Proposed Approach to Address Nanoscale Forms of Substances on the Domestic Substances List

Consultation Document

Environment Canada and Health Canada

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1. Introduction

1.1 Objective of this Consultation

Environment Canada and Health Canada are proposing a new approach to address certain nanomaterials under the *Canadian Environmental Protection Act, 1999*. Environment Canada and Health Canada have prepared this consultation document to inform stakeholders and solicit feedback on key elements of the proposed approach to address nanoscale forms of substances on the *Domestic Substances List*. This consultation document is intended to serve as a starting point for dialogue with stakeholders.

1.2 Consultation Process

This consultation document will be posted on the CEPA Environmental Registry[1] and has been distributed by email to Canadian stakeholders involved in the Chemicals Management Plan and/or nanomaterials, including representatives from other federal departments and agencies, provincial and territorial governments, industry, academia, and non-governmental organizations. International stakeholders are also being consulted.

Environment Canada and Health Canada welcome broad participation in this consultation, for example through the distribution of this consultation document to other potential stakeholders. There will be multiple opportunities for stakeholders to participate and provide input as this approach is developed and implemented (e.g., consultation documents, workshops, meetings).

Stakeholders may provide their written comments on this consultation document by mail, fax or email via the contact information provided in Section 7. Environment Canada and Health Canada will review all written comments received during the consultation period. Feedback will be considered in the finalization of the approach.

2. Context

2.1 Chemicals Management in Canada

Chemical substances in Canada are regulated under the *Canadian Environmental Protection Act, 1999* (the Act) which provides the authority to collect information, to assess and to manage risks to the environment and human health. Substances are defined as either existing or new using the *Domestic Substances List*[2] (DSL) which determines if a substance is considered in commerce in Canada or is new to the Canadian market. Existing substances are assessed and managed under the Act through the Chemicals Management Plan (CMP). Launched in 2006, the CMP builds on previous initiatives to prioritize and take action on substances which may be harmful.[3] New substances are regulated under

[1] Environment Canada. 2014. CEPA Environmental Registry – Public Consultations. Available online at: http://ec.gc.ca/lcpe-cepa/eng/participation/default.cfm?n=FBC634F3-1

[2] The Domestic Substances List is an inventory of substances manufactured in, imported into, or used in Canada on a commercial scale. Environment Canada. 2013. Domestic Substances List. Available online at: http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=5F213FA8-1

[3] Government of Canada. http://www.chemicalsubstanceschimiques.gc.ca/plan/index-eng.php

the *New Substances Notification Regulations (Chemicals and Polymers)* (the Regulations) which prescribe data requirements needed to conduct a pre-market assessment before a substance can be imported into or manufactured in Canada.[4]

2.2 Nanomaterials

Nanomaterials which are new to the Canadian market must undergo a pre-market evaluation to assess the potential risks to the environment and human health. To date, Environment Canada and Health Canada have conducted a limited number of assessments of new nanomaterials under the current regulatory framework of the Regulations. Existing nanomaterials generally have not been considered under the Act, therefore, this approach to address nanoscale forms of substances on the DSL is proposed.

For the purposes of this consultation document, nanomaterials are substances that are manufactured at or within the nanoscale (1-100 nanometres, inclusive), or have internal or surface structures at the nanoscale. Substances may also be considered nanomaterials if they are smaller or larger than the nanoscale in any dimension and exhibit one or more nanoscale properties/phenomena. Nanoscale properties/phenomena refer to properties that are attributable to the size of the substance and size effects.[5] For example, nanoscale gold can act as a catalyst compared to its non-nanoscale form which is inert. Nanomaterials may also demonstrate different electrical, magnetic or optical properties than their non-nanoscale forms. Often these properties cannot be predicted based on extrapolation from the non-nanoscale form.

Environment Canada and Health Canada do not intend for this approach to target substances at or within the nanoscale that do not demonstrate different properties/phenomena.[6] For example, organic pigments typically do not exhibit nanoscale properties/phenomena.[7] These types of substances are already considered under the regulatory regime for assessment and management of chemicals under the Act.

