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Promoting Chemical Recycling: Resource Conservation In Chemical Manufacturing

PROMOTING CHEMICAL RECYCLING:
Resource Conservation in Chemical Manufacturing

Lessons from the New Jersey Chemical Industry Project
Materials Recycling Team

Scenarios and Regulatory Interpretations
June, 1999

PREFACE

The U.S. Environmental Protection Agency's (EPA) Office of Policy is working with the New Jersey Department of Environmental Protection (NJ DEP), EPA Region 2, and a Stakeholder group made up of industry, environmental group, union, and community representatives on a project involving the batch chemical industry in New Jersey. This project, named the New Jersey Chemical Industry Project, is an effort to assess current environmental protection strategies on a sector basis and develop better approaches.

The project started by asking what inspires companies to achieve--or keeps them from achieving--better environmental performance. From this information, the Stakeholder group developed a list of 45 issues for possible pilot projects to test new environmental protection strategies. The Materials Recycling Pilot was one of four pilot projects selected by the Stakeholder group. The other pilots selected by the group include: effluent trading of local limits between indirect dischargers, compliance assistance, and flexible track for good environmental performers.

A subset of the Stakeholder group formed the Pilot Team for the Materials Recycling Pilot, along with several additional facility and regulatory experts who were invited to participate. The Pilot Team worked together to identify and define five materials recycling scenarios that are potentially applicable to many batch chemical manufacturers. NJ DEP and EPA staff reviewed the scenarios and determined how the recycling activities envisioned in the scenarios relate to current regulations. Since New Jersey hazardous waste regulations are the same as federal hazardous waste regulations, the information presented here is applicable to facilities in other states where the federal hazardous waste regulations also apply. The Pilot Team anticipates that these scenarios and responses will provide useful information to chemical facilities and other manufacturing facilities that have similar materials recycling opportunities.

Two facilities on the Pilot Team have already implemented one of the scenarios. The Pilot Team has documented the economic and environmental benefits of the scenario in Appendix A. Another facility is currently trying to identify trading partners for implementing a second scenario.

In addition to this report, the New Jersey Chemical Industry Project has prepared reports on the work of the Effluent Trading Pilot Team and the Compliance Assistance Pilot Team. The Effluent Trading report describes the Pilot Team's experience in implementing the first-ever trade of local pretreatment limits among indirect dischargers. It also provides guidance on how trading of local limits can be established at other publicly-owned treatment works. This report is titled *Sharing the Load: Effluent Trading for Indirect Dischargers (*EPA-231-R-98-003, May, 1998).

The Compliance Assistance report describes how the Pilot Team developed compliance assistance materials for New Jersey companies as an Industry-Government Team. The materials include plain language descriptions of many NJ state environmental regulations and NJ DEP

compliance assistance activities, applicability flowcharts for six key regulations, and an extensive bibliography of compliance assistance resources. The cooperative approach allowed the Pilot Team to develop materials that were targeted to industry needs, used less agency resources, and improved relationships between industry and regulators. The report is titled *Inspiring Performance: The Government-Industry Team Approach to Improving Environmental Compliance* (EPA-231-R-99-002, May 1999). The compliance assistance materials that were developed can be viewed on the Internet, at **http://www.state.nj.us/dep/enforcement/home.htm.**

The Pilot Team for the final pilot, Flexible Track, is working with EPA and NJ DEP to develop a program that provides incentives to facilities that are good environmental performers. NJ DEP anticipates announcing the project and accepting applications in the fall of 1999. The Pilot Team is also working with EPA and NJ DEP to develop future enhancements for the Flexible Track program.

For more information about the New Jersey Chemical Industry Project, the Materials Recycling Pilot, or any of the other Pilots, or to obtain a copy of any of the New Jersey Chemical Industry Project reports, please contact:

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This project benefitted from the dedication, enthusiasm, creativity, and technical knowledge of the participants on the Materials Recycling Pilot Team of the New Jersey Chemical Industry Project. Through the efforts of the Pilot Team, the expertise and perspectives of both industry and regulatory agencies have been incorporated throughout the definition, implementation, and documentation of this pilot project.

Each of the Pilot Team members listed on page iii contributed to the preparation of this document. This includes Barry Bochner, Fabricolor, Inc.; Shih Chang, New Jersey Department of Environmental Protection; Joseph Gentile, CasChem, Inc; Dorothy Kelly, Ciba Specialty Chemicals; Richard Klawunn, Tosco; Mitchell Press, E.I. DuPont; Sharon Sexton, Infineum USA L.P.; and Sarah Henricks Holtz, Joshua Levine, and Eric Ruder, Industrial Economics. We would also like to thank the EPA staff members who contributed to this report. This includes staff from the Office of Policy, who helped draft the scenarios and staff from Region 2 Division of Environmental Planning and Protection, who helped prepare scenario responses. The team would like to extend a special thank you to the staff from the Office of Solid Waste, who reviewed the document to ensure consistency with Resource Conservation Recovery Act (RCRA) regulations.

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INTRODUCTION CHAPTER 1

Background

The New Jersey Chemical Industry Project Stakeholder group established the Materials Recycling Pilot project to promote safe and economical recycling of materials produced by batch chemical manufacturing processes. The group saw opportunities for improving environmental quality and reducing costs by recycling materials that were being treated and disposed. Some facilities sent "non-product output" materials to hazardous waste sites rather than recycling them because of the regulatory requirements that facilities believed recycling would entail. Other facilities transported and used virgin raw materials by the truckload to neutralize the pH of process effluent before discharging it into a sewer rather than reusing other process streams as neutralization chemicals.

The Stakeholders realized that significant environmental as well as economic benefits could be reaped if some of these practices could be changed so that certain materials were safely recycled within a facility or at another facility. These benefits would accrue from:

- Reducing the amount of chemicals shipped off-site for treatment or disposal,
- Reducing the need for facilities to purchase new solvents and other raw materials (thereby reducing the environmental costs of the manufacture and transport of these materials), and
- Reducing the associated financial costs of these activities.

The Materials Recycling Pilot Project

The goal of the Materials Recycling Pilot is to conserve raw materials and improve resource use and process efficiency by facilitating safe and efficient recycling of materials. We define materials recycling as an activity in which non-product output from one process is used productively and safely as an input for the same or a different process. Recycling activities can be performed at a single industrial facility or can be an exchange of materials with other facilities. The Pilot Team

hopes that the information in this report will encourage chemical and other manufacturing facilities to explore materials recycling opportunities.

The Materials Recycling Pilot Team prepared this document to encourage innovative thinking about recycling activities. Even if your operations do not fully match those presented in these scenarios, we strongly encourage facilities to discuss opportunities for recycling with the appropriate state or federal agency.

The Pilot Team prepared a series of five scenarios that represent a range of likely materials recycling scenarios for the batch chemical industry. The five scenarios are:

- Scenario 1: Trading Neutralization Chemicals
- Scenario 2: Wastewater Alcohol Reuse
- Scenario 3: Characteristic By-Product Recycling
- Scenario 4: On-Site Reclamation of Spent Solvents
- Scenario 5: Off-Site Reclamation of Spent Solvents

For each scenario, the Pilot Team aimed to clearly delineate the conditions under which the proposed activities are permissible. The Pilot Team felt this was particularly important for facilities in New Jersey, since the State's hazardous waste rules were changed in 1996 to be consistent with the federal rules, and therefore facilities may be confused about how the new rules apply. Each scenario contains a description of the process that is currently in place, the proposed recycling activities that would be beneficial for a facility to undertake, and a series of questions and responses that specify the conditions under which regulatory requirements apply or do not apply. The scenarios and responses were prepared by various members of the Pilot Team and refined through a series of discussions.

For three of the scenarios -- Trading Neutralization Chemicals, Wastewater Alcohol Reuse, and Characteristic By-product Recycling -- the proposed materials recycling activity may be undertaken without triggering hazardous waste management requirements as long as certain conditions are met. For the other two scenarios, hazardous waste management requirements would be triggered under most conditions. The conditions that would trigger hazardous waste management requirements in each of the five scenarios are identified in the scenario descriptions that follow.

Two facilities on the Pilot Team have already implemented the Wastewater Alcohol Reuse scenario, and we have summarized the associated environmental and economic benefits in Appendix A of this report. Another facility is currently trying to identify a trading partner for the Trading Neutralization Chemicals scenario.

Regulatory Background Information for Interpreting the Scenarios

The discussion for each scenario is intended to explain how the current Resource Conservation and Recovery Act (RCRA) hazardous waste management regulations apply to the scenario. The majority of the regulatory citations in this report refer to the federal RCRA hazardous waste management regulations found in Title 40 of the United States Code of Federal Regulations (CFR).

Note that this report focuses on the federal hazardous waste management regulations. Most states are authorized to implement the federal regulations, and individual state regulations may be more stringent than the federal regulations. In authorized states, the state regulations apply to facilities in lieu of the federal regulations. Anyone interested in the specifics of the application of the federal hazardous waste regulations to a particular facility should contact the appropriate state environmental agency.

