevity of turbines, generators, and other rotating equipment.
h. Metalworking: Lubricants are used in metal cutting and forming processes, such as machining, drilling, and stamping, to reduce friction, heat, and tool wear.
i. Mining and construction: Lubricants are applied to heavy machinery used in mining and construction to protect against wear, extend equipment life, and minimize downtime
j. Agricultural equipment: Lubricants are applied to tractors, harvesters, and other agricultural machinery to reduce friction and maintain proper functioning.
k. Household appliances: Lubricants are used in various household appliances, such as fans, motors, and hinges, to ensure smooth and quiet operation.

Continuation Sheet

ID	P7SC2a1C0R8	Field	Part I, Section C, 2.a.(1) Category of Use, Row 8

Thermoplastics
a. Packaging: Thermoplastics like polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), and polystyrene (PS) are extensively used in packaging materials, such as bottles, containers, bags, and films.
b. Consumer goods: Thermoplastics find application in a wide range of consumer products, including household appliances, and electronics casings.
c. Automotive: Thermoplastics are used in the automotive industry for manufacturing interior and exterior components, such as dashboards, bumpers, door panels, and trim.
d. Construction: Thermoplastics are used in the construction sector for various applications, including pipes, fittings, roofing membranes, window profiles, and insulation materials.
e. Textiles: Thermoplastic fibers, such as polyester and nylon, are used in the production of clothing, upholstery, and other textile products.
f. 3D printing: Thermoplastic materials are commonly used in additive manufacturing or 3D printing due to their ability to be melted and solidified repeatedly, making them suitable for producing complex shapes.
g. Electrical and telecommunications: Thermoplastics are utilized in the production of electrical connectors, cable insulation, and telecommunications equipment enclosures.
h. Sports equipment: Thermoplastics are employed in various sports equipment, such as ski boots, bike helmets, and protective gear, due to their lightweight and impact-resistant properties.

Continuation Sheet

ID	P7SC2a1C0R9	Field	Part I, Section C, 2.a.(1) Category of Use, Row 9

Hollow glass microspheres are tiny, spherical particles made from glass with a hollow interior. The graphene PMN substance coats the glass microspheres. These microspheres have diverse properties that make them useful in various applications.

a. Oil and gas drilling: They are used in drilling fluids to reduce weight and improve buoyancy in deep-water drilling operations.

b. Aerospace: Hollow glass microspheres are used in aerospace materials to reduce weight and enhance thermal insulation.

c. Automotive: They are used in automotive components, such as body fillers and lightweight structural parts.

Continuation Sheet

ID	P7SC2a1C0R11	Field	Part I, Section C, 2.a.(1) Category of Use, Row 11

Printed Inks

a. Conductive inks: Used for printed electronics and flexible electronics applications. These inks can be used to print circuits, sensors, and other electronic components on flexible substrates, such as plastic or paper. Graphene-based conductive inks offer advantages like high conductivity, low cost, and the ability to be printed using conventional printing techniques like inkjet printing and screen printing.

b. Inkjet printer inks: Used in inkjet printers. Graphene inkjet inks have applications in printed electronics, energy storage devices, and even for creating graphene-coated surfaces for improved mechanical properties.

c. Sensors: Used to print sensors for various applications, including gas sensors, biosensors, and environmental monitoring devices. The high surface area of graphene allows for efficient interaction with analytes, enabling sensitive and selective detection

Continuation Sheet

ID	P7SC2a1C0R12	Field	Part I, Section C, 2.a.(1) Category of Use, Row 12

Bullet proof armor and glass. The graphene PMN substance will be either coated or embedded depending on performance requirements for military applications and security applications.

Continuation Sheet

ID	P7SC2a1C0R13	Field	Part I, Section C, 2.a.(1) Category of Use, Row 13

Composites (embedded) consist of combining resins and reinforcing fibers like fiberglass or carbon fiber, create high-strength composite materials used in aerospace, automotive, construction, and sporting goods industries. The graphene PMN substance is embedded in the resin.
a. Aerospace: used due to their high strength-to-weight ratio, which helps reduce the overall weight of aircraft and spacecraft.
b. Automotive: used to manufacture lightweight body panels, frames, and interior components.
c. Wind energy: Commonly employed in wind turbine blades. Their strength and durability make them ideal for withstanding the stresses of wind and weather.
d. Marine: Used to build boat hulls, decks, and other marine components for their resistance to corrosion and ability to withstand harsh marine environments.
e. Construction: Used in the construction of bridges, buildings, and infrastructure components. They can offer improved durability, corrosion resistance, and high strength, making structures more resilient
f. Sports equipment: Widely used in the production of sporting goods like tennis rackets, golf clubs, hockey sticks, and bicycle frames. They provide a balance of strength, flexibility, and lightweight properties.
g. Oil and Gas: Employed in the oil and gas industry for pipelines, offshore platforms, and storage tanks, as they can withstand harsh environmental conditions and corrosion.
h. Consumer goods: Composites find use in various consumer products like furniture, luggage, and sporting equipment due to their design flexibility and durability.
i. Defense: Composites play a significant role in military applications, including armor systems, and lightweight vehicle components

Continuation Sheet

ID	P7SC2a1C0R14	Field	Part I, Section C, 2.a.(1) Category of Use, Row 14

Energy storage: Applied to both the cathode and anode side of batteries to improve charge acceptance, charge rate, and charge capacity. Is applied to various types of batteries including:

a. Lead acid batteries

b. Lithium ion

c. Lithium air

d. Lithium sulfur

e. Super capacitors

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

Category of Use: Alternative energy: wind blades and solar panels
Consumer Use: null
Attachments:
Category of Use: Coatings - not spray applications - for: a. Paints and architectural coatings: Used in buildings, homes, and infrastructure for both decorative and protective purposes. They improve the appearance of surfaces, provide weather resistance, and protect against UV radiation. b. Automotive coatings: Applied to cars, trucks, motorcycles, and other vehicles to provide a protective layer against environmental elements and improve their appearance. They also offer resistance to scratches and help prevent corrosion. c. Marine coatings and anti-corrosion coatings: Protect ships, boats, and offshore structures from the corrosive effects of saltwater and harsh marine environments. d. Anti-fouling coatings: Applied to ship hulls and underwater structures to prevent the attachment of marine organisms like barnacles and algae, reducing drag and improving fuel efficiency. e. Industrial coatings: Various industries use coatings to protect machinery, equipment, and infrastructure from wear, abrasion, and chemical exposure. Industrial coatings may also provide thermal insulation and electrical resistance. f. Electronic coatings: Electronic components are often coated to protect them from moisture, dust, and other environmental contaminants. These coatings also offer electrical insulation and improve the performance and reliability of electronic devices. g. Aerospace coatings: Aircraft and spacecraft require coatings that provide protection against extreme temperatures, UV radiation, and atmospheric conditions while also meeting strict weight and performance requirements.
Consumer Use: Potential to be in high value paints and coatings for anti-corrosion application on homes and boats and consumer paints.
Attachments:
Category of Use: Biosensors: Are analytical devices that combine a biological component with a transducer to detect and measure the presence or concentration of specific biological or chemical substances. Biosensors offer several advantages, including high sensitivity, specificity, rapid response, and the potential for miniaturization and point-of-care applications. Biosensors have a wide range of applications in various fields, including medical diagnostics, environmental monitoring, and biotechnology. There are several types of biosensors based on the biological component used and the transduction method employed:
a. Optical biosensors: Optical biosensors use light-based detection methods to measure changes in light properties caused by the interaction between the biological component and the target analyte. Surface plasmon resonance (SPR) and fluorescence-based biosensors are examples of optical biosensing techniques.
b. Electrochemical biosensors: Electrochemical biosensors measure changes in electrical properties resulting from the interaction between the biological component and the analyte. These sensors are commonly used due to their high sensitivity and simplicity.
c. Piezoelectric biosensors: Piezoelectric biosensors detect changes in mass or viscoelastic properties that occur when the biological component interacts with the analyte. These changes are converted into electrical signals by the piezoelectric transducer.
Consumer Use: Graphene used in biosensors will be in sensors used by consumers. The graphene is placed inside the sealed biosensor and should not have human contact. The majority of these sensors are administered and controlled in a Commercial setting
Attachments:
Category of Use: Flexible electronics and electromagnetic shielding (EMI).
Consumer Use: null
Attachments:
Category of Use: Resins-To be applied as part of the formulation, for example as an additive or ingredient. Can be done so in dry form or mixed in a dispersion such as an epoxy any polyester base dispersion. Sub-applications can includes:
a. Adhesives and Sealants: providing strong bonding properties between materials.
b. Paints: enabling them to adhere to surfaces and providing protection, and durability.
c. Composite Materials: create high-strength composite materials.
d. Plastics and Polymers: forms the basis for many types of plastics and polymers, such as polyethylene, polypropylene, polystyrene, and more.
e. Electronics: Resins are used in electronic components for encapsulation, potting, and coating to protect them from moisture, dust, and mechanical stress.
f. 3D Printing: Resins are utilized in stereolithography and other resin-based 3D printing.
g. Casting and Molding various objects, including prototypes, and industrial parts.
h. Flooring and Surfacing: used in self-leveling flooring systems due to their durability and chemical resistance.
i. Textiles and Fibers: to provide water repellency and other functional properties.
Consumer Use: null
Attachments:
Category of Use: Thermosets
a. Automotive parts: Used to manufacture various automotive components, such as brake pads, engine mounts, electrical connectors, and interior trim, due to their excellent heat resistance and mechanical properties.