2.3 Domestic

As described in the New Substances Program Advisory Note 2014-02, substances, including nanomaterials, not appearing on the DSL are considered new to Canada and may be subject to notification under the Regulations. Substances listed on the DSL do not require notification under the

[4] Environment Canada. http://www.ec.gc.ca/subsnouvelles-newsubs/default.asp?lang=En&n=AB189605-1
[5] Health Canada. 2011. Policy Statement on Health Canada's Working Definition for Nanomaterial. Available online at: http://www.hc-sc.gc.ca/sr-sr/pubs/nano/pol-eng.php
[6] Health Canada. 2011. Frequently Asked Questions Related to the Policy Statement on Health Canada's Working Definition for Nanomaterial. Available online at: http://www.hc-sc.gc.ca/sr-sr/pubs/nano/faq-eng.php#a13
[7] Government of Canada NanoPortal. 2014. Regulatory Cooperation Council (RCC) Nanotechnology Initiative Final Report - Work Element 2, Priority Setting: Development of a Joint Nanomaterials Classification Scheme. Available online at: http://nanoportal.gc.ca/default.asp?lang=En&n=5A56CB00-1

Regulations unless they are subject to the Significant New Activity (SNAc) provisions of the Act, as indicated with an 'S flag' on the DSL.[8]

The DSL lists substances by their Chemical Abstracts Service Registry Number (CAS RN). The assignment of CAS RNs is generally based on the chemical composition of a substance. CAS RNs do not distinguish between substances with the same chemical composition but made up of particles of different sizes (e.g., non-nanoscale particles versus nanoscale particles), nor do they take into account differences in properties between the nanoscale and the non-nanoscale forms of a substance. The nanoscale forms of substances on the DSL (existing nanomaterials) are, therefore, generally considered to be existing substances and are not notifiable under the Regulations.[9]

The potential novel properties of existing nanomaterials generally have not been considered as part of the risk assessments conducted under the Act, and as a result, the potential risks to the environment and to Canadians have not been examined. When the DSL was created, the nanoscale forms of substances were not considered in the criteria for the substance nomination process; however, some substances may now be identified as nanomaterials. Consequently, some nanomaterials may already have been in commerce in Canada for several decades while some may only have entered into commerce more recently. Others could be manufactured or imported into Canada in the future. Environment Canada and Health Canada want to ensure that existing nanomaterials are addressed as some may require further action to determine if they pose any potential risk to the environment or to human health.

2.4 International

In 2013, the OECD Council issued a Recommendation on the Safety Testing and Assessment of Manufactured Nanomaterials:

> *"that Members, to manage the risks of manufactured nanomaterials, apply the existing international and national chemical regulatory frameworks or other management systems, adapted to take into account the specific properties of manufactured nanomaterials."* [10]

Consistent with the OECD Recommendation, the approach proposed in this consultation document works within Canada's current legislative and regulatory regimes to address existing nanomaterials. Nanomaterials that are not covered by a CAS RN on the DSL are subject to the Regulations and clarifications are made as needed to address nanomaterials (e.g., via the publication of New Substances program Advisory Notes[11]). Similarly, the Act provides the necessary legislative authority to gather and

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[8] Environment Canada. 2014. Significant New Activity Notices (Chemicals and Polymers). Available online at: https://www.ec.gc.ca/subsnouvelles-newsubs/default.asp?lang=En&n=21ADF98D-1

[9] ibid

[10] Organisation for Economic Co-operation and Development. 2013. OECD countries address the safety of manufactured nanomaterials. Available online at: http://www.oecd.org/newsroom/oecd-countries-address-the-safety-of-manufactured-nanomaterials.htm

[11] Environment Canada. 2014. New Substance Program Advisory Note 2014-02. Assessment of nanomaterials under the New Substances Notification Regulations (Chemcials and Polymers). Available online at: https://www.ec.gc.ca/subsnouvelles-newsubs/default.asp?lang=En&n=53527F9D-1

examine information on nanoscale forms of substances on the DSL, to inform the risk assessment, as required, and the potential risk management activities with those substances. Other jurisdictions, such as Australia, the United States, and the European Union, also address existing nanomaterials under their current legislative and regulatory frameworks. In particular, the United States Environmental Protection Agency regulates nanomaterials under the authority of the *Toxic Substances Control Act* and is developing an information gathering rule to require submission of certain information to aid understanding of the potential environmental and health effects of nanomaterials.

Canada has been working at the international level through various initiatives including the Canada-United States Regulatory Cooperation Council (RCC) Nanotechnology Initiative and the Organisation for Economic Co-operation and Development (OECD) Working Party on Manufactured Nanomaterials (WPMN). The aims of such fora are to improve the scientific knowledge of nanomaterials and to use that knowledge to develop consistent risk assessment approaches for nanomaterials. Outcomes and information from these and other international initiatives will be used to inform the proposed approach to existing nanomaterials in Canada.

