TSCA Chemical Data Reporting Fact Sheet: Reporting Manufactured Chemical Substances from Metal Mining and Related Activities

This document provides guidance on the Chemical Data Reporting (CDR) rule requirements related to the reporting of mined metals, intermediates, and byproducts manufactured during metal mining and related activities. This fact sheet supplements other documents, such as the CDR Instructions for Reporting.

The primary goal of this document is to help the regulated community comply with the CDR rule. This document does not substitute for that rule, nor is it a rule itself. It does not impose legally binding requirements on the regulated community or on the U.S. Environmental Protection Agency (EPA).

The CDR rule, issued under the Toxic Substances Control Act (TSCA), requires manufacturers (including importers) to give EPA information on the chemicals they manufacture domestically or import into the United States. EPA uses the data, which provides important screening-level exposure related information, to help assess the potential human health and environmental effects of these chemicals and makes the non-confidential business information it receives available to the public.

Mining Activities and Manufacturing under the CDR Rule

Reporting under the CDR rule is based on the manufacture (including import) of chemical substances (see 40 CFR 711.8). Mining is a manufacturing activity, and as such is captured by the definition of manufacturing.

It is important to note that the act of processing or using one chemical substance (including a naturally occurring chemical substance) may result in the manufacture of a reportable chemical substance. In such cases, persons who process or use chemical substances may be subject to reporting requirements under CDR: not with respect to the chemical substance that they processed or used, but with respect to the chemical substance *that they manufactured*.

1. When is a mined chemical substance exempt from reporting under the CDR rule?

This section describes when your mined chemical substance is not reportable. Table 1 provides a brief summary.

Manufactured for commercial purposes

If the chemical substance(s) resulted from mining activities conducted for no commercial purpose, then the manufacture of those chemical substances is not reportable under the CDR rule. That is because, for a chemical substance to be reportable under the CDR rule, it must be manufactured for commercial purposes. “Manufactured for commercial purposes” means:

> (1) To import, produce, or manufacture with the purpose of obtaining an immediate or eventual commercial advantage for the manufacturer, and includes among other things, such “manufacture” of any amount of a chemical substance or mixture: (i) For

commercial distribution, including for test marketing; and (ii) For use by the manufacturer, including use for product research and development, or as an intermediate.

(2) Manufacture for commercial purposes also applies to substances that are produced coincidentally during the manufacture, processing, use, or disposal of another substance or mixture, including both byproducts that are separated from that other substance or mixture and impurities that remain in that substance or mixture. Such byproducts and impurities may, or may not, in themselves have commercial value. They are nonetheless produced for the purpose of obtaining a commercial advantage since they are part of the manufacture of a chemical product for a commercial purpose. (40 CFR 704.3, referenced by 40 CFR 711.3)

Table 1: Overview of when Chemical Substances Resulting from Mining Activities are NOT Reportable under CDR

You do **not** report a chemical substance under CDR when your chemical substance is:	Regulatory Citation	Cautions
Not manufactured for a commercial purpose	40 CFR 704.3, referenced by 40 CFR 711.3	• Metal mining is typically done for a commercial purpose, and results in the manufacture of chemical substances.
A byproduct manufactured for a commercial purpose, • but not used for a commercial purpose after it is manufactured, or • used for an exempted commercial purpose OR a byproduct that is manufactured solely in non-integral pollution control or boiler equipment. (see the section "When is a byproduct reportable?" below)	40 CFR 720.30 (g) and (h)(2), referenced by 40 CFR 711.10(c), or 40 CFR 711.10(d)	• Byproduct chemical substances are typically manufactured for a commercial purpose and are reportable when they are also used for a non-exempt commercial purpose. • Alternatively, if a byproduct is manufactured solely in non-integral pollution control or boiler equipment, the byproduct remains exempt even if used for a commercial purpose (NOTE: different substances manufactured from the exempted byproduct may still be subject to reporting).
A naturally occurring chemical substance as defined for TSCA purposes.	40 CFR 711.6(a)(3)	• A naturally occurring chemical substance is exempted from reporting as long as it meets the TSCA description of "naturally occurring chemical substance" at 40 CFR 710.4(b). • As a result of processing, a naturally occurring substance may no longer be considered a naturally occurring chemical substance under TSCA and would be subject to reporting under CDR. See 40 CFR 710.4(b).

Naturally occurring chemical substances

A naturally occurring chemical substance as described in 40 CFR 710.4(b) is exempt from CDR requirements. (40 CFR 711.6(a)(3))

A chemical substance qualifies as naturally occurring if it is:

(1)(i) Unprocessed or (ii) Processed only by manual, mechanical, or gravitational means; by dissolution in water; by flotation; or by heating solely to remove water; or
(2) Extracted from air by any means. (40 CFR 710.4(b), referenced by 40 CFR 711.3)

Chemical substances contained in mined materials such as metal ores, minerals, and clays that are separated from the natural environment by only physical means are examples of chemical substances that are considered naturally occurring for TSCA purposes and are exempt from reporting under the CDR rule.

Note that a chemical substance manufactured by artificial means may have the same identity as a naturally occurring substance but would not, itself, be considered naturally occurring.

2. When is a mined chemical substance no longer a naturally occurring chemical substance?

When a naturally occurring substance is further processed in any manner other than as specifically described above in the definition for naturally occurring chemical substances (see the previous section), it is no longer considered a naturally occurring chemical substance as defined in 40 CFR 710.4(b) and, therefore, would not be exempt from reporting under the CDR rule. For example, extractive metallurgy processes often dissolve the mined material and, therewith, its constituent chemical substances, in solutions other than water to obtain the chemical substances. After this type of process, the chemical substances originally contained in the mined material would no longer be considered naturally occurring chemical substances.