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

b. Aerospace components: The aerospace industry employs thermosets for manufacturing lightweight yet durable components
c. Pipe and tank linings: Thermoset linings are used to protect pipes and tanks from corrosion and chemical degradation in industrial applications.
d. Insulation materials: Thermoset foams, such as polyurethane foam, are utilized for thermal and acoustic insulation in buildings, appliances, and transportation.
e. Molding and casting applications: Thermoset materials are used in compression molding, transfer molding, and casting processes to create a wide range of components and products.
Consumer Use: null
Attachments:
Category of Use: Lubricants includes greases and oils and can be dry or liquid. Applications include
a. Automotive: Lubricants are widely used in engines, transmissions, and differentials of vehicles to reduce friction and wear between moving parts, thereby improving fuel efficiency and engine performance.
b. Industrial machinery: Lubricants are employed in various industrial machines, such as pumps, compressors, turbines, gearboxes, and hydraulic systems, to ensure smooth operation and prevent equipment failure.
c. Bearings: Lubricants are critical for the proper functioning of bearings, reducing friction and minimizing wear in rotating equipment like motors and wheels.
d. Aerospace: In the aerospace industry, lubricants are used in aircraft engines, landing gears, and other critical components to ensure safe and efficient operation
e. Marine: Lubricants are used in marine engines and equipment to reduce friction and protect against corrosion in harsh marine environments.
f. Railroad: Lubricants are applied to rail tracks and wheels to reduce friction and wear, improving the efficiency and safety of train operations
g. Power generation: Lubricants are used in power plants to maintain the performance and longevity of turbines, generators, and other rotating equipment.
h. Metalworking: Lubricants are used in metal cutting and forming processes, such as machining, drilling, and stamping, to reduce friction, heat, and tool wear.
i. Mining and construction: Lubricants are applied to heavy machinery used in mining and construction to protect against wear, extend equipment life, and minimize downtime
j. Agricultural equipment: Lubricants are applied to tractors, harvesters, and other agricultural machinery to reduce friction and maintain proper functioning.
k. Household appliances: Lubricants are used in various household appliances, such as fans, motors, and hinges, to ensure smooth and quiet operation.
Consumer Use: Possible use in consumer lubrication products and motor oils. The use is expected to be mixed with the other oil additives and to have the same packaging and distribution chain as the current consumer motor oils.
Attachments:
Category of Use: Thermoplastics
a. Packaging: Thermoplastics like polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), and polystyrene (PS) are extensively used in packaging materials, such as bottles, containers, bags, and films.
b. Consumer goods: Thermoplastics find application in a wide range of consumer products, including household appliances, and electronics casings.
c. Automotive: Thermoplastics are used in the automotive industry for manufacturing interior and exterior components, such as dashboards, bumpers, door panels, and trim.
d. Construction: Thermoplastics are used in the construction sector for various applications, including pipes, fittings, roofing membranes, window profiles, and insulation materials.
e. Textiles: Thermoplastic fibers, such as polyester and nylon, are used in the production of clothing, upholstery, and other textile products.
f. 3D printing: Thermoplastic materials are commonly used in additive manufacturing or 3D printing due to their ability to be melted and solidified repeatedly, making them suitable for producing complex shapes.
g. Electrical and telecommunications: Thermoplastics are utilized in the production of electrical connectors, cable insulation, and telecommunications equipment enclosures.
h. Sports equipment: Thermoplastics are employed in various sports equipment, such as ski boots, bike helmets, and protective gear, due to their lightweight and impact-resistant properties.
Consumer Use: Graphene could be added in the making of thermoplastics in the production process of making end products that can be used by consumers such as appliances and sports equipment. By the time it reaches consumers it is embedded in the thermoplastic components in the ratio of less than 0.1% of total weight.
Attachments:

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

XXXXCategory of Use: Hollow glass microspheres are tiny, spherical particles made from glass with a hollow interior. The graphene PMN substance coats the glass microspheres. These microspheres have diverse properties that make them useful in various applications.
a. Oil and gas drilling: They are used in drilling fluids to reduce weight and improve buoyancy in deep-water drilling operations.
b. Aerospace: Hollow glass microspheres are used in aerospace materials to reduce weight and enhance thermal insulation.
c. Automotive: They are used in automotive components, such as body fillers and lightweight structural parts.
Consumer Use: null
Attachments:
Category of Use: Oil drilling fluids - Added into drilling fluids for cooling and lubrication
Consumer Use: null
Attachments:
Category of Use: Printed Inks
a. Conductive inks: Used for printed electronics and flexible electronics applications. These inks can be used to print circuits, sensors, and other electronic components on flexible substrates, such as plastic or paper. Graphene-based conductive inks offer advantages like high conductivity, low cost, and the ability to be printed using conventional printing techniques like inkjet printing and screen printing.
b. Inkjet printer inks: Used in inkjet printers. Graphene inkjet inks have applications in printed electronics, energy storage devices, and even for creating graphene-coated surfaces for improved mechanical properties.
c. Sensors: Used to print sensors for various applications, including gas sensors, biosensors, and environmental monitoring devices. The high surface area of graphene allows for efficient interaction with analytes, enabling sensitive and selective detection
Consumer Use: null
Attachments:
Category of Use: Bullet proof armor and glass. The graphene PMN substance will be either coated or embedded depending on performance requirements for military applications and security applications.
Consumer Use: null
Attachments:
Category of Use: Composites (embedded) consist of combining resins and reinforcing fibers like fiberglass or carbon fiber, create high-strength composite materials used in aerospace, automotive, construction, and sporting goods industries. The graphene PMN substance is embedded in the resin.
a. Aerospace: used due to their high strength-to-weight ratio, which helps reduce the overall weight of aircraft and spacecraft.
b. Automotive: used to manufacture lightweight body panels, frames, and interior components.
c. Wind energy: Commonly employed in wind turbine blades. Their strength and durability make them ideal for withstanding the stresses of wind and weather.
d. Marine: Used to build boat hulls, decks, and other marine components for their resistance to corrosion and ability to withstand harsh marine environments.
e. Construction: Used in the construction of bridges, buildings, and infrastructure components. They can offer improved durability, corrosion resistance, and high strength, making structures more resilient
f. Sports equipment: Widely used in the production of sporting goods like tennis rackets, golf clubs, hockey sticks, and bicycle frames. They provide a balance of strength, flexibility, and lightweight properties.
g. Oil and Gas: Employed in the oil and gas industry for pipelines, offshore platforms, and storage tanks, as they can withstand harsh environmental conditions and corrosion.
h. Consumer goods: Composites find use in various consumer products like furniture, luggage, and sporting equipment due to their design flexibility and durability.
i. Defense: Composites play a significant role in military applications, including armor systems, and lightweight vehicle components
Consumer Use: Graphene could be added during the making of composites in the production process of making end products that can be used by consumers such as sports equipment. By the time it reaches consumers it is embedded in the composite components at a ratio of less than 0.1% by weight.
Attachments:
Category of Use: Energy storage: Applied to both the cathode and anode side of batteries to improve charge acceptance, charge rate, and charge capacity. Is applied to various types of batteries including:
a. Lead acid batteries
b. Lithium ion
c. Lithium air
d. Lithium sulfur

Continuation Sheet

ID		Field	Part I, Section C, 2.a. Additional Consumer Use Text

e. Super capacitors
Consumer Use: null
Attachments:
Category of Use: Construction materials including concrete, asphalt, and other engineered materials.
Consumer Use: null
Attachments:

Part II-- HUMAN EXPOSURE AND ENVIRONMENTAL RELEASE

Section A -- INDUSTRIAL SITES CONTROLLED BY THE SUBMITTER

Mark (X) the "Confidential" box next to any item you claim as confidential

The information on pages 8 and 8a refer to consolidated chemical number(s): [X] **1** [X] **2** [ ] **3** [ ] **4** [ ] **5** [ ] **6**

Complete section A for each type of manufacture, processing, or use operation involving the new chemical substance at industrial sites you control. Importers do not have to complete this section for operations outside the U.S.; however, you may still have reporting requirements if there are further industrial processing or use operations after import. You must describe these operations. See instructions manual

1. Operation description

a.1 Identity -- Enter the identity of the site at which the operation will occur.

