Sustainable Industry

U. S. Environmental Protection Agency

PRINCIPAL FINDINGS: THE U. S. SPECIALTY-BATCH CHEMICAL INDUSTRY

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OVERVIEW OF THE SPECIALTY-BATCH SECTOR

Specialty-batch chemicals represent one segment of the chemical industry. The specialty-batch sector is characterized by:

- Batch processing;
- The manufacture of intermediate and custom formulations, as well as end-use products;
- An emphasis on product differentiation and performance; and
- In general, the production of products in relatively small volumes and the sale of these products at a higher profit margin than commodity or bulk chemicals, although this may vary widely for different types of specialty-batch chemicals.

The specialty-batch sector is highly competitive and proprietary in nature; companies tend to develop a market niche and focus on their competitive advantages. The sector consists primarily of small and medium-sized companies, a characteristic which has a significant impact on decision-making.

Facilities in this sector generally fall into two broad categories, although there is some overlap:

Manufacturers perform chemical reactions using raw materials (typically commodity chemicals) to create specialty chemicals, which are generally used as intermediates.

Formulators and packagers blend specialty chemicals and other chemical intermediates to create chemical specialties, which may be household or industrial/institutional end-use products.

There is a trend in the chemical industry toward semi-batch processing, which is more continuous than typical batch processing. Semi-batch processing requires less human capital input compared to batch processing, and reduces material loss by generating less by-product.

The majority of four-digit SIC codes within SIC 28 (Chemicals and Allied Products) include specialty-batch manufacturers and/or formulators. Exhibit 1 at the end of this document presents the SIC 28 four-digit codes likely to contain specialty-batch facilities. We estimate that specialty-batch facilities represent between 10 to 100 percent of these different SIC codes. In addition, some formulators also may fall into several SIC codes other than SIC 28 (e.g., 2992 and 5100).

The information presented in this document is based on research and interviews with manufacturers and formulators. Unless otherwise noted, the information provided pertains to both of these types of facilities.

TRAITS AND TRENDS OF THE U.S. SPECIALTY-BATCH CHEMICAL INDUSTRY

Economic and Demographic Characteristics

TRAITS	*TRENDS*
C There are approximately 5,400 specialty-batch facilities in the U.S., employing nearly 275,000 people.[1]	C Some facilities are moving out of states where regulations are more restrictive (e.g., California) or where the regulatory process is more cumbersome (e.g., New Jersey) to states where regulations are less restrictive or where there is less uncertainty about timing of agency actions (e.g., North Carolina). There is also a trend of facilities locating in countries and regions where regulatory enforcement is less stringent or labor costs are lower (e.g., Mexico, India, Latin America, and Asia-Pacific).
C Sales of specialty-batch products were $80 billion in 1996, approximately 22 percent of the total value of shipments for the chemical industry as a whole in that year, and 2 percent of value of shipments for all manufacturing.[2,3]	C There is increasing consolidation within the industry. This may be particularly true for mature markets that are becoming more commodity-like, such as water treatment chemicals, lubricants, adhesives, dyes, and inks.[5]
C Specialty-batch facilities are likely to be concentrated in the same states as the Chemical and Allied Products industry (SIC 28) as a whole. The states with the most SIC 28 facilities are California, Texas, New Jersey, New York, and Illinois. North Carolina, Georgia, and Louisiana also have high concentrations of chemical facilities.	C Companies are pursuing new opportunities for business development through increased outsourcing of processes. Ę Facilities may sell more products and get them to market more quickly by contracting with custom manufacturers and tollers. Ę Outsourcing may increase sales and profits for custom manufacturers and tollers.
C Manufacturers tend to locate in proximity to sources of raw materials, while formulators tend to situate near markets and distribution centers.	C High growth segments include adhesives and sealants, electronic chemicals, specialty polymers, flavors and fragrances, polymers, and pharmaceuticals.[6]
C The specialty-batch sector is small-business dominated. Over 75 percent of the manufacturers in the Synthetic Organic Chemical Manufacturers Association (SOCMA) and 30 percent of those in the Chemical Specialties Manufacturers Association (CSMA) are smaller businesses. It is common for large chemical companies to own smaller subsidiaries with specialty-batch operations.	
C The chemical industry as a whole (SIC 28) spends roughly 50 percent more on new capital equipment than the manufacturing sector overall (based on 1995 data). This high capital intensity likely characterizes both the specialty-batch and commodity sectors.[4]	
C In dealing with regulators, quick turnaround and certainty are critical for business success (e.g., permit process).	