For example, if Company A manufactures bauxite ore such that the bauxite ore meets requirements to be considered a naturally occurring chemical substance for purposes of CDR, and then further processes the bauxite ore through chemical flocculation to concentrate the ore, then Company A's manufacture of the concentrated bauxite ore is not the manufacture of a "naturally occurring chemical substance." Company A's manufacture of concentrated bauxite ore through chemical flocculation is not thereby exempt from reporting under the CDR rule.

In another example, Company A manufactures and processes copper ore in such a way that the copper ore is considered a naturally occurring chemical substance for purposes of CDR. Company A is exempt from reporting the copper ore under the CDR rule. Company A then sells the copper ore to Company B who uses hydrometallurgical processes to recover elemental copper from the ore. The elemental copper is a wholly separate chemical substance from the copper ore, and the manufacture of the elemental copper is furthermore not the manufacture of a "naturally occurring chemical substance." The elemental copper is not covered under the exemption and Company B must report the manufacture of copper.

Intermediates and Byproducts under the CDR Rule

Reporting under the CDR rule may also extend to chemical intermediates and byproducts that are manufactured in the course of mining activities. This section discusses the reporting requirements under the CDR rule for intermediates and byproducts generated during these activities. Table 2 identifies examples of intermediates and byproducts from several mining activities.

1. When is an intermediate reportable?

An intermediate is reportable if it is produced in sufficient quantity (i.e., it meets the reporting threshold) and neither the naturally occurring chemical substance exemption nor any other exemption applies to its manufacture.

An intermediate is defined by regulation:

> *Intermediate* means any chemical substance that is consumed, in whole or in part, in chemical reactions used for the intentional manufacture of other chemical substances or mixtures, or that is intentionally present for the purpose of altering the rates of such chemical reactions. (40 CFR 704.3, referenced by 40 CFR 711.3)

Even if an intermediate no longer qualifies for the naturally occurring chemical substances exemption, it may qualify for the "non-isolated intermediate" exemption. See 40 CFR 711.10(c), 40 CFR 720.30(h)(8). A non-isolated intermediate is defined by regulation:

> *Non-isolated intermediate* means any intermediate that is not intentionally removed from the equipment in which it is manufactured, including the reaction vessel in which it is manufactured, equipment which is ancillary to the reaction vessel, and any equipment through which the substance passes during a continuous flow process, but not including tanks or other vessels in which the substance is stored after its manufacture. Mechanical or gravity transfer through a closed system is not considered to be intentional removal, but storage or transfer to shipping containers "isolates" the substance by removing it from process equipment in which it is manufactured. (40 CFR 704.3, referenced by 40 CFR 711.3)

For additional information about non-isolated intermediates, see *TSCA Chemical Data Reporting Fact Sheet: Non-Isolated Intermediates*.

2. When is a byproduct reportable?

As a mined material is further processed, it is also possible that chemical substances are manufactured as byproducts as a result of the use of various chemicals to extract metals or other valuable materials. Because the manufacture of the byproduct is incidental to some other activity by which the manufacturer is obtaining a commercial advantage, the byproduct is manufactured for a commercial purpose. Like other chemical substances manufactured for commercial purposes, byproducts are subject to reporting unless an exemption applies.

The manufacture of a byproduct is exempt from reporting if the byproduct is not "used for commercial purposes." (40 CFR 720.30(h)(2), referenced by 40 CFR 711.10(c))

There are other circumstances where a byproduct may be exempt:

- The manufacture of a byproduct is also exempt from reporting if its only commercial purpose is for use by public or private organizations that:

  (1) Burn it as a fuel,
  (2) Dispose of it as a waste, including in a landfill or for enriching soil, or
  (3) Extract component chemical substances from it for commercial purposes. This exclusion only applies to the byproduct; it does not apply to the component substances extracted from the byproduct. (40 CFR 720.30(g), referenced by 40 CFR 711.10(c))

The third provision above means that the extracted component must already be a distinct chemical substance in the waste byproduct stream. If the chemical substances that are extracted from the byproduct are not distinct chemical substances (i.e., the extraction changes the chemical identity of the component chemical), the manufacture of the byproduct does not qualify for the 40 CFR 720.30(g)(3) exemption. Note that the extracted chemical substance never qualifies for this exemption.[1] For example, the recovery of metals from a solution of soluble metal compounds is typically achieved through chemical reaction processes (on both the solution and the recovered metals); this type of recovery process would mean the byproduct (e.g., the "solution of soluble metal compounds") is not eligible for this exemption.

- For certain industrial processes, the byproducts listed at 40 CFR 711.10(d)(1)(i) are exempt when recycled or otherwise used within a site-limited, physically enclosed system that is part of the same overall manufacturing process from which the byproduct substance was generated, and when the site is reporting the byproduct or a different chemical substance that was manufactured from the recycled byproduct or manufactured in the same overall manufacturing process. (40 CFR 711.10(d)(1))

  As of April 2020, the listed industrial processes are Portland cement manufacturing and Kraft pulping process (40 CFR 711.10(d)(1)(i)). Therefore, at this time, this exemption is not expected to be applicable to byproducts manufactured at mining or related activity sites. The public may petition for amendments to this list of industrial processes and associated byproducts. Petitions to amend the list for the 2024 CDR submission period are due before January 1, 2022 (40 CFR 711.10(d)(1)(ii)). For more information, see www.epa.gov/cdr.

- Byproducts that are manufactured solely in certain equipment (i.e., (i) Pollution control equipment or (ii) Boilers used to generate heat or electricity for that site), when that equipment is not integral to the chemical manufacturing processes of the site, are also exempt from reporting. (40 CFR 711.10(d)(2))

  As an example, copper-containing ores are concentrated and sent to a smelter. The smelting process results in sulfur dioxide-containing gasses which exceed the limits allowed to be released directly to the air. These gasses are sent to a metallurgical acid plant, where the sulfur dioxide content of the gasses is reduced by producing sulfur trioxide; this process enables the remaining sulfur dioxide containing gasses to be released directly to the air. In this example, the produced sulfur trioxide qualifies for the pollution control byproduct exemption because the sulfur trioxide is a byproduct of reducing the sulfur dioxide content, the metallurgical acid plant contains pollution control equipment, and the pollution control equipment is not integral to the production of copper. The sulfur trioxide is used to manufacture sulfuric acid, which is an intended product and not a byproduct of the pollution control equipment and therefore would be reportable to CDR if thresholds are met.