				Confi-dential
Name	HYDROGRAPH			
Site address (number and street)	809 LEVEE DR			[ ]
City	MANHATTAN	County	POTTAWATOMIE	
State	KS	ZIP code	66502	

a.2 If the same operation will occur at more than one site, enter the number of sites. Identify the additional sites on a continuation sheet, and if any of the sites have significantly different production rates or operations, include all the information requested in this section for those sites as attachments. → 1 [ ]

Mark (X) this box if the data continues on the next page. [ ]

b. Type -- Mark (X) Manufacturing [X] Processing [ ] Use [ ] [ ]

c. Amount and Duration -- Complete 1 or 2 as appropriate

				Confi-dential
1. Batch	Maximum kg/batch (100% new chemical substance)	Hours/batch	Batches/year	[X]
	XXXX	XXXX	XXXX	
2. Continuous	Maximum kg/day (100% new chemical substance)	Hours/day	Days/year	[ ]

d. Process description — Mark (X) to indicate your willingness to have your process description binding. → [ ]

(1) Diagram the major unit operation steps and chemical conversions. Include interim storage and transport containers (specify- e.g. 5 gallon pails, 55 gallon drum, rail car, tank truck, etc.).

(2) Provide the identity, the approximate weight (by kg/day or kg/batch on a 100% new chemical substance basis), and entry point of all starting materials and feedstocks (including reactants, solvents, catalysts, etc.), and of all products, recycle streams, and wastes. Include cleaning chemicals (note frequency if not used daily or per batch.).

(3) Identify by number the points of release, including small or intermittent releases, to the environment of the new chemical substance. If releasing to two media at the same step, assign a second release number for the second medium.

[X]

XXXX

PMN Page 8a

Diagram of the major unit operation steps.	Confidential ☐

See Attachment Continuation Page

Enter Attachment filename for Part II, Section A, 1. d.	See Attachment Continuation Page ☐

Continuation Sheet

ID		Field	Process Description

Original Document: 5 HydroGraph Manufacturing-...
Original Document: 6 Receiving process.pdf
Original Document: 8 HydroGraph Quality System...
Original Document: 9 HydroGraph Production Pro...
Original Document: 10 Sales order process.pdf
Original Document: 11 HydroGraph PPE descriptio...
Original Document: 20 NIOSHHydrographOELFinalRe...
Original Document: 21 HydroGraphProductionProce...

PMN Page 9

Part II-- HUMAN EXPOSURE AND ENVIRONMENTAL RELEASE -- Continued

Section A -- INDUSTRIAL SITES CONTROLLED BY THE SUBMITTER -- Continued

The information on pages 9 and 9a refer to consolidated chemical number(s): [X] **1** [X] **2** [ ] **3** [ ] **4** [ ] **5** [ ] **6**

2. Occupational Exposure -- You must make separate confidentiality claims for the description of worker activity, physical form of the new chemical substance, number of workers exposed, and duration of activity. Mark (X) the "Confidential" box next to any item you claim as confidential.

(1) -- Describe the activities (i.e. bag dumping, tote filling, unloading drums, sampling, cleaning, etc.) in which workers may be exposed to the substance.

(2) -- Mark (X) this column if entry in column (1) is confidential business information (CBI).

(3) -- Describe any protective equipment and engineering controls used to protect workers.

(4),(7),(10) -- Indicate your willingness to have the information provided in column (3), (6) or (9) binded.

(5),(8),(11) -- Mark (X) this column if entries in columns (3), (6) or (9) are confidential business information (CBI).

(6) -- Indicate the physical form(s) of the new chemical substance (e.g., solid: crystal, granule, powder, or dust)

(9) -- Indicate the % new chemical substance (if part of a mixture) at the time of exposure.

(12) -- Estimate the maximum number of workers involved in each activity for all sites combined.

(13) -- Mark (X) this column if entry in column (12) is confidential business information (CBI).

(14) and (15) -- Estimate the maximum duration of the activity for any worker in hours per day and days per year.

(16) -- Mark (X) this column if entries in columns (14) or (15) are confidential business information (CBI).

Worker activity (i.e., bag dumping, filling drums) (1)	CBI (2)	Protective Equipment/ Engineering Controls (3)	Binding Option Mark (X) (4)	CBI (5)	Physical form(s) (6)	Binding Option Mark (X) (7)	CBI (8)	% new substance (9)	Binding Option Mark (X) (10)	CBI (11)	# of Workers Exposed (12)	CBI (13)	Maximum Duration		CBI (16)
													Hrs/Day (14)	Days/Yr (15)	
Sampling		See continuation page. id: <P9SA2(3)C1R1>			Dry graphene powder			100			XXXX	X	XXXX	XXXX	X
Loading into Small Containers		See continuation page. id: <P9SA2(3)C1R2>			Dry graphene powder			100			XXXX	X	XXXX	XXXX	X

Mark (X) this box if the data continues on the next page. [ ]

Enter Attachment filename for Part II, Section A on the bottom of page 9a. [ ]

Continuation Sheet

ID	P9SA2(3)C1R1	Field	Part II, Section A, 2.(3) Prot. Equipment, etc., Row 1

Protective Equipment/ Engineering Controls:

The product sampling process allows controlled access to the produced material for the purpose of collecting 5g samples. This process is quality controlled and performed using the appropriate PPE and under constant, evacuated, downdraft through a HEPA filter and is exhausted above the roof.

The PPE used is as follows:

Eye Protection - McMaster-Carr, 3M, Part #62065T131

Ear Plugs - 33 dB Noise Reduction Rating, McMaster-Carr, Honeywell, Rollup Foam, Part #54725T32

Disposable Respirator for Use with Solid Particles, N99 Filter, #TC-84A-1459, McMaster-Carr, Part #5450T65

Respirator, N95 Filter Rating, NIOSH #TC-84A-7544, Silicone, McMaster- Carr, Part #54445T183

Respirator, N95 Filter, NIOSH #TC-84A-1100, Silicone Rubber, McMaster- Carr, Part #5541T16

Lab Coats - Cintas, 1 wear, picked up each week for cleaning and rotated with cleaned coats

Disposable Tyvek Polyethylene Shirt, McMaster-Carr, Polyethylene Fabric, Part #5584T15

Tyvek Polyethylene Disposable Coveralls with Long Sleeves and Open Cuffs, McMaster-Carr, Polyethylene Fabric, Part #5231T31

Chemical-Resistant Tychem 2000 Disposable Coveralls with Long Sleeves and Open Cuffs, McMaster-Carr, Part #5224T2

Disposable Nitrile Gloves, Powdered, Textured, 5 Mil Thick - McMaster-Carr, Ambidex Turbo, Part #52555T97

Kimberly-Clark Powder Free Purple Nitrile Gloves, 5.9 Mil Thick, Quill.com, Item #55082Q

On August 30 and 31, 2023, NIOSH conducted an occupational exposure evaluation using Elemental Carbon (EC) as a surrogate for graphene. Personal breathing zone samples collected during transferring product revealed background corrected 8-Hr Time Weighted Average (TWA) concentrations of 2.22 micrograms per cubic meter (ug/m3) inhalable aerosol fraction and 0.26 ug/m3 respirable aerosol fraction, compared to a safety guideline level of 18 ug/m3. Please see attached NIOSH report for details.

Continuation Sheet

ID	P9SA2(3)C1R2	Field	Part II, Section A, 2.(3) Prot. Equipment, etc., Row 2

Protective Equipment/ Engineering Controls:

The Packaging process allows controlled access to the produced material. This process is quality controlled and performed using the appropriate PPE and within a negative-pressure enclosure that is constantly evacuated through a HEPA filter and exhausted above the roof.

A typical packaging process removes from inventory a sealed 15-gallon storage container with 8kg of PMN substance. This constitutes one uniquely identifiable, and quality traceable, batch of PMN substance. This batch is placed in the negative-pressure packaging enclosure where it is opened and repacked into one of two standard packaging containers: a 50g plastic jar with screw-top lid and pressure sensitive seal, or a double-bagged, double-zipper seal, one-gallon plastic bag containing 500g where the bags are evacuated and both sealed with industrial tape. These packaged units are labeled and inventoried into finished goods ready to be boxed for customer orders.