For example, some knowledge has been gained on the commercial uses of nanomaterials in Canada and the United States under the RCC Nanotechnology Initiative. Targeted consultations were conducted with certain industry stakeholders via a Technical Team on nanomaterial uses currently or soon to be commercially available in Canada and the US. This information was summarized in the form of a Nanomaterials Use Matrix.[12] In addition, a classification scheme was developed for nanomaterials based on their chemical composition. This scheme could help to identify which classes of nanomaterials behave differently from their non-nanoscale forms (i.e., those engineered to exploit a nanoscale property/phenomenon).[13] Furthermore, a significant body of human health and environmental toxicology data on a set of 13 nanomaterials has been gathered under the OECD WPMN Sponsorship Programme.[14]

3. Proposed Approach

Environment Canada and Health Canada are proposing a stepwise approach to addressing nanoscale forms of substances on the DSL. It is important to establish a foundation of knowledge to support scientifically and technically informed decision making to advance the regulatory mandate under the Act. The proposed approach follows the same guiding principles to be used in the CMP going forward including acquisition of information, evaluation of information, and action on substances as required.[15]

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[12] Placeholder if Matrix is published before consultation document is released.

[13] Government of Canada NanoPortal. 2014. Regulatory Cooperation Council (RCC) Nanotechnology Initiative Final Report - Work Element 2, Priority Setting: Development of a Joint Nanomaterials Classification Scheme. Available online at: http://nanoportal.gc.ca/default.asp?lang=En&n=5A56CB00-1

[14] Organization for Economic Co-operation and Development. Safety of Manufactured Nanomaterials. Sponsorship Programme for the Testing of Manufactured Nanomaterials. Available online at: http://www.oecd.org/science/nanosafety/sponsorshipprogrammeforthetestingofmanufacturednanomaterials.htm

[15] Environment Canada and Health Canada. 2014. Approach for identification of chemicals and polymers as risk assessment priorities under Part 5 of the *Canadian Environmental Protection Act, 1999*. Available online at: http://www.chemicalsubstanceschimiques.gc.ca/plan/approach-approche/chem-pol-priori-eng.php

Elements of the proposed approach can also be compared to the approach used for Categorization[16] under the Act as well as the creation of the In Commerce List[17] for substances in products regulated under the *Food and Drugs Act*. The proposed approach consists of three phases:

1. Establishment of a list of existing nanomaterials in Canada;
2. Prioritization of existing nanomaterials for action; and
3. Action on substances identified for further work.

The following sections describe in more detail the first two phases of the proposed approach, as well as identify areas for input from stakeholders to refine and guide the development of the approach.

4. List of Existing Nanomaterials in Canada

4.1 Purpose

The first phase of the approach requires acquisition of data in order to establish a list of existing nanomaterials in Canada. This list could be considered a reference list to support decision-making on activities related to nanoscale forms of substances on the DSL. To create this list, Environment Canada and Health Canada would like to work with stakeholders and other sources to gather information on which nanomaterials are currently in commerce in Canada. The information gathering efforts will also inform the approach for addressing those nanomaterials and will provide a basis to enable additional stakeholder cooperation.

4.2 Current Status

Environment Canada and Health Canada already have some knowledge about the status of certain nanomaterials in Canada addressed through the New Substances program. To date, Canada has assessed 20 nanomaterials under the Regulations. The most prevalent uses have been in composite materials and coatings. The individual production volumes of each of the notified nanomaterials in Canada have ranged from 100 kg/year to 350,000 kg/year.

As described in Section 2, information has also been obtained on certain nanomaterials in Canada and the United States through the Regulatory Cooperation Council Nanotechnology Initiative. Under Work Element 4 – Commercial Information, the Nanomaterials Use Matrix was developed to identify nanomaterials which are likely to be in commerce in Canada and the United States. This Matrix was developed using a number of sources (such as the Industry Canada Company Directory for Nanotechnologies[18], the Nanowerk database[19], interactions with provincial nanotechnology associations, and external contractors). The Matrix was vetted through consultations with knowledgeable stakeholder groups such as the Nanotechnology Sub-Committee of the Industry

[16] http://www.chemicalsubstanceschimiques.gc.ca/approach-approche/categor-eng.php
[17] http://www.hc-sc.gc.ca/ewh-semt/contaminants/person/impact/list/index-eng.php
[18] Industry Canada. 2011. Nanotechnologies Company Directories. Available online at: http://www.ic.gc.ca/eic/site/aimb-dgami.nsf/eng/03503.html
[19] Nanowerk. 2014. Nanotechnology in Canada – companies, research, and degree programs. Available online at: http://www.nanowerk.com/nanotechnology/Nanotechnology_Companies_Research_and_Degree_Programs_in_Canada.php

Coordinating Group for the *Canadian Environmental Protection Act* and the RCC Nanotechnology Technical Team. It is important to note, however, that the information in the Matrix has not been verified through any formal process. Nevertheless, it does provide a preliminary reference to facilitate discussions on developing a list of existing nanomaterials in Canada.