For more information about these exemptions, see the 2020 Byproducts, Impurities, and Recycling Scenarios guidance document.

Identifying the Manufactured Chemical Substance

[1] EPA clarified byproduct reporting in the TSCA IUR Modifications Final Rule Federal Register notice. See 76 FR 50816, 50849 (Aug. 16, 2011)).

Under TSCA, a chemical substance is defined by its unique, specific chemical identity, generally identified by the Chemical Abstracts Service Registry Number (CASRN) and its corresponding Chemical Abstracts (CA) Index Name. In the manufacture of chemical substances, such as by metal mining and related activity sites, chemical substances may exist as: 1) an individual chemical substance; 2) a mixture of individual chemical substances; or 3) a complex reaction product of unknown, uncertain or variable composition, what EPA often refers to as a "UVCB substance" (a substance of Unknown or Variable composition, Complex reaction products, and Biological materials). Generally, EPA considers each combination of substances resulting from a reaction to be either:

(1) A *mixture*, composed of two or more well-defined chemical substances to be named and listed separately; or
(2) A "*UVCB*" substance, or another type of single substance that EPA and CAS refer to as a "Class 2 substance" (non-UVCB, where the chemical structure is indefinite). A UVCB substance, in this case, is a "reaction product", or combination of chemicals from a reaction, listed in the TSCA Inventory as a single chemical substance, using one name that collectively describes the products or, if that is not ascertainable, describes the reactants used to make the products and perhaps the nature of the reaction or key aspects of the manufacturing process.

As the manufacturer, the site should determine, based on the specific manufacturing scenario, whether the manufactured chemical is more appropriately represented as an individual chemical substance, a mixture of individual chemical substances, or a UVCB chemical substance.

It may be appropriate, for CDR purposes, to characterize a complex byproduct as a mixture of well-defined chemical substances or a single well-defined chemical substance, even though there are some uncharacterized components in the combination of byproduct substances. In addition, where a manufacturer reasonably concludes (after considering all the facts known and reasonably ascertainable) that the uncharacterized components of a byproduct will have no subsequent commercial purpose after they are manufactured, for CDR purposes, the manufacturer may treat the byproduct as a mixture of the remaining characterized components. The manufacturer would report each component as a separate substance. For each reported substance, the manufacturer would report the production volume associated only with that substance. The uncharacterized components that have no subsequent commercial purpose would not be reported to CDR.

Determining Whether A Site Meets the Reporting Threshold

To determine whether a chemical substance meets the reporting threshold for CDR, compare the applicable reporting threshold to the total amount of that chemical substance produced at the whole site (40 CFR 711.15). For example, if there are three processes on a site, and each process produces 10,000 pounds of Chemical X at the site in a single year, then the 25,000 pounds reporting threshold is exceeded for Chemical X at the site.

Scenario – Gold Recovery from Ore

This example provides an overview of a gold (Au) recovery process that results in manufactured chemicals, intermediates, and byproducts that may be reportable to CDR. The prevalent method for the recovery of gold from mined ore uses Carbon-in-Pulp (CIP) or Carbon-in-Leach (CIL) processes. The major difference between CIP and CIL is that, in CIP, leaching and carbon adsorption occur sequentially and in CIL, leaching and carbon adsorption occur simultaneously. The following section details a CIP process.

See Figure 1 for a simplified schematic of the mineral processing and extractive metallurgy activities involved with the Carbon-in-Pulp gold recovery process.