The PPE used is as follows:

Eye Protection - McMaster-Carr, 3M, Part #62065T131

Ear Plugs - 33 dB Noise Reduction Rating, McMaster-Carr, Honeywell, Rollup Foam, Part #54725T32

Disposable Respirator for Use with Solid Particles, N99 Filter, #TC-84A-1459, McMaster-Carr, Part #5450T65

Respirator, N95 Filter Rating, NIOSH #TC-84A-7544, Silicone, McMaster- Carr, Part #54445T183

Respirator, N95 Filter, NIOSH #TC-84A-1100, Silicone Rubber, McMaster- Carr, Part #5541T16

Lab Coats - Cintas, 1 wear, picked up each week for cleaning and rotated with cleaned coats

Disposable Tyvek Polyethylene Shirt, McMaster-Carr, Polyethylene Fabric, Part #5584T15

Tyvek Polyethylene Disposable Coveralls with Long Sleeves and Open Cuffs, McMaster-Carr, Polyethylene Fabric, Part #5231T31

Chemical-Resistant Tychem 2000 Disposable Coveralls with Long Sleeves and Open Cuffs, McMaster-Carr, Part #5224T2

Disposable Nitrile Gloves, Powdered, Textured, 5 Mil Thick - McMaster-Carr, Ambidex Turbo, Part #52555T97

Kimberly-Clark Powder Free Purple Nitrile Gloves, 5.9 Mil Thick, Quill.com, Item #55082Q

On August 30 and 31, 2023, NIOSH conducted an occupational exposure evaluation using Elemental Carbon (EC) as a surrogate for graphene. Personal breathing zone samples collected during transferring product revealed background corrected 8-Hr Time Weighted Average (TWA) concentrations of 2.22 micrograms per cubic meter (ug/m3) inhalable aerosol fraction and 0.26 ug/m3 respirable aerosol fraction, compared to a safety guideline level of 18 ug/m3. Please see attached NIOSH report for details.

PMN Page 9a

3. Environmental Release and Disposal -- You must make separate confidentiality claims for the release number and the amount of the new chemical substance released and other release and disposal information. Mark (X) the "Confidential" box next to each item you claim as confidential.
(1) – Enter the number of each release point identified in the process description, part II, section A, subsection 1d(3).
(2) – Mark (X) this column if entries in column (1) is confidential business information (CBI).
(3) – Estimate the amount of the new substance released (a) directly to the environment or (b) into control technology (in kg/day or kg/batch).
(4) – Mark (X) this column if entries in columns (3a) or (3b) are confidential business information (CBI).
(5) – Identify the media (stack air, fugitive air (optional-see Instruction Manual), surface water, on-site or off-site land or incineration, POTW, or other (specify)) to which the new substance will be released from that release point. (specify)) to which the new substance will be released from that release point.
(6) – Mark (X) this column if entries in column (5) is confidential business information (CBI).
(7) – (a) Describe control technology, if any, and control efficiency that will be used to limit the release of the new substance to the environment. For releases disposed of on land, characterize the disposal method and state whether it is approved for disposal of RCRA hazardous waste. On a continuation sheet, for each site describe any additional disposal methods that will be used and whether the waste is subject to secondary or tertiary on-site treatment. (b) Estimate the amount released to the environment after control technology (in kg/day).
(8) – Mark (X) this column if entries in columns (7(a)) or (7(b)) are confidential business information (CBI).
(9) – Identify the destination(s) of releases to water. Please supply NPDES (National Pollutant Discharge Elimination System) numbers for direct discharges or NPDES numbers of the POTW (Publicly Owned Treatment Works). Mark (X) if the POTW name or NPDES # is confidential business information (CBI).

Release Number	CBI	Amount of New Substance Released		CBI	Medium of release e.g. Stack air	CBI	Control technology and efficiency (you may wish to optionally attach efficiency data)			CBI
(1)	(2)	(3a)	(3b)	(4)	(5)	(6)	(7a)	Binding Mark (X)	(7b)	(8)
001		BDL			Stack Air		See continuation page. id: <P9ASA3(5a)C1R1>		0	
Mark (X) this box if the data continues on the next page.									☐	

(9) Mark (X) the destination(s) of releases to water.		NPDES#	CBI
☐ POTW--provide name(s)			☐
☐ Navigable waterway- - provide name(s)			☐
☐ Other--Specify			☐
Enter Attachment filename for Part II, Section A.			☐

Continuation Sheet

ID	P9ASA3(5a)C1R1	Field	Part II, Section A, B.(5a) Control Technology & Efficiency, Row 1

Release Number 001 is Below our Detectable Limits (BDL).
The production process exhaust is drawn through two separate HEPA filters by an oil-bath vane vacuum pump and pushed through an oil-recovery air-filter before being exhausted at roof level which is 30 feet above the nearest ground level.
A qualitative swab test evaluation after 700kg of production detects only trace evidence of graphene on the pump exhaust and the pump oil remains clear and clean. Note, FGA-1 graphene is highly admissible in oil and rapidly blackens oil.
A quantitative assessment of the 99.97% filter efficiency calculates to 0.027g of graphene release per 300 kg batch. Operational results show actual filter efficiency for our material is 99.86%. Which calculates to 0.55g of graphene escaping the two HEPA filters per 300kg batch. This excludes the substantial contribution of the machines internal collection performance and the collection properties of the oil and the final oil-recovery air filter which further reduces this emission.

Part II-- HUMAN EXPOSURE AND ENVIRONMENTAL RELEASE – Continued

Section B -- INDUSTRIAL SITES CONTROLLED BY OTHERS

The information on pages 10 and 10a refer to consolidated chemical number(s): ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Complete section B for typical processing or use operations involving the new chemical substance at sites you do not control. Importers do not have to complete this section for operations outside the U.S.; however, you must report any processing or use activities after import. See the Instructions Manual. *Complete a separate section B for each type of processing, or use operation involving the new chemical substance*. If the same operation is performed at more than one site describe the typical operation common to these sites. Identify additional sites on a continuation sheet.

1(a). Operation Description -- To claim information in this section as confidential, bracket (e.g. {}) the specific information that you claim as confidential.

(1) -- Diagram the major unit operation steps and chemical conversions, including interim storage and transport containers (specify - e.g. 5 gallon pails, 55 gallon drums, rail cars, tank trucks, etc). On the diagram, identify by letter and briefly describe each worker activity.

(2) -- Either in the diagram or in the text field 1(b) below, provide the identity, the approximate weight (by kg/day or kg/batch, on an 100% new chemical substance basis), and entry point of all feedstocks (including reactants, solvents and catalysts, etc) and all products, recycle streams, and wastes. Include cleaning chemicals (note frequency if not used daily or per batch).

(3) -- Either in the diagram or in the text field 1(b) below, identify by number the points of release, including small or intermittent releases, to the environment of the new chemical substance.

(4) -- Please enter the # of sites (remember to identify the locations of these sites on a continuation sheet):

	Number of Sites		Confidential ☐

1(b). (Optional) This space is for a text description to clarify the diagram above. Confidential ☐

Enter Attachment filename for Part II, Section B on the bottom of page 10a.		☐

PMN Page 10a

2. Worker Exposure/Environmental Release

(1) – From the diagram above, provide the letter for each worker activity. Complete 3-13 for each worker activity described.
(2), (4), (6), (8), (10), (12), (14), (17), (19) and (21) – Mark (X) this column if any of the preceeding entries are confidential business information (CBI).
(3) – Estimate the number of workers exposed for all sites combined.
(5) – Estimate the typical duration of exposure per worker in (5a) hours per day and (5b) days per year.
(7) – Describe physical form of exposure and any protective equipment and engineering controls, if any, used to protect workers.
(9) – Provide the physical form of exposure.
(11) – Enter the % new chemical substance (if in mixture).
(13) – Estimate the percent of the new substance as formulated when packaged or used as a final product
(15) – From the process diagram above, enter the number of each release point. Complete 16-18 for each release point identified.
(16) – Estimate the amount of the new substance released (a) directly to the environment or (b) into control technology to the environment (in kg/day or kg/batch).
(18) – Describe media of release i.e. stack air, fugitive air (optional-see Instructions Manual), surface water, on-site or off-site land or incineration, POTW, or other (specify) and control technology, if any, that will be used to limit the release of the new substance to the environment.
(20) – Identify byproducts which may result from the operation.

Letter of Activity	CBI	# of Workers Exposed	CBI	Duration of Exposure		CBI	Protective Equip./ Engineering Controls	CBI	Physical Forms	CBI	% new substance	CBI	% in formulation	CBI
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

Release Number	Amount of New Substance Released		CBI	Media of Release & Control Technology	CBI
(15)	(16a)	(16b)	(17)	(18)	(19)

Mark (X) this box if the data continues on the next page. ☐

(20) Byproducts:		(21) CBI	☐

Enter Attachment filename for Part II, Section B.		☐

OPTIONAL POLLUTION PREVENTION INFORMATION

To claim information in the following section as confidential, bracket (e.g. {}) the specific information that you claim as confidential.