It is important to recognize that in order to make this report usable, the descriptions of the scenarios and the regulatory discussions are brief and somewhat generalized. These descriptions do not include all of the information that would be necessary to accurately determine, in detail, how the hazardous waste regulations would apply to a particular case. All possible variations of these scenarios are also not included. It is anticipated that members of the regulated community would work with representatives of the appropriate state or federal regulatory agency to discuss the details of any particular situation.

This report is not intended to change any aspect of the current federal hazardous waste regulations. Its goal is to aid in the application of these regulations for facilities that encounter opportunities similar to those outlined in the scenarios presented here. Please note the date this report was prepared, indicated at the bottom of each page. Any future changes to the federal hazardous waste regulations made after this date may supercede the discussions presented in this report.

Introduction to the Federal Hazardous Waste Regulations Discussed in the Scenarios

All of the scenarios in this report discuss the application of the federal hazardous waste regulations to a recycling activity. These regulations are published in the Code of Federal Regulations (CFR), which is available in many law libraries. The CFR is also available at:

http://www.access.gpo.gov/nara/cfr/index.html

A brief introduction to these regulations is presented below.

Very generally, a secondary material is regulated if it is disposed. Whether a secondary material is regulated as a solid and hazardous waste when recycled depends largely on three things:

1) **Whether treatment or processing is required prior to reuse.** Secondary materials that are reused directly without reclamation (processing or treatment) may be excluded from being regulated as a solid or hazardous waste if certain conditions are met (40 CFR 261.2(e)).

2) **The type of recycling activity.** Secondary materials that are recycled in certain ways are regulated as solid and hazardous wastes. These include materials that are speculatively accumulated (stored for long periods of time without recycling), burned for energy recovery, or used in a manner constituting disposal (e.g., used by being placed on the land).

3) **The type of material recycled.** Of those secondary materials that are reclaimed, listed wastes and all spent materials are regulated as solid and hazardous wastes. However, by-products and sludges that are hazardous only due to exhibiting a characteristic of hazardous waste are not regulated as solid and hazardous wastes.

There are also numerous exclusions, exemptions, and special regulations that address the regulatory status of many specific recycling activities.

All exclusions and exemptions for recycled materials are applicable only if the recycling is legitimate, and not sham, recycling. Whether a recycling activity is legitimate depends on the individual recycling activity. To encourage recycling, EPA subjects recycling activities to reduced regulation. Some facilities, however, may claim that they are "recycling" a material in order to avoid being subject to RCRA regulation, when in fact the activity is not legitimate recycling. Therefore, EPA has established guidelines for what constitutes legitimate recycling and has described activities it considers to be "sham recycling."

Considerations used in determining whether an activity is legitimate recycling include but are not limited to: how the material is used to make a marketable product, how the material is stored/managed to minimize loss, the time until the material is actually recycled, and the record-keeping practices used by the facility to track the material. For additional guidance on how this determination is made, see the April 26, 1989 Office of Solid Waste memorandum from Sylvia K. Lowrance, Director, to the U.S. Environmental Protection Agency (EPA) Regions I - X Hazardous Waste Management Division Directors, which is included as Appendix C to this report. It is assumed that all of the recycling scenarios described in this report have been determined to be legitimate recycling.

Under CFR 261.2(f), facilities claiming that materials are excluded from the definition of solid waste or conditionally exempted from the hazardous waste regulations must be able to document that the terms of the exclusion or exemption are met.

In each of the scenarios, it is also assumed that generators are regulated large- or small-quantity generators.[1] However, the requirements might be different from those presented here for conditionally exempt small quantity generators (generators who generate 100 kg of hazardous waste per month or specified small quantities of acutely hazardous waste).

Generators of regulated hazardous waste generally can store and treat the hazardous waste on-site within either 90, 180, or 270 days without a RCRA permit depending upon the quantity of waste and several other conditions specified in 40 CFR 262.34. However, management standards do apply. In many cases, the recycling unit itself is exempt from RCRA regulations (see 40 CFR 261.6(c)). The Land Disposal Restrictions (LDR) requirements of 40 CFR part 268 generally apply to the management of any material that is determined to be hazardous waste. For generators of recycled hazardous waste, the requirements may largely consist of notification and proper management of residues.

While it is not addressed in detail in this report, there is also a Closed Loop Exclusion in the regulations (40 CFR 261.4(a)(8)) that is available to encourage on-site recycling of process materials.

[1] For guidance on the hazardous waste rules for small quantity generators, see U.S. EPA's *Understanding the Small Quantity Generator Hazardous Waste Rules: A Handbook for Small Businesses - 1996 Update* (EPA 530-K-95-001).

Spent Material

As defined in 40 CFR 261.1(c)(1), a spent material is "any material that has been used and as a result of contamination can no longer serve the purpose for which it was produced without processing."

Solvent/Spent Solvent

A solvent is a chemical that does not participate in the chemical reaction(s) and does not change its chemical structure throughout the chemical reaction process. It is neither a reactant nor a product of the reaction. A spent solvent is a solvent that has been used, and as a result of contamination can no longer serve its solvent purpose without processing. If a contaminated solvent continues to be used directly as a solvent, it is not a spent solvent. See 50 FR 53316, December 31, 1985, for additional discussion of solvents and solvent uses.

Listed Waste

A listed waste is a secondary material that is specifically listed in CFR 261 as a hazardous waste.

Reactant

A reactant is a chemical that reacts with other chemicals (reactants) to form products that are chemically different from the original reactant molecules.

By-product

As defined in 40 CFR 261.1(c)(3), a by-product is "a material that is not one of the primary products of a production process and is not solely or separately produced by the production process. Examples are process residues such as slags or distillation column bottoms." By-products include materials, generally of a residual nature, that are not produced intentionally or separately, and that are unfit for end use without substantial processing (50 FR 625, January 4, 1985).

A characteristic by-product is not specifically listed in CFR 261 but exhibits one or more hazardous waste characteristics, i.e., it is ignitable, EP toxic, corrosive, and/or reactive.

Co-Product

While there is not a separate regulatory definition for the term "co-product," it is described in the regulations as a material "that is produced for the general public's use and is ordinarily used in the form it is produced by the process" (40 CFR 261.1(c)(3)). EPA has provided some further clarification as to what would be considered a co-product, as distinct from a by-product. Generally, co-products are "materials produced intentionally, and which in their existing state are ordinarily used as commodities in trade by the general public " (50 FR 625, January 4, 1985).

Effective Substitute for a Commercial Product

Whether a material can be used as an "effective substitute" (40 CFR 261.2(e)(1)(ii)) must be decided on a case-by-case basis, and depends on the individual situation where the substitute is used. Generally, the material should be something that can be used as a functional replacement for a commercial product and that a user would consider buying. Other considerations include: 1) the amount and effect of toxic constituents in the effective substitute that are not found in a commercial grade material, 2) whether it is more or less cost effective to use the material in question or a commercial product, and 3) whether actual use of the effective substitute as compared to the commercial grade material is more or less operationally effective in producing the intended product. For additional guidance on how this determination is made, see the attachment to an April 26, 1989 Office of Solid Waste memorandum from Sylvia K. Lowrance, Director, to EPA Regions I - X Hazardous Waste Management Division Directors, which is included as Appendix C to this report.

Additional definitions may be found in the RCRA regulations under 40 CFR 260.10 and 40 CFR 261.1(c).

Scenario Description

Overview

A manufacturing facility would like to trade acidic and alkaline process streams with other facilities as an alternative to purchasing fresh chemicals for their neutralization systems. For example, a dye manufacturer produces an acidic process stream that contains sulfuric acid produced from oleum. The facility, which normally uses fresh ammonia to neutralize its process streams before discharging to a Publicly Owned Treatment Works (POTW), would like to trade its acidic process stream to a facility needing acid for neutralization of its process streams. Alternatively, the facility would like to receive an alkaline process stream from another facility to neutralize its process stream. In either case, the traded material would be combined with the receiving facility's process stream to neutralize the pH, then discharged into the sewer to a POTW. These process streams have been classified as by-products under the RCRA hazardous waste regulations. (See Chapter 2, Definition of Terms.)

Benefits

This scenario would benefit the environment by reducing the use and discharge of fresh corrosive neutralization chemicals. This could also reduce the demand for production of these neutralization chemicals. In addition, it would decrease the risk of release during transportation if the distance between the trading facilities is less than the total distance between each of the trading facilities and the manufacturers of the neutralization chemicals they use to neutralize their process streams.

The facility receiving the acid or alkaline process stream would benefit as long as the cost of identifying a trading partner and its share of the transportation costs are less than the cost of purchasing fresh neutralization chemicals. The facility trading away the acid or alkaline stream

would also benefit as long as the cost of identifying a trading partner and its share of the transportation costs are less than the cost of neutralizing and disposing of its process stream.

