

**Nanoscale Materials Stewardship Program (NMSP) – Optional Data Submission Form  
10/30/2007**

**Notice to Participants:**

**Participation in and submission of data to the Program is voluntary**

**EPA is requesting you provide data to the extent it is known or reasonably ascertainable**

**Use of this form by Program participants is also voluntary**

**You do not have to fill out the entire form – you may leave portions blank when data is not known or reasonably ascertainable**

**In some instances EPA is requesting that you explain why data is not available**

**EPA encourages participants to provide as much data as possible including why data is not available**

**You may use the form as a guide to determine which data to report to EPA**

**Participation in and submission of data to the Program does not imply an intent to manufacture or import for a commercial purpose**

**Completion and submission of this form to the Program does not satisfy any requirement under 40 CFR part 720 to submit a PMN or under 40 CFR part 721 to submit a Significant New Use Notification**

## U.S. ENVIRONMENTAL PROTECTION AGENCY

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# NANOSCALE MATERIALS STEWARDSHIP PROGRAM

## DATA SUBMISSION FORM

Total number  
of pages in the  
Form

When completed  
send this form to

U.S. E.P.A.  
DOCUMENT CONTROL OFFICER (7407M)  
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WASHINGTON, D.C. 20460  
ATTN: NANOSCALE MATERIALS STEWARDSHIP PROGRAM

This form has been developed for the U.S. EPA's Nanoscale Materials Stewardship Program. To ease the burden of reporting, the form is based on the standard Premanufacture Notice (PMN) form (EPA FORM 7710-25, Rev. 5-95); many of the pages in this form are adapted from those in the PMN form; irrelevant sections have been removed. Additional pages seeking nanoscale materials-specific information are inserted in the most relevant places.

**GENERAL INSTRUCTIONS**

- As much of this form is adapted from the PMN form, it may be instructive to read "Instruction Manual for Reporting Under the TSCA §5 New Chemicals Program" (available from the Toxic Substances Control Act (TSCA) Information Service, 202-554-1404, or 202-554-5603(fax) or at <http://www.epa.gov/opptintr/newchems/pubs/pmnforms.htm>).
- Just as in a standard PMN, provide all information requested in this form to the extent it is known or reasonably ascertainable. Particularly as related to the health and environmental effects of the manufacture, processing, distribution in commerce, use, or disposal of the substance, all test data in your possession or control and a description of all other known data should be provided. Reasonable estimates or modeling data may be given in the absence of actual data. Standard literature citations may be submitted for data in the open scientific literature. Complete test data report (written in English), not summary data, should be submitted, if they do not appear in the open literature. Clearly identify whether test data is on the substance, on an analog, or from models.
- Any answer may be left blank or filled with "N/A," if the information is not available, or the question is not applicable (e.g., characterization data for tests that were not run, production volume for materials that are not at the production stage, CAS name and number for materials not registered with CAS, etc.). **IT IS NOT NECESSARY TO DO ADDITIONAL TESTING IN ORDER TO COMPLETE THIS FORM.**
- Attach additional sheets as needed. Label each continuation sheet with the corresponding section heading. List all attachments including data and optional information on page 15.
- Only one substance should be submitted per form.
- Any information may be claimed as confidential. To assert a claim on the form, mark (X) the confidential box next to the information claimed as confidential. To assert a claim in an attachment, circle or bracket the information claimed as confidential. If information is claimed as confidential, a sanitized version (including attachments) should be provided. For additional instructions on claiming information as confidential, read the Instructions Manual. Submission of confidential information on this form constitutes consent for disclosure of the information to EPA contractors under the security procedures used in handling information submitted under TSCA.