In this section you may provide information not reported elsewhere in this form regarding your efforts to reduce or minimize potential risks associated with activities surrounding manufacturing, processing, use and disposal of the PMN substance. Please include new information pertinent to pollution prevention, including source reduction, recycling activities and safer processes or products available due to the new chemical substance. Source reduction includes the reduction in the amount or toxicity of chemical wastes by technological modification, process and procedure modification, product reformulation, and/or raw materials substitution. Recycling refers to the reclamation of useful chemical components from wastes that would otherwise be treated or released as air emissions or water discharges, or land disposal. Quantitative or qualitative descriptions of pollution prevention, source reduction and recycling should emphasize potential risk reduction in addition to compliance with existing regulatory requirements. The EPA is interested in the information to assess overall net reductions in toxicity or environmental releases and exposures, not the shifting of risks to other media (e.g., air to water) or nonenvironmental areas (e.g., occupational or consumer exposure). To the extent known, information about the technology being replaced will assist EPA in its relative risk determination. In addition, information on the relative cost or performance characteristics of the PMN substance to potential alternatives may be provided.

Describe the expected net benefits, such as

(1) an overall reduction in risk to human health or the environment;
(2) a reduction in the generation of waste materials through recycling, source reduction or other means;
(3) a reduction in the use of hazardous starting materials, reagents, or feedstocks;
(4) a reduction in potential toxicity, human exposure and/or environmental release; or
(5) the extent to which the new chemical substance may be a substitute for an existing substance that poses a greater overall risk to human health or the environment.

Information provided in this section will be taken into consideration during the review of this substance. See PMN Instructions Manual and Pollution Prevention Guidance manual for guidance and examples.

See continuation page. id: <Pollute>

Enter Attachment filename for Pollution Prevention Page 11.		☐

Continuation Sheet

ID	Pollute	Field	Optional Pollution Prevention Information

HydroGraph's ability to produce tonnage amounts of high-quality graphene is essential to support the Federal Government's implementation of Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability by its use in end-markets such as energy storage devices, concrete, plastics, lubrication, and composite materials. Graphene enhances or reduces the needed volumes of many materials. HydroGraph's graphene production method requires the lowest energy input and produces the lowest emission in the graphene market. With increased production, HydroGraph's Fractal Graphene will improve its ability to use less total input energy and capture all emissions.

The expected net benefits to HydroGraph graphene are as follows:

(1) An overall reduction in risk to human health or the environment:
Regarding HydroGraph employees, the Hyperion process is totally enclosed during production of the PMN substance and the only potential for exposure is during quality testing, maintenance, and some packaging tasks. This process performed well under evaluation by NIOSH during an on-site assessment as part of developing Occupational Exposure Limits for graphene (See the complete NIOSH report included with this submission).
When considering the broader human and environmental risks, HydroGraph's Hyperion process represents substantial improvement over existing graphene production techniques by avoiding chemical processes and energy input. Laser/plasma techniques are energy intensive for low yield. Electrochemical exfoliation, mechanical exfoliation and chemical vapor deposition (CVD) techniques require complex chemicals or processed ore and some techniques produce a relatively large amount of waste including air pollutants and/or toxic and flammable effluent.
In small concentrations, specifically HydroGraph's PMN substance has been shown to be highly effective in increasing strength in many materials. This small additive for large gains promises to reduce the required volume of these enhanced materials thereby reducing all aspects of material production, recycling, and disposal. One good example of this material reduction is concrete and the corresponding Carbon Dioxide emission avoidance (Reference #6).
Finally, HydroGraph's PMN graphene is poised to reduce its total energy requirement and become more efficient as its production increases. This PMN substance will move to feedstocks and combined cycles that drastically reduce the energy input and help sequester existing sources of atmospheric carbon emissions

• (2) A reduction in the generation of waste materials through recycling, source reduction or other means:
In the graphene industry, HydroGraph's PMN graphene requires the least amount of energy input and currently emits the least amount of waste products (identified in this submission as Release 001).
Once known production targets are met, this process will further improve through identified technologies and combined cycling, Hydrograph's production process will use less energy intensive feedstocks and recover all output gas making HydroGraph's Hyperion production technology a zero-emission product and source of compressed hydrogen, carbon monoxide, and a viable method of carbon sequestration. This is a stark difference from other production methods and is even a model for other industries.

• (3) A reduction in the use of hazardous starting materials, reagents, or feedstocks:
Currently, large production volume graphene typically begins as graphite. Industrial graphite is produced by processing natural graphite ore, or through a synthetic method.
The production of natural graphite by mining is a resource and energy intensive process. North America consumes 2% of global natural graphite and 1% of synthetic graphite (Reference #1). In 2021, global consumption of graphite reached 3.5 million tones. Synthetic graphite accounted for about two-thirds of the graphite consumption, which was largely concentrated in Asia. The Brazilian graphite producer, Nacional de Grafite, describes the mining and production process of natural graphite as an intensive mining operation with successive grinding and mechanical processes to separate impurities from the graphite. The mechanical concentration aims for maximum recovery of the graphite present in the ore while preserving its physical features and reducing impurities. Chemical treatments are used to further purify the ore. These chemicals must be reprocessed to prevent environmental contamination. The resulting graphite is washed extensively with demineralized water to achieve pH 7. It is then pressed, filtered and finished in rotary dryers before classifying and packaging. For more information see https://www.grafite.com/en/production-process.

Synthetic graphite is generally made from pet coke, from crude oil, and coal tar pitch, from coal. The mass-balance calculations of the overall process may be summarized as follows: material inputs of 0.95 ton/ton of petroleum coke and 0.24 ton/ton of coal tar pitch (83% efficiency) and purchased energy of 5.1 MMBTU/ton of natural gas for the baking furnace (25% efficiency) and 14 MMBTU/ton of electricity for the Acheson granitization furnace (26% efficiency). Moreover, the sulfur, nitrogen and ash impurities in the raw materials are calcined off resulting in emissions of criteria pollutants of NOX, 9.3 kg/ton; PM, 4.1 kg/ton; SOX, 64 kg/ton and CO2, 440 kg/ton. (Reference #7)

Continuation Sheet

ID	Pollute	Field	Optional Pollution Prevention Information

Once natural or synthetic graphite is produced, it must be exfoliated from its stacked structure to separate the graphene layers. This step produces graphite oxide. Graphite oxide is fabricated in various ways. One example uses the Hummers method which involves soaking graphite in a solution of sulfuric acid and potassium permanganate. From this graphite oxide, graphene is produced in a final reduction step often using hydrazine.
Sulfuric acid, (H_2SO_4) is corrosive to all body tissues. Inhalation of the vapors may cause serious lung damage, and which is classified as an extremely hazardous chemical by EPA and classified under GHS as skin corrosive category 1, H314, with a Danger signal word, causes severe skin burns and eye damage.
Potassium permanganate ($KMnO_4$) is a chemical which burns and stains the skin dark brown, which if ingested will cause severe gastro-intestinal distress. Its GHS classification is an oxidizing solid, category 2, H272, with a signal word of Danger, aquatic toxicity category 1, very toxic to aquatic life, H400, very toxic to aquatic life with long lasting effects, H410, reproductive toxicity category 2, H361, suspected of damaging the unborn child, and acute oral toxicity, category 4, H302, harmful if swallowed.
Hydrazine (N_2H_4) is a skin and eye irritant and possible organ damage. Its GHS classification is flammable, oxidizer, that is a toxic health and environmental hazard.

The production and processing of graphite into graphene requires large material, chemical, and energy inputs and creates many managed waste products. In contrast, the HydroGraph Hyperion production process for the PMN substance does not require graphite as a starting material and avoids all environmental burdens described above. The PMN material only requires two readily available industrial gases, and a small amount of electricity.

• (4) A reduction in potential toxicity, human exposure and/or environmental release:
In addition to the avoidance of toxic process chemicals discussed above, HydroGraph's PMN graphene can be a substitution ingredient replacing existing materials such as carbon black. But unlike carbon black, the PMN substance does not use metallic catalysts, and eliminates the potential carbon black toxicity from the iron oxide catalyst remaining in carbonaceous nanomaterials. This has been demonstrated in a study (Reference #8) that concludes: "Co-exposure to carbon black and Fe_2O_3 particles causes a synergistic oxidative effect that is significantly greater than the additive effects of exposures to either particle type alone. The intracellular redox reaction between carbon black and Fe^{3+} is likely responsible for the synergistic oxidative effect. Therefore, elemental carbon particles and fibers should be considered as potential reducing agents rather than inert materials in toxicology studies. Acidified cell organelles such as the lysosomes probably play a critical role in the solubilization of Fe_2O_3."