Canada has also been engaged with the OECD Working Party on Manufactured Nanomaterials Sponsorship Programme for the Testing of Manufactured Nanomaterials.[20] The Sponsorship Programme was created to pool global expertise and establish a foundation of knowledge on human health and environmental safety for a representative set of nanomaterials. The representative set was based on a list of nanomaterials which are or soon to be in use globally. This list also provides a reference to facilitate identification of existing nanomaterials in Canada.

4.3 List of Existing Nanomaterials

As a first step in this approach, a list of existing nanomaterials in Canada needs to be established to serve as an administrative tool to enable further decision making. The list of nanomaterials initiated under the RCC Nanotechnology Initiative is used as a starting point and is cross-referenced with the DSL to identify the likely types of existing nanomaterials in Canada (see Appendix A). While this list provides a preliminary reference, it has not been validated and may *not* be a comprehensive list of all nanomaterials. Information about the commercial status of nanomaterials in Canada needs to be further verified for completeness. Moreover, there is currently a lack of quantitative information on the volumes of these nanomaterials in Canada. A proposed set of criteria has been developed to describe nanomaterials that could be added to and excluded from this list.

Proposed criteria for defining existing nanomaterials include, but are not limited to:

- The substance has a chemical composition that is identical to that of a bulk substance already listed on the DSL; AND
- The substance is in commerce in Canada at quantities above 100 kg/year; AND
- The substance is at or within the nanoscale in at least one external dimension, or has internal or surface structure at the nanoscale; OR
- The substance is smaller or larger than the nanoscale in all dimensions and exhibits one or more nanoscale properties/phenomena.

Proposed criteria for substances to be excluded, unless they are intentionally manufactured to exhibit one or more nanoscale properties/phenomena, include, but are not limited to:

- Polymers;
- Organic or organo-metallic pigments and dyes;
- Naturally occurring or incidentally produced nanomaterials;

[20] Organisation for Economic Co-operation and Development WPMN. http://www.oecd.org/env/ehs/nanosafety/sponsorshipprogrammeforthetestingofmanufacturednanomaterials.htm

- Deoxyribonucleic acid, ribonucleic acid, proteins, peptides, liposomes, antibodies, viruses or a virus-like particles, organelles or other biological materials.

A mandatory survey under section 71 of the Act will be used to obtain the essential data needs to support the development of the list of the existing nanomaterials in Canada and subsequent prioritization activities for those substances. This will ensure that future decision making is based on the best available information. The survey will be designed in consultation with key stakeholders to ensure the scope and objectives are appropriate and achievable. Wherever possible, the timing and/or content of a section 71 Notice would be aligned with similar mandatory information gathering initiatives taking place in Canada and other jurisdictions. In parallel, other approaches for collecting data would also be considered, such as sectoral submission of information or obtaining information prepared by industry for submission to other jurisdictions. Information submitted voluntarily would be excluded from any mandatory survey that is issued.

Environment Canada and Health Canada would like to work with stakeholders to explore these approaches for collecting information to create and verify the list of existing nanomaterials and to inform decision making on potential actions. Stakeholders are invited to contact the departments to discuss ideas and opportunities for information sharing via the contact information provided in Section 7.

Environment Canada and Health Canada will also continue to examine information from available sources to further refine the preliminary list of nanomaterials identified in the Nanomaterials Use Matrix.

5. Prioritization

5.1 Purpose

Once a list of existing nanomaterials in Canada has been established, an evaluation exercise will be conducted to prioritize existing nanomaterials for possible further action. Analysis of the available information will take into account multiple factors and could be similar to Categorization which identified substances requiring further attention based on a prescribed set of factors. Environment Canada and Health Canada would like to work with stakeholders to develop criteria which would be considered for the prioritization of existing nanomaterials.

5.2 Factors to consider when prioritizing nanomaterials

In order to determine if action is required to address existing nanomaterials, several factors could be considered to establish a prioritization scheme.

Factors such as the following could be considered:

- Commercial status in Canada;
- Potential for human or environmental exposure;
- Potential for toxicity or harmful effects;
- Presence in the environment;
- Availability of information; and
- Alignment with other international activities.