**NOTICES**

- Participation in and submission of data to the Program is voluntary.
- Use of this form by Program participants is also voluntary.
- Participation in and submission of data to the Program does not imply an intent to manufacture or import for a commercial purpose.
- Completion and submission of this form to the Program does not satisfy any requirement under 40 CFR part 720 to submit a PMN or under 40 CFR part 721 to submit a Significant New Use Notice. For information on PMN submissions, see <http://www.epa.gov/opptintr/newchems/index.htm>

**TEST DATA** Hazard and exposure test data would be most useful if the physical/chemical properties of the nanoscale material relevant to assessing test results are obtained at the initiation of testing. Additional relevant information on preparation of the nanoscale material for administration and storage history of the material between production and administration will assist in interpretation. When possible, interpret data in the context of accompanying positive and negative nanoscale substance control data from the same test system. **Indicate which of the following data are included in this submission:**

- |   |                                 |  |  |
|---|---------------------------------|--|--|
| <input type="checkbox"/> Physical / Chemical properties     | <input type="checkbox"/> Health | <input type="checkbox"/> Environmental effects | <input type="checkbox"/> Test data not in the possession or control of the submitter |
| <input type="checkbox"/> Structure / activity relationships | effects                         | <input type="checkbox"/> Environmental fate    | <input type="checkbox"/> Other   |

Mark (x) if any information is claimed as confidential.



**Part I -- GENERAL INFORMATION**

<b>Section A -- SUBMITTER IDENTIFICATION</b>				Confidential	
Mark ( ) the "Confidential" box next to any subsection you claim as confidential					
1a. Person Submitting (in U.S.)	Name of authorized official	Position			
	Company				
	Mailing address (number and street)				
	City, State, ZIP Code				
b. Agent (if applicable)	Name of authorized official	Position			
	Company				
	Mailing address (number and street)				
	City, State, ZIP Code	Telephone	Area Code	Number	
c. If you are submitting this as part of a joint submission, mark (X) this box. <span style="display: inline-block; border-bottom: 1px solid black; width: 300px; margin-left: 10px;"></span> <input type="checkbox"/>					
Joint Submitter (if applicable)	Name of authorized official	Position			
	Company				
	Mailing address (number and street)				
	City, State, ZIP Code	Telephone	Area Code	Number	
2. Technical Contact (in U.S.)	Name of authorized official	Position			
	Company				
	Mailing address (number and street)				
	City, State, ZIP Code	Telephone	Area Code	Number	

**Part I -- GENERAL INFORMATION -- Continued**

**Section B -- CHEMICAL IDENTITY INFORMATION: \*\***

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. \_\_\_\_\_ →

Confidential

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 or  Class 2

b. Chemical name (Currently correct Chemical Abstracts (CA) Name that is consistent with TSCA Inventory listings for similar substances. \*\*

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

Method 1 (CAS Inventory Expert Service

Method 2 (Other Source)

d. Molecular formula and CAS Registry Number (if a number already exists for the substance) \*\*

CAS#

e. For a class 1 substance, provide a complete and correct chemical structure diagram. 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). (4) Provide a correct representative or partial chemical structure diagram, as complete as can be known, if one can be reasonably ascertained. \*\*

Mark (X) this box if you attach a continuation sheet.

Based on PMN Form EPA 7710-25 (Rev. 5-95) Page 4

**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) \_\_\_\_\_

- i) lowest number average molecular weight: \_\_\_\_\_
- ii) maximum weight % below 500 molecular weight: \_\_\_\_\_
- iii) maximum weight % below 1000 molecular weight: \_\_\_\_\_

Mark (X) this box if you attach a continuation sheet.

b. 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) - Mark (X) the identity column 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 and CAS Registry Number (1)	Confidential (2)	Typical composition (3)	Identity Mark (X) (4)	Confidential (5)	Maximum residual (6)	Confidential (7)
		%			%	
		%			%	
		%			%	
		%			%	
		%			%	
		%			%	
		%			%	

Mark (X) this box if you attach a continuation sheet.

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

- Method 1 (CAS Inventory Expert Service)  Method 2 (other source)

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

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

Mark (X) this box if you attach a continuation sheet.

## 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 and CAS Registry Number (a)	Maximum percent (b)	Confidential
	%	
	%	
	%	
	%	
	%	
	%	
	%	
	%	

Mark (X) this box if you attach a continuation sheet.

4. Synonyms - Enter any chemical synonyms for the chemical identified in subsection 1 or 2.

Confidential

Mark (X) this box if you attach a continuation sheet.