TRAITS	*TRENDS*
Economic and Demographic Characteristics (continued)	
	C Facilities increasingly use computers to control their operations. C There is a trend toward developing "green" products and those with health-benefit claims. C [*What are current trends in technology and new products?*]
Environmental Characteristics[7]	
C Batch processing generates many different types of emissions, discharges, and wastes. Ę For manufacturers, air emissions may be the most difficult environmental release to control, because of the wide variation of products and raw materials in batch manufacturing and the frequent opening of vessels, which creates fugitive air emissions. Ę Formulators generate relatively small amounts of air emissions because most inputs are conserved. However, they must control VOC emissions and levels in their products. Ę Manufacturers and formulators must rinse and wash reactors, tanks, and pipes, generating wastewater with a wide range of constituents. BOD, pH, and TSS are common wastewater constituents. Heavy metals are uncommon in specialty-batch chemical wastewater. C Specialty-batch facilities generated an estimated 15.7 million tons of hazardous waste in 1995, accounting for approximately 20 percent of SIC 28 hazardous waste, and seven percent of hazardous waste generated through all manufacturing in the U.S.[8] Ę The hazardous waste generated by specialty-batch manufacturers is often listed hazardous waste under 40 CFR Part 261 Subpart D. Ę Specialty-batch facilities treat little of their hazardous waste on-site, shipping it off-site for treatment instead. For larger, commodity manufacturers, on-site treatment is much more common. Ę Nearly half of all the hazardous waste that is managed on-site is treated. Incineration is another common waste management method.	C Formulators are shifting toward aqueous-based ingredients and away from solvent-based and volatile ingredients for many reasons including: Ę Reducing VOCs (particularly due to California standards and Form R requirements) and fugitive emissions; Ę Reducing costs --solvents are more costly than aqueous-based substitutes; Ę End-use requirements, such as customer reporting issues. C Many environmental improvements have already been achieved. Additional improvements are possible at the facility level, but technology and resource limitations make them increasingly difficult and expensive to achieve. Further reductions in fugitive air emissions will be very difficult to achieve. The greatest opportunities for improvement are in the areas of waste reduction and recovery for re-use.

TRAITS	*TRENDS*
Environmental Characteristics (continued)	
C Greenhouse gas (GHG) emissions from specialty-batch facilities were approximately 13 million metric tons of carbon equivalents in 1994, or 15 percent of total GHG emissions from SIC 28 and less than one percent of the total GHG emissions generated in the U.S. Nearly all of the GHG emissions from the specialty-batch sector were from energy consumption.[9] C Specialty-batch facilities accounted for an estimated 400 million pounds of toxic chemical releases and transfers in 1995, or 30 percent of all chemical industry (SIC 28) releases and transfers, based on Toxics Release Inventory (TRI) data.[10] The chemicals industry as a whole reported more total TRI releases in 1995 than any other industry group. Of SIC 28 total TRI releases and transfers, approximately 29 percent was related to energy recovery, 21 percent was released as air emissions, and 17 percent was recycled off-site. Less than 10 percent was discharged to surface water or POTWs. For the specialty-batch sector, toxic chemical releases and transfers to water may represent a greater percentage of the total.	C The chemicals industry as a whole (SIC 28) has achieved the greatest reductions in Toxics Release Inventory (TRI) "core" chemical releases of all industry groups, posting a reduction of nearly 50 percent between 1988 and 1995. [*Note that certain reporting requirements have changed since the inception of the TRI program. For example, EPA added 286 chemicals and chemical categories for the 1995 reporting year, nearly doubling the TRI chemical list. "Core" chemicals are those that were on the TRI list during both the years of comparison (i.e., 1988 and 1995).*]
Regulatory Requirements	
C Most manufacturers and formulators are subject to a wide range of environmental regulations at the state and federal levels, including those related to air, solid and hazardous waste, and water. Many are also subject to the Pre-Manufacture Notification (PMN) requirements of the Toxics Substances Control Act (TSCA), the Inventory Update Rule under TSCA, TRI reporting, and Occupational Safety and Health Administration (OSHA) regulations. The sector is also affected by Risk Management Plan (RMP) requirements under the Clean Air Act (CAA) and the High Production Volume (HPV) Challenge program. Manufacturers and formulators may also be subject to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regulations. C Companies in the pharmaceutical industry are subject to the Food and Drug Administration's current Good Manufacturing Practice regulations. C Under the Children's Health Chemical Testing Program, EPA may ask facilities to volunteer to conduct testing of chemicals with identified children's health concerns. C Based on EPA air permit data, less than five percent of specialty-batch facilities are subject to Title V permitting requirements under the CAA.[11] Industry representatives suggest that this estimate may be low. C Preparing Title V permit applications is difficult because many specialty-batch facilities cannot predict what processes/materials they will use in upcoming years. Pharmaceutical companies in particular may have a tough time planning for the future due to the nature of their products/market.	C Facilities experience difficulty in maintaining confidentiality while meeting regulatory requirements. Ę RMP requirements make process and input information available to the public. C Food Quality Protection Act (FQPA) new tolerance requirements may reduce the availability of active and inactive ingredients on the market, forcing manufacturers to reformulate their products. C Regulatory agencies are seeking more data from companies on a voluntary basis, especially information on human health impacts.