Other Issues

During trading, a facility may receive a process stream containing materials (e.g., copper and organic chemicals) that are not currently present in its waste. By receiving this process stream, the facility's discharges may be subject to categorical and/or local discharge limits for the new materials. Similarly, a process stream traded to the recipient facility may contain materials in quantities that, together with the quantities in the facility's current waste, exceed the applicable limits. These issues would have to be discussed and resolved with the receiving POTW. If the two facilities discharge to the same POTW, the trading framework could be constructed to allow the water discharge permit limits for each facility to apply across trading partners if their combined discharges to the POTW do not exceed the applicable limits for all permitted substances. These aspects of the trade would have to be approved by the POTW.

Additional Information

- **Handling of Traded Materials vs. Analogous Raw Materials.** The traded materials would be handled similarly to analogous raw materials, in a tank wagon, drums, or totes.

- **Are there Hazardous Constituents or Characteristics in the Traded Materials not Found in Analogous Raw Materials?** In this example, the acidic traded materials would contain copper, while analogous raw materials would not. Although copper is not a RCRA hazardous constituent, it is a Clean Water Act priority pollutant. We assume that the alkaline process stream does not contain any additional hazardous constituents. The process streams, which have a pH of <2 or >12.5, would be hazardous wastes because they exhibit the characteristic of corrosivity. These process streams are not listed wastes, do not contain any listed wastes, and do not exhibit any other characteristics of hazardous waste that would not be found in analogous raw materials (e.g., they do not exhibit the characteristic of toxicity (TC)).

- **How are the Process Streams Treated?** It is not known if the alkaline process stream would receive any treatment. The acidic process stream would be managed on-site before the material is traded in one of three ways:

  Scenario a: The material is partially neutralized (but is still corrosive) by adding gaseous ammonium or caustic soda or other neutralization chemicals.

It is also treated to remove the copper either by ion exchange, electro winning or reverse osmosis.

Scenario b: The material is not neutralized but is treated to remove the copper by either ion exchange, electro winning or reverse osmosis.

Scenario c: The acidic material is not neutralized and is not treated to remove the copper. In this case, the copper concentrations would either be below the POTW local limits or a POTW-approved effluent trading agreement with another facility would be in effect. This agreement would raise the facility's permitted copper limit so that the copper concentrations would be within the facility's permitted limit, although above the local limit *(see the discussion under "Other Issues," above).*

Relevant Regulations, Permits, and Guidance

- N.J.A.C. 7:26G-5,6, and 7
- *Draft Framework for Watershed-Based Trading* (EPA 800-R-96-001, May 1996)
- *Sharing the Load: Effluent Trading for Indirect Dischargers* (EPA 231-R-98-003, May 1998)
- Relevant Effluent Guidelines
- Relevant POTW Regulations and Guidance
- Identification and Listing of Hazardous Waste (40 CFR Part 261)

Questions and Regulatory Response

General Comments

The regulatory status of the traded materials under the RCRA hazardous waste regulations could be different depending on whether the materials are spent materials or by-products (see definitions). Based on the specifics of the facilities under consideration in this Pilot, both the acidic and alkaline process streams have been determined to be by-products.

Questions and Answers

1. What would be the regulatory status of the acidic process stream that is traded from the dye manufacturer to another facility under New Jersey state and federal hazardous waste regulations under Scenario a? Scenario b? Scenario c?

Answer: The New Jersey state regulations are the same as the federal regulations. The acidic process stream is a characteristic by-product. For Scenarios a and b, if the acidic process stream is reclaimed prior to use (e.g., copper is removed), it is not a solid or hazardous waste and its management is not subject to the RCRA hazardous waste regulations. This is because characteristic by-products that are reclaimed are not solid wastes under 40 CFR 261.2(c)(3). Note that the material may not be used in a manner constituting disposal (e.g., used by being placed on land), burned for energy recovery, or speculatively accumulated.

For Scenario c, if the acidic process stream is legitimately used directly (without reclamation) as an effective substitute for a neutralization product, it is not a solid or hazardous waste and is not subject to the RCRA hazardous waste regulations as long as it is not used in a manner constituting disposal, burned for energy recovery, or speculatively accumulated. (40 CFR 261.2(e)(1)(ii) and 40 CFR 261.2(e)(2)).

Once reclaimed (or if the process stream does not need reclamation), the acid would be considered an effective substitute for a commercial product and is not a solid or hazardous waste as long as it is not used in a manner constituting disposal, burned for energy recovery, or speculatively accumulated. (40 CFR 261.2(e)(1)(ii) and 40 CFR 261.2(e)(2)).

2. What would be the regulatory status of the alkaline process stream under current New Jersey state and federal regulations?

Answer: For the potential trading partner identified, the alkaline process stream is also a characteristic by-product, thus the answers are the same as in 1, above. For other facilities, the alkaline (or acid) process stream may be a spent material or a characteristic by-product, depending on how it is produced.

3. Would the RCRA regulatory status of the process streams change if the facilities were direct dischargers instead of dischargers to a POTW?

Answer: No, the RCRA regulatory status does not change.

Scenario Description

Overview

A chemical manufacturing facility and a refinery are co-permittees of a private wastewater treatment plant (WWTP). Discharges from the refinery to the WWTP contain organics, including alcohols and other hydrocarbons. These organics are used by the WWTP as a food source (substrate) for the microbes that biodegrade wastewater. The microbes must have a sufficient level of substrate to maintain proper operation of bio-treatment processes at the WWTP. During scheduled and unscheduled downtimes for the refinery, the substrate necessary for bio-treatment must be obtained from other sources because the refinery does not discharge sufficient organics to support the microbial population. Food supplements are also necessary to support the microbial population at other times of the year, for example, during cold weather.

The chemical manufacturer produces alcohols from the manufacture of lubricating oil additives. The manufacturer currently manages these alcohols by phase separating alcohol from wastewater, placing the alcohol into a tank and shipping it offsite to fuel blending operations. The chemical manufacturer would like to send these alcohols to the WWTP, where they could help to maintain a healthy microbial operation and enhance biodegradation of chemical compounds during downtimes for the refinery and other times when food for the microbes is limited.

The alcohols would not require any treatment or processing prior to their use in the WWTP, other than phase separation from the wastewater. The alcohol/wastewater would not be stored for a long enough period of time to be speculatively accumulated (40 CFR 261.1(c)(8)).

The alcohols have been classified as by-products under the RCRA hazardous waste regulations (See Chapter 2, Definition of Terms).

This scenario has already been implemented by two industry members of the Materials Recycling Team. The environmental and economic benefits of this scenario are described in more detail in Appendix A.

Benefits

This scenario would benefit the environment by reusing, rather than discarding, the wastewater alcohols; reducing the use and therefore demand for production of fresh alcohol to help sustain microbes; and improving the functioning of the microbes and the quality of discharges from the WWTP. Both the manufacturing plant and WWTP would also benefit financially -- the manufacturing plant would benefit from avoided treatment and disposal costs for the alcohol, and the WWTP would benefit from avoided purchases of fresh alcohol.

Additional Information

- **What is the composition of the alcohol/wastewater mixture from the chemical manufacturer?** The alcohol composition changes based on production requirements for the plant. However, ethanol accounts for approximately 50 percent of the alcohol at all times. Other alcohols include isoamyl alcohol, isobutanol, isopropanol, and methyl isobutyl carbinol.

- **Does the alcohol/wastewater mixture contain any hazardous constituents or exhibit any hazardous waste characteristics?** The alcohol/wastewater mixture may exhibit the characteristic of ignitability, and contains zinc (which is not a RCRA hazardous constituent).

- **How is the alcohol transferred from the facility to the WWTP?** Alcohols would be initially transferred to the WWTP through a discharge pipe or in tank wagons.

Regulations Involved

- Identification and Listing of Hazardous Waste (40 CFR Part 261)

<u>Questions and Regulatory Response</u>

General Comments

The answers for this scenario are based on the assumption that the alcohol/wastewater mixture is a by-product, as defined in 40 CFR 261.1(c)(3)

Assuming the alcohol/wastewater by-product from the lube oil additive manufacturing process is a characteristic by-product (see definitions), it would not be considered a RCRA solid waste when reclaimed by being phase-separated, pursuant to 261.2(c)(3), provided that the by-

product wastewater/alcohol stream: (1) is truly a by-product and not a spent material, (2) is not a listed hazardous waste, and (3) is not used in a manner constituting disposal, burned for energy recovery, or accumulated speculatively.

Once the secondary material is reclaimed (or if the material did not need reclaiming), it is not a solid or hazardous waste if it is an effective substitute for a commercial product (40 CFR 261.2(e)(1)(ii)) as long as it is not used in a manner constituting disposal, burned for energy recovery, or speculatively accumulated. (40 CFR 261.2(e)(2)).