5. Trade identification - List trade names for the chemical substance identified in subsection 1 or 2.

Mark (X) this box if you attach a continuation sheet.

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

Mark (X) this box if you attach a continuation sheet.

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

Byproduct (1)	CAS Registry Number (2)	Confidential

Mark (X) this box if you attach a continuation sheet.

**Part I -- GENERAL INFORMATION -- Continued**

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

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% chemical substance basis.

Maximum first 12-month production (kg/yr) (100% chemical substance basis)	Maximum 12-month production (kg/yr) (100% chemical substance basis)	Confidential	

**2. Use Information --** 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 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 chemical substance by function and application..
- (2) -- Mark (X) this column if entry column (1) is confidential business information (CBI).
- (3) -- Estimate the percent of total production for the first three years devoted to each category of use.
- (4) -- Mark (X) this column if entry in column (4) is confidential business information (CBI).
- (5) -- Estimate the percent of the 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.
- (6) -- Mark (X) this column if entry in column (6) is confidential business information (CBI).
- (7) -- Indicate % of product volume expected for the listed "use" sectors. Mark more than one box if appropriate.
- (8) -- Mark (X) this column if entry(ies) in column (8) is (are) confidential business information (CBI).

Category of use (1)  (by function and application i.e. a dispersive dye for finishing polyester fibers)	CBI  (2)	Production %  (3)	CBI  (4)	% in Formulation  (5)	CBI  (6)	% of substance expected per use (7)				CBI  (8)
						Site-limited	Consumer*	Industrial	Commercial	
		%		%						
		%		%						
		%		%						
		%		%						
		%		%						
		%		%						
		%		%						

\* 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 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 you attach a continuation sheet.

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 Instructions Manual for examples of generic use descriptions.

Mark (X) this box if you attach a continuation sheet.

**3. Hazard Information --** Include 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 handling, transport, use, or disposal of the substance. List in part III hazard information you include.

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



**Part I -- GENERAL INFORMATION -- Continued**

**Section C --Continued**

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

**4. State of manufacture or importation**

Please specify:

a. Substance is at what stage of manufacture (importation)?

currently manufactured     will be manufactured     no plan to manufacture     not known

b. First/planned date of manufacture/import:

**5. State of commercial availability**

Please specify:

a. Substance is at what stage of commercial availability?

currently available     will be made available     no plan to make commercially available     not known

b. First/planned date of commercial availability:

**6. Nanoscale properties.** Briefly describe any unique or enhanced properties that arise from the nanoscale features of the material, particularly in contrast to any non-nanoscale varieties that exist.

Mark (X) this box if you attach a continuation sheet.

**7. Briefly explain why this material is designed and/or produced to be a nanoscale material.**

Mark (X) this box if you attach a continuation sheet.

## 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

Complete section A for each type of manufacture, processing, or use operation involving the chemical substance at industrial sites you control. See instructions manual

1. Operation description Confidential

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

Name

Site address (number and street)

City, County, State, ZIP code

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. →

Mark (X) this box if you attach a continuation sheet.

b. Type --

Mark (X)

Manufacturing

Processing

Use

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

	Maximum kg/batch (100% chemical substance)	Hours/batch	Batches/year
1. Batch			
2. Continuous	Maximum kg/day (100% chemical substance)	Hours/day	Days/year

d. Process description

- (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% 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 chemical substance. If releasing to two media at the same step, assign a second release number for the second medium.

Mark (X) this box if you attach a continuation sheet.

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

**Section A – INDUSTRIAL SITES CONTROLLED BY THE SUBMITTER – Continued**

- 2. Occupational Exposure** -- Make separate confidentiality claims for the description of worker activity, physical form of the 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) -- Indicate the physical form(s) of the chemical substance (e.g., solid: crystal, granule, powder, or dust) and % chemical substance (if part of a mixture) at the time of exposure.
  - (5) -- Mark (X) this column if entry in column (4) is confidential business information (CBI).
  - (6) -- Estimate the maximum number of workers involved in each activity for all sites combined.
  - (7) -- Mark (X) this column if entry in column (6) is confidential business information (CBI).
  - (8) and (9) -- Estimate the maximum duration of the activity for any worker in hours per day and days per year.
  - (10) -- Mark (X) this column if entries in columns (8) and (9) are confidential business information (CBI).