5.3 Using the Results of Prioritization

The prioritization exercise would review each existing nanomaterial to determine what, if any, action should be taken. The results of prioritization would provide some certainty for stakeholders on the potential activities going forward.

Possible outcomes for each existing nanomaterials could include:

- No further action;
- Scheduling for further examination (e.g., research required, more information needed); or
- Scheduling for risk assessment and/or risk management as needed.

6. Questions for stakeholders

Environment Canada and Health Canada are seeking comments on the overall proposed approach as well as specific elements of the proposed approach. The following questions are intended to guide stakeholder feedback on specific topics in this consultation document.

List of Existing Nanomaterials

- Is the list of nanomaterials in Appendix A of this document a good preliminary reference list?
- What additional criteria could be considered to identify existing nanomaterials?
- What methods can be used to collect information to develop a more comprehensive list or verify information on existing nanomaterials in commerce in Canada?
- What other sources of information are available to determine the commercial status of existing nanomaterials in Canada?
- What barriers exist to obtaining/providing information on existing nanomaterials in Canada?

Prioritization

- What factors should Environment Canada and Health Canada consider when prioritizing nanomaterials?
- What outcomes should Environment Canada and Health Canada consider when prioritizing nanomaterials?

7. Timelines and Next Steps

Stakeholders are invited to submit comments on the content of this consultation document and provide other information that would help inform decision making. Please submit comments to one of the addresses provided below prior to **60-days from posting**. Environment Canada and Health Canada will respond to comments and adapt the proposed approach based on the feedback received on this document, as described in Section 1.2.

An information gathering survey is planned for June 2015.

A stakeholder workshop is proposed for June 2015 to discuss the proposed approach and the information gathering survey. Stakeholders are also invited to indicate their interest in receiving future information and communications regarding this approach, as well as their interest in participating in a stakeholder workshop.

Comments on this consultation document can be submitted to one of the following addresses:

By Mail:
Substances Management Information Line
Chemicals Management Plan
Gatineau, QC K1A 0H3

By Email:
substances@ec.gc.ca

Please type “Consultation on Approach for Nanomaterials” in the subject line of your message.

By Fax:
819-938-3231

APPENDIX A: Preliminary Reference List of Existing Nanomaterials in Canada

The substances identified under the RCC Nanotechnology Initiative represent, at the time, the most up-to-date information on likely or soon-to-be commercially available types of nanomaterials in Canada and the United States. The list was developed using information from the Canadian and US regulatory programs, publicly available and third party information. To further refine the list to identify substances that are likely in commerce in Canada, the RCC list was cross-referenced with the *Domestic Substances List*. The result is a preliminary reference list of nanomaterials in commerce in Canada. It is proposed to add or exclude substances to this list based on certain criteria (see also section 4.3 of this document for more information on generation of this list). It is important to note that the proposed approach is intended to target the nanoscale forms of these substances.

CAS RN	Substance Name
54991-58-1	Aluminum chromium oxide
1333-88-6	Aluminum cobalt oxide (Al2CoO4)
13596-12-8	Aluminum fluoride oxide (AlFO)
24623-77-6	Aluminum hydroxide oxide (Al(OH)O)
11137-98-7	Aluminum magnesium oxide
12004-35-2	Aluminum nickel oxide (Al2NiO4)
24304-00-5	Aluminum nitride (AlN)
1344-28-1	Aluminum oxide (Al2O3)
12141-46-7	Aluminum oxide silicate (Al2O(SiO4))
12068-56-3	Aluminum oxide silicate (Al6O5(SiO4)2)
1333-84-2	Aluminum oxide, hydrate
11138-49-1	Aluminum sodium oxide
1304-85-4	Bismuth hydroxide nitrate oxide (Bi5(OH)9(NO3)4O)
13565-96-3	Bismuth molybdenum oxide (Bi2MoO6)
1304-76-3	Bismuth oxide (Bi2O3)
14059-33-7	Bismuth vanadium oxide (BiVO4)
1306-24-7	Cadmium selenide (CdSe)
12626-36-7	Cadmium selenide sulfide (Cd(Se,S))
12214-12-9	Cadmium selenide sulfide (Cd2SeS)
1306-23-6	Cadmium sulfide (CdS)
1306-25-8	Cadmium telluride
7778-44-1	Arsenic acid (H3AsO4), calcium salt (2:3)
75-20-7	Calcium carbide (CaC2)
592-01-8	Calcium cyanide (Ca(CN)2)
1305-62-0	Calcium hydroxide (Ca(OH)2)
1305-78-8	Calcium oxide (CaO)
12168-85-3	Calcium oxide silicate (Ca3O(SiO4))
1305-79-9	Calcium peroxide (Ca(O2))
471-34-1	Carbonic acid calcium salt (1:1)
156-62-7	Cyanamide, calcium salt (1:1)