Questions and Answers

1. Under the current RCRA regulations, can the reclaimed alcohol be used in the WWTP without being regulated as a hazardous waste?

   Answer: Yes, if the reclaimed alcohol is an effective substitute and is not used in a manner constituting disposal, burned for energy recovery, or speculatively accumulated. (40 CFR 261.2(e)(1)(ii) and 40 CFR 261.2(e)(2)).

2. Would the regulatory requirements change if it were found that some of the reclaimed alcohols were more beneficial than others in promoting a healthy microbial population?

   Answer: No, as long as the reclaimed alcohols are determined to be an effective substitute for commercial alcohols, the regulatory analysis does not change.

3. Would the regulatory situation change if the reclaimed alcohol proved to be a slightly less effective nutrient for WWTP microbes than a specific, purchased alcohol?

   Answer: As long as the reclaimed alcohols used are determined to be an effective substitute for a commercial product, the regulatory analysis would not change. Since generators who raise a claim that a certain material is not a solid waste must demonstrate that there is a known market for the material and that they meet the terms of the exclusion or exemption, it is important to document, including testing results, that the alcohol mixture is an effective substrate for enhancing the microbial population or enhancing biotreatment (40 CFR 261.2(f)).

4. Would the regulatory requirements change if the reclaimed alcohols were supplied from another facility, not a co-permittee of the WWTP, and all other factors remained the same?

   Answer: No, the hazardous waste regulatory analysis does not depend on the location of generation or use of the material, and thus would not change. The sending facility would need to ensure that the by-product use would be approved by the WWTP.

5. Does the regulatory status of the reclaimed alcohols change for any of the above questions if they were transferred to the WWTP via mobile tank truck instead of being hard-piped?

   Answer: No, the regulatory analysis does not depend on the mode of transport and thus would not change.

6. Does the regulatory status of the reclaimed alcohols depend on whether they are used to augment the organic levels at the WWTP during normal operations or whether they are only used as a substitute for alcohols that would be purchased by the WWTP during downtimes for the refinery?

   Answer: No, it does not matter when the alcohols are used. The key to the regulatory analysis is their use as an effective substitute.

7. Would the regulatory requirement change if the WWTP paid for or did not pay for the reclaimed alcohols?

   Answer: The regulatory determination would be the same regardless of whether the WWTP pays for the reclaimed alcohols, as long as the activity is legitimate recycling. In determining whether an activity is legitimate recycling, the Agency may take into consideration factors such as the similarity of the secondary material to an analogous raw product, as well as the economic value of the material and the economics of the recycling process (Memo, Lowrance to Regions; April 26, 1989, see Appendix C). Thus, the economic value of the material is considered in the determination of whether the recycling and/or reuse are legitimate recycling and, thus, whether the recycling/reuse exclusions discussed are available for this activity.

8. Would the regulatory situation change if the WWTP only used a small amount of the reclaimed alcohols?

   Answer: No, provided that the alcohols are determined to be used as effective substitutes.

9. Under what conditions would the Land Disposal Restrictions (LDRs) apply to this alcohol reuse scenario?

   Answer: If the alcohol/wastewater mixture and the reclaimed alcohols are determined not to be solid and hazardous wastes from the point of generation due to the manner in which they are recycled, they are not regulated hazardous wastes and the LDRs do not apply. However, if they are determined to be solid and hazardous wastes, the LDRs may apply.

Scenario Description

Overview

A specialty chemical manufacturer uses an alkyl hydroperoxide as a reactant. The reaction produces a process stream containing alkyl alcohol. The facility currently incinerates this process stream, but would like to instead purify the alkyl alcohol. The facility would like to sell the purified alcohol, since it does not use it as a raw material in any of its processes. The manufacturing facility believes the process stream is either a co-product or a characteristic by-product.

Benefits

This scenario would benefit the environment by avoiding the emissions associated with incineration of the process stream and reducing the use and therefore the demand for production of fresh alkyl alcohol. The manufacturing facility would also benefit as long as the revenue earned from the sale of the purified alcohol is greater than the cost of purifying, storing, marketing, and selling it. If the cost is greater than the revenue earned, the facility would still benefit as long as the net cost of selling the alcohol is less than the cost of incinerating the process stream.

Additional Information

- **Are there hazardous constituents or characteristics in the alkyl alcohol not found in the analogous raw material?** The alkyl alcohol exhibits the characteristic of ignitability, as would commercial alkyl alcohol. There are no hazardous constituents that would not be found in an analogous commercial alkyl alcohol.

Regulations Involved

- Identification and Listing of Hazardous Waste (40 CFR Part 261)

Questions and Regulatory Response

General Comments

In order to determine the RCRA hazardous waste regulatory status of a recycled material it must be classified as one of several types of materials (e.g., by-product, co-product, spent material, etc.). (See Chapter 2, Definition of Terms, 40 CFR 261.1(c), and 40 CFR 261.2, Table 1.) In this scenario, the most likely classifications for the process stream appear to be by-product, or co-product. While there is not a separate regulatory definition for the term "co-product," it is described in the regulations as a material "that is produced for the general public's use and is ordinarily used in the form it is produced by the process." (40 CFR 261.1(c)(3)) EPA has provided some further clarification as to what would be considered a co-product, as distinct from a by-product. Generally, co-products are "materials produced intentionally, and which in their existing state are ordinarily used as commodities in trade by the general public. " (50 FR 625, January 4, 1985).

A by-product is defined as "a material that is not one of the primary products of a production process and is not solely or separately produced by the production process. Examples are process residues such as slags or distillation column bottoms. The term does not include a co-product..." (40 CFR 261.1(c)(3)) By-products include materials, generally of a residual nature, that are not produced intentionally or separately, and that are unfit for end use without substantial processing (50 FR 625, January 4, 1985).

Based on the general information in this scenario it seems likely that the alkyl alcohol containing process stream would be classified as a by-product. However, this is a case-specific determination that would require further information about the individual situation. In addition, such a determination should be reviewed with the appropriate EPA or state regulatory agency.

Questions and Answers

1. What is the regulatory status of the alkyl alcohol process stream before purification if it is a co-product?

   Answer: A co-product is an intended result of a manufacturing process, which is not a solid or hazardous waste.

2. What is the regulatory status of the alkyl alcohol process stream before reclamation if it is a characteristic by-product?

Answer: By-products that are destined for reclamation and are hazardous only because they exhibit a hazardous waste characteristic are not solid or hazardous wastes as long as they are not speculatively accumulated, burned for energy recovery, or used in a manner constituting disposal (40 CFR 261.2 Table 1). If the process stream is classified as a characteristic by-product, it is not a solid or hazardous waste if it is legitimately reclaimed under 40 CFR 261.2(c)(3).

3. What is the regulatory status of the purified alkyl alcohol after purification if the alkyl alcohol process stream was determined to be a co-product?

Answer: The alkyl alcohol after purification would continue to be considered a co-product, which is not a solid or hazardous waste. Co-products are products and are regulated by RCRA only when they are discarded. RCRA regulations do not place requirements on either the manufacturing process or the use of co-products.

4. What is the regulatory status of the purified alkyl alcohol after purification if the alkyl alcohol process stream was determined to be a by-product?

Answer: The alkyl alcohol after purification would not be a solid or hazardous waste as long as it is an effective substitute and is not used in a manner constituting disposal, burned for energy recovery, or speculatively accumulated. (40 CFR 261.2(e)(1)(ii) and 40 CFR 261.2(e)(2)). In addition, if the reclaimed characteristic by-product is discarded, it is subject to RCRA regulations (40 CFR 261.2(a)(1)).

5. Does the regulatory status for either the co-product alkyl alcohol or reclaimed characteristic by-product alkyl alcohol depend on whether the alkyl alcohol is reused by the manufacturing facility or sold off-site?

Answer: No, the hazardous waste regulatory analysis does not depend on who uses the material and thus does not change.

Scenario Description

Overview

A facility uses a commercial xylene solvent to clean its reactor system. After a certain number of uses, the solvent is considered spent because it can no longer be used for its original purpose due to build-up of polymeric, non-hazardous solids and lower xylene concentrations. The facility now sends the spent solvent off-site to be incinerated. The facility would like to clean this spent solvent to remove the solids and reuse it in the same cleaning process. Between uses, the reprocessed solvent may be stored in 55-gallon drums or a storage tank until it can be added to the next batch or until the next time that product is produced. Records of solvent reclamation and reuse are maintained.

Benefits

Reprocessing and reusing the spent solvent would benefit the environment by reducing the use and therefore the demand for production of fresh solvent. There would also be a decrease in the disposal of spent solvent. Assuming the same level of safety precautions are used, there would be less transportation risk because there would be less transportation of fresh solvent and no transportation of spent solvent to a disposal site. The facility would also benefit as long as the cost of reprocessing the spent solvent is less than the cost of disposing of the spent solvent plus purchasing new solvent.