Worker activity (i.e., bag dumping, filling drums)  (1)	CBI  (2)	Protective Equipment/ Engineering Controls  (3)	Physical forms(s) and % substance (4)	CBI  (5)	# of Workers Exposed (6)	CBI  (7)	duration		CBI  (10)
							Maximum Hrs/day (8)	Days/yr (9)	

Mark (X) this box if you attach a continuation sheet.

- 3. Environmental Release and Disposal** -- Make separate confidentiality claims for the release number and the amount of the 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) -- Estimate the amount of the substance released (a) directly to the environment or (b) into control technology (in kg/day or kg/batch).
  - (3) -- Mark (X) this column if entries in columns (1) and (2) are confidential business information (CBI).
  - (4) -- 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 substance will be released from that release point.
  - (5) -- a. Describe control technology, if any, and control efficiency that will be used to limit the release of the 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).
  - (6) -- Mark (X) this column if entries in columns (4) and (5) are confidential business information (CBI).
  - (7) -- 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 (1)	Amount of substance released		CBI  (3)	Media of release e.g. stack air (4)	Control technology and efficiency (you may wish to optionally attach efficiency data)  (5a)	CBI  (6)
	(2a)	(2b)				

(7) Mark (X) the  POTW provide name(s) below:  CBI  Navigable  Other - Specify  provide NPDES #  CBI  
 destination(s) of releases to water. \_\_\_\_\_  
 waterway

Mark (X) this box if you attach a continuation sheet.

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

**Section B – INDUSTRIAL SITES CONTROLLED BY OTHERS**

Complete section B for typical processing or use operations involving the chemical substance at sites you do not control. See the Instructions Manual. *Complete a separate section B for each type of processing, or use operation involving the 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. Operation Description** -- To claim information in this section as confidential, circle or bracket 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) -- Provide the identity, the approximate weight (by kg/day or kg/batch, on a 100% 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) -- Identify by number the points of release, including small or intermittent releases, to the environment of the chemical substance. (4) Please enter the # of sites (remember to identify the locations of these sites on a continuation sheet):

\_\_\_\_\_ # of sites

**Mark (X) this box if you attach a continuation sheet.**

**2. Worker Exposure/Environmental Release**

- (1) --From the diagram above, provide the letter for each worker activity. Complete 2-8 for each worker activity described.
- (2) --Estimate the number of workers exposed for all sites combined.
- (4) --Estimate the typical duration of exposure per worker in (a) hours per day and (b) days per year.
- (6) --Describe physical form of exposure and % chemical substance (if in mixture), and any protective equipment and engineering controls, if any, used to protect workers.
- (7) --Estimate the percent of the substance as formulated when packaged or used as a final product.
- (9) --From the process diagram above, enter the number of each release point. Complete 9-13 for each release point identified.
- (10) -- Estimate the amount of the substance released (a) directly to the environment or (b) into control technology to the environment (in kg/day or kg/batch).
- (12) -- 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 substance to the environment.
- (14) -- Identify byproducts which may result from the operation.
- (3), (5), (8), (11), (13) and (15) -- Mark (X) this column if any of the proceeding entries are confidential business information (CBI).

Letter of Activity (1)	# of Workers Exposed (2)	CBI (3)	Duration of Exposure		CBI (5)	Protective Equip. / Engineering Controls/ Physical Form and % substance (6)	% in Formulation (7)	CBI (8)	Release Number (9)	Amount of Substance Released		CBI (11)	Media of Release & Control Technology (12)	CBI (13)
			(4a)	(4b)						(10a)	(10b)			

(14) -- Byproducts: \_\_\_\_\_ (15)

**Mark (X) this box if you attach a continuation sheet,**

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

**Section A / B, Subsection 2. Occupational Exposure – Continued. b. Details of protective equipment / engineering controls.**

(Use this form both for sites controlled by submitter and by others. Make copies as necessary.)