7790-76-3	Diphosphoric acid, calcium salt (1:2)
7789-80-2	Iodic acid (HIO3), calcium salt
7789-82-4	Molybdate (MoO42-), calcium (1:1), (T-4)-
7789-79-9	Phosphinic acid, calcium salt
7757-93-9	Phosphoric acid, calcium salt (1:1)
7789-77-7	Phosphoric acid, calcium salt (1:1), dihydrate
7758-23-8	Phosphoric acid, calcium salt (2:1)
7758-87-4	Phosphoric acid, calcium salt (2:3)
7778-18-9	Sulfuric acid, calcium salt (1:1)
7790-75-2	Tungstate (WO42-), calcium (1:1), (T-4)-
9004-34-6	Cellulose
9013-34-7	Cellulose, 2-(diethylamino)ethyl ether
9004-41-5	Cellulose, 2-cyanoethyl ether
81859-24-7	Cellulose, 2-hydroxyethyl 2-[2-hydroxy-3-(trimethylammonio)propoxy]ethyl 2-hydroxy-3-(trimethylammonio)propyl ether, chloride
51331-09-0	Cellulose, 2-hydroxyethyl 2-hydroxypropyl ether
9004-62-0	Cellulose, 2-hydroxyethyl ether
68957-96-0	Cellulose, 2-hydroxyethyl ether, polymer with ethanedial
92183-41-0	Cellulose, 2-hydroxyethyl ether, polymer with N,N-dimethyl-N-2-propenyl-2-propen-1-aminium chloride
111774-28-8	Cellulose, 2-hydroxyethyl ether, polymer with N,N-dimethyl-N-2-propenyl-2-propen-1-aminium chloride, graft
9032-42-2	Cellulose, 2-hydroxyethyl methyl ether
85919-51-3	Cellulose, 2-hydroxyethyl methyl ether, polymer with ethanedial
68441-63-4	Cellulose, 2-hydroxyethyl methyl ether, reaction products with glyoxal
9004-64-2	Cellulose, 2-hydroxypropyl ether
147868-40-4	Cellulose, 2-hydroxypropyl ether, reaction products with 1,6-diisocyanatohexane homopolymer and 2,4-TDI
9004-65-3	Cellulose, 2-hydroxypropyl methyl ether
103170-24-7	Cellulose, 2-hydroxypropyl methyl ether, reaction products with glyoxal
9004-35-7	Cellulose, acetate
9004-36-8	Cellulose, acetate butanoate
68310-22-5	Cellulose, acetate butanoate, polymer with (chloromethyl)oxirane, 4,4’-(1-methylethylidene)bis[phenol], triethoxyphenylsilane and 3-(triethoxysilyl)-1-propanamine
9004-38-0	Cellulose, acetate hydrogen 1,2-benzenedicarboxylate
9004-39-1	Cellulose, acetate propanoate
9081-58-7	Cellulose, alkali
9088-04-4	Cellulose, carboxymethyl 2-hydroxyethyl ether, sodium salt
9000-11-7	Cellulose, carboxymethyl ether
9004-32-4	Cellulose, carboxymethyl ether, sodium salt
72162-13-1	Cellulose, carboxymethyl ether, sodium salt, reaction products with bis[(1-oxo-2-propenyl)amino]acetic acid