TRAITS	*TRENDS*
Regulatory Requirements (continued)	
C Specialty-batch facilities that are considered major sources for air toxics are likely to be subject to one of the following Maximum Achievable Control Technology (MACT) standards: Ę Hazardous Organic NESHAP for the synthetic organic chemical manufacturing industry; Ę Polymers and Resins (Groups I and IV); Ę Miscellaneous Organic NESHAP. C Many facilities must obtain state air permits. In New Jersey, for example, facilities that exceed specific emission thresholds must obtain an operating permit, which lists processes and equipment and specifies operational requirements, monitoring requirements, and emission limits. Smaller facilities must obtain preconstruction permits and operating certificates. C Formulators and manufacturers typically are required to obtain stormwater permits. C Specialty-batch facilities may generate substantial amounts of wastewater. Many facilities discharge wastewater to publicly owned treatment works (POTWs). Based on EPA water permit data, less than five percent of specialty-batch facilities are direct dischargers that are subject to National Pollution Discharge Elimination System (NPDES) permit requirements.[12] C Specialty-batch manufacturers that are direct or indirect dischargers are subject to effluent guidelines for specific industrial categories, e.g., Organic Chemicals, Plastics & Synthetic Fibers; Paint Formulating; Pesticide Chemicals Formulating, Packaging & Repackaging; Pesticide Chemicals Manufacturing; or Soap and Detergent Manufacturing. C According to EPA data on hazardous waste generation, between 15 and 20 percent of specialty-batch facilities are Large Quantity Generators under the Resource Conservation and Recovery Act (RCRA).[13] C Many current environmental regulations, particularly air permitting requirements and regulations governing waste recovery and reuse, do not allow for the operational flexibility needed by specialty-batch manufacturers. C Specialty-batch facilities must also comply with Department of Transportation, Coast Guard, and International Maritime Organization (IMO) requirements.	C Thresholds for reporting chemical usage and emissions are being lowered as regulatory agencies seek more information on potential and actual chemical releases and exposure. C Increased chemical testing programs require spending of additional resources, often affecting specialty-batch manufacturers disproportionately. C There is interest among industry and regulators to consider multimedia permits and broader exemptions. C The regulatory agencies are generally responsive to public outcry/concerns; there is a trend toward public regulation of industry.

TRAITS	*TRENDS*
Regulatory Compliance	
C Facilities that are not in a trade association may find it more difficult to comply with regulations because they have less access to compliance assistance information. These non-member facilities represent a substantial segment of the sector. C Small facilities in particular may be unintentionally out of compliance, i.e., unable to recognize and/or address difficulties with environmental performance. C Under the current Enforcement Targeting Plan, EPA has identified parts of the chemical industry as national priorities, in part due to the high rate of RCRA violations per inspection.[14] The Agency was uncertain of compliance status in the sector because of the small number of inspections over the past several years.	C The chemical industry will not be targeted as a priority sector under EPA's 2000/2001 Enforcement Targeting Plan.
Beyond Compliance and other Voluntary Initiatives	
C Approximately 400 specialty-batch facilities, over seven percent of the sector, participate in Responsible Care®, an initiative implemented by CMA and SOCMA that requires facilities to make continuous improvement of health, safety, and environmental quality. C Due to the great variation among specialty-batch facilities and operations, no voluntary program will be universally valuable to facilities in the sector. C Other voluntary programs in which specialty-batch facilities participate include: <u>Environmental</u> Ę EPA's Wastewi$e program Ę EPA's Climate Wise program Ę EPA's 33/50 program Ę EPA's Green Lights program Ę ISO 14001 certification Ę HPV Challenge program Ę EPA's Consumer Labeling Initiative Ę Green Chemistry Award Program Ę State Chemical Industry Council programs similar to Responsible Care® Ę National Association of Chemical Distributors' Responsible Distribution program <u>Other</u> Ę ISO 9001 certification Ę OSHA's Voluntary Protection Program	C ISO 14001 certification is becoming more important for remaining competitive in foreign markets. C Participation in voluntary programs has increased.
DRIVERS OF AND BARRIERS TO ECONOMIC AND ENVIRONMENTAL PERFORMANCE	

FACTORS	*EFFECTS*
Economics/Marketing	
1. **Customer needs.** Facilities seek to develop new products, processes and technology in order to please customers and meet their specifications/timeframes in the most cost-effective manner.	--Time pressures affect a facility's ability to plan proactive environmental management or seek new pollution prevention equipment/techniques. --Facilities seek pollution prevention and other opportunities that can reduce the cost of producing their products in order to remain competitive.
2. **Good environmental performance and image.** Facilities engage in activities to improve their environmental compliance and performance, to minimize emissions and waste, and to ensure the safe handling and use of their products in order to: a. Meet their desire to be environmentally responsible, a good neighbor, and a good example for other companies. b. Help allay public concern about potential impacts of a facility or the industry as a whole. c. Gain a marketing advantage. For example, manufacturers may gain a competitive advantage through increased product stewardship activities. Industry representatives suggest that environmental performance is often a business consideration for a company's larger customers. d. For formulators, advertise to end-use customers that their products and processes have less environmental impact. e. For manufacturers, advertise to formulators that their chemicals are less toxic, that they are in compliance with all regulations, and/or that they meet the requirements of Responsible Care®. f. Increase efficiency. For example, inspections take less time for facilities that are ISO 14001 certified.	--The desire to maintain a good public image prompts facilities to commit resources to improve their environmental performance, including participating in voluntary initiatives.