Additional Information

- **Percent of Raw Material that is Reclaimed.** 40 to 50 percent of the spent solvent is recoverable for use as a new cleaning solvent.

- **How would the Reclamation Process Differ from the Current Disposal Process?** The reclamation process would likely be either distillation or filtration. The current disposal process is incineration.

- **Is the Spent Solvent a Listed Hazardous Waste?** Yes. If the solvent product before use meets the volume description for F003 mixtures in 40 CFR 261.31, the spent solvent would meet the F003 listing for spent non-halogenated solvents including xylene.

- **Are there Hazardous Constituents or Characteristics in the Spent Material not Found in Analogous Raw Materials?** Although the spent xylene would be ignitable (as would an analogous xylene product), it does not exhibit any other hazardous waste characteristics and does not include any other hazardous constituents not found in virgin xylene.

- **Handling of Spent and Treated Materials vs. Analogous Raw Materials:** Both the spent and treated solvent, as well as the analogous raw material (i.e., virgin xylene), would be handled in drums or tanks.

Regulations Involved

- Identification and Listing of Hazardous Waste (40 CFR Part 261)
- Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262)
- N.J.A.C. 7:26G-5,6, and 7

Questions and Regulatory Response

General Comments

A solvent that is used as a cleaning agent would be considered a spent material once it is no longer to be used for its solvent properties. See the definitions of spent material and spent solvent in Chapter 2, Definition of Terms.

Questions and Answers

1. What is the regulatory status of the spent xylene that is to be reclaimed and reused on-site?

   Answer: Because the spent xylene is a spent material that is to be reclaimed, it is a regulated solid and hazardous waste and must be managed following the hazardous waste management regulations (40 CFR 261.2(c)(3)). Since it is managed on-site, the generator may choose to

manage it under the generator accumulation provisions of 40 CFR 262.34 (e.g., the 90-day accumulation provisions for large-quantity generators). Note that the recycling process itself may be exempt from regulation pursuant to 40 CFR 261.6(c)(1).

2. What is the regulatory status of the reclaimed solvent?

Answer: After it is reclaimed, assuming the reclaimed solvent is beneficially used as a legitimate product (and is not burned for energy recovery or used in a manner constituting disposal), it is not a solid or hazardous waste (40 CFR 261.3(c)(2)(i)).[1]

3. Does the regulatory status of the spent or reclaimed solvent depend on the specific type of reprocessing activity (e.g., whether it is distilled, filtered, or treated by some other means)?

Answer: No, as long as the reprocessing is legitimate recycling.

4. What is the regulatory status of the removed solids? Does this depend on the method of removal?

Answer: If the recycling process is distillation, the residues would be the listed waste F003, which includes distillation column bottoms. Residues from other treatment processes would, in many cases, also be considered the listed waste F003, since they would be derived-from treatment of F003 (40 CFR 261.3(c)(2)(i)). There may be some cases in which the residues are no longer considered F003 and may not be a hazardous waste. This is a case-specific determination that depends on the details of the individual situation. Facilities with questions regarding their situation should talk to the appropriate state agency or EPA.

5. Does the regulatory status of the spent xylene change for any of the above questions if it had been used for another purpose rather than as a cleaning solvent?

Answer: To determine the regulatory status of a recycled secondary material it must be classified as one of several types of materials (e.g., spent material, by-product, sludge). See Chapter 2, Definition of Terms, and 40 CFR 261.1(c). A solvent that has been used as a cleaning solvent is considered a spent material once it is no longer to be used for that purpose. If, however, the solvent had been used for some other purpose, in order to determine its regulatory status it would have to be classified in the proper category, depending on the nature of the material. For example, a residue remaining from use of a solvent as a reactant would likely be considered a by-product rather than a spent material. However, this is a case-specific determination that will depend on the details of the

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[1] See "The Status of Reclaimed Products," *Federal Register*, Vol. 50., No. 3, Friday January 4, 1985 p. 634 for further discussion of the regulatory status of products reclaimed from hazardous waste.

individual situation. Once the type of material is determined, the regulatory status can be determined depending on the recycling scenario. See 50 FR 53316, December 31, 1985, for further discussion of the types of uses of solvents.

6. Does the regulatory status of the reclaimed solvent change if the secondary material from which it is derived is not a spent cleaning solvent?

Answer: No. Once it is reclaimed, the solvent is not a solid or hazardous waste as long as it is used beneficially as a legitimate product under 40 CFR 261.3(c)(2)(i) and is not burned for energy recovery or used in a manner constituting disposal.

7. Does the regulatory status of the spent solvent prior to reclamation depend on whether the reclaimed solvent is hard-piped back to the original process in which it was generated?

Answer: If a material is reclaimed and returned to the original process or processes in which it was generated where it is reused, it may not be a solid and hazardous waste under the closed-loop tank exclusion of 40 CFR 261.4(a)(8). To meet this exclusion: 1) only tank storage may be involved; 2) the entire process through completion of reclamation must be closed by being entirely connected with pipes or other comparable enclosed means of conveyance; 3) the reclamation must not involve controlled flame combustion; 4) the materials must not be accumulated in the tanks for over twelve months without being reclaimed; and 5) the reclaimed material must not be used to produce a fuel, or used to produce products that are used in a manner constituting disposal. See 40 CFR 261.4(a)(8). Accordingly, if the spent xylene in this scenario is reclaimed and returned to the original process in which it was generated, and all of the conditions of the closed-loop tank exclusion are met, then the spent xylene would not be a solid or hazardous waste and its management would not be subject to the RCRA hazardous waste management regulations (other than the conditions listed above).

8. Would EPA and DEP consider granting flexibility for a pilot project through which spent solvents are reprocessed as described above?

Answer: Facilities wishing regulatory flexibility for a project similar to what is outlined in this scenario could consider making a proposal through EPA's Project XL, which is described in Appendix B of this report. In the future, the Standardized Permit Rule may also be available, as described in Appendix D of this report.

Scenario Description

Overview

A facility uses a commercial xylene solvent to clean its reactor system. After a certain number of uses, the solvent is considered spent because it can no longer be used for its original purpose due to build-up of polymeric, non-hazardous solids and lower xylene concentrations. The facility now sends the spent solvent off-site to be incinerated. The facility would like to send this spent solvent off-site to a facility that will reprocess it and either use it, sell it, or return it.

Benefits

Reprocessing and reusing the spent solvent would benefit the environment by reducing the use and therefore the demand for production of fresh solvent. There would also be a reduction in the disposal of spent solvent. In addition, there would be decreased transportation risk if the recipient facility is closer than the disposal site, assuming that the same level of transportation safety precautions are used.

If the solvent is sent from the generating facility to a second facility that uses the solvent as an input, the generating facility would benefit as long as the cost of identifying the recipient facility and transporting the solvent is less than the cost of treating and disposing of the material. Likewise, the recipient facility would benefit if the cost of identifying the facility generating the solvent and reprocessing it for use is less than the cost of purchasing fresh solvent. Similar benefits would also accrue if the second facility sells or returns the solvent.

Additional Information

- **Percent of Raw Material that is Reclaimed.** 40 to 50 percent of the spent solvent is recoverable for use as a cleaning solvent.

- **How would the Reclamation Process Differ from the Current Disposal Process?** The reclamation process would likely entail either distillation or filtration. The current disposal process is incineration.

- **Is the Spent Solvent a Listed Hazardous Waste?** Yes. If the solvent product before use meets the volume descriptions for F003 solvent mixtures in 40 CFR 261.31, the spent solvent would meet the F003 listing for spent non-halogenated solvents including xylene.

- **Are there Hazardous Constituents or Characteristics in the Spent Material not Found in Analogous Raw Materials?** Although the spent xylene would be ignitable (as would an analogous xylene product), it does not exhibit any other hazardous waste characteristics and does not include any other hazardous constituents not found in virgin xylene.

- **Handling of Traded Material vs. Analogous Raw Materials.** Like the analogous raw material, the spent solvent and the reprocessed solvent would be handled in drums or tanks.

Regulations Involved

- Identification and Listing of Hazardous Waste (40 CFR Part 261)
- Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262)
- Standards Applicable to Transporters of Hazardous Waste (40 CFR Part 263)
- N.J.A.C. 7:26G-5,6, and 7

Questions and Regulatory Response

General Comments

A solvent that is used as a cleaning agent would be considered a spent material once it is no longer to be used for its solvent properties. See the definitions of spent material and spent solvent in Chapter 2, Definition of Terms.

Questions and Answers

1. What is regulatory status of the spent xylene as it is being sent to a recipient facility for reprocessing?

   Answer: Because the spent xylene is a spent material that is to be reclaimed, it is a regulated solid and hazardous waste and must be managed following the hazardous waste management regulations (40 CFR 261.2(c)(3)). Thus the generating facility must comply with 40 CFR Part 262, the transporter with 40 CFR Part 263, and the receiving facility with 40 CFR 261.6(c) - (d). Note that the recycling process itself may be exempt from regulation pursuant to 40 CFR 261.6(c)(1). (See 40 CFR 261.6(a) - (d).)