37206-01-2	Cellulose, carboxymethyl methyl ether
68610-92-4	Cellulose, ether with α-[2-hydroxy-3-(trimethylammonio)propyl]-ω-hydroxypoly(oxy-1,2-ethanediyl) chloride
98616-25-2	Cellulose, ether with α-[3-(dodecyldimethylammonio)-2-hydroxypropyl]-ω-hydroxypoly(oxy-1,2-ethanediyl) chloride
9004-58-4	Cellulose, ethyl 2-hydroxyethyl ether
9004-57-3	Cellulose, ethyl ether
9051-13-2	Cellulose, hydrogen carbonodithioate, sodium salt
9005-22-5	Cellulose, hydrogen sulfate, sodium salt
9041-56-9	Cellulose, hydroxybutyl methyl ether
9004-67-5	Cellulose, methyl ether
68583-46-0	Cellulose, methyl ether, propoxylated
9004-70-0	Cellulose, nitrate
9012-09-3	Cellulose, triacetate
1306-38-3	Cerium oxide (CeO2)
12515-32-1	Cerium tin oxide (Ce2Sn2O7)
53169-23-6	Cerium tin oxide (CeSnO4)
1302-87-0	Clays
1333-88-6	Aluminum cobalt oxide (Al2CoO4)
63497-09-6	Chromium cobalt iron oxide
11104-61-3	Cobalt oxide
1308-04-9	Cobalt oxide (Co2O3)
1308-06-1	Cobalt oxide (Co3O4)
1307-96-6	Cobalt oxide (CoO)
55353-02-1	Chromium copper iron oxide (Cr2CuFe2O7)
11104-65-7	Chromium copper oxide
12018-10-9	Chromium copper oxide (Cr2CuO4)
1317-39-1	Copper oxide (Cu2O)
1317-38-0	Copper oxide (CuO)
20405-64-5	Copper selenide (Cu2Se)
22205-45-4	Copper sulfide (Cu2S)
1317-40-4	Copper sulfide (CuS)
1303-00-0	Gallium arsenide (GaAs)
7440-57-5	Gold
1303-61-3	Gold sulfide (Au2S3)
1303-11-3	Indium arsenide (InAs)
63497-09-6	Chromium cobalt iron oxide
55353-02-1	Chromium copper iron oxide (Cr2CuFe2O7)
12737-27-8	Chromium iron oxide
7439-89-6	Iron
20344-49-4	Iron hydroxide oxide (Fe(OH)O)
11115-91-6	Iron manganese oxide

13769-81-8	Iron molybdenum oxide
1332-37-2	Iron oxide
1309-37-1	Iron oxide (Fe2O3)
1317-61-9	Iron oxide (Fe3O4)
1345-25-1	Iron oxide (FeO)
1310-43-6	Iron phosphide (Fe2P)
26508-33-8	Iron phosphide (FeP)
12160-44-0	Iron potassium oxide
12160-30-4	Iron potassium oxide (Fe5KO8)
12022-95-6	Iron silicide (FeSi)
11126-12-8	Iron sulfide
1317-37-9	Iron sulfide (FeS)
12789-64-9	Iron titanium oxide
12063-19-3	Iron zinc oxide (Fe2ZnO4)
12069-00-0	Lead selenide (PbSe)
1314-87-0	Lead sulfide (PbS)
11137-98-7	Aluminum magnesium oxide
1309-48-4	Magnesium oxide (MgO)
14987-04-3	Magnesium silicon oxide (Mg2Si3O8)
68611-24-5	Phenol, polymer with formaldehyde, magnesium oxide complex
11115-91-6	Iron manganese oxide
12033-07-7	Manganese nitride (Mn4N)
1309-55-3	Manganese oxide
11129-60-5	Manganese oxide
1317-34-6	Manganese oxide (Mn2O3)
1317-35-7	Manganese oxide (Mn3O4)
1344-43-0	Manganese oxide (MnO)
1313-13-9	Manganese oxide (MnO2)
18820-29-6	Manganese sulfide (MnS)
12004-35-2	Aluminum nickel oxide (Al2NiO4)
1314-06-3	Nickel oxide (Ni2O3)
1313-99-1	Nickel oxide (NiO)
12035-57-3	Nickel silicide (NiSi)
11113-75-0	Nickel sulfide
12035-72-2	Nickel sulfide (Ni3S2)
16812-54-7	Nickel sulfide (NiS)
1327-36-2	Aluminatesilicate
12141-46-7	Aluminum oxide silicate (Al2O(SiO4))
12068-56-3	Aluminum oxide silicate (Al6O5(SiO4)2)
68647-35-8	C.I. Basic Violet 1, molybdatesilicate
59794-15-9	Calcium borate silicate