Economics/Marketing (continued)	
3. **Increase efficiency.** Facilities have an economic incentive to develop technologies that are faster, more efficient, use less energy, or reduce/recycle hazardous wastes.	--Facilities can improve efficiency by committing resources to projects aimed at decreasing energy use and waste generated. --Facilities can utilize recycled materials instead of virgin raw materials to reduce their costs of purchasing process inputs and to gain customer approval.
4. **Incentives to stay under regulatory thresholds.** Although risks may increase (e.g., increased number of loadings/unloadings), facilities have economic and marketing incentives to stay under regulatory thresholds in order to avoid the time and expenses associated with permitting and other requirements, such as: a. Title V emissions thresholds; b. CAA RMP chemical-specific thresholds; c. RCRA small quantity generator thresholds; d. Significant industrial user discharge thresholds for non-categorical limits; e. HPV Challenge program testing thresholds; f. TSCA Inventory Update Rule; g. State permitting thresholds; h. California's Air Toxics Hot Spots Program	--Facilities may commit resources to improve environmental performance and discharge/emit fewer pollutants into the environment. Efforts may include raw material substitutions, pollution prevention measures, emissions controls, etc. --Facilities that are below the regulatory threshold may choose not to invest resources in developing innovative technologies, even though they have not achieved zero discharge. --Facilities re-evaluate their operations and material inventories in an effort to operate below regulatory thresholds.

Economics/Marketing (continued)	
5. **Facilities fear legal actions and other repercussions of noncompliance.** a. Enforcement actions, including large fines or imprisonment for violations, especially given the determination of inspectors to find violations. b. Liability for end-use products (formulators). c. Bad press/public image.	--Facilities invest in activities to achieve compliance/improve environmental performance, sometimes through voluntary programs.
6. **Increased competition/uneven playing field due to environmental regulations.** To manage costs, facilities consider the ease of doing business and certainty of regulatory timing when making location/relocation decisions. In addition, the restrictiveness of regulations and the degree to which regulations are enforced are important factors. Together, these factors affect the level of competition that facilities face from those under other jurisdictions. a. California and New Jersey have some of the most restrictive requirements in the U.S. b. Regulatory enforcement in India, China, and Mexico may be less stringent than in the U.S. c. Some countries do not recognize property rights or patents, putting U.S. companies at a disadvantage. d. Tariff barriers create a disadvantage. e. Signing the Basel Agreement could benefit U.S. firms with international operations. f. Foreign countries may apply different standards and fees for chemical use/registration (e.g., chemical registration in Canada differs from TSCA requirements; European Inventory of Existing Chemical Substances).	--A possible unintended effect of regulations is that some companies decide to move to or site new facilities in states or countries where regulatory timing is more certain or where regulations or enforcement are less stringent. --Environmental regulations may not result in the intended environmental improvements. --Companies are reluctant to locate in countries that do not recognize property rights or patents.

Regulatory Requirements	
7. **Time to get products to market.** Extensive time and resources are required to bring new ***or modified*** products to market, in part due to restrictive regulatory requirements. Regulatory inefficiencies exist more often at the federal level than at the state level. a. FIFRA requires a facility to obtain a registration amendment when making changes in product composition, including those that reduce or have no effect on the toxicity of the product. b. FIFRA and FQPA review deadlines are not always met by EPA. c. Air permitting process (permit applications, amendments, New Source Reviews) interferes with production schedules, a company's ability to meet customers' needs, and business opportunities. d. Need to submit additional Pre-Manufacture Notice information to use a chemical for a purpose other than the one for which it was originally registered.	--There is a disincentive for facilities to develop innovative environmental improvements. --Resources spent on paperwork reduce opportunities for innovative environmental improvements. --Newer, "cleaner" chemicals may not be produced or be readily available to industry and the public as substitutes for older and possibly more toxic chemicals.
8. **Cost of compliance.** a. Cost of obtaining environmental permits for new buildings, process lines, products, and modifications can hinder potential environmental improvements associated with upgrades. b. Cost of complying with multiple regulations. Examples of burdensome and time consuming regulatory requirements include: Title V air permitting requirements; BACT requirements; and Community Right-to-Know requirements. For small companies, testing requirements can be particularly costly. Compliance with these and other regulations may involve use of consultants or in-house staff, purchase of new control equipment, and completion of substantial amounts of paperwork. Industry would like to see EPA focus on increasing compliance with existing regulations rather than developing new ones. c. Investments in "compliance" projects generally pay for themselves relatively quickly. d. The cost of routine compliance tasks can be particularly critical for smaller firms.	--Facilities may be overly cautious in deciding upon upgrades or decide not to pursue environmental enhancements that would require permit modifications. --Facilities focus resources on compliance rather than environmental performance and innovation.