2. Does the regulatory status of the spent solvent depend on whether or not it is sold to the processing facility?

   Answer: In determining whether an activity is legitimate recycling, the Agency may take into consideration factors including the economic value of the material and the economics of the recycling process (Memo, Lowrance to Regions; April 26, 1989, see Appendix C). Thus, this factor could affect the determination as to whether the solvent recycling is legitimate recycling. In this case, however, it would not affect the regulatory status of the spent solvent since it is already a solid and hazardous waste even when recycled. It could, however, affect which regulations apply to management of the material (recycling requirements or treatment/disposal requirements).

3. What is the regulatory status of the reclaimed solvent?

   Answer: After it is reclaimed, assuming the reclaimed solvent is used beneficially as a legitimate product (and is not burned for energy recovery or used in a manner constituting disposal), it is not a solid or hazardous waste (40 CFR 261.3(c)(2)(i)).[1]

4. What is the regulatory status of the removed solids? Does this depend on the method of removal?

   Answer: If the recycling process is distillation, the residues would be the listed waste F003, which includes distillation column bottoms. Residues from other treatment processes would, in many cases, also be considered the listed waste F003, since they would be derived-from treatment of F003 (40 CFR 261.3(c)(2)(i)). There may be some cases in which the residues

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[1] See "The Status of Reclaimed Products," *Federal Register*, Vol. 50., No. 3, Friday January 4, 1985 p. 634 for further discussion of the regulatory status of products reclaimed from hazardous waste.

are no longer considered F003 and may not be a hazardous waste. This is a case-specific determination that depends on the details of the individual situation. Facilities with questions regarding their situation should talk to the appropriate state agency or EPA.

5. Does the regulatory status of the spent or reclaimed solvent depend on the specific type of reprocessing activity that occurs at the recipient facility (e.g., whether it is distilled, filtered, or treated by some other means)?

   Answer: No, as long as the reprocessing is legitimate recycling.

6. How does the regulatory status of the spent solvent, reprocessed solvent, or the removed solids change if the reprocessed solvent is used by the treating facility? If it is returned to the sending facility for reuse? If it is sold to a third party?

   Answer: The status would not change. Note that if the sender is a Small Quantity Generator (SQG) and the reclaimed solvent is returned to the sender, there is an exemption from manifesting under 40 CFR 262.20(e) that may apply if certain conditions are met (e.g., a certain form of contractual agreement is in place).

7. Does the regulatory status of the spent xylene change for any of the above questions if it had been used for another purpose rather than as a cleaning solvent?

   Answer: To determine the regulatory status of a recycled secondary material it must be classified as one of several types of materials (e.g., spent material, by-product, sludge). See Chapter 2, Definition of Terms, and 40 CFR 261.1(c). A solvent that has been used as a cleaning solvent is considered a spent material once it is no longer to be used for that purpose. If, however, the solvent had been used for some other purpose, in order to determine its regulatory status it would have to be classified in the proper category, depending on the nature of the material. For example, a residue remaining from use of a solvent as a reactant would likely be considered a by-product rather than a spent material. This is a case-specific determination that will depend on the details of the individual situation. Once the type of material is determined, the regulatory status can be determined depending on the recycling scenario. See 50 FR 53316, December 31, 1985, for further discussion of the types of uses of solvents.

8. If the spent solvents or removed solids would be regulated as hazardous wastes under any of the scenarios described in Questions 1 - 6, are there any changes that could be made that would allow them to avoid a hazardous waste designation?

   Answer: The handler could petition for a potential delisting of a listed waste if: 1) the handler could show that the waste does not meet any of the criteria for which the waste was listed; and, 2) if there are any other factors which could cause the waste to be a hazardous

waste, the handler could show that those additional factors do not warrant retaining the waste as a hazardous waste (40 CFR 260.22).

9. Would EPA and DEP consider granting some regulatory flexibility for a pilot project through which spent solvents are treated for reuse under any of the above conditions?

Answer: Facilities wishing regulatory flexibility for a project similar to what is outlined in this scenario could consider making a proposal through EPA's Project XL, which is described in Appendix B of this report.

BENEFITS OF IMPLEMENTING THE WASTEWATER ALCOHOL REUSE SCENARIO **APPENDIX A**

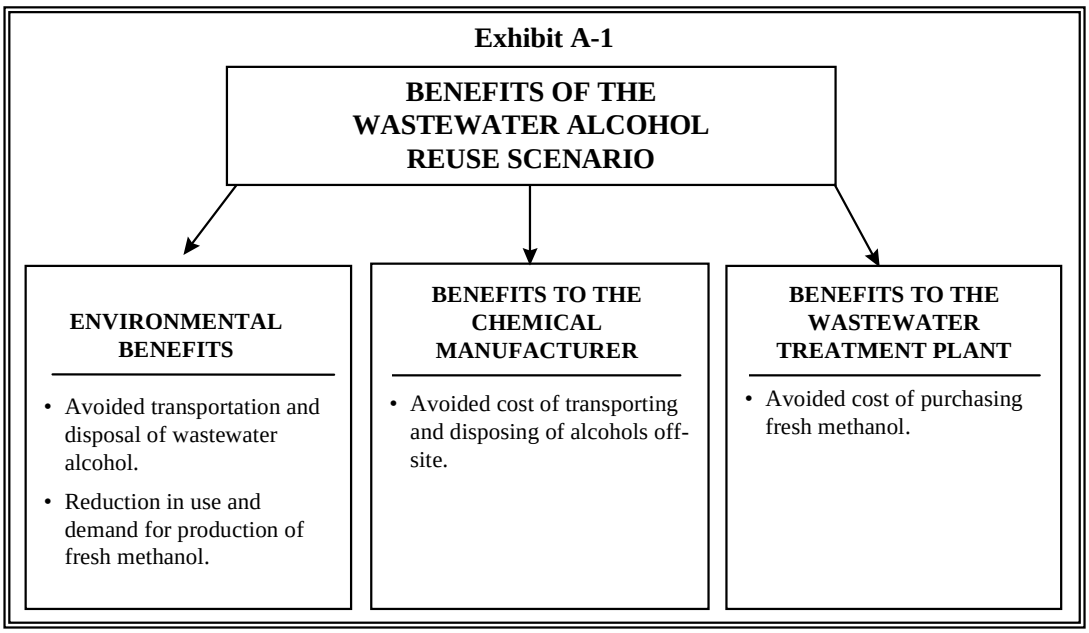
A batch chemical manufacturer and wastewater treatment plant (WWTP) implemented the Wastewater Alcohol Reuse scenario for five days in October 1998 when microbial activity at the WWTP was low. During this initial test of the scenario, the chemical manufacturer sent approximately 1,000 gallons of wastewater alcohols to the WWTP instead of disposing of them off-site. The WWTP used these alcohols to stimulate microbial activity instead of purchasing fresh methanol for this purpose.

The chemical manufacturer and WWTP plan to implement this scenario on a broader scale in the future. This includes implementing the scenario during additional periods when microbial activity at the WWTP is low, and during month-long shutdowns at the refinery known as "turnarounds."

Implementation of the scenario benefits the environment, the WWTP, and the chemical manufacturer. The environment benefits from a reduction in the transportation and off-site disposal of wastewater alcohol, and a reduction in the use and demand for production of fresh methanol. The WWTP and chemical manufacturer both accrue cost savings; the WWTP from avoided purchases of fresh methanol, and the chemical manufacturer from avoided transportation and off-site disposal of the wastewater alcohols. These benefits are summarized in Exhibit A-1 and described further in this appendix.

In addition to the facilities that have already tested the Wastewater Alcohol Reuse scenario, implementation of the scenario would likely benefit other chemical manufacturers, WWTPs, and publicly-owned treatment works (POTWs). Chemical manufacturers most likely to benefit from the scenario are those that are currently sending wastewater alcohols off-site for disposal. Wastewater treatment plants and POTWs most likely to benefit from the scenario are those that purchase alcohol to stimulate microbial activity and/or those that rely on wastewater alcohols from chemical or other manufacturers as a food source for microbes.

Exhibit A-1



As explained in Chapter 4 of this document, there are several conditions that must exist in order for facilities to implement the scenario without triggering RCRA hazardous waste regulations. For example, the wastewater alcohols must be a by-product, must not be a listed hazardous waste, and must be used as an effective substitute for a commercial product. Prior to implementing the scenario, facilities are encouraged to discuss the details of their situation with representatives of the appropriate state or federal regulatory agency.

The remainder of this appendix first provides a summary of the Wastewater Alcohol Reuse scenario. This is followed by a description of the benefits that accrued to the environment, the WWTP, and the chemical manufacturer during the October 1998 implementation of the scenario, and a discussion of the potential benefits from broader implementation of the scenario at the participating facilities.

