Short Title: Approach E – Limit Reporting for Site-Specific Catalyst Recycling

General Description: Limit reporting for catalyst recycling, when as an inorganic byproduct that is recycled, reused, or reprocessed either at the site of byproduct manufacture or at a different site, it is returned to the site of byproduct manufacture for further use or processing.

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Proposal:
The reporting of inorganic byproducts that are recycled on-site or confined to recycling at another site, where recycled material is sent back to the original site of use (and byproduct generation), should be afforded a limited reporting burden that includes one-time reporting of the name of the byproduct and the average percentage range of byproduct that is recycled for subsequent use. If significant changes in the percentage range that is recycled occur, the generator of the byproduct would report that change to EPA in the next reporting cycle.

The manufacturer of the original material already reports the substances in the catalyst, the physical form of the catalyst, whether the catalyst is being recycled, and downstream uses on Form U as part of its CDR reporting obligations, including the sectors in which the catalyst is used, the number of sites and the number of workers. The information that EPA does not have from the original manufacturer is the name of the byproduct and how much is sent for recycling.

General Description:
Catalysts are used throughout the chemical and refining industries to help produce desirable products under less hazardous conditions. They are critical to work place safety. Catalysts are used in closed systems, which are designed to reintroduce the catalyst into a processing unit or reaction vessel until the catalyst is spent and in need of regeneration (an industry term synonymous with recycling). During the use of the catalyst, in some cases inorganic byproducts are formed. Catalyst regeneration also takes place in closed systems during processing and often makes use of chemical reactions to return the spent catalyst to its original and useful molecular species.

The methods for catalyst regeneration are varied, depending on molecular structure of the catalyst after use and the specific chemical reactions required to return the catalyst to its original molecular species. The one thing that catalyst regeneration techniques tend to have in common is that the reactions take place in closed systems during processing. During regeneration, the used catalyst is introduced into a reaction vessel with one or more other chemicals to induce a reaction that consumes the reactants and forms one or more new molecular species. Some of the new molecular species are disposed of as waste and subject to federal and local requirements. The new molecular species of interest is also consumed in each step until the original catalyst species is produced. The only products resulting from this multi-step process are some wastes (not currently reportable under CDR) and the original catalyst species. The only commercial intent in this process is to recycle a used catalyst and return that catalyst for its original purpose.

Reporting burden requirements/problems(s) addressed with proposed revision(s):
- The time and resources necessary to identify the substance or substances and, in some cases, submit a PMN for the specific inorganic species or UVCB not currently on the Inventory or distributed in commerce.
- The time and resources necessary to track and report the amounts manufactured on an annual basis.
- These costs can be excessive and repetitive when one considers that facilities and/or processes that manufacture the same products may use slightly different raw materials, catalysts, unit sizes and process conditions, which can impact the specific chemical identity produced (so there is no cookie cutter

approach across facilities or units). In addition, these materials and conditions can change over time as companies make efforts to optimize processes.
- The CDR database would contain higher quality, more accurate data because there would not be multiple counting of the same molecule as it passed through the recycle loop.

Under proposal, describe information that would no longer be reported/available:
- Redundant information pertaining to the original catalyst would not be reported during each reporting cycle.
- Chemical substances temporarily produced and then consumed during the recycling process would not be reported.

Under the proposal, describe the type of information that would remain available on the byproduct as manufactured and the byproduct as recycled for purposes of EPA evaluation:
- If the generator of the inorganic byproduct sells that byproduct into commerce for uses other than those covered by this reduced reporting proposal, those would still be reported under the CDR by the byproduct manufacturer.
- Recycling of the inorganic byproduct may still be subject to certain TRI and RCRA reporting requirements.
- The original chemical substance would still be reported under CDR as required.

Conditions to be met for exemption:
1. The virgin substance has already been reported under CDR,
2. Production of the inorganic byproduct takes place in a closed system during any processing and the entire process takes place at only one site,
3. Regeneration takes place in a closed system during any processing and the entire process takes place at only one site, and
4. Recycled substance is used by the same entity that either generated the inorganic byproduct or that needed it to be regenerated.

Examples
Metal Catalysts:
Metal catalysts are used in certain refining processes. Depending on the severity of its use, the catalyst is contaminated with coke and other organic materials and requires regeneration periodically (e.g., every 6 months, annually or biannually). The organic materials occlude (block) the pore sites and reduce the surface area of each catalyst particle, which reduces contact with reactants, thereby reducing the effectiveness of the catalyst. Regeneration is a physical process that uses heat to remove the organic materials; therefore, there is no chemical change and no biproduct formed. There is nothing reportable under this scenario under the current reporting criteria.