Please provide the following information:

- (1) –The worker activities listed in Section A.2 or B.1 for which protective equipment/engineering controls are in use.
- (2) – A brief description of the rationale for selecting the protective equipment/engineering controls, including internal exposure control limits, data and the methods used to generate the data that informed the decision.
- (3) – A brief description of the cleaning, reuse, and/or disposal of the protective equipment
- (4) – A brief description of any data (personal and/or area), units (e.g., mass conc., surface area, or particle number conc.) and any exposure monitoring methods used.

Mark (X) in the "CBI" column next to any item you claim as confidential. CBI

(1) Worker activity / Protective equipment / Engineering Control

(2) Rationale for selecting equipment / controls, associated internal exposure control limit / data / methods

Mark (X) this box if you attach a continuation sheet.

(3) Cleaning, reuse, and/or disposal of protective equipment

Mark (X) this box if you attach a continuation sheet.

(4) Exposure monitoring data (personal and/ or area), units (e.g., mass conc., surface area, or particle number conc.), and methods used

Mark (X) this box if you attach a continuation sheet.

Mark (X) this box if you attach a continuation sheet.

**Section A.3 / Section B, subsection 2. Environmental Release and Disposal – Continued. Details of control technology.**

(Use this form both for sites controlled by submitter and by others. Make copies as necessary)

To assist EPA in gaining a better understanding of the need for and the types of control technology used at the release points in the manufacture and handling of engineered nanoscale materials, please provide the following information for each release point for which control technology is used:

- (1) – The Release Number, as identified in the process description, part II, section A, subsection 1d(3) (page 8).
- (2) – A brief description of the rationale for selecting the control technology.
- (3) – Data and measurement methods of waste treatment efficiency studies.

<b>Release Number (1)</b>		Mark (X) in the "CBI" column next to any item you claim as confidential.	CBI
---------------------------	--	--	-----

(2) Rationale for selecting control technology

Mark (X) this box if you attach a continuation sheet.

(3) Data and measurement methods of waste treatment or purification studies

Mark (X) this box if you attach a continuation sheet.

Mark (X) this box if you attach a continuation sheet.

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

**Section C – Lifecycle**

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

1. In addition to the information already given, provide a brief overview of the lifecycle of the material, including all workplaces that manufacture, process, or use the material, methods of packaging and transporting the material, all expected general population, environmental, and consumer uses, and the expected manufacturing and processing methods of the material or any consumer products containing the material. If not included in Sections A or B above, include a description of the end of life disposal or disposition of products containing the nanoscale material.

Mark (X) this box if you attach a continuation sheet.

**Section D – Misc. Health, Exposure, Hazard Information**

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

1. Describe any training, hazard communication (e.g. MSDS), etc. specific to the nanoscale material that is provided to workers.

Mark (X) this box if you attach a continuation sheet.

2. Estimate the total number of individuals—other than previously described workers—(e.g. general public, consumers) who may be exposed to the material and the duration of the exposure.

Mark (X) this box if you attach a continuation sheet.

3. Describe any other procedure, equipment, etc. being used to mitigate exposure to the material.

Mark (X) this box if you attach a continuation sheet.

4. Describe product labeling and any customer training specific to the nanoscale material.

Mark (X) this box if you attach a continuation sheet.

5. Describe other risk management practices specific to the nanoscale material.

Mark (X) this box if you attach a continuation sheet.

## POLLUTION PREVENTION INFORMATION

To claim information in this section as confidential circle or bracket 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 substance. Please include new information pertinent to pollution prevention, including source reduction, recycling activities and safer processes or products available due to the chemical substance. Source reduction includes the reduction in the amount or toxicity of chemical wastes by technological modification, process and procedure modification, product reformulation, raw materials substitution, and/or inventory control. 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. Descriptions of pollution prevention, source reduction and recycling should emphasize potential risk reduction subsequent to compliance with existing regulatory requirements and can be either quantitative or qualitative. 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 environmental media or non-environmental areas (e.g., occupational or consumer exposure). In addition, information on the relative cost or performance characteristics of the substance to potential alternatives may be provided.