How the Wastewater Alcohol Reuse Scenario Works

The Wastewater Alcohol Reuse scenario involves a chemical manufacturer, a refinery, and a wastewater treatment plant. The chemical manufacturer and refinery are co-permittees of the WWTP. Although the chemical manufacturer discharges some of its wastewaters to the WWTP for treatment and disposal, it does not discharge its wastewater alcohols from the manufacture of lubricating oil additives. The manufacturer instead transports these wastewater alcohols off-site for disposal. The refinery also discharges wastewaters to the WWTP. Some of these wastewaters contain organics that act as a substrate for the microbes that biodegrade wastewater.

The WWTP must sustain a sufficient level of microbial activity and a healthy population of microbes for biological treatment processes to work effectively. When microbial activity is low, the WWTP typically purchases fresh methanol to increase microbial activity. The WWTP also purchases fresh methanol as a supplemental substrate when there is not enough substrate in wastewaters entering the plant to maintain a healthy population of microbes.

The chemical manufacturer and WWTP can benefit from implementing the Wastewater Alcohol Reuse scenario under two different circumstances. The first is when microbial activity at the WWTP is low, which was the rationale for implementing the scenario in October 1998. Under the Wastewater Alcohol Reuse scenario, the chemical manufacturer discharges wastewater alcohols to the WWTP. The WWTP uses these wastewater alcohols to stimulate microbial activity instead of purchasing fresh methanol. The facilities anticipate that each time they implement the scenario, the chemical manufacturer will discharge 1,000 gallons of wastewater alcohols to the WWTP and the WWTP will avoid purchasing 1,000 gallons of fresh methanol.

The chemical manufacturer and WWTP are also planning to implement the Wastewater Alcohol Reuse scenario during turnaround times at the refinery. During these turnarounds, operations at the refinery shut down and it does not discharge any wastewaters to the WWTP. The WWTP can use wastewater alcohols from the chemical manufacturer to act as the primary substrate for the microbes instead of purchasing fresh methanol. The chemical manufacturer anticipates discharging approximately 30,000 gallons of wastewater alcohols to the WWTP during a turnaround (1,000 gallons per day), allowing the WWTP to avoid purchasing an equivalent quantity of fresh methanol.

Please see Chapter 4 of this document for a more detailed description of the scenario.

Benefits of Implementing the Scenario

In October of 1998, the chemical manufacturer and WWTP implemented the Wastewater Alcohol Reuse scenario when cold weather resulted in low microbial activity at the WWTP. The section below describes the observed environmental benefits and cost savings associated with this test scenario. It also presents benefits that would accrue from broader implementation of this scenario at these facilities.

Environmental Benefits

Implementation of the Wastewater Alcohol Reuse scenario benefitted the environment in several ways. Because the WWTP used the wastewater alcohols to stimulate microbial activity in place of methanol, use and therefore demand for production of fresh methanol decreased. This benefitted the environment by reducing the resources used to manufacture methanol and transport

it to the WWTP. Reusing the wastewater alcohols also benefitted the environment by decreasing the amount of waste transported from the chemical manufacturer and disposed off-site.

Expanded implementation of the scenario will result in the same environmental benefits. Because the magnitude of these benefits depends upon the quantity of wastewater alcohol reused, the benefits will be significantly larger when the scenario is implemented during turnarounds than when it is implemented to stimulate low microbial activity.

Cost Savings

Exhibit A-2 and the description below present the chemical manufacturer's and WWTP's cost savings from the October 1998 test of the scenario. The WWTP saved $505 from avoiding the purchase of 1,009 gallons of fresh methanol. The chemical manufacturer saved $807 in avoided transportation and disposal of 1,009 gallons of wastewater alcohol. Because it incurred an additional $40 to monitor the transfer of the wastewaters to the WWTP, net savings to the chemical manufacturer were $767.

Exhibit A-2
ACTUAL COST SAVINGS FROM TESTING THE WASTEWATER ALCOHOL REUSE SCENARIO
October 1998

	Quantity	Cost Savings	Costs Incurred	Net Savings
WWTP	Avoided purchase of 1,009 gallons of fresh methanol	$.50 per gallon * 1,009 gallons = $505	None	$505
Chemical Manufacturer	Avoided transportation and disposal of 1,009 gallons of wastewater transferred to WWTP	$.80 per gallon for avoided transportation and disposal * 1,009 gallons = $807	$8.00 per day for monitoring transfer of wastewater alcohols to WWTP * 5 days = $40	$767
Total		$1,312	$40	$1,272

The chemical manufacturer and WWTP plan to implement this scenario on a similar scale four times per year. Thus, the anticipated annual cost savings for the WWTP and chemical manufacturer are approximately $2,000 and $3,040, respectively.

The chemical manufacturer and WWTP also plan to implement the scenario during month-long turnaround periods for the refinery. As shown in Exhibit A-3, potential cost savings for the

WWTP are $15,000 from the avoided purchase of 30,000 gallons of fresh methanol during the refinery turnaround. Potential cost savings for the chemical manufacturer are $24,000 from the avoided transportation and disposal of 30,000 gallons of wastewater alcohol minus $240 for monitoring the transfer, a net savings of $23,760.

Exhibit A-3
POTENTIAL COST SAVINGS FROM IMPLEMENTING THE WASTEWATER ALCOHOL REUSE SCENARIO
30-Day Turnaround at the Refinery

	Quantity	Cost Savings	Costs Incurred	Net Savings
WWTP	Avoided purchase of 1,000 gallons of fresh methanol per day * 30 days = 30,000 gallons	$.50 per gallon * 30,000 gallons = $15,000	None	$15,000
Chemical Manufacturer	Avoided transportation and disposal of 1,000 gallons of fresh methanol per day * 30 days = 30,000 gallons	$.80 per gallon for avoided transportation and disposal * 30,000 gallons = $24,000	$8.00 per day for monitoring transfer of wastewater alcohols to WWTP * 30 days = $240	$23,760
Total		$39,000	$240	$38,760

These cost savings are realized only during turnarounds, which occur an average of once every four years. On an annualized basis, the potential cost savings of reusing the wastewater alcohols during turnarounds are $3,750 for the WWTP and $5,940 for the chemical manufacturer.

If these facilities implemented this scenario fully, including four times per year to stimulate microbial activity and once every four years during turnarounds, total anticipated annual cost savings would be $5,750 for the WWTP and $8,980 for the chemical manufacturer. The potential cost savings for other facilities implementing this scenario depend on how frequently they reuse wastewater alcohols and the quantities that are reused.

OVERVIEW OF PROJECT XL **APPENDIX B**

Project XL, which stands for "eXcellence and Leadership," is a national initiative that tests innovative ways of achieving better and more cost-effective public health and environmental protection. The information and lessons learned from Project XL will be used to assist EPA in redesigning its current regulatory and policy-setting approaches. Project XL encourages testing of cleaner, cheaper, and smarter ways to attain environmental results than those achieved under current regulations and policies, in conjunction with greater accountability to stakeholders. Lessons learned from successful XL projects will improve EPA policies, regulations, and programs.

A number of companies have already used XL to test innovative approaches that save money and reduce paperwork while increasing environmental protection in and around their plants. As of April 1998, seven pilot experiments are being implemented and twenty additional projects are currently being developed.

If you are interested in initiating an XL project, please contact the XL coordinator in your EPA region:

Region 1	Boston, MA (ME, NH, MA, VT, RI, CT)	
	Anne Kelly	617/565-9301
	George Frantz	617/565-2752
Region 2	New York, NY (NY, NJ, PR, VI)	
	Aleksandra Dobkowski	212/637-3676
Region 3	Philadelphia, PA (MD, VA, WVA, DC, DE, PA)	
	David Byro	215/814-5563
	Mindy Snoparksi	215/814-3316

Region 4	Atlanta, GA (TN, NC, SC, AL, GA, FL, KY, MS)	
	Michelle Glenn	404/562-8674
Region 5	Chicago, IL (MN, WI, MI, IL, IN, OH)	
	Linda Martin	312/353-9486
Region 6	Dallas, TX (NM, TX, OK, AR, LA)	
	Adele Cardenas	214/665-7210
Region 7	Kansas City, KS (NE, KS, IA, MO)	
	Dick Sumpter	913/551-7661
Region 8	Denver, CO (MT, WY, ND, SD, UT, CO)	
	Mary Byrne	303/312-6491
Region 9	San Francisco, CA (CA, NV, AZ, GU, AS, HI)	
	Mark Samolis	415/744-2331
Region 10	Seattle, WA (OR, WA, ID, AK)	
	Bill Glasser	206/553-7215

For more information on Project XL or for an application:

- Visit our Website at: www.epa.gov/projectXL;
- Call Project XL's fax-on-demand line at 202-260-8590;
- Call Project XL's Information Line at 202-260-5754; or
- Contact at EPA Headquarters in Washington DC: Chris Knopes (202) 260-9298

APPENDIX C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

APR 26 1989

MEMORANDUM

SUBJECT: F006 Recycling

FROM: Sylvia K. Lowrance, Director
Office of Solid Waste (OS-300)

TO: Hazardous Waste Management Division Directors
Regions I-X

It has come to the attention of EPA Headquarters that many of the Regions and authorized States are being requested to make determinations on the regulatory status of various recycling schemes for F006 electroplating sludges. In particular, companies have claimed that F006 waste is being recycled by being used as: (1) an ingredient in the manufacture of aggregate, (2) an ingredient in the manufacture of cement, and (3) feedstock for a metals recovery smelter. The same company may make such requests of more than one Region and/or State. Given the complexities of the regulations governing recycling vs. treatment and the definition of solid waste, and the possible ramifications of determinations made in one Region affecting another Region's determination, it is extremely important that such determinations are consistent and, where possible, coordinated.