Over time, the catalyst can no longer be regenerated and is sent off-site for reclamation of the metal. For safety reasons, the metal catalyst is often deactivated by conversion to a metal oxide prior to shipment. Under the current reporting system, the metal oxide would be reported under CDR, even though it poses less risk than the metal catalyst. Under the proposal, the metal oxide would be considered an intermediate and would not be reported.

Depending on the catalyst, reclamation can use chemical reactions and/or heat to reclaim the metal. Either approach results in complete destruction of the original catalyst species and, through a series of steps, results in the manufacture of the metal. Currently, the intermediates formed during processing are reportable, as is the resulting metal. Under this proposal, only the resulting metal would be reported under CDR. The intermediates that are formed and consumed during processing would no long be reported.

Acid Catalysts:
Acid catalysts are described in a different manner than metal catalysts. When acid catalysts need regeneration, they are considered "spent." For metal catalysts, "spent" means that the catalyst can no longer be regenerated. When an acid catalyst is spent, it usually means that impurities are formed, which reduces the acidity and, thereby, the catalytic effectiveness. At that point, the acid needs to be regenerated.

The method for regenerating the acid catalyst is also different than for metals. In the case of sulfuric acid, heat is used to thermally decompose the spent acid and form sulfur dioxide, which is then cleaned and oxygenated to form sulfur trioxide. The sulfur trioxide is mixed with water to form sulfuric acid. Under the current regulations, the sulfur dioxide, sulfur trioxide and sulfuric acid are reportable. Under the proposal, there would be no reporting as long as sulfuric acid is sent back to the original site.

Background
Status:
<u>711.10 Activities for which reporting is not required.</u>
A person described in § 711.8 is not subject to the requirements of this part with respect to any chemical substance described in § 711.5 that the person solely manufactured or imported under the following circumstances:
(a) The person manufactured or imported the chemical substance described in § 711.5 solely in small quantities for research and development.
(b) The person imported the chemical substance described in § 711.5 as part of an article.
(c) The person manufactured the chemical substance described in § 711.5 in a manner described in 40 CFR 720.30(g) or (h).

720.30: Chemicals Not Subject to Notification Requirements
(g) Any byproduct 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.)

(h) The chemical substances described below: (Although they are manufactured for commercial purposes under the Act, they are not manufactured for distribution in commerce as chemical substances per se and have no commercial purpose separate from the substance, mixture, or article of which they are a part.)

(1) Any impurity.
(2) Any byproduct which is not used for commercial purposes.
(3) Any chemical substance which results from a chemical reaction that occurs incidental to exposure of another chemical substance, mixture, or article to environmental factors such as air, moisture, microbial organisms, or sunlight.
(4) Any chemical substance which results from a chemical reaction that occurs incidental to storage or disposal of another chemical substance, mixture, or article.
(5) Any chemical substance which results from a chemical reaction that occurs upon end use of another chemical substance, mixture, or article such as an adhesive, paint, miscellaneous cleanser or other housekeeping product, fuel additive, water softening and treatment agent, photographic film, battery, match, or safety flare, and which is not itself manufactured or imported for distribution in commerce or for use as an intermediate.
(6) Any chemical substance which results from a chemical reaction that occurs upon use of curable plastic or rubber molding compounds, inks, drying oils, metal finishing compounds, adhesives, or paints, or any other chemical substance formed during the manufacture of an article destined for the

marketplace without further chemical change of the chemical substance except for those chemical changes that occur as described elsewhere in this paragraph.

(7) Any chemical substance which results from a chemical reaction that occurs when (i) a stabilizer, colorant, odorant, antioxidant, filler, solvent, carrier, surfactant, plasticizer, corrosion inhibitor, antifoamer or defoamer, dispersant, precipitation inhibitor, binder, emulsifier, deemulsifier, dewatering agent, agglomerating agent, adhesion promoter, flow modifier, pH neutralizer, sequesterant, coagulant, flocculant, fire retardant, lubricant, chelating agent, or quality control reagent functions as intented, or (ii) a chemical substance, which is intended solely to impart a specific physiochemical characteristic, functions as intended.

(8) Any nonisolated intermediate.

(i) Any chemical substance which is manufactured solely for non-commercial research and development purposes. Non-commercial research and development purposes include scientific experimentation, research, or analysis conducted by academic, government, or independent not-for-profit research organizations (e.g., universities, colleges, teaching hospitals, and research institutes), unless the activity is for eventual commercial purposes.

Current CDR Reporting Process for Catalysts