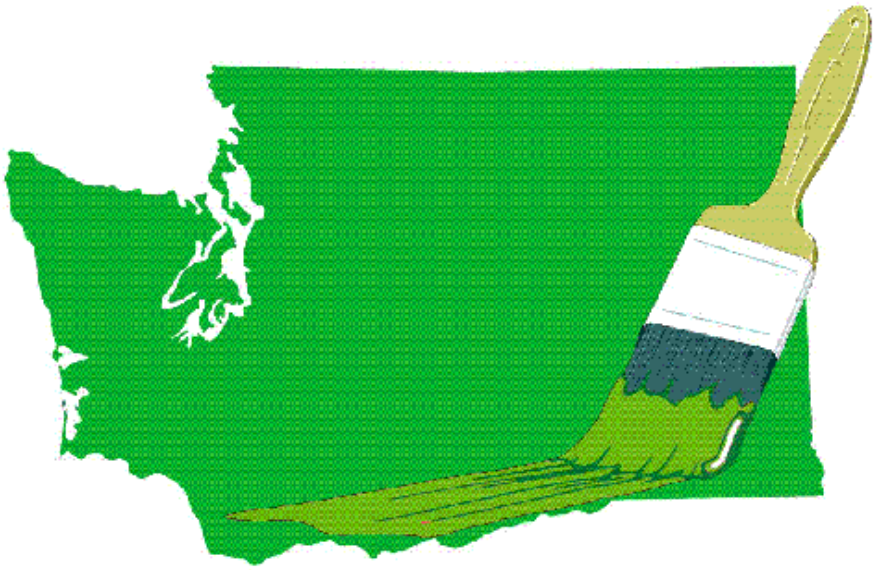
WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Paint and Coatings Manufacturing Sector

A Pollution Prevention Assessment and Guidance



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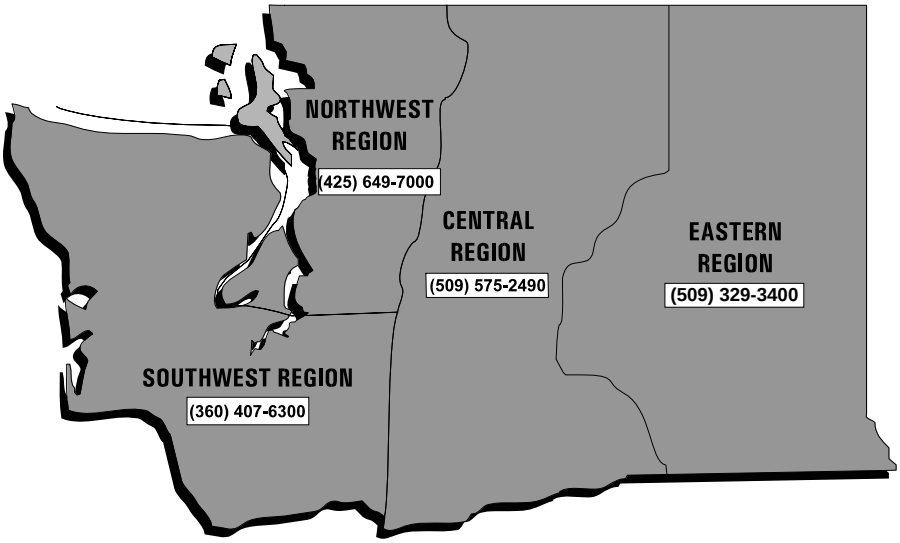

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This report is dedicated to Jeff Phillips, a bright and vital member of Ecology's Paint Sector Team.

Jeff died at the age of 30 on January 1, 1999 in a car accident. He is deeply missed.

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"The success of this project is a result of the efforts of many people. First of all, the Paint Sector Team, would like to express gratitude for the Pacific Northwest Paint Council's Operating Committee's continued support and participation. Without the committee's input, this project could have easily veered into a number of less-effective directions. In particular, we would like to extend special thanks to Ms. Laurel Jamison, Operating Committee chair, and President of Rudd Company for her leadership not only on the committee but in modeling good environmental practices in her business, and for her sense of humor. We are also deeply appreciative of the time and information provided by the eleven facilities we visited in March—they provided the foundation of data for this report.

Finally, as project lead, I wish to acknowledge the hard work and dedication of my Sector Teammates—Mark Benedict, James DeMay, Judy Kennedy, Miles Kuntz, Byung Maeng and Jeff Phillips—I feel blessed to have worked with such a great group of individuals."

—Margit Bantowsky