• (5) The extent to which the new chemical substance may be a substitute for an existing substance that poses a greater overall risk to human health or the environment:
The PNM graphene with its low energy input and planned zero-emission process, is showing promise in many materials in ways that reduce the amount of material needed, enhance existing material properties, or even replace existing additives for better performance. Two of these additive materials, ripe for replacement, are Carbon Black and Acetylene Black. These two materials represent an annual production exceeding 19.2 million metric tons (Reference #9) and related emissions that include. carbon monoxide, carbon dioxide, methane, carbon soot, nitrogen oxides, sulfur compounds, polycyclic organic matter, and trace amounts of lead, mercury and other metals. Replacing just these two materials represents a large improvement in waste reduction and energy usage and aligns well with the Federal government Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability.
When considering enhancing existing materials with the PMN graphene, battery technology is a good example. A test conducted by a prospective customer found that adding the PMN substance to the cathode side of electric vehicle led-acid batteries increased the charging rate by 47%. This reduces the number of batteries needed to obtain the same charge rate and reduces heat during charge that decreases battery life.
In another study, lubrication products enhanced with the PMN substance has been shown to reduce friction by 40% resulting in less heat and less wear on parts thereby promising to extend the life of many end products.

References:
#1 Government of Canada, Minerals and Metals Facts:
https://natural-resources.canada.ca/our-natural-resources/minerals-mining/minerals-metals-facts/graphite-facts/24027

#2 US Patent 9,440,857 B2 Sorensen et. al., Process for High-Yield Production of Graphene via Detonation of Carbon-Containing Material. Sep. 13, 2016

#3 Guo, B., Zebda, R., Drake, S.J. and C.M. Sales, Synergistic effect of co-exposure to carbon black and Fe_2O_3 nanoparticles on oxidative stress in cultured lung epithelial cells. Part Fibre Toxicol 6, 4 (2009). https://doi.org/10.1186/1743-8977-6-4

Continuation Sheet

ID	Pollute	Field	Optional Pollution Prevention Information

#4 Argonne National Laboratory September 2015 report "Material and Energy Flows the Production of Cathode and Anode Materials for Lithium Ion Batteries," ANL/ESD-14/10 Rev. https://publications.anl.gov/anlpubs/2015/10/121442.pdf

#5 US Army Corps of Engineers February 23, 2022 news story "ERDC partners with multiple universities on graphene research" By Jason Scott, ERDC public affairs specialist U.S. Army Engineer Research and Development Center
ERDC partners with multiple universities on graphene research > Engineer Research and Development Center > News Stories (army.mil)

#6 This article identifies Hydrograph's Fractal Graphene specifically. ACS Sustainable Chemistry & Engineering, Vol 12, Issue 24, Article "New Generation Graphenes in Cement-Based Materials: Production, Property Enhancement, and Life Cycle Analysis"
https://pubs.acs.org/doi/10.1021/acssuschemeng.4c01924

#7 Argonne National Laboratory September 2015 report "Material and Energy Flows the Production of Cathode and Anode Materials for Lithium Ion Batteries," ANL/ESD-14/10 Rev. https://publications.anl.gov/anlpubs/2015/10/121442.pdf

#8 Bing Guo, Rema Zebda, Stephen J. Drake and Christie M. Sayes, "Synergistic effect of co-exposure to carbon black and Fe2O3 nanoparticles on oxidative stress in cultured lung epithelial cells."

#9 Carbon Black - A Global Market Overview Jan 2016 Industry Experts Report CP024 page 328

Part III -- LIST OF ATTACHMENTS

Attach continuation sheets for sections of the form, test data and other data (including physical/chemical properties and structure/activity information), and optional information after this page. Clearly identify the attachment and the section of the form to which it relates, if appropriate. Number consecutively the pages of any paper attachments. In the Number of Pages column below, enter the inclusive page numbers of each attachment for paper submissions or enter the total number of pages for each attachment for electronic submissions. Electronic attachments can be identified by filename.
Mark (X) the "Confidential" box next to any attachment name or filename you claim as confidential. Read the Instructions Manual for guidance on how to claim any information in an attachment as confidential. You must include with the sanitized copy of the notice form a sanitized version of any attachment in which you claim information as confidential.

#	Attachment Name	Attachment Filename	Number of Pages	Associated PMN Section Number	CBI
1	Technical data sheet for FGA-1 Fractal Graphene Aggregate	Form-F-18-FGA-1-Fractal-Graphene-Technical-Datasheet-	4	Synonyms Section (FGA-1)	
2	FGA-1 SDS 09.21.2022	Form F-29 FGA-1 Fractal Graphene SDS Version 2 (1).pdf	9	Hazard Information Section (FGA-1)	
3	CAS Registry Services assigned CAS number 1034343-98-0 to this material	CAS1034343-98-0CCOrderResults497125.pdf	2	Hazard Information Section (FGA-1)	
4	Material characterization including Raman and TEM/SEM scans of "Hydrograph Graphene (G-	NanoSafe Characterization of Hydrograph_Rev1.pdf	18	Physical and Chemical Properties Worksheet Continued (FGA-1)	
5	Material characterization including structural measurements, Raman/SEM/AFM, BET, C:O	NPL Test Report 2021070260 - Graphene Council report.pdf	30	Physical and Chemical Properties Worksheet Continued (FGA-1)	
6	HydroGraph/ Kansas State University comments on variation of physical chemical test results	Comparison of KSU NPL NS final version.docx	2	Physical and Chemical Properties Worksheet Continued (FGA-1)	
7	FGA-1 Chemical Structure Diagram	FGA-1structuraldiagram.pdf	1	Class 1 or 2 Substances Chemical Structure Diagram (FGA-1)	
8	IES can not provide a chemical name or CASRN for the Graphene new chemical substance and we	Method Attachment for FGA-1.docx	1	Class 1 or 2 Substances ID Method (FGA-1)	
9	The most recent third-party analysis validating composition claim.	20240207-02FGA-1CandNanalysisfromUNLWaterS	1	B.1.e.3. Range of Composition (FGA-1)	
10	Technical data sheet for FGA-2 Fractal Graphene Aggregate	FormF-36FGA-2FractalGrapheneTechnicalData	4	Synonyms Section (FGA-2)	
11	Fractal graphene US SDS	Fractal Graphene US SDS 2023.05.08.pdf	9	Hazard Information Section (FGA-2)	
12	FGA-2 Chemical Structure Diagram	FGA-2structuraldiagram.pdf	1	Class 1 or 2 Substances Chemical	
13	IES cannot provide a chemical name or CASRN for the Graphene new chemical substance and we	MethodAttachmentForFGA2.txt	1	Class 1 or 2 Substances ID Method (FGA-2)	
14	Manufacturing process flow chart	HydroGraph Manufacturing-Inventory.pdf	1	Submitter Controlled Operations (Kansas manufacturing)	
15	Material receiving process flow chart	Receiving process.pdf	1	Submitter Controlled Operations	
16	description of Quality process	HydroGraph Quality System process description.pdf	1	Submitter Controlled Operations (Kansas manufacturing)	
17	Production Process description	HydroGraph Production Process description.pdf	1	Submitter Controlled Operations (Kansas manufacturing)	
18	Sales Order process flow chart	Sales order process.pdf	1	Submitter Controlled Operations (Kansas manufacturing)	
19	Detailed PPE description	HydroGraph PPE description.pdf	1	Submitter Controlled Operations	
20	This document describes the NIOSH onsite test to determine the exposure limit for HydroGraph	NIOSHHydrographOELFinalReport.pdf	24	Submitter Controlled Operations (Kansas manufacturing)	
21	Production Process flowchart	HydroGraphProductionProcessfl	1	Submitter Controlled Operations	

Mark (X) this box if the data continues on the next page. [X]

Part III -- LIST OF ATTACHMENTS

Attach continuation sheets for sections of the form, test data and other data (including physical/chemical properties and structure/activity information), and optional information after this page. Clearly identify the attachment and the section of the form to which it relates, if appropriate. Number consecutively the pages of any paper attachments. In the Number of Pages column below, enter the inclusive page numbers of each attachment for paper submissions or enter the total number of pages for each attachment for electronic submissions. Electronic attachments can be identified by filename.
Mark (X) the "Confidential" box next to any attachment name or filename you claim as confidential. Read the Instructions Manual for guidance on how to claim any information in an attachment as confidential. You must include with the sanitized copy of the notice form a sanitized version of any attachment in which you claim information as confidential.