Two issues are presented. The first issue is whether these activities are legitimate recycling, or rather just some form of treatment called "recycling" in an attempt to evade regulation. Second, assuming the activity is not sham recycling, the issue is whether the activity is a type of recycling that is subject to regulation under sections 261.2 and 261.6 or is it excluded from our authority.

With respect to the issue of whether the activity is sham recycling, this question involves assessing the intent of the owner or operator by evaluating circumstantial evidence, always a difficult task. Basically, the determination rests on whether the secondary material is "commodity-like." The main environmental considerations are (1) whether the secondary material truly has

value as a raw material/product (i.e., is it likely to be abandoned or mismanaged prior to reclamation rather than being reclaimed?) and (2) whether the recycling process (including ancillary storage) is likely to release hazardous constituents (or otherwise pose risks to human health and the environment) that are different from or greater than the processing of an analogous raw material/product. The attachment to this memorandum sets out relevant factors in more detail.

If the activity is not a sham, then the question is whether it is regulated. If F006 waste is used as an ingredient to produce aggregate, then such aggregate would remain a solid waste if used in a manner constituting disposal (e.g., road-base material) under sections 261.2(c)(1) and 261.2(e)(2)(i)or if it is accumulated speculatively under section 261.2(e)(2)(iii). Likewise, the F006 "ingredient" is subject to regulation from the point of generation to the point of recycling. The aggregate product is, however, entitled to the exemption under 40 CFR 266.20(b), as amended by the August 17, 1988, Land Disposal Restrictions for First Third Scheduled Wastes final rule (see 53 FR 31197 for further discussion). However, if the aggregate is not used on the land, then the materials used to produce it would not be solid wastes at all, and therefore neither those materials nor the aggregate would be regulated (see section 261.2(e)(1)(i)).

Likewise, cement manufacturing using F006 waste as an ingredient would yield a product that remains a solid waste if it is used in a manner constituting disposal, also subject to section 266.20(b). There is an additional question of whether the cement kiln dust remains subject to the Bevill exclusion. In order for the cement kiln dust to remain excluded from regulation, the owner or operator must demonstrate that the use of F006 waste has not significantly affected the character of the cement kiln dust (e.g., demonstrate that the use of F006 waste has not significantly increased the levels of Appendix VIII constituents in the cement kiln dust leachate). **[NOTE: This issue will be addressed more fully in the upcoming supplemental proposal of the Boiler and Industrial Furnace rule, which is pending Federal Register publication.]**

For F006 waste used as a feedstock in a metals recovery smelter, the Agency views this as a recovery process rather than use as an ingredient in an industrial process and, therefore, considers this to be a form of treatment that is not currently regulated (see sections 261.2(c) and 261.6(c)(1)). Furthermore, because this is a recovery process rather than a production process, the F006 waste remains a hazardous waste (and must be managed as such prior to introduction to the process), and the slag from this process would normally be considered a "derived from"

F006 waste. However, for primary smelters, the slag may be considered subject to the Bevill exclusion provided that the owner or operator can demonstrate that the use of F006 waste has not significantly affected the hazardous constituent content of the slag (i.e., make a demonstration similar to the one discussed above for the cement kiln dust). [NOTE: In the supplemental proposal of the Boiler and Industrial Furnace rule noted above, the Agency will be proposing a definition of "indigenous waste" based on a comparison of the constituents found in the waste to the constituents found in an analogous raw material. Should the F006 waste meet the definition of an "indigenous waste," the waste would cease to be a waste when introduced to the process and the slag would not be derived from a hazardous waste.]

Also, you should be aware that OSW is currently reevaluating the regulations concerning recycling activities, in conjunction with finalizing the January 8, 1988 proposal to amend the Definition of Solid Waste. While any major changes may depend on RCRA reauthorization, we are considering regulatory amendments or changes in regulatory interpretations that will encourage on-site recycling, while ensuring the protection of human health and the environment.

Headquarters is able to serve as a clearinghouse to help coordinate determinations on whether a specific case is "recycling" or "treatment" and will provide additional guidance and information, as requested. Ultimately, however, these determinations are made by the Regions and authorized States. Attached to this memorandum is a list of criteria that should be considered in evaluating the recycling scheme. Should you receive a request for such a determination, or should you have questions regarding the criteria used to evaluate a specific case, please contact Mitch Kidwell, of my staff, at FTS 475-8551

Attachment

CRITERIA FOR EVALUATING WHETHER A WASTE IS BEING RECYCLED

The difference between recycling and treatment is sometimes difficult to distinguish. In some cases, one is trying to interpret intent from circumstantial evidence showing mixed motivation, always a difficult proposition. The potential for abuse is such that great care must be used when making a determination that a particular recycling activity is to go unregulated (i.e., it is one of those activities which is beyond the scope of our jurisdiction). In certain cases, there may be few clear-cut answers to the question of whether a specific activity is this type of excluded recycling (and, by extension, that a secondary material is not a waste, but rather a raw material or effective substitute); however, the following list of criteria may be useful in focusing the consideration of a specific activity. Here too, there may be no clear-cut answers but, taken as a whole, the answers to these questions should help draw the distinction between recycling and sham recycling or treatment.

(1) Is the secondary material similar to an analogous raw material or product?

- Does it contain Appendix VIII constituents not found in the analogous raw material/product (or at higher levels)?
- Does it exhibit hazardous characteristics that the analoqous raw material/product would not?
- Does it contain levels of recoverable material similar to the analogous raw material/product?
- Is much more of the secondary material used as compared with the analogous raw material/product it replaces? Is only a nominal amount of it used?
- Is the secondary material as effective as the raw material or product it replaces?

(2) What degree of processing is required to produce a finished product?

- Can the secondary material be fed directly into the process (i.e., direct use) or is reclamation (or pretreatment) required?
- How much value does final reclamation add?

(3) What is the value of the secondary material?

- o Is it listed in industry news letters, trade journals, etc.?
- o Does the secondary material have economic value comparable to the raw material that normally enters the process?

(4) Is there a guaranteed market for the end product?

- o Is there a contract in place to purchase the "product" ostensibly produced from the hazardous secondary materials?
- o If the type of recycling is reclamation, is the product used by the reclaimer? The generator? Is there a batch tolling agreement? (Note that since reclaimers are normally TSDFs, assuming they store before reclaiming, reclamation facilities present fewer possibilities of systemic abuse).
- o Is the reclaimed product a recognized commodity? Are there industry-recognized quality specifications for the product?

(5) Is the secondary material handled in a manner consistent with the raw material/product it replaces?

- o Is the secondary material stored on the land?
- o Is the secondary material stored in a similar manner as the analogous raw material (i.e., to prevent loss)?
- o Are adequate records regarding the recycling transactions kept?
- o Do the companies involved have a history of mismanagement of hazardous wastes?

(6) Other relevant factors.

- o What are the economics of the recycling process? Does most of the revenue come from charging generators for managing their wastes or from the sale of the product?
- o Are the toxic constituents actually necessary (or of sufficient use) to the product or are they just "along for the ride."

These criteria are drawn from 53 FR at 522 (January 8, 1988); 52 FR at 17013 (May 6, 1987); and 50 FR at 638 (January 4, 1985).

OVERVIEW OF STANDARDIZED PERMIT RULE **APPENDIX D**

EPA is currently drafting the Standardized Permit Rule, which would provide streamlined permitting procedures for facilities that generate wastes and manage them on-site in tanks, containers, or containment buildings. The Agency believes that the risk of managing waste in these types of units is sufficiently low that this management can be satisfactorily addressed through a standardized process. The primary purpose of the rule is to promote recycling and reuse of hazardous waste by decreasing the regulatory requirements for facilities involved in these activities while ensuring adequate environmental protection.

Facilities that receive waste from off-site sources will not be eligible for the standardized permit. In addition, waivers and variances under the current permitting system will not be incorporated into the rule due to the level of communication required between the permittee and the permitting agency during the review of waiver and variance requests.

For additional information on the Standardized Permit Rule, please contact Vernon Myers, US EPA Office of Solid Waste, 703-308-8660.