**See Instructions Manual and Pollution Prevention Guidance manual for guidance and examples.**

Describe the expected net benefits, such as (1) an overall reduction in risk to human health or the environment; (2) a reduction in the volume manufactured; (3) a reduction in the generation of waste materials through recycling, source reduction or other means; (4) a reduction in potential toxicity or human exposure and/or environmental release; (5) an increase in product performance, a decrease in the cost of production and/or improved operation efficiency of the chemical substance in comparison to existing chemical substances used in similar application; or (6) the extent to which the chemical substance may be a substitute for an existing substance that poses a greater overall risk to human health or the environment.

Mark (X) this box if you attach a continuation sheet.

Based on PMN Form EPA 7710-25 (Rev. 5-95) Page 11





**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET \*\***

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 form. Identify the property measured, the page on which the property appears, 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. 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 (% substance in \_\_\_).

Property (a)	Mark (X) if provided	Page number (b)	Value (c)	Measured or Estimate (M or E)	Confidential Mark (X) (d)
Physical state of neat substance			____ (s) ____ (l) ____ (g)		
Vapor pressure @ Temperature _____ °C			Torr		
Density/relative density			g/cm <sup>3</sup>		
Solubility @ Temperature _____ °C  Solvent _____			g/L		
Solubility in water @ Temperature _____ °C			g/L		
Melting temperature			°C		
Boiling / sublimation temperature @ _____ torr pressure			°C		
Spectra					
Dissociation constant					
Octanol / water partition coefficient					
Henry's Law constant					
Volatilization from water					
Volatilization from soil					
pH @ concentration _____					
Flammability					
Explosibility					
Adsorption / coefficient					

**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET II**

To assist EPA in understanding the types of characterization data typically available for engineered nanoscale materials and the cost of obtaining that data, for each of the physical and chemical properties submitted on page 16, provide: the approximate cost of obtaining data, the method used to obtain the data, and, if a particular piece of data was not collected, a brief reason why. If non-standard methods were used in the collection of data, briefly describe them.

Property	Mark (X) if provided	Method used	Confidential Mark (X)	Approx. Cost	Confidential Mark (X)
Physical state of neat substance	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Vapor pressure	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Density/relative density	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Solubility in solvent _____	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Solubility in water	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Melting temperature	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Boiling / sublimation temperature	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Spectra	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Dissociation constant	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					

**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET II – Continued**

Property	Mark (X) if provided	Method used	Confidential Mark (X)	Approx. Cost	Confidential Mark (X)
Octanol / water partition coefficient		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Henry's Law constant		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Volatilization from water		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Volatilization from soil		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
pH		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Flammability		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Explodability		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Adsorption / coefficient		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					

**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET III – Nanoscale Materials Specific Data**

Please provide the additional chemical and physical characterization data listed below. Additional pages may be attached to provide more information.

Property	Mark (X) if provided	Mark (X) if page attached	Value	Measured / Estimated (M or E)	CBI Mark (X)
<b>General Characteristics</b>					
Crystal structure					
Agglomeration state					
<b>Particle Characteristics</b>					
Particle size distribution			Provide graph with percentage of particles in each diameter class. For elongated particles, provide length distribution graph showing the percentage of particles in each length class.		
Mean particle size (diameter and/or length)			nm		
Standard deviation from mean					
Largest particle size (diameter and/or length)			nm		
Smallest particle size (diameter and/or length)			nm		
Aspect ratio					
Average aerodynamic diameter			nm		
Average particle mass			µg		
Particle shape					
<b>Surface Characteristics</b>					
Surface area			m <sup>2</sup> /g		
Average particle surface area			m <sup>2</sup>		
Surface charge (Zeta potential)			mV		
Porosity					
Surface chemical composition					
Surface / volume ratio					
<b>Other</b>					
Other					
<input type="checkbox"/> Mark (X) this box if you attach a continuation sheet.					