#	Attachment Name	Attachment Filename	Number of Pages	Associated PMN Section Number	CBI
22	Final Report dated December 4 2023 of NIOSH Exposure Assessment Study at HydroGraph in	12-4-23 Hydrograph Final Report.pdf	24	Additional Attachments	
23	PDF of the Optional Cover Letter	CoverLetterforHydroGraphFGA1 andFGA2Rev3.pdf	3	Additional Attachments	

Mark (X) this box if the data continues on the next page. ☐

PMN Page 13

PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET

The information on this page refers to chemical number(s): [X] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ] 6

To assist EPA's review of physical and chemical properties data, please complete the following worksheet for data you provide and include it in the notice. Identify the property measured, the value of the property, the units in which the property is measured (as necessary), and whether or not the property is claimed as confidential. Give the attachment number (found on page 12) in column (b). The physical state of the neat substance should be provided. These measured properties should be for the neat (100% pure) chemical substance. Properties that are measured for mixtures or formulations should be so noted (% PMN substance in __). You are not required to submit this worksheet; however, EPA strongly recommends that you do so, as it will simplify the review and ensure that confidential information is properly protected. You should submit this worksheet as a supplement to your submission of test data. This worksheet is not a substitute for submission of test data.

Property (a)		Unit	Mark X if Provided	Attachment Number (b)	Value (c)			Measured or Estimate (M or E)	CBI Mark (X) (d)
					(solid)	(liquid)	(gas)		
Physical state of neat substance			[X]	6	[X]	[ ]	[ ]	Measured	
Vapor Pressure @ Temperature		°C	[ ]				Torr		
Density/relative density			[X]	6	0.060 -0.350		g/cm3	Measured	
Solubility			[ ]				g/L		
@ Temperature		°C							
Solvent									
Solubility in Water @ Temperature		°C	[ ]				g/L		
Melting Temperature			[ ]				°C		
Boiling / Sublimation temperature @		Torr	[ ]				°C		
Spectra			[X]	6	Raman & X-ray diffraction			Measured	
Dissociation constant			[ ]						
Octanol / water partition coefficient			[ ]						
Henry's Law constant			[ ]						
Volatilization from water			[ ]						
Volatilization from soil			[ ]						
pH@ concentration			[ ]						
Flammability			[ ]						
Explodability			[ ]						
Adsorption / Coefficient			[ ]						
Particle Size Distribution			[X]	6	particle size of 20-50nm with 6 graphene layer			Measured	
Other – Specify			[ ]						

PMN Page 13

PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET

The information on this page refers to chemical number(s): ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

To assist EPA's review of physical and chemical properties data, please complete the following worksheet for data you provide and include it in the notice. Identify the property measured, the value of the property, the units in which the property is measured (as necessary), and whether or not the property is claimed as confidential. Give the attachment number (found on page 12) in column (b). The physical state of the neat substance should be provided. These measured properties should be for the neat (100% pure) chemical substance. Properties that are measured for mixtures or formulations should be so noted (% PMN substance in __). You are not required to submit this worksheet; however, EPA strongly recommends that you do so, as it will simplify the review and ensure that confidential information is properly protected. You should submit this worksheet as a supplement to your submission of test data. This worksheet is not a substitute for submission of test data.

Property (a)	Unit	Mark X if Provided	Attachment Number (b)	Value (c)			Measured or Estimate (M or E)	CBI Mark (X) (d)
Physical state of neat substance		☒		(solid) ☒	(liquid) ☐	(gas) ☐	Measured	
Vapor Pressure @ Temperature	°C	☐				Torr		
Density/relative density		☒		0.060 -0.350		g/cm3	Measured	
Solubility		☐				g/L		
@ Temperature	°C							
Solvent								
Solubility in Water @ Temperature	°C	☐				g/L		
Melting Temperature		☐				°C		
Boiling / Sublimation temperature @	Torr	☐				°C		
Spectra		☒		Raman & X-ray diffraction			Measured	
Dissociation constant		☐						
Octanol / water partition coefficient		☐						
Henry's Law constant		☐						
Volatilization from water		☐						
Volatilization from soil		☐						
pH@ concentration		☐						
Flammability		☐						
Explodability		☐						
Adsorption / Coefficient		☐						
Particle Size Distribution		☒		particle size of 75-200nm with up to 32 graphene			Measured	
Other – Specify		☐						

CBI SUBSTANTIATION RESPONSE(S)

Selected Chemical Identifier: N/A
Selected Chemical Claim: OCCUPATIONAL EXPOSURES - Maximum Duration
Selected Chemical Claim Location: Part II, Section A, 2 - Maximum Duration

A person may assert a claim of confidentiality for the specific chemical identity of a chemical substance as described in 711.15(b)(3) of this part only if the identity of that chemical substance is treated as confidential in the Master Inventory File as of the time the report is submitted for that chemical substance. Generic chemical identities and accession numbers may not be claimed as confidential. To assert a claim of confidentiality for the identity of a reportable chemical substance, you must submit with the report detailed written answers to the questions from subsection (b) and to the following questions.

CBI Questions and Answers	Yes	No	CBI
1. Please specifically explain what harm to the competitive position of your business would be likely to result from the release of the information claimed as confidential. How would that harm be substantial? Why is the substantial harm to your competitive position likely (i.e., probable) to be caused by release of the information rather than just possible? If you claimed multiple types of information to be confidential (e.g. site information, exposure information, environmental release information, etc.), explain how disclosure of each type of information would be likely to cause substantial harm to the competitive position of your business. Response: The graphene market, as with many markets, is competitive. Operational data is protected information. Willfully releasing information regarding the number of employees and the associated labor loading gives competitors valuable insight into the direct labor costs associated with our production. This information can be easily converted into a base cost per production unit thereby limiting customer negotiations. HydroGraph has a market advantage over may competitors regarding the required labor for production. Releasing this information gives our competitors a production-related target to be more competitive with us. The EPA submission is to protect society, it is important that submissions can be made without damage to the compliant companies. This helps ensure future disclosures.	X		

CBI Questions and Answers	Yes	No	CBI
2. Has your business taken precautions to protect the confidentiality of the disclosed information? If yes, please explain and identify the specific measures, including but not limited to internal controls, that your business has taken to	X		

protect the information claimed as confidential. If the same or similar information was previously reported to EPA as non-confidential (such as in an earlier version of this submission), please explain the circumstances of that prior submission and reasons for believing the information is nonetheless still confidential. Response: Production related CBI data disclosed is internally protected in several ways. The most important is limited access. The CBI information is only available to five employees of the company.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
3A. Is any of the information claimed as confidential required to be publicly disclosed under any other Federal law? If yes, please explain. Response: *Text Area Left Empty*		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
3B. Does any of the information claimed as confidential otherwise appear in any public documents, including (but not limited to) safety data sheets; advertising or promotional material; professional or trade publications; state, local, or Federal agency files; or any other media or publications available to the general public? If yes, please explain why the information should be treated as confidential. If this chemical is patented and the patent reveals the information you are claiming confidential, please explain your reasons for believing the information is nonetheless still confidential. Response: A reviewer may notice similar data disclosed in the NIOSH testing report provided in this submission. The NIOSH disclosure is limited information for the sole purpose of providing a basis for helping set Occupational Exposure Limits (OEL) for the graphene industry. HydroGraph believes this is a public service to the industry. It is further noted that the data contained in this EPA submission is updated and more representative of current production processes and thereby more sensitive.		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
4. Is the claim of confidentiality intended to last less than 10 years (see TSCA section 14(e)(1)(B))? If yes, please indicate the number of years (between 1-10 years) or the specific date after which the claim is withdrawn.	X		

Response: The CBI claims maybe withdrawn in 5 years from submission.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
5. Has EPA, another federal agency, or court made any confidentiality determination regarding information associated with this chemical substance? If yes, please provide the circumstances associated with the prior determination, whether the information was found to be entitled to confidential treatment, the entity that made the decision, and the date of the determination. Response: *Text Area Left Empty*		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
1. Please specifically explain what harm to the competitive position of your business would be likely to result from the release of the information claimed as confidential. How would that harm be substantial? Why is the substantial harm to your competitive position likely (i.e., probable) to be caused by release of the information rather than just possible? If you claimed multiple types of information to be confidential (e.g. site information, exposure information, environmental release information, etc.), explain how disclosure of each type of information would be likely to cause substantial harm to the competitive position of your business. Response: The graphene market, as with many markets, is competitive. Operational data is protected information. Willfully releasing information regarding the number of employees and the associated labor loading gives competitors valuable insight into the direct labor costs associated with our production. This information can be easily converted into a base cost per production unit thereby limiting customer negotiations. HydroGraph has a market advantage over may competitors regarding the required labor for production. Releasing this information gives our competitors a production-related target to be more competitive with us. The EPA submission is to protect society, it is important that submissions can be made without damage to the compliant companies. This helps ensure future disclosures.	X		
CBI Questions and Answers	**Yes**	**No**	**CBI**
2. Has your business taken precautions to protect the confidentiality of the disclosed information? If yes, please explain and identify the specific measures, including but not limited to internal controls, that your business has taken to	X		