Regulatory Requirements (continued)	
9. **One-size-fits-all regulations.** Regulatory agencies develop one-size-fits-all regulations rather than industry-specific regulations, because agencies may be unaware of small business segments of industry or have only a general understanding of the differences between sectors. Furthermore, the specialty-batch sector is not uniform; there are great differences between facilities and between plants within a facility, necessitating flexibility at the plant level. a. Increased chemical testing programs add layers of additional resource requirements, often affecting specialty-batch manufacturers disproportionately. b. EPCRA Tier II hazardous chemical reporting, TRI Form R reporting, TSCA Inventory Update Rule (IUR) reporting, 12(b) reporting. Industry representatives suggest conducting drills with the local fire department as a more useful alternative to Tier II reporting. c. Paperwork requirements generally apply to solvents rather than active ingredients used by the specialty-batch industry. Industry representatives question the usefulness of these reports. d. Regulations may focus on a broad segment of the industry rather than specific activities of facilities within the industry (e.g., FIFRA pesticide wastewater regulation for formulators). e. [*Are there other examples?*]	--Facilities focus resources only on compliance rather than on innovation because regulations are not applied appropriately. --Facilities spend much time trying to comply with regulations that are written for commodity chemical manufacturers (e.g., OSHA's required list of chemicals on site).
10. **Single media approach.** Many regulations focus on controlling releases to a single media. This may cause a shift of releases from one media to another rather than an overall reduction in releases to the environment, as can be achieved through a cross-media approach.	--Facilities focus on meeting media-specific requirements, which can lead to cross-media transfer and limit the potential for achieving true reductions in environmental releases.

Regulatory Requirements (continued)	
11. **Duplication, different interpretations, inconsistencies.** a. EPA headquarters and regional offices sometimes interpret rules differently. Examples include air permitting and hazardous waste management requirements. b. Regulations that have duplicative or inconsistent requirements. Examples include duplicative requirements of EPA's RMP and OSHA's Process Safety Management (PSM) plan; use of different risk scenarios under FDA's Federal Food, Drug, and Cosmetic Act requirements for testing new products and EPA's FIFRA; and different EPA and DOT reporting thresholds for spills. c. Interpretation of rules may vary across states. d. EPA Regions differ in their priorities. For example, some promote innovative technologies, while others are stricter about first completing paperwork. There are occasions where a Region may act independently from the Agency. e. Federal oversight of issues that have already been resolved at the state or local level lengthens but does not improve the outcome of the regulatory process. f. [*Are there other examples?*]	--Facilities may choose not to invest in innovative improvements based on misinformation. --Facilities may implement innovative environmental ideas, but in the process violate certain regulations due to misinformation. For example, a facility may not know that a permit modification is required. --Facilities focus resources on compliance rather than environmental performance improvements that may be more cost-effective and environmentally beneficial.
12. **Conservative assumptions and politics.** Regulatory requirements, policies, and programs are sometimes based on conservative assumptions and political considerations instead of "sound science," which increases regulatory burden and compliance costs. Examples include: a. Required use of worst case scenarios under FIFRA and for CAA potential-to-emit calculations and RMPs. The chance of a worst case scenario actually occurring may be negligible; b. Great Lakes Initiative effluent standards, which are below background levels; c. Potential reduction of TRI threshold quantities; d. Proposed PM-2.5 standards under CAA;	--Facilities may make environmental improvements that are not cost-effective for industry to achieve or result in changes that do not significantly improve the environment. --Facilities might be less opposed to lower thresholds if EPA could provide indicators of the benefits and could show it has assimilated and acted upon what it has already regulated.

Regulatory Requirements (continued)	
e. HPV Challenge Program; f. Proposed Children's Health Chemical Testing Program; g. Executive orders on environmental justice issues; h. California's approach to RMPs. i. [*Are there other examples specific to state or local regulations?*]	
13. **Regulatory requirements may make it difficult to maintain confidentiality.** The public and other companies, including foreign competitors, can gain access to a facility's information, which may threaten its ability to protect confidential business information and result in adverse economic impacts. a. RMP requirements make process and input information available to the public. b. Facility TRI information is publicly available and does not give facilities credit for recycling or reduction efforts. c. Proposed FIFRA inert ingredients rule; d. TSCA IUR and proposed changes; e. New Jersey requirement for top five ingredients; f. Department of transportation labeling requirements and shipping names; g. California Business Plan/Hot Spots require a company to go to court to prevent release of data for FOIA request.	--Facilities decide to focus on improving community relations to avoid potential misunderstandings about facility operations.