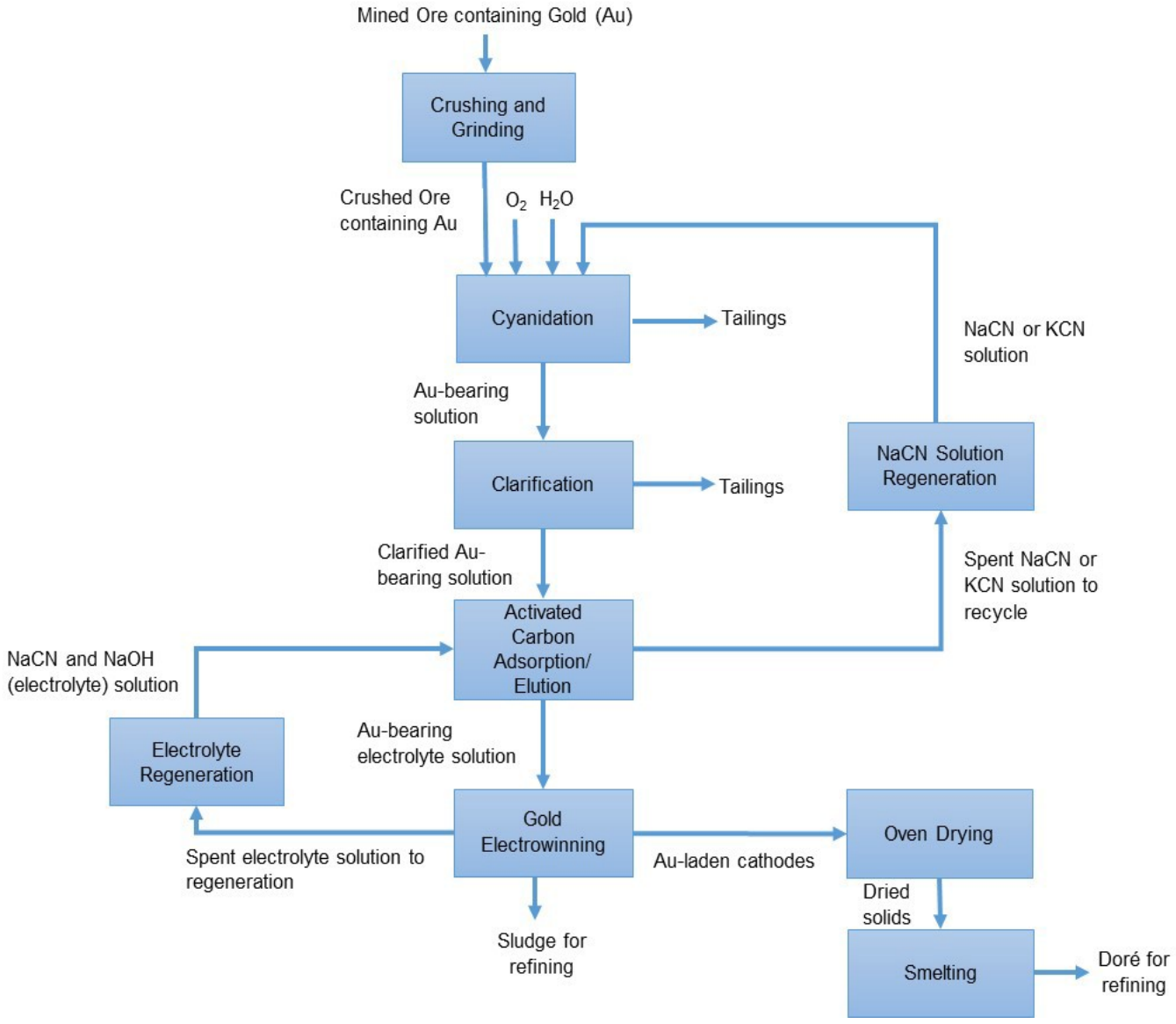

Figure 1: Carbon-in-Pulp Gold Recovery Process

PROCESS OVERVIEW:

In CIP, the mined ore first undergoes a leaching process (via milling or oxide milling) using a sodium or potassium cyanide solution (i.e., cyanidation) followed by a concentration step. Concentration involves adsorption of the gold by activated carbon followed by elution using a sodium or potassium cyanide and sodium hydroxide solution. The eluate undergoes gold electrowinning, where an electric current is applied to facilitate precipitation (plating) of gold
from the eluate onto a cathode (usually steel wool). The plated gold is washed off of the cathode and oven dried. The dried gold is then further purified via smelting methods. Some impurities may remain on the activated carbon after elution. These impurities are generally burned off in a carbon regeneration furnace.

Crushing and Grinding

Is the mined ore reportable under CDR?

Mined ore containing gold (Au) is prepared for extraction through crushing and grinding, and also may be further treated to remove sulfur.

- The mined ore is a naturally occurring chemical substance and therefore is not reportable under CDR. (40 CFR 711.6(a)(3))
- The crushing and grinding processing steps to prepare the ore for extraction are all mechanical and do not change the naturally occurring status of the mined substance.
- Some crushed ore may also be roasted or autoclaved for sulfur removal, which produces sulfide or sulfate byproducts that are reportable under CDR, unless otherwise exempt (see byproduct exemptions at 40 CFR 720.30(g), referenced by 40 CFR 711.10(c)).

Cyanidation

Does the Cyanidation process result in reportable chemical substances?

In milling or oxide milling, the ground ore is mixed with an aqueous solution of sodium cyanide or potassium cyanide (NaCN or KCN), which, in the presence of air or pure oxygen, leaches the gold from the crushed ore resulting in an Au-bearing solution (i.e., a NaCN or KCN solution) and tailings. The Au-bearing solution is then separated from the tailings via clarification. The tailings, which in this scenario are byproducts, are sent for disposal and the Au-bearing solution is further processed to purify and/or concentrate the gold.

- The tailings are not reportable to CDR because they are byproducts that are disposed of as waste, which makes them exempt from CDR reporting. (40 CFR 720.30(g), referenced by 40 CFR 711.10(c))
- The Au-bearing solution is a chemical intermediate manufactured during the cyanidation process and is generally reportable unless it meets the definition of “non-isolated intermediate” (defined in 40 CFR 704.3).

Activated Carbon Adsorption/Elution

Does the adsorption step result in reportable chemical substances?

After clarification, the Au-bearing solution is exposed to granulated activated carbon which adsorbs the metal (primarily gold and mercury, but also silver, copper and other related compounds). After adsorption, the remaining spent NaCN or KCN solution (known in industry as the gold-barren leach solution) is 1) chemically treated/neutralized and disposed of as waste or 2) regenerated to be reused in the cyanidation process.

- Spent NaCN or KCN solution: The spent NaCN or KCN solution is likely characterized as a chemical substance that is of Unknown or Variable composition, a Complex reaction product or a Biological material (a "UVCB" chemical substance) that is reportable for purposes of CDR.
  - The recovery of the sodium cyanide or potassium cyanide in aqueous solution (or any other chemical component) from a UVCB substance for reuse is considered to be manufacturing and therefore, is also reportable for purposes of CDR.
    - Note that if the desired substance can be isolated from the UVCB byproduct without reacting the desired substance as it exists in the UVCB byproduct, then the desired substance is reportable but the UVCB byproduct itself is exempted by 40 CFR 720.30(g)(3), as long as the remainder of the UVCB byproduct is disposed of as waste.
  - If the spent solution is disposed of as waste, it is not reportable for purposes of CDR because it is an exempt byproduct.
- The metal compounds adsorbed onto the activated carbon are reportable unless they meet the definition of a "non-isolated chemical intermediate."

Does the elution step result in reportable chemical substances?

An elution process removes adsorbed gold, mercury and related compounds from the activated carbon bed using a solution of sodium or potassium cyanide and sodium hydroxide resulting in an Au-bearing electrolyte solution (i.e., an electrolyte solution containing gold, mercury and other trace metals, known in industry as a pregnant strip solution). After elution, the activated carbon (containing some impurities) is regenerated in a carbon regeneration furnace which burns the impurities off.

- The Au-bearing electrolyte solution is likely characterized as a UVCB substance and is generally reportable unless it meets the definition of "non-isolated chemical intermediate."
- The regenerated carbon is not reportable under CDR because it has not undergone any change in chemical identity.
- The impurities are disposed of as waste when they are burnt off of the activated carbon and are thus not reportable under CDR, as they are exempt byproducts.

Gold Electrowinning

Does the electrowinning process result in reportable chemical substances?

The Au-bearing electrolyte solution undergoes gold electrowinning, an electrolytic redox reaction, to recover the gold in solution. In gold electrowinning, the Au-bearing electrolyte solution passes through an electrolytic cell containing a set of cathodes and anodes. A rectifier passes an electrical current through the cell that causes the gold ions to be reduced and deposited onto the cathode. The remaining spent electrolyte solution (i.e., spent electrolyte consisting of cyanide, hydroxide and other metal ions, known in industry as barren strip solution) is either disposed of, regenerated and reused,

or further processed to recover additional metal products.

- If the spent electrolyte is disposed of, it is classified as an exempt byproduct and is not reportable.
- If the spent electrolyte is further processed to recover additional metal products, the solution and any metals recovered from the solution are considered to be manufactured substances and are reportable for purposes of CDR unless otherwise exempt.

During electrowinning, a byproduct sludge forms at the bottom of the reaction tank, consisting of metal compounds that have not been deposited on the cathode. Generally, the sludge is further processed via pyrometallurgy techniques (i.e., smelting) to recover the valuable components of the sludge.

- This sludge (may be called precious metal precipitates or PMP) is a byproduct
  - If classified as a UVCB substance, the sludge and any chemical substances recovered from it via chemical reaction (on the precursors of those substances that exist in the sludge) are reportable for purposes of CDR.
  - If appropriate, treat the sludge as a mixture of chemical substances (rather than as a single UVCB chemical substance) even though there are uncharacterized components to the mixture that are not reportable to CDR. However, each component metal compound or salt would be reportable if using this approach.
- If the recovered chemical substances are extracted from the sludge as component chemical substances (already existing distinctly in the sludge), the extracted substances are reportable and the UVCB substance is exempted from reporting. ((40 CFR 720.30(g)(3), referenced by 40 CFR 711.10(c))

Oven Drying and Smelting

Does the oven drying and doré formation process result in reportable chemical substances?

After electrolysis, the gold and other solids are washed off the cathodes and oven dried. The dried solids are then smelted into doré (i.e., bars or bullions that contain both silver and gold) before being sent off-site for further refining.

- The resultant doré may be a UVCB substance or a mixture of metals (i.e. an alloy of known composition).
  - If the resultant doré is characterized as a mixture of metals, the mixture itself is not reportable for purposes of CDR, however each component metal is reportable for purposes of CDR.
  - If the resultant doré is characterized as a UVCB substance, the doré is reportable under CDR because it is manufactured for a commercial purpose and is listed on the TSCA Inventory (CASRN 69029-47-6).

Doré Refining

Does refining of the doré result in reportable chemical substances?

Doré is smelted at mining sites and sent off-site to be further purified via specialty smelting methods. Smelting removes impurities from the doré to produce a purer form of gold. In smelting, the doré is exposed to high temperatures and the chemical compounds in the doré (mostly oxides of gold, silver, and copper) are exposed to reducing agents that free the metals from the molten material (to become molten metals). Flux is also added to catalyze the redox reactions as well as to provide a

binding agent to unwanted impurities and reaction products, contributing to the production of molten slag.

- Slag produced during smelting is also classified as a UVCB substance on the TSCA Inventory (CASRN 67711-98-2: Slags, dore furnace). Slag may be sold for recovery of its component metals.
  - If the recovery of the metals involves a chemical reaction that results in a desired chemical substance that is not a component chemical substance, the slag is considered a byproduct used for a non-exempt commercial purpose and is thus reportable to CDR.
  - If the recovery of the metals does not require a chemical reaction to extract the component metals, or if the only portions of the slag that are reacted are disposed of as a waste, then the slag's only commercial purpose is "for use to extract component chemical substances from it for commercial purposes" and is therefore an exempt byproduct, not reportable for purposes of CDR.
  - Slag may also be disposed of as waste, in which case it is not reportable for purposes of CDR because it is an exempt byproduct.
- Slag may contain residual gold, and therefore is often sent back through the smelting process to recover the additional gold. Because the slag is classified as a UVCB substance, the slag and any chemical substance recovered from it via chemical reaction on the slag component of interest are reportable for purposes of CDR.
- The "pure" gold recovered from doré or slag in the smelting process is considered "manufactured for a non-exempt commercial purpose" and is reportable for purposes of CDR.

Examples of Mining Activities and Manufacturing under the CDR Rule

For some of the processes used in mining and extraction activities, the following tables give examples of chemical substances manufactured from these processes and state which may or may not be reportable under the CDR rule. Each compaguny should evaluate the chemical substances manufactured in each of its processes and determine if each chemical substance would be subject to CDR reporting requirements.

This series of tables organize mining and related activities into the following extractive metallurgy categories:

- Mining and Mineral Processing – Separation and processing of ore minerals by physical means (see Table *2*).
- Pyrometallurgy – Separation and processing of ore minerals via thermal treatment (see Table 3).
- Hydrometallurgy – Separation and processing of ore minerals using aqueous solutions (see Table 4).
- Electrometallurgy – Separation and processing of ore minerals using electrolysis (see Table 5).
- Selected Other Processing – Certain recycling activities (see Table 6)

Table 2: CDR Reporting Requirements for Mining and Mineral Processing Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
Mining (surface or underground)	Remove metals and minerals contained in other geological materials in the natural environment, such as rocks, ores, reefs, and seams.	Mined material (rocks, ores, etc.)	**Not Reportable**, if the mined material meets the description of a naturally occurring chemical substance[a] (40 CFR 710.4(b)). e.g., ore-containing rock is not reportable when it is only processed using manual, mechanical, or gravitational means; by dissolution in water; by flotation; or by heating solely to remove water e.g., waste rock (consisting of mineralized rock for which it is not currently economical to recover the metals contained therein) is not reportable when it is disposed of as a waste **Reportable,** if the mined material does not meet the description of a naturally occurring chemical substance (40 CFR 710.4(b)).
Size reduction (i.e., comminution)	Reduce by physical means the size of mined material to liberate metals and minerals from gangue and prepare them for further processing	None	**Not reportable**. This is a mechanical process in which the chemical identity of the ore does not change, and no chemical substances are manufactured. e.g., crushing and grinding of mined ore
Sizing	Separate mined ore to ensure it meets size requirements before further processing	None	**Not reportable**. This is a mechanical process in which the chemical identity of the ore does not change, and no chemical substances were manufactured. e.g., screening, sieving or classification of mined ore

Table 2: CDR Reporting Requirements for Mining and Mineral Processing Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
Concentration	Separate valuable metals and minerals into a small, concentrated mass which can be treated further to produce purer forms of metal or mineral products	Metal or mineral Complexes	**Reportable**, if the concentration of the wanted minerals entails separation methods that are inconsistent with the naturally occurring status of the starting materials (e.g., concentration by chemical means), according to 40 CFR 710.4(b). e.g., flocculation, agglomeration, froth flotation[b] **Not Reportable**, if the concentration of the wanted substances uses only physical separation methods, retaining the naturally occurring status of the starting materials, as described in 40 CFR 710.4(b).[a] e.g., gravity separation, gravity concentration, froth flotation[b], optical and photometric sorters
		Tailing	**Not reportable**, if the tailings are waste streams from mining concentration operations that are disposed of as a waste or if they are used for another exempt use listed in 40 CFR 720.30(g).[a] **Reportable**, if substances within the tailings are reacted chemically to be recovered from the tailings and none of the resulting substances are otherwise exempt.
Dewatering	Remove water from mineral slurries to prepare the material for further processing	None	**Not reportable**, because this is a mechanical or gravitational process in which the chemical identity of the ore does not change (even through heating to remove water) and no chemical substances are manufactured. e.g. sedimentation, filtration, centrifugal separation and thermal drying

NOTES:

[a]Or if other available exemptions under TSCA apply. See the Instructions for Reporting for additional information.

[b]If there is any reaction or significant degree of chemical interaction (such as a partial degree of bonding or complexation, or a strong intermolecular attraction) between the surface modification reagent and the substrate (e.g., metal-containing material), this flotation process would no longer qualify the substance as naturally occurring under TSCA. Ultimately, the determination of whether there is a chemical reaction or a significant degree of chemical interaction between the surface modifying agent and the metal material that negates the naturally occurring status is up to you; EPA does not have sufficient information about how this particular material is processed to make that determination. However, it is important to note that the amount of chemical doesn't matter – a small amount of a surface modifying chemical could have sufficient reaction or chemical interaction with the substrate to disqualify the processed substance from being considered to be naturally occurring.

Table 3: CDR Reporting Requirements for Pyrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
Ore/ concentrate preparation	Alters the chemical and/or physical properties of the ore/concentrate to make it more suitable for further processing e.g., calcination, roasting of sulfides, chlorination, sintering and pelletizing	Metal oxides, metal sulfates, metal chlorides, and metal agglomerations	**Reportable**, if the resulting substance[a] is either intentionally removed from the enclosed process vessel or operating unit and considered an "isolated chemical intermediate" or is further processed. e.g., metal agglomeration from pelletizing is removed from the processing unit and stored prior to being fed to the smelting process e.g., calcine is formed by the calcination of dolomite and then is shipped elsewhere for final processing into magnesium metal **Not reportable**, if (1) the process merely blends/mixes various feedstocks for introduction into the smelting process without a chemical reaction, or (2) the manufactured substance is a non-isolated intermediate and exempt from reporting. For instance, the process occurs in the same operating unit as smelting and the substance is not intentionally removed from the enclosed process equipment prior to final processing.[b] e.g., blending of copper concentrates, other copper-bearing substances, and flux to produce a smelter-ready feedstock
Smelting	Uses heat and a chemical reducing agent to remove metals impurities from ore and create final metal products e.g., reduction smelting of	Elemental Metal(s) (one metal element or a combination of them)	**Reportable**, if the metal[a] is manufactured for a non-exempt commercial purpose. e.g., bars of dore, which contain silver and gold (the UVCB substance CASRN 69029-47-6); gold (CASRN 7440-57-5), copper (CASRN 7440-50-8), tin (CASRN 7440-31-5), nickel (CASRN 7440-02-0) **Not reportable**, if the metal has been manufactured and reported in a previous step and the smelting process is simply removing impurities from the metal. NOTE: If the removed impurities are used for a commercial purpose, they may be subject to reporting, but if disposed of as a waste are not reportable.[b]

Table 3: CDR Reporting Requirements for Pyrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
	non-ferrous metals, matte smelting and converting, reduction to gaseous metal and reduction to solid metal e.g., use of a metallic UVCB substance in secondary processing to recover individual metals and minerals	Slag	**Reportable**, if the slag, which is a byproduct chemical substance[a], is used for a non-exempt commercial purpose, such as to manufacture another chemical substance. e.g., slags, dore furnace (CASRN 67711-98-2); slags, copper smelting (CASRN 67711-92-6) **Not reportable**, if the slag, as a byproduct, is disposed of as waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
		Matte or matte/slag mixture	**Reportable**, if the matte, which is a smelting intermediate[a] is used for a commercial purpose, such as to manufacture another chemical substance. **Not reportable**, if the matte or slag, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
		Furnace or converter brick	**Reportable**, if the brick, which contains metallic substance and is periodically removed from the various smelting vessels, is a byproduct but has a separate commercial purpose (e.g., it is returned to the smelting process or routed to flotation where the metal (oxides and sulfides) is recovered along with metal concentrate in the ores). **Not reportable**, if the brick, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]