protect the information claimed as confidential. If the same or similar information was previously reported to EPA as non-confidential (such as in an earlier version of this submission), please explain the circumstances of that prior submission and reasons for believing the information is nonetheless still confidential. Response: Production related CBI data disclosed is internally protected in several ways. The most important is limited access. The CBI information is only available to five employees of the company.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
3A. Is any of the information claimed as confidential required to be publicly disclosed under any other Federal law? If yes, please explain. Response: *Text Area Left Empty*		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
3B. Does any of the information claimed as confidential otherwise appear in any public documents, including (but not limited to) safety data sheets; advertising or promotional material; professional or trade publications; state, local, or Federal agency files; or any other media or publications available to the general public? If yes, please explain why the information should be treated as confidential. If this chemical is patented and the patent reveals the information you are claiming confidential, please explain your reasons for believing the information is nonetheless still confidential. Response: A reviewer may notice similar data disclosed in the NIOSH testing report provided in this submission. The NIOSH disclosure is limited information for the sole purpose of providing a basis for helping set Occupational Exposure Limits (OEL) for the graphene industry. HydroGraph believes this is a public service to the industry. It is further noted that the data contained in this EPA submission is updated and more representative of current production processes and thereby more sensitive.		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
4. Is the claim of confidentiality intended to last less than 10 years (see TSCA section 14(e)(1)(B))? If yes, please indicate the number of years (between 1-10 years) or the specific date after which the claim is withdrawn.	X		

Response: The CBI claims maybe withdrawn in 5 years from submission.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
5. Has EPA, another federal agency, or court made any confidentiality determination regarding information associated with this chemical substance? If yes, please provide the circumstances associated with the prior determination, whether the information was found to be entitled to confidential treatment, the entity that made the decision, and the date of the determination. Response: *Text Area Left Empty*		X	

Selected Chemical Identifier: N/A
Selected Chemical Claim: OCCUPATIONAL EXPOSURES - # Workers Exposed
Selected Chemical Claim Location: Part II, Section A, 2 - # Workers Exposed

A person may assert a claim of confidentiality for the specific chemical identity of a chemical substance as described in 711.15(b)(3) of this part only if the identity of that chemical substance is treated as confidential in the Master Inventory File as of the time the report is submitted for that chemical substance. Generic chemical identities and accession numbers may not be claimed as confidential. To assert a claim of confidentiality for the identity of a reportable chemical substance, you must submit with the report detailed written answers to the questions from subsection (b) and to the following questions.

CBI Questions and Answers	**Yes**	**No**	**CBI**
1. Please specifically explain what harm to the competitive position of your business would be likely to result from the release of the information claimed as confidential. How would that harm be substantial? Why is the substantial harm to your competitive position likely (i.e., probable) to be caused by release of the information rather than just possible? If you claimed multiple types of information to be confidential (e.g. site information, exposure information, environmental release information, etc.), explain how disclosure of each type of information would be likely to cause substantial harm to the competitive position of your business. Response: The graphene market, as with many markets, is competitive. Operational data is protected information. Willfully releasing information regarding the number of employees and the associated labor loading gives competitors valuable insight into the direct labor costs associated with our production. This information can be easily converted into a base cost per production unit thereby limiting customer negotiations. HydroGraph has a market advantage over may competitors regarding the required labor for production.	X		

Releasing this information gives our competitors a production-related target to be more competitive with us. The EPA submission is to protect society, it is important that submissions can be made without damage to the compliant companies. This helps ensure future disclosures.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
2. Has your business taken precautions to protect the confidentiality of the disclosed information? If yes, please explain and identify the specific measures, including but not limited to internal controls, that your business has taken to protect the information claimed as confidential. If the same or similar information was previously reported to EPA as non-confidential (such as in an earlier version of this submission), please explain the circumstances of that prior submission and reasons for believing the information is nonetheless still confidential. Response: Production related CBI data disclosed is internally protected in several ways. The most important is limited access. The CBI information is only available to five employees of the company.	X		
CBI Questions and Answers	**Yes**	**No**	**CBI**
3A. Is any of the information claimed as confidential required to be publicly disclosed under any other Federal law? If yes, please explain. Response: *Text Area Left Empty*		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
3B. Does any of the information claimed as confidential otherwise appear in any public documents, including (but not limited to) safety data sheets; advertising or promotional material; professional or trade publications; state, local, or Federal agency files; or any other media or publications available to the general public? If yes, please explain why the information should be treated as confidential. If this chemical is patented and the patent reveals the information you are claiming confidential, please explain your reasons for believing the information is nonetheless still confidential. Response: A reviewer may notice similar data disclosed in the NIOSH testing report provided in this submission. The NIOSH disclosure is limited information for the sole purpose of providing a basis for helping set Occupational Exposure Limits (OEL) for the graphene industry. HydroGraph believes this is a public		X	

service to the industry. It is further noted that the data contained in this EPA submission is updated and more representative of current production processes and thereby more sensitive.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
4. Is the claim of confidentiality intended to last less than 10 years (see TSCA section 14(e)(1)(B))? If yes, please indicate the number of years (between 1-10 years) or the specific date after which the claim is withdrawn. Response: The CBI claims maybe withdrawn in 5 years from submission.	X		
CBI Questions and Answers	**Yes**	**No**	**CBI**
5. Has EPA, another federal agency, or court made any confidentiality determination regarding information associated with this chemical substance? If yes, please provide the circumstances associated with the prior determination, whether the information was found to be entitled to confidential treatment, the entity that made the decision, and the date of the determination. Response: *Text Area Left Empty*		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
1. Please specifically explain what harm to the competitive position of your business would be likely to result from the release of the information claimed as confidential. How would that harm be substantial? Why is the substantial harm to your competitive position likely (i.e., probable) to be caused by release of the information rather than just possible? If you claimed multiple types of information to be confidential (e.g. site information, exposure information, environmental release information, etc.), explain how disclosure of each type of information would be likely to cause substantial harm to the competitive position of your business. Response: The graphene market, as with many markets, is competitive. Operational data is protected information. Willfully releasing information regarding the number of employees and the associated labor loading gives competitors valuable insight into the direct labor costs associated with our production. This information can be easily converted into a base cost per production unit thereby limiting customer negotiations. HydroGraph has a market advantage over may competitors regarding the required labor for production.	X		

Releasing this information gives our competitors a production-related target to be more competitive with us. The EPA submission is to protect society, it is important that submissions can be made without damage to the compliant companies. This helps ensure future disclosures.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
2. Has your business taken precautions to protect the confidentiality of the disclosed information? If yes, please explain and identify the specific measures, including but not limited to internal controls, that your business has taken to protect the information claimed as confidential. If the same or similar information was previously reported to EPA as non-confidential (such as in an earlier version of this submission), please explain the circumstances of that prior submission and reasons for believing the information is nonetheless still confidential. Response: Production related CBI data disclosed is internally protected in several ways. The most important is limited access. The CBI information is only available to five employees of the company.	X		
CBI Questions and Answers	**Yes**	**No**	**CBI**
3A. Is any of the information claimed as confidential required to be publicly disclosed under any other Federal law? If yes, please explain. Response: *Text Area Left Empty*		X	
CBI Questions and Answers	**Yes**	**No**	**CBI**
3B. Does any of the information claimed as confidential otherwise appear in any public documents, including (but not limited to) safety data sheets; advertising or promotional material; professional or trade publications; state, local, or Federal agency files; or any other media or publications available to the general public? If yes, please explain why the information should be treated as confidential. If this chemical is patented and the patent reveals the information you are claiming confidential, please explain your reasons for believing the information is nonetheless still confidential. Response: A reviewer may notice similar data disclosed in the NIOSH testing report provided in this submission. The NIOSH disclosure is limited information for the sole purpose of providing a basis for helping set Occupational Exposure Limits (OEL) for the graphene industry. HydroGraph believes this is a public		X	

service to the industry. It is further noted that the data contained in this EPA submission is updated and more representative of current production processes and thereby more sensitive.			
CBI Questions and Answers	**Yes**	**No**	**CBI**
4. Is the claim of confidentiality intended to last less than 10 years (see TSCA section 14(e)(1)(B))? If yes, please indicate the number of years (between 1-10 years) or the specific date after which the claim is withdrawn. Response: The CBI claims maybe withdrawn in 5 years from submission.	X		
CBI Questions and Answers	**Yes**	**No**	**CBI**
5. Has EPA, another federal agency, or court made any confidentiality determination regarding information associated with this chemical substance? If yes, please provide the circumstances associated with the prior determination, whether the information was found to be entitled to confidential treatment, the entity that made the decision, and the date of the determination. Response: *Text Area Left Empty*		X	