Regulatory Requirements (continued)	
14. **Counterproductive regulatory programs.** a. FQPA new tolerance requirements may reduce the availability of active and inactive ingredients on the market, forcing manufacturers to reformulate their products. b. Federal, state, and local regulations under the Clean Air Act and Clean Water Act lack flexibility for emissions and wastewater discharge trading.	--The new requirements may force companies to reformulate products to be more environmentally friendly. --Companies may use ingredients that are not fully tested. --Facilities may have to invest in environmental improvements that are not cost-effective. --Facilities may choose not to spend time and resources identifying opportunities for reducing pollution at a lower cost, because the regulations do not allow for flexible alternatives.
Recycling/Reuse	
15. **Constraints/disincentives to recycling.** a. Low disposal costs of non-hazardous wastes. b. Regulatory constraints/disincentives under RCRA: C RCRA's current definition of hazardous waste places many restrictions on reusing materials. This issue may affect tollers in particular. Definitions of solid waste, co-products, and by-products are also controversial. C Difficult to recycle waste streams within the 90-day storage limit because of need to accumulate sufficient volume for use or resale. Significant cost/burden of obtaining RCRA permit to hold waste over 90 days. C Speculative accumulation rules do not provide sufficient flexibility to allow for increased recycling activities. The limitations (e.g., accumulation for up to one year and requirement to recycle at least 75 percent of the material) are too restrictive. C Some regulatory agencies do not provide credit for out-of-process recycling. For example, New Jersey facilities can not include -out-of-process recycling activities in pollution prevention reports they must file with the state.	--Facilities choose to send waste to landfills or cement kilns rather than reusing or recycling on-site. --Facilities are conservative in their waste management approaches in order to avoid future Superfund liability. Disposal costs may be greater in the long term.

Recycling/Reuse (continued)	
c. Difficulty of finding markets for recycling small quantities of low-value wastes generated by specialty-batch processors. d. A collective recycling program for companies (similar to household recycling collection) may be effective; however, such a program could raise liability concerns. e. Lack of technology (e.g., for recycling residual isobutane aerosols from the packaging process). f. Difficulty of collecting rinse water for reuse at facilities where equipment is spread out across the site. g. Customers may have negative perception of products made from recycled "waste." h. Repositories for and information on reusable wastes (e.g., latex paints, solvents, and pesticides) could facilitate waste exchanges, particularly for small businesses. Incentives may be necessary, given the lack of success of the recycled paper and plastic markets. i. Chemicals are banned except for particular uses, creating a barrier to chemical reuse. j. Fear of liability if the customer goes out of business or uses a material inappropriately.	
Technology	
16. **Lack of technology or in-house expertise (especially for small businesses) to manufacture a new product safely/quickly.** Small companies in particular lack the resources for investigating or keeping up with the latest technologies, and/or they do not know how to use technology to approach their problems. Verification that a technology does what it claims is important.	--Facilities may turn away customers if they do not have the necessary technology to produce a new product. --Facilities may turn to consultants, who are not always current on the latest technologies for recent process developments in the specialty-batch industry. --Small companies in particular may wait until a new technology has been proven effective before making an investment.

Technology (continued)	
17. **Difficulty of funding R&D (e.g., for new P2 technology) due to limited capital and other priorities.** Banks are reluctant to finance investments that will not yield a return, or that will not guarantee compliance. Companies that are in compliance appear less risky to banks. Banks are unlikely to finance an investment that goes beyond compliance, unless the facility can demonstrate some sort of return.	--Facilities may choose not to invest in long-term environmental and process improvements that could save the company money over time.
18. **Prescriptive regulations.** Technology-based regulations create a disincentive to develop alternative technologies and processes, in part because obtaining agency(s) approval for new technology can be resource intensive. For example, scrubber technology may be effective for multiple applications, but facilities are reluctant to invest resources to demonstrate to EPA that it works. For the specialty-batch sector, technologies are process-specific**.**	--Facilities focus resources on compliance rather than risk investing in technology that may not be approved.
19. **Registration of new chemicals.** Requirements for registration of new chemicals, particularly in foreign countries, are a constraint to the research and development of new technologies for the specialty-batch chemical industry.	--Facilities devote fewer resources to developing new technologies that could have economic and environmental benefits.
Information/Assistance	
20. **Complexity of regulations and difficulty of staying informed.** a. Language in the Federal Register is difficult to understand. Facilities want straightforward information to help answer the following questions: "Does this regulation apply to me?" "What do I need to do to comply?" Finding this information often requires much referencing of other documents. Therefore, opportunities for overlooking caveats are numerous. b. Insufficient government technical assistance and educational outreach, particularly relating to the applicability of existing and new requirements. This has led to missed opportunities for increasing compliance levels (e.g., developing applicability flowcharts, tutorials, and interactive websites). c. Companies lack time and resources for taking advantage of available compliance assistance, such as documents and websites.	--Facilities spend resources on in-house regulatory staff, consultants, and/or attorneys to interpret and comply with regulations. --Facilities join trade associations in part to utilize provided resources for achieving compliance/ improving environmental performance.