**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET III cont– Nanoscale Materials Specific Data**

Please provide the additional chemical and physical characterization data listed below. Additional pages may be attached to provide more information.

Property	Mark (X) if provided	Mark (X) if page attached	Value	Measured / Estimated (M or E)	CBI Mark (X)
<b>Fate and Transport</b>					
Diffusion rate					
Gravitational settling rate					
Sorption rate					
Deposition rate					
Wet and dry transport					
Biodegradation rate					
Bioaccumulation					
Biotransformation					
Influence of redox/photochemical reaction					
<b>Other</b>					
Other					
<input type="checkbox"/> Mark (X) this box if you attach a continuation sheet.					

## PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET IV

To assist EPA in understanding the types of characterization data typically available for engineered nanoscale materials and the cost of obtaining that data, for each of the physical and chemical properties submitted on page 19, provide: the approximate cost of obtaining data, the method used to obtain the data, and, if a particular piece of data was not collected, a brief reason why. If non-standard methods were used in the collection of data, briefly describe them.

Property	Mark (X) if provided	Method used	Confidential Mark (X)	Approx. Cost	Confidential Mark (X)
Crystal structure	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Agglomeration state	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Particle size distribution	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Mean particle size and standard deviation	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Largest particle size	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Smallest particle size	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Aspect ratio	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Average aerodynamic diameter	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Average particle mass	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					

**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET IV continued**

Property	Mark (X) if provided	Method used	Confidential Mark (X)	Approx. Cost	Confidential Mark (X)
Particle shape		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Surface area		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Average particle surface area		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Surface charge		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Porosity		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Surface chemical composition		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Surface / volume ratio		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Diffusion rate		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Gravitational settling rate		<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					

**PHYSICAL AND CHEMICAL PROPERTIES WORKSHEET IV continued**

Property	Mark (X) if provided	Method used	Confidential Mark (X)	Approx. Cost	Confidential Mark (X)
Sorption rate	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Deposition rate	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Wet and dry transport	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Biodegradation rate	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Bioaccumulation	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Biotransformation	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Influence of redox / photochemical reaction	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Other	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					
Other	<input type="checkbox"/>	<input type="checkbox"/> Mark (X) if description of method attached			
If not provided, why?: <input type="checkbox"/> Not applicable <input type="checkbox"/> Too expensive <input type="checkbox"/> Too much test material required <input type="checkbox"/> No known method <input type="checkbox"/> Other (specify):					



## \*\* Notes

### Part I

1. **Section B:** It is recognized that systematic nomenclature has not been fully developed for nanoscale materials, therefore it is not necessary to provide the “correct Chemical Abstract name” nor the “CAS Registry Number,” if it does not exist. Please fill out these sections to the best of your ability in light of the limitations.
  - a. **B.1.a:** It is noted that a nanoscale material may or may not be accurately described as a Class 1 or Class 2 substance. If the choice is not obvious, this section may be left blank. In addition, a brief explanation may be given for why a particular classification is or is not appropriate.
  - b. **B.1.b / B.2.d:** If a Chemical Abstracts Name is not available, please use a name that is most in agreement with CA nomenclature.
  - c. **B.1.d** may be read as:
    - d. Molecular formula (including molecular shape / physical form) and CAS Registry Number (if a number already exists for the substance).
  - d. **B.1.e:** For the nanoscale material, please provide the information requested for Class 2 substances, regardless of whether the material is Class 1 or Class 2 or cannot be determined.
  - e. **B.2.e** may be read as:

"Provide a correct representative or partial chemical structure diagram, as complete as can be known, if one can be reasonably ascertained. Alternatively, if applicable, provide a correct representative structure for the polymer as part of a composite."

    - i. [Note: the components of a composite are separate chemical identities. For example in a composite of starch molecules between layers of clay treated with surfactants, the starch, clay, and surfactants might be on the TSCA Inventory, but since the interactions between the components are weak electrical interactions, there is no chemical substance.]

### Physical and Chemical Properties Worksheet

1. It is noted that, for nanoscale materials, protocols and methods may not exist or be standardized for measurement of the physical and chemical properties listed in this worksheet.