12168-85-3	Calcium oxide silicate (Ca3O(SiO4))
116565-74-3	Chromium lead oxide sulfate, silica-modified
68583-49-3	Cyclotetrasiloxane, octamethyl-, reaction products with silica
68583-58-4	Ethanamine, N-ethyl-N-hydroxy-, reaction products with hexamethylcyclotrisiloxane, silica and 1,1,1-trimethyl-N-(trimethylsilyl)silanamine
69012-64-2	Fumes, silica
39390-00-6	Lead chloride silicate
12687-78-4	Lead silicate sulfate
12511-31-8	Magnesium aluminum silicate
67953-81-5	Octadecanoic acid, polymer with silica and trimethoxy[3-(oxiranylmethoxy)propyl]silane
68909-20-6	Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, hydrolysis products with silica
68937-51-9	Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, reaction products with ammonia, octamethylcyclotetrasiloxane and silica
71889-01-5	Silane, chlorotrimethyl-, hydrolysis products with silica
68611-44-9	Silane, dichlorodimethyl-, reaction products with silica
71889-02-6	Silane, trichlorooctadecyl-, hydrolysis products with silica
68584-81-6	Silane, trimethoxymethyl-, hydrolysis products with silica
7631-86-9	Silica
63231-67-4	Silica gel
308075-23-2	Silica gel, aero-
112926-00-8	Silica gel, pptd., cryst.-free
68988-89-6	Silica, [(ethenyldimethylsilyl)oxy]- and [(trimethylsilyl)oxy]-modified
112945-52-5	Silica, amorphous, fumed, cryst.-free
10279-57-9	Silica, hydrate
60676-86-0	Silica, vitreous
67762-90-7	Siloxanes and Silicones, di-Me, reaction products with silica
50815-87-7	Sodium borate silicate
14987-04-3	Magnesium silicon oxide (Mg2Si3O8)
409-21-2	Silicon carbide (SiC)
12033-89-5	Silicon nitride (Si3N4)
11126-22-0	Silicon oxide
12037-47-7	Silicon phosphate (Si3(PO4)4)
13870-30-9	Silicon sodium oxide (Si3Na2O7)
12271-95-3	Boron silver oxide (B4Ag2O7)
7440-22-4	Silver
7785-23-1	Silver bromide (AgBr)
7783-96-2	Silver iodide (AgI)
20667-12-3	Silver oxide (Ag2O)
12002-86-7	Silver selenide (AgSe)
21548-73-2	Silver sulfide (Ag2S)
12014-14-1	Cadmium titanium oxide (CdTiO3)

69011-08-1	Chromium titanium antimonate oxide (CrTi10(SbO3)O20)
12190-87-3	Chromium titanium oxide (Cr2TiO5)
12789-64-9	Iron titanium oxide
12060-00-3	Lead titanium oxide (PbTiO3)
12626-81-2	Lead titanium zirconium oxide (Pb(Ti,Zr)O3)
100209-12-9	Silane, trimethoxyoctyl-, reaction products with titanium oxide (TiO2)
25583-20-4	Titanium nitride (TiN)
51745-87-0	Titanium oxide
1344-54-3	Titanium oxide (Ti2O3)
12137-20-1	Titanium oxide (TiO)
13463-67-7	Titanium oxide (TiO2)
1314-36-9	Yttrium oxide (Y2O3)
68585-82-0	Yttrium oxide (Y2O3), europium-doped
68784-83-8	Yttrium oxide sulfide (Y2O2S), europium-doped
124578-08-1	1,3-Butadiene, 2-chloro-, homopolymer, reaction products with zinc oxide
155240-18-9	Benzenesulfonic acid, dodecyl-, reaction products with succinic anhydride monopolyisobutylene derivs., tetraethylenepentamine and zinc oxide
68987-52-0	Benzenesulfonic acid, octadecenyl-, reaction products with succinic anhydride monopolyisobutenyl deriv., tetraethylenepentamine and zinc oxide
71077-22-0	Benzoic acid, 2-hydroxy-, polymer with formaldehyde, 4-nonylphenol and zinc oxide (ZnO)
12767-90-7	Boron zinc oxide (B6Zn2O11)
12442-27-2	Cadmium zinc sulfide ((Cd,Zn)S)
68512-49-2	Cadmium zinc sulfide ((Cd,Zn)S), copper chloride-doped
50922-29-7	Chromium zinc oxide
12063-19-3	Iron zinc oxide (Fe2ZnO4)
22914-58-5	Molybdenum zinc oxide (Mo2Zn3O9)
13767-32-3	Molybdenum zinc oxide (MoZnO4)
1314-13-2	Zinc oxide (ZnO)
64539-51-1	Zinc oxide phosphite (Zn4O3(HPO3))
59766-35-7	Zinc oxide sulfate (Zn4O3(SO4))
1314-22-3	Zinc peroxide (Zn(O2))
1314-98-3	Zinc sulfide (ZnS)
72869-37-5	Zinc sulfide (ZnS), cobalt and copper-doped
68611-70-1	Zinc sulfide (ZnS), copper chloride-doped
12626-81-2	Lead titanium zirconium oxide (Pb(Ti,Zr)O3)
1314-23-4	Zirconium oxide (ZrO2)