Information/Assistance (continued)	
d. Compliance assistance materials are not always helpful. For example, they typically do not provide simple, plain English answers. In addition, replies to requests for assistance from EPA and OSHA are often focused on legal issues and do not answer specific questions. The plain language initiative has not been very effective.	
e. Inspectors may be ignorant of the difference between continuous and batch processes, and significant power is vested in lower-level agency employees, which can cause agencies to miss opportunities to identify areas for improvement/share information to improve environmental performance.	--Facilities are reluctant to work constructively with agencies to test innovative approaches for improving environmental performance. They do not want to implement projects that may become mired in legal hassles.
f. Industry trade associations provide performance improvement initiatives and guidance, regulatory compliance assistance, and advocacy support.	
g. Small business assistance programs may miss companies/facilities that do not qualify for assistance based on size but still need help.	--Facilities choose not to fight misconceptions about the industry held by high-level agency employees due to the high costs that may be involved.
h. U.S. subsidiaries of international companies, which may not qualify for assistance based on size, may receive little compliance assistance from the parent company.	
i. Some state agencies and/or Chemical Industry Councils (CICs) have developed programs/partnerships for helping smaller companies. Industry representatives noted that the Illinois CIC is particularly helpful.	
j. Compliance assistance information may be provided too late; by the time assistance is available, companies may already have spent time and resources trying to understand the regulations.	
k. Several resources are particularly useful: EPA's ChemAlliance website and the New Jersey compliance assistance materials have saved time and eliminated confusion.	
l. Assistance that must be paid for is less appealing than free services and resources.	
m. Internal EPA policy memos may change regulations, unbeknownst to industry. EPA does not routinely share these interpretive memos with the regulated community.	

Information/Assistance (continued)	
21. **Reluctance to take advantage of government assistance.** a. Fear that asking for compliance and technical assistance from regulatory agencies will result in being targeted for inspections. b. Inconsistency within the EPA (between HQ and Regions, and between two different Regions) in responding to compliance questions. c. Inspectors may not be willing to provide technical or practical assistance (e.g., unwilling to make inspection checklist available to facilities); only look for violations. Agency personnel have varying knowledge levels of the industry.	--Facilities pay outside sources to provide information rather than take advantage of established programs and readily available information provided by government agencies. --Facilities may be out of compliance with the law when they do not seek needed assistance from regulatory agencies.
Voluntary Programs	
22. **Lack of incentive/disincentives for participating in voluntary programs.** Some facilities have achieved environmental performance improvements through participating in voluntary programs. However, utilization and growth of some programs have suffered from a lack of incentive and/or disincentives for participation. Companies seek tangible benefits. a. Benefits of ISO 14001 certification are not worth the costs for companies operating primarily in domestic markets. b. Government programs such as Texas/Clean Industries 2000 do not allow banking of air emissions reductions for use on future projects. c. Threshold volume for testing under the voluntary HPV Challenge program is too low given the high cost of chemical testing and the nature of the specialty-batch sector. d. Lack of regulatory flexibility; e.g., regulatory restrictions prevent facilities from implementing innovative solutions that could result in environmental performance beyond compliance. e. Fear that implementing management approaches requiring written management plans (e.g., Responsible Care® and ISO 14001) may subject facilities to greater scrutiny. f. Voluntary programs can be overly prescriptive.	--Facilities may not participate in voluntary programs, therefore programs do not achieve the maximum environmental improvements. --Facilities may participate in voluntary programs as a means for instilling pride in their employees. --Facilities participate in voluntary programs to gain guidance from the Agency, and to receive individual attention outside of enforcement. --Facilities select voluntary programs that provide tangible benefits and have low costs. --Facilities may prefer programs that encourage continuous improvement over those with specific goals and required procedures.

Voluntary Programs (continued)	
g. EPA's disregard of compliance and performance history in setting penalties for violations; companies with generally good performance are treated the same as frequent violators. h. Lack of Agency support for multimedia approaches to solving environmental problems. i. Some voluntary programs require disclosure of confidential business information. j. Under OSHA's voluntary inspection program, facilities receive audits and agree to make the necessary improvements during a reasonable timeframe. OSHA also provides incentives such as reduced workers' compensation and insurance premiums. k. Through Texas' OSHCON program, facilities receive exemption from inspections for one year. l. Voluntary initiatives promote better public perception of the industry. m. Good incentives for participation might include exemption from random inspections, paperwork reductions (e.g., consolidated reporting), reduced monitoring requirements (e.g., HON leak detection and control), tax incentives for reduced emissions, and/or public recognition of achievements by EPA. [*What is the potential for voluntary programs to achieve environmental improvements? Are certain types of programs (e.g., stewardship programs) more likely to succeed than others?*]	--Facilities have increasingly chosen to participate in OSHA's voluntary inspection program. In some states, companies even pay a small fee to have OSHA conduct the inspection. --Facilities continue to participate in voluntary programs that have tangible benefits. For example, potential customers are quicker to reach agreement or raise fewer concerns once they know a facility participates in Responsible Care® or ISO 14001.

Exhibit 1

NUMBER OF SPECIALTY-BATCH CHEMICAL COMPANIES, FACILITIES, AND EMPLOYEES BY FOUR-DIGIT SIC CODE

SIC Code	SIC Description	# of Companies	# of Facilities	# of Employees
2816	Inorganic Pigments	18	22	2,200
2819	Industrial Organic Chemicals, Not Elsewhere Classified	44	69	7,900
2821	Plastic Materials, Synthetic Resins, & Non-Vulcanizable Elastomers	61	114	15,300
2822*	Synthetic Rubber (Vulcanizable Elastomers)	46	56	7,100
2824	Manmade Organic Fibers, Except Cellulosic	4	7	4,400
2833	Medicinal Chemicals & Botanical Products	52	57	3,300
2834	Pharmaceutical Preparations	145	171	30,700
2835	In Vitro & In Vivo Diagnostic Substances	52	59	10,000
2836	Biological Products, Except Diagnostic Substances	49	70	4,600
2841	Soaps & Other Detergents, Except Specialty Cleaners	255	283	13,100
2842*	Specialty Cleaning, Polishing, & Sanitation Preparations	551	595	17,600
2843	Surface Active Agents, Finishing Agents, Sulfonated Oils, & Assistants	70	82	3,300
2844	Perfumes, Cosmetics, & Other Toilet Preparations	211	225	17,900
2851*	Paints, Varnishes, Lacquers, Enamels, & Allied Products	1,019	1,277	46,000
2861	Gum & Wood Chemicals	12	19	600
2865	Cyclic Organic Crudes & Intermediates, and Organic Dyes & Pigments	29	41	4,400
2869	Industrial Organic Chemicals, Not Elsewhere Classified	95	139	20,000
2879*	Pesticides & Agricultural Chemicals, Not Elsewhere Classified	178	209	13,400
2891*	Adhesives & Sealants	523	691	21,100
2893	Printing Ink	66	156	3,700
2895	Carbon Black	3	6	500
2899*	Chemicals & Chemical Preparations, Not Elsewhere Classified	912	1,040	26,000
TOTAL		**4,394**	**5,387**	**273,200**

* Denotes SIC Codes estimated to be at least 50 percent specialty-batch.

SOURCE: Based on data from U.S. Census Bureau, *1992 Census of Manufactures*, Table 1-1b: Statistics for Industry Groups and Industries: 1992 and Earlier Years. Demographic data are not readily available for the specialty-batch segment of the chemical industry. These data are reported by Standard Industrial Classification (SIC) Codes, but most of the codes within SIC 28 (Chemical and Allied Products) include both commodity and specialty-batch processing. To compile demographic data for this sector, we consulted with industry experts to estimate the percentage of each 4-digit SIC code within SIC 28 that is likely to be specialty-batch manufacturing or formulating and applied these percentages to the available demographic data.

END NOTES

[1] Based on data from U.S. Census Bureau, *1992 Census of Manufactures*, Table 1-1b: Statistics for Industry Groups and Industries: 1992 and Earlier Years. Demographic data are not readily available for the specialty-batch segment of the chemical industry. These data are reported by Standard Industrial Classification (SIC) Codes, but most of the codes within SIC 28 (Chemical and Allied Products) include both commodity and specialty-batch processing. To compile demographic data for this sector, we consulted with industry experts to estimate the percentage of each 4-digit SIC code within SIC 28 that is likely to be specialty-batch manufacturing or formulating and applied these percentages to the available demographic data.

[2] Specialty-batch sales reported in Strategic Analysis, Incorporated, in "Specialties' New Lineup," *Chemical Week*, April 30, 1997.

[3] Value of shipments for all manufacturing and SIC 28 reported in U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries*, 1998.

[4] U.S. Census Bureau, *1995 Annual Survey of Manufactures*, Tables 2 and 3, 1996.

[5] Ian Young, et al., "Specialties' New Lineup," *Chemical Week*, April 30, 1997.

[6] Kerri Walsh, "Specialties Heat Up," *Chemical Week*, January 7, 1998. According to a SOCMA representative, pharmaceuticals is a high growth area among members of the trade association.

[7] Environmental data are not readily available for the specialty-batch segment of the chemical industry. These data are reported by Standard Industrial Classification (SIC) Codes, but most of the codes within SIC 28 (Chemical and Allied Products) include both commodity and specialty-batch processing. To compile environmental data for this sector, we consulted with industry experts to estimate the percentage of each 4-digit SIC code within SIC 28 that is likely to be specialty-batch manufacturing or formulating and applied these percentages to the available environmental data.

[8] Based on U.S. EPA Office of Solid Waste, *Environmental Protection Agency Biennial Reporting System*, February, 1997.

[9] U.S. Energy Information Administration, *1994 Manufacturing Energy Consumption Survey* and U.S. EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1994* and *1990-1996.*

[10] U.S. EPA Office of Pollution Prevention and Toxics, *1995 Toxics Release Inventory*, 1997.

[11] U.S. EPA Office of Air Quality Planning and Standards, *AIRSData,* Source SIC Report, December 3, 1998.

[12] U.S. EPA Envirofacts Warehouse, Water Discharge Permits, December 7, 1998.

[13] U.S. EPA Office of Solid Waste, *Environmental Protection Agency Biennial Reporting System*, February, 1997.

[14] U.S. EPA, *Fiscal Year 98/99 OECA Memorandum of Agreement (MOA) Guidance*, June 1997.