Table 3: CDR Reporting Requirements for Pyrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
		Revert	**Reportable**, if the revert, which contains matte, slag, blister metal, and anode metal, is a byproduct but has a separate commercial purpose (e.g., is returned to the smelting process). **Not reportable**, if the revert, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
Refining	Removal of metal impurities from molten metal to refine final product	Precipitated metal byproducts	**Reportable**, if the precipitated metal byproducts are further processed to recover metals for a commercial purpose. e.g. removal of iron from tin via drossing; removing residual copper from crude lead by adding sulfur to precipitate Cu_2S **Not reportable**, if the precipitated metal impurities, as a byproduct, are disposed of as waste or used for another exempt use listed in 40 CFR 720.30(g), such as extracting a component chemical substance.
Off-gas cleaning system	Off-gas from the smelter is routed through a waste heat boiler and electrostatic precipitator to remove partially smelted concentrate and clean the off-gas for routing to the acid plant for production of sulfuric acid.	Sulfur trioxide	**Not reportable**, if (1) the sulfur trioxide is a non-isolated intermediate and is exempt from reporting (i.e., if the process occurs in the same operating unit and if the substance is not intentionally removed from that process equipment prior to final processing) (40 CFR 720.30(h)(8), referenced by 40 CFR 711.10(c)), (2) the sulfur trioxide, as a byproduct, is manufactured solely in non-integral pollution control equipment (40 CFR 711.10(d)(2)), or (3) the sulfur trioxide, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b] **Reportable**, if the sulfur trioxide is not a non-isolated intermediate, is used for a commercial purpose, and does not meet the byproduct exemptions listed under “not reportable.”

Table 3: CDR Reporting Requirements for Pyrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
		Sulfuric acid	**Reportable**, if the sulfuric acid, manufactured from the sulfur trioxide byproduct, is manufactured for commercial purposes. **Not reportable**, if the sulfuric acid is disposed of as a waste.
Pollution control or wastewater treatment	Particulate matter from process off-gas and ventilation gases collected in either air or water pollution control devices e.g., baghouse, wastewater treatment filter	Dry dusts e.g., baghouse dust	**Not reportable**, if (1) the baghouse dust contains only unreacted feed substances,[c] (2) the dry dusts, as a byproduct, are manufactured solely in non-integral pollution control equipment (40 CFR 711.10(d)(2)), or (3) the dry dusts, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b] **Reportable**, if dry dusts[a] are manufactured for a non-exempt commercial purpose.
		Wastewater treatment filter cakes	**Not reportable**, if (1) the filter cake, as a byproduct, is manufactured solely in non-integral pollution control equipment (40 CFR 711.10(d)(2)), or (2) the filter cake, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b] **Reportable**, if dry dusts[a] are manufactured for a non-exempt commercial purpose.
Solids recovery	After removal of particulates from the waste heat boiler and electrostatic precipitator, off-gas is routed to a gas cleaning system where particulates are washed down with an acidic solution	Clarified liquid (weak acid)	**Reportable**, if the weak acid[a], as a byproduct, is manufactured for a commercial purpose. **Not reportable**, if the weak acid, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
		Acid plant solids	**Reportable**, if the acid plant solids[a], as a byproduct are manufactured for a commercial purpose. **Not reportable**, if the acid plant solids, as a byproduct, are disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]

Table 3: CDR Reporting Requirements for Pyrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
	consisting of water. The slurry is clarified and used in leaching.	Sludge from the bottom of electrowinning tanks	**Reportable**, if the resulting byproduct chemical substance[a] is used for a commercial purpose. e.g., slimes and sludge, copper electrolytic (CASRN 67711-95-9) **Not reportable**, if the sludge, as a byproduct, is disposed of as waste or used for another exempt use listed in 40 CFR 720.30(g).[b]

NOTES:

[a]Whether as a single substance, multiple components in a mixture, or as a UVCB chemical substance, as listed on the TSCA Inventory.

[b]Or if other available exemptions under TSCA apply. See the Instructions for Reporting for additional information.

[c]If baghouse dust contains reacted substances (and if determined that the dust is not manufactured in non-integral pollution control equipment or not used for a commercial purpose), then consider whether to report the baghouse dust as a single UVCB substance or as the individual substances that were manufactured and will be used for commercial purposes (e.g., used by a recycler to reduce to elemental lead).

Table 4: CDR Reporting Requirements for Hydrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
Leaching	Dissolve the mined material and separate the valuable metals and minerals from the gangue material e.g. in-situ, heap, vat, tank, or autoclave leaching	Soluble metal or mineral salts in aqueous or other solution(s)	**Reportable**, if leaching occurs in any solution other than plain water, such as with other solvents, solutions, or liquid chemicals, thereby making it a not naturally occurring substance as described in 40 CFR 710.40(b). e.g., leaching by acid solutions, alkaline solutions, complex-forming solutions, oxidizing solutions, other solvent/chemical solutions, and/or bioleaching **Not reportable**, if leaching of mined material that itself qualifies as a naturally occurring chemical substance occurs solely by dissolution in water.

		Solid spent ore (gangue)	**Reportable**, if spent ore[a] is not a naturally occurring chemical substance as described in 40 CFR 710.4(b) and is used for a non-exempt commercial purpose (including secondary processing and recovery of additional metals and minerals). **Not reportable**, if (1) spent ore is a naturally occurring chemical substance because the processing used to generate the spent ore used only physical means allowed under 40 CFR 710.4(b), or (2) spent ore is not a naturally occurring chemical substance and it is disposed of as a waste or, as a byproduct, is used for another exempt use listed in 40 CFR 720.30(g), such as to extract a component chemical substance.[b]
Purification and concentration	Remove impurities and/or concentrate the solution containing valuable metals and minerals e.g., precipitation, distillation, adsorption, cementation, gas reduction, ion exchange, dissolution extraction, electrowinning	Metal cathode (e.g., copper cathode)	**Reportable**, if the metal[a] is manufactured for a commercial purpose. e.g., copper (CASRN 7440-50-8) **Not reportable**, if the recovered metal solid is not a naturally occurring chemical substance and, as a byproduct, it is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g), such as to extract a component chemical substance from it.[b]
		Raffinate (Spent leachate solution)	**Reportable**, if spent leachate solution[a], as a byproduct, is further processed to recover substances for commercial purposes. **Not reportable**, if (1) the spent leachate solution is a naturally occurring chemical substance as described in 40 CFR 710.4(b), or (2) the spent leachate solution is not a naturally occurring chemical substance and, as a byproduct, it is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g), such as to extract a component chemical substance from it.[b]

		Metal byproducts	**Reportable,** if the impurity is removed from solution via chemical reaction that produces a byproduct[a] that is used for a non-exempt commercial purpose. e.g., precipitation of copper as copper sulfide to purify nickel leachates and recovery of copper from copper sulfide **Not reportable**, if (1) the impurity is a naturally occurring chemical substance because the byproduct is a naturally occurring chemical substance and the impurity removal process uses physical means allowed under 40 CFR 710.4(b), or (2) the impurity is not a naturally occurring chemical substance and, as a byproduct, it is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g), such as to extract a component chemical substance from it.[b] (3) the byproduct is manufactured solely in non-integral pollution control equipment (40 CFR 711.10(d)(2)).
		Lead-containing materials	**Reportable**, if the lead byproduct[a] is used for a non-exempt commercial purpose. e.g., consumed lead anode in electrowinning process resulting in lead "flake" that is shipped to a lead smelter for production of lead metal **Not reportable**, if (1) the lead-containing material is a naturally occurring chemical substance because the material that is being purified or concentrated is a naturally occurring chemical substance and the process used to remove the lead-containing material used only physical means allowed under 40 CFR 710.4(b), or (2) the lead-containing material is not a naturally occurring chemical substance and, as a byproduct, it is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g), such as to extract a component chemical substance from it.[b]

NOTES:

[a]Whether as a single substance, multiple components in a mixture, or as a UVCB chemical substance, as listed on the TSCA Inventory.

[b]Or if other available exemptions under TSCA apply. See the Instructions for Reporting for additional information.

Table 5: CDR Reporting Requirements for Electrometallurgy Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
Purification and concentration via electrochemical methods	Recovers metal by electrochemical reduction of metal compound in an electrolyte solution and subsequent plating of the metal onto a cathode. e.g., electrowinning from aqueous solutions, fused salt electrolysis	Elemental metal – almost pure	**Reportable**, if the metal[a] is manufactured for a commercial purpose. e.g., zinc (CASRN 7440-66-6)
		Spent electrolyte	**Reportable**, if the spent electrolyte[a] is further processed to recover metals. The spent electrolyte solution and any substances recovered from the spent electrolyte solution are reportable. **Not reportable**, if the spent electrolyte is a byproduct that is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
Electrorefining	Purification process in which an impure metal anode from smelting is dissolved in a solution of a salt of the desired metal product and then recovered to produce high purity cathode	Elemental metal – almost pure	**Reportable**, if the chemical[a] is manufactured for commercial purposes, is not a byproduct used only for exempted uses, and is not a naturally occurring substance. e.g., copper (CASRN 7440-50-8); nickel (CASRN 7440-02-0) **Not reportable**, e.g., for copper cathode produced via electrorefining of copper anode since there is no manufacture of a new chemical substance (both are copper (CASRN 7440-50-8)).
		Spent electrolyte	**Reportable**, if the spent electrolyte[a] is further processed to recover metals. **Not reportable**, if the spent electrolyte, as a byproduct, is disposed of as waste or used for another exempt use listed in 40 CFR 720.30(g).[b]

		Sludge from the bottom of electrowinning tanks	**Reportable**, if the sludge[a], as a byproduct, is manufactured for a non-exempt commercial purpose. e.g., slimes and sludge, copper electrolytic (CASRN 67711-95-9) **Not reportable**, if the sludge, as a byproduct, is disposed of as waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
		Solids from the de-copperizing refinery bleed electrolyte used to produce other products	**Reportable**, if the solids, as a byproduct[a], are used for a commercial purpose, such as to manufacture another chemical substance. **Not reportable**, if the solids, as a byproduct, are disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]

NOTES:

[a]Whether as a single substance, multiple components in a mixture, or as a UVCB chemical substance, as listed on the TSCA Inventory.

[b]Or if other available exemptions under TSCA apply. See the Instructions for Reporting for additional information.

Table 6: CDR Reporting Requirements for Selected Other Processing Activities

Activity	Description of Activity	Types of Chemical Substances Manufactured	CDR Reporting Requirement and Select Examples
Production of copper rod (i.e., produces copper rod from copper cathode)	Melting copper cathode to produce copper rod and production of copper cathode from rod cleaning solutions	Elemental metal – almost pure	**Reportable**, if the elemental metal[a] is manufactured for commercial purposes and is not a byproduct used only for exempted uses. **Not reportable**, if the elemental metal, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]
		Spent rod cleaning solution	**Reportable**, if the spent rod cleaning solution[a] is further processed to recover metals or metal compounds. **Not reportable**, if the spent rod cleaning solution, as a byproduct, is disposed of as a waste or used for another exempt use listed in 40 CFR 720.30(g).[b]

NOTES:

[a]Whether as a single substance, multiple components in a mixture, or as a UVCB chemical substance, as listed on the TSCA Inventory.

[b]Or if other available exemptions under TSCA apply. See the Instructions for Reporting for additional information.

For further information:

To access additional fact sheets and other CDR information, visit www.epa.gov/cdr.

If you have questions about CDR, you can contact the TSCA Hotline by phone at 202-554-1404 or e-mail your question to eCDRweb@epa.gov.