United States Environmental Protection Agency

Reporting Byproducts for Chemical Data Reporting (CDR)

January 19, 2012

Office of Chemical Safety and Pollution Prevention

Agenda

- Basic Information
- When is a Byproduct Reportable?
- Byproduct Reporting Scenarios
  - Overarching Questions
  - Assumptions
  - Individual Scenario Discussion

Basic Information

- Chemical Data Reporting (CDR) submission period is February 1 to June 30, 2012
- The e-CDRweb reporting tool is available through EPA's Central Data Exchange (CDX)
- On-line training, guidance documents, and user guides are available on the CDR website

www.epa.gov/cdr

What is a Byproduct?

"…a chemical substance produced without a separate commercial intent during the manufacture, processing, use, or disposal of another chemical substance or mixture." (40 CFR 704.3)

When is a Byproduct Manufactured for a Commercial Purpose?

Manufacture for commercial purposes **also applies to:**

"chemicals that are produced coincidentally during manufacture, processing, use, or disposal of another substance or mixture, including both byproducts that are separated and impurities that remain in a substance or mixture." (40 CFR 704.3)

When is a Byproduct Subject to the CDR Rule?

- TSCA Inventory → Byproduct is listed on the TSCA Inventory.
- Commercial Purpose → Byproduct is used for a non-exempt commercial purpose
- Production Volume Threshold → Byproduct is manufactured in volumes of **25,000 pounds** or more during the principal reporting year at a single site.

When is a Byproduct Exempt?

A byproduct is EXEMPT if: (1) it is not used for a commercial purpose, or (2) "its only commercial purpose is for use by public or private organizations that:

a) burn it as fuel,
b) dispose of it as waste, including in a landfill or for enriching soil, or
c) extract component chemical substances from it for commercial purposes."* 40 CFR 720.30 (g) and (h)(2)

*Note that this last part of the exemption only applies to the byproduct, and not to the extracted component chemical substance.

Byproduct Reporting Scenarios for 2012 CDR

EPA's Response to Reporting Scenarios Provided by Bergeson & Campbell for Industry

Overarching Questions

- What is the chemical identification of the byproduct?
- How does the company report under the reporting element "Is Chemical Substance Being Recycled, Remanufactured, Reprocessed, or Reused?" *(a.k.a., Is chemical being recycled?)*

Identification of Byproducts under TSCA

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 reaction product, to be listed as a single chemical substance, using one name that collectively describes the products, or, the reactants used to make the products.

What is a Mixture?

- *"…any combination of two or more chemical substances if the combination does not occur in nature and is not, in whole or in part, the result of a chemical reaction; except that such term does include any combination which occurs, in whole or in part, as a result of a chemical reaction if none of the chemical substances comprising the combination is a new chemical substance and if the combination could have been manufactured for commercial purposes without a chemical reaction at the time the chemical substances comprising the combination were combined."* (TSCA Section 3)

- The TSCA Inventory does not include mixtures.

What if your Byproduct is Complex?

- Complex byproducts can be identified as chemical substances of Unknown or Variable composition, Complex reaction products and Biological materials ("UVCB" substances).
- Complex byproducts can be identified as single UVCB chemical substances that represent the process stream; the volumes of the individual chemical substances that comprise them do not need to be determined.
- The TSCA Inventory includes listings for UVCB Chemical Substances.

What is an Impurity?

"…a chemical substance which is unintentionally present with another chemical substance."

(40 CFR 704.3)

When is a Chemical Being Recycled?

- For purposes of filling out the data element "Is chemical being recycled?" on CDR Form U, a manufactured chemical substance is being recycled when the chemical substance is being removed from the waste stream and is instead being recycled, remanufactured, reprocessed, or reused.
- EPA generally expects:
  - That this data element would apply to many byproduct substances.
  - That product finishing, which does not involve removing a chemical substance from a waste stream, would not qualify as recycling for purposes of this data element.

General Assumptions for Scenarios

- A substance is purchased from domestic sources, unless otherwise stated
- Production volumes are sufficient to trigger full reporting (manufacturing, processing, and use) (Form U, Parts I-III)
- Remaining portions of a byproduct are disposed of as a waste, unless otherwise stated
- Additional assumptions were added as needed

Scenario 1 – Spent Etchant

- Summary:
  - ABC Company uses an etchant to strip copper off of a substrate. The process results in a mixture, Spent Etchant, containing a complex combination of substances.
  - Spent Etchant is sent to XYZ Recycler to extract the elemental copper by electrolytic reduction. The remaining components of the mixture are disposed of by XYZ Recycler.
- Additional Assumptions:
  - ABC Company would otherwise dispose of Spent Etchant as a waste

Scenario 1 – Spent Etchant

Reporting Obligations:

ABC Company

Spent Etchant:

- Report identity and manufacturing information
  - Answer "yes" to "Is substance being recycled?"
- Report Processing and Use:
  - PC (Processing as a reactant)
  - IS19 (All other basic inorganic chemical manufacturing)
  - U015 (Intermediates)

XYZ Recycler

Copper:

- Report identity and manufacturing information
  - Copper, CASRN 7440-50-8
  - Answer "no" to "Is substance being recycled?"
- Report processing and use information

Scenario 1*(alternate)* – Spent Etchant

- Summary:
  - ABC Company uses sulfuric acid etchant to strip copper off of a substrate. The process results in a mixture containing essentially cupric sulfate in solution.
  - The cupric sulfate in solution is sent to XYZ Recycler to obtain elemental copper by electrolytic reduction. The remaining components of the mixture are disposed of by XYZ Recycler.

- Additional Assumptions:
  - ABC Company would otherwise dispose of Spent Etchant as a waste

Scenario 1*(alternate)* – Spent Etchant

Reporting Obligations:

ABC Company

Cupric Sulfate:

- Report identity and manufacturing information
  - Sulfuric acid copper(2+) salt (1:1), CASRN 7758-98-7
  - Answer "yes" to "Is substance being recycled?"
- Report processing and use:
  - PC (Processing as a reactant)
  - IS19 (All other basic inorganic chemical manufacturing)
  - U015 (Intermediates)

XYZ Recycler

Copper:

- Report identity and manufacturing information
  - Copper, CASRN 7440-50-8
  - Answer "no" to "Is substance being recycled?"
- Report processing and use information

Scenario 2– Byproduct Mixture

- Summary:
  - GEF Company's process to make Chemical A results in the production of a byproduct.
  - GEF Company knows the byproduct, Mixture B, is comprised of:
    - Chemical A, formed via a chemical reaction
    - Chemicals X, Y, and Z, all of which were present in the original starting materials.
    - The specific percentage of each component in the byproduct is unknown.
  - Mixture B is sent to Company 123, who extracts Chemical X via a chemical reaction.
  - After Chemical X is extracted, the remaining portion of the mixture is disposed of by MNO Company.

Scenario 2– Byproduct Mixture

Reporting Obligations:

GEF Company

Chemical A:

- Report manufacturing information
- Report downstream processing and use activities

Chemicals X, Y, and Z:

- No manufacturing, and therefore no reporting

Mixture B:

- GEF Company is not required to report Mixture B. The CDR does not require the reporting of mixtures.

Company 123

Salt of X:

- Report manufacturing information
- Report processing information (used to manufacture Chemical X)

Chemical X:

- Report manufacturing information
- Report processing and use information

Scenario 3 – Sulfuric Acid

- Summary:
  - Site A domestically purchases and uses sulfuric acid in its operations, which generates a spent sulfuric acid (SSA) and ships it to Site B.
  - SSA is a mixture of water, sulfuric acid, and unspecified impurities.
  - Site B uses SSA in a closed system:
    - SSA is used to convert the sulfuric acid to sulfur dioxide
    - The sulfur dioxide is reacted to create sulfur trioxide.
    - The sulfur trioxide is reacted to form sulfuric acid

Scenario 3 – Sulfuric Acid

Reporting Obligations:

Site A

Water:

- Not reportable

Sulfuric Acid:

- No manufacturing, and therefore no reporting

Unspecified Chemical Substances:

- Not reportable - byproducts not used for a separate commercial purpose.

SSA:

- Site A does not report SSA because it is a mixture.

Site B

Sulfur dioxide:

- Report manufacturing information
- Report processing information

Sulfur trioxide:

- Report manufacturing information
- Report processing information

Sulfuric acid:

- Report manufacturing information
- Report processing and use information

Scenario 3 – Sulfuric Acid

- If sulfur dioxide and sulfur trioxide are also not isolated, they would likely meet the definition for non-isolated intermediates which are exempt from CDR under 40 CFR 711.10(c).

- *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)

Scenario 4 – Wastewater

- Summary:
  - MNO Company, a metal processing facility, has an agreement with Company 678 to remove its wastewater/spent baths (Byproduct W) for treatment.
  - Byproduct W contains soluble metal compounds
  - Company 678 may recover Metal G from Byproduct W, depending upon the market value of Metal G. If the value of Metal G is low, Company 678 disposes of Byproduct W without recovering Metal G.
  - MNO Company is unaware of Company 678's use or disposition of Byproduct W.
- Assumptions:
  - Byproduct W is a UVCB chemical substance that was manufactured for a commercial purpose.

Scenario 4 – Wastewater

Reporting Obligations:

MNO Company

Byproduct W:

- Reportable as a feedstock for Metal G, which is a commercial use
- Volume that is disposed of as a waste does not have a commercial use and is exempted from reporting
- MNO Company needs to make a reasonable estimate of the volume to report or not report, or should report the full volume if a reasonable estimate cannot be made.
- Answer "yes" to the question "Is chemical being recycled?"

Company 678

Metal G:

- Report manufacturing information
- Report processing and use information

Scenario 5 – Reaction Byproduct

- Summary:
  - Company 123 reacts Chemical A and Chemical B to form Product AB and a byproduct mixture of Chemical A and Chemical C (Byproduct X).
  - Company 123 ships Byproduct X to Company 456.
  - Company 456 separates Byproduct X into Chemical A and Chemical C without a chemical reaction.
  - Company 456 uses both Chemical A and Chemical C for commercial purposes.

Scenario 5 – Reaction Byproduct

Reporting Obligations:

Company 123

Product AB:

- Reportable
- Answer "no" to "Is substance being recycled?"

Chemical C:

- Report, used by for a non-exempt commercial purpose
- Answer "yes" to "Is substance being recycled?"

Chemicals A and B:

- Not reportable – not being manufactured.

Byproduct X:

- Do not report because it is a mixture.

Company 456

Chemicals A and C:

- Do not report – not manufactured by Company 456

Scenario 6 – Reaction Byproduct 2

- Summary:
  - Company 123 reacts Chemical A and Chemical B to form Product AB and a byproduct mixture of Chemical A, Chemical C, and other unknown chemical substances, including reaction products (Byproduct X).
  - Company 123 ships Byproduct X to Company 456.
  - Company 456 separates Byproduct X into Chemical A, Chemical C, and the rest of the mixture (Mixture M), without a chemical reaction.
  - Company 456 uses both Chemical A and Chemical C for commercial purposes and disposes of Mixture M.
- Assumption and Discussion:
  - Mixture M is never used for its own commercial purpose.
  - Byproduct X can be treated as a mixture because the portions of the byproduct that are unknown have no commercial purpose and are disposed of as a waste.

Scenario 6 – Reaction Byproduct 2

Reporting Obligations:

Company 123

Product AB:

- Reportable
- Answer "no" to "Is substance being recycled?"

Chemical C:

- Report, used by for a non-exempt commercial purpose
- Answer "yes" to "Is substance being recycled?"

Chemicals A and B:

- Not reportable – not being manufactured.

Byproduct X:

- Do not report because it is a mixture.

Company 456

Chemicals A and C:

- Do not report – not manufactured by Company 456

Mixture M:

- Do not report – not used for commercial purposes and disposed of as a waste

Scenario 7 – Reaction Byproduct (3)

- Summary:
  - Same as Scenario 5, except for knowledge of Company 456's use of Byproduct X:
    - Company 123 reacts Chemical A and Chemical B to form Product AB and a byproduct mixture of Chemical A and Chemical C (Byproduct X).
    - Company 123 ships Byproduct X to Company 456.
- Assumptions and Discussion:
  - Byproduct X is correctly characterized as a mixture of two chemicals.
  - Company 123 is manufacturing Chemical C for commercial purposes.
  - Company 123 lacks an adequate factual basis to claim an exemption for Chemical C.
- Reporting Obligations for Company 123:
  - Same as scenario 5: Report Product AB and Chemical C

Scenario 8 – Reused Solvent Mixture

- Summary:
  - Company X manufactures Polymer Q in the presence of Solvent G.
  - Results in Mixture TT, consisting of unreacted raw materials, unspecified impurities, and Solvent G.
  - Mixture TT is stored in a tank until it is transferred back to the reactor for further use as a solvent.
- Assumptions:
  - Polymer Q is exempt from CDR under 40 CFR 711.6(a)(1).
  - The unspecified impurities were present in the raw materials.
  - Mixture TT is correctly characterized as a mixture.
- Reporting Obligations for Company X:
  - None - Polymer Q is exempt, Solvent G is not manufactured
  - Mixtures are not reported for CDR purposes

Scenario 9 – Potassium Iodide

- Summary:
  - Company 123 reacts Chemicals A and B to form Intermediate AB.
  - Results in formation of Mixture K, consisting of potassium iodide (KI) and water.
  - Mixture K is sold to company 456, which oxidizes the KI to form iodine for commercial purposes.

Scenario 9 – Potassium Iodide

Reporting Obligations:

Company 123

Intermediate AB:

- Reportable
- Answer "no" to "Is substance being recycled?"

Mixture K:

- Do not report because it is a mixture

Water:

- Fully exempted from reporting.

Potassium Iodide (KI):

- Report the volume of KI, which is used for a non-exempt commercial purpose.
- Do not include the volume of the water.

Company 456

Iodine:

- Report – manufactured for a commercial purpose

Scenario 10 – Spent Solvent 1

- Summary:
  - Company X reacts raw materials, including monomers and other agents, in the present of a purchased Solvent A to form
    - Polymer P, and
    - A spent solvent mixture, Mixture SS, consisting of Solvent A, unreacted starting materials, and unspecified chemical substances.
  - Mixture SS is collected in a storage tank, transferred to a distillation to separate Solvent A from the impurities and the unreacted starting materials.
  - The distilled Solvent A is transferred back to the reactor for reuse and the impurities and unreacted starting materials are incinerated.
- Assumptions:
  - Polymer P is exempt from CDR under 40 CFR 711.6(a)(1).
  - The unspecified chemical products in the byproduct are impurities that were present in the raw materials.

Scenario 10 – Spent Solvent 1

- Reporting Obligations for Company X:
  - Polymer P: No reporting obligations under the assumptions of this scenario.
  - Solvent A: No reporting obligations, because it is initially purchased and later distilled from a mixture.
  - Unspecified chemical substances: No reporting obligations for these byproducts, because they are disposed of as a waste and have no commercial purpose.
  - Mixture SS: No reporting obligations because the identified Solvent A is distilled and the rest of Mixture SS is disposed of as waste by incineration and has no commercial purpose.

Scenario 11 – Spent Solvent 2

- Summary:
  - Using information in Scenario 10, except Mixture SS is shipped to Company Y.
  - Company Y distills out Solvent A and ships it back to Company X for commercial use.
- Assumptions
  - It is assumed that after Company Y distills out Solvent A, the rest of Mixture SS is disposed of as a waste and has no commercial purpose.
- Reporting Obligations:
  - Company X: Same as for Scenario 10.
  - Company Y: No reporting obligations, because Solvent A is being distilled from a mixture.

Scenario 12 – Refrigerant Gases

- Summary:
  - Company 123 manufactures refrigerant Gases A, B, and C.
  - Off-spec gases A1, B1, and C1 are generated from the manufacturing operations and collected in a consolidation tank, where the 3 gases and compressor oil are sold to Company 456 as Mixture P.
  - Company 456 distills Recovered Gas A, Recovered Gas B, and Recovered Gas C and the compressor oil is incinerated.
  - Company 123 knows that Company 456 is selling the distilled gases for commercial use.

Scenario 12 – Refrigerant Gases

Reporting Obligations:

Company 123

Gases A, B, and C: Report manufacturing information

Gases A1, B1, and C1:

- Volume reported as part of Gases A, B, and C; compressor oil volume is not included
- Answer "no" to the question "Is chemical being recycled?" because Company 456 is finishing the gases and is not removing a chemical substance from a waste stream.

Mixture P: Not reported because it is a mixture.

Recovered Gases A, B, and C: Not reported.

Company 456

Gases A, B, and C:

No reporting, because they were manufactured by Company 123.

Gases A1, B1, and C1:

No reporting.

Mixture P:

No reporting.

Recovered Gases A, B, and C:

No reporting because they are being separated from a mixture.

Scenario 13 – Off-Spec Material

- Summary:
  - Company A produced and sold 180,000 lb of Substance X that met product specs.
  - Company A also produced 20,000 lb of Substance X that was off-spec for color due to an impurity (99% Substance X) and was reworked by distillation to remove the impurity, resulting in approximately 20,000 lb of >99% pure Substance X.
  - Company A determined that 200,000 lb of Substance X was reportable under CDR.
- Assumptions:
  - Substance X has a commercial purpose regardless of purity.
  - In this scenario, Company A is considered to be completing the manufacture of Substance A by reworking the off-spec material.

Scenario 13 – Off-Spec Material

Reporting Obligations for Company A:

Substance X:

- Report manufacture of 200,000 lb.
- Answer "no" to the question "Is chemical being recycled?" because the purification activity of the off-spec Substance X is simply product finishing and does not involve removing a chemical substance from a waste stream.

Scenario 14 – Carbon Canisters

- Summary:
  - Company A uses carbon canisters to remove excess organic alcohol during the manufacture of another chemical substance.
  - Company A sends used carbon canisters to Company Z.
  - Company Z regenerates the spent carbon by removing the adsorbed alcohol through a heating process.
  - Company Z repacks the canisters with new and/or regenerated carbon and sends them back to Company A for use.
- Assumptions:
  - EPA assumes that the organic alcohol is excess starting material and that it is being adsorbed to the carbon as a physical interaction as opposed to a chemical interaction.
  - The organic alcohol is not an "impurity" of the carbon, because the alcohol and carbon are being intentionally combined into a mixture.

Scenario 14 – Carbon Canisters

Reporting Obligations:

Company A

No reporting, because:

- Neither domestically manufactures nor imports the canisters and so is not required to report the carbon.
- The organic alcohol adsorbed onto carbon can be treated as a mixture of carbon and alcohol

Company Z

No reporting because separation of carbon from a mixture of carbon and organic alcohol is processing and not manufacturing.

Scenario 15 – Palladium Catalyst

- Summary:
  - Company X purchases and uses a palladium catalyst which is described as a mixture of palladium and carbon (the palladium is on a carbon support).
  - After the catalyst has been deactivated by adsorption of impurities, it is sent to Company Y for catalyst regeneration by an unknown process.
- Assumptions:
  - The palladium catalyst adsorbs impurities through a physical interaction and not a chemical interaction.
  - Company Y's catalyst regeneration process does not involve a chemical reaction.
  - Following removal of the palladium, the remainder of the material is disposed of as waste.

Scenario 15 – Palladium Catalyst

Reporting Obligations:

Company X

No reporting, because:

- Neither domestically manufactures nor imports the palladium catalyst.
- The impurities adsorbed onto the palladium catalyst are not reportable under 40 CFR 720.30(h)(1).

Company Y

No reporting, because although the chemical substances removed from the palladium catalyst are a byproduct of the purification process, the byproduct is disposed of as a waste and has no commercial purpose.

Scenario 16 – Electronics 1

- Summary:
  - Company EG sends outdated electronic equipment to CR Recycling but does not know what CR Recycling does with it.
  - CR Recycling may refurbish and sell the electronic equipment or disassemble for other uses.
  - As part of the other uses, CR Recycling may extract from the equipment metals used in solder.

Scenario 16 – Electronics 1

Reporting Obligations:

Company EG

No reporting because collecting old office equpment from domestic sources is not considered manufacturing.

CR Recycling

Reporting depends on use:

- Refurbishing: no reporting, if merely engaged in refurbishing.
- Metal reclamation: reporting for chemical substances it manufactures from chemical reactions in the reclamation process.

Scenario 17 – Electronics 2

- Summary:
  - Using information in Scenario 16, except Company EG is aware that CR Recycling will only use the office equipment to extract usable components, including metals.
- Reporting Obligations:
  - Company EG: same as for Scenario 16.
  - CR Recycling: reporting is required for chemical substances it manufactures from chemical reactions in the reclamation process, e.g. metal reclaimed for solder.

Scenario 18 – Electronics 3

- Summary:
  - Using information in Scenario 16, except Company EG imports used office equipment and sends it to CR Recycling.
- Assumptions and Discussion
  - Assumed that the used office equipment was imported intact.
  - If the office equipment is imported for the end use of metals reclamation, then that is an end use that is not depending in whole or in part on the shape or design of the office equipment and therefore, it is not eligible for the imported article exemption.
  - Chemical constituents in the office equipment other than those being reclaimed are impurities and are exempt under 40 CFR 720.30(h)(1).
  - Company EG needs a factual basis to claim the imported articles exemption. If the end use function is not known, then EG is a manufacturer of the chemical substances representing the recyclable metal value in the equipment.

Scenario 18 – Electronics 3

Reporting Obligations:

Company EG

Reporting depends on what EG knows about CR's end uses:

• Refurbishing: if EG knows that CR is refurbishing EG's imports, the imported articles exemption applies and EG has no reporting obligations.

•Reclamation: if EG knows that CR is reclaiming metal value from EG's imports, the imports are not articles and EG reports the manufacture of the specific chemical substances corresponding to the metal value.

•Dual uses: apportion the import volume between uses.

CR Recycling

Reporting depends on use:

- Refurbishing: no reporting, If merely engaged in refurbishing.
- Metal reclamation: reporting for chemical substances it manufactures, from chemical reactions in the reclamation process.

www.epa.gov/cdr

- Submission period ends June 30, 2012
- Revised byproducts guidance will be added to the CDR website
- See the CDR website for:
  - Frequently Asked Questions
  - On-line training
  - Guidance documents
  - e-CDRweb User guides
- Other questions? Email ecdrweb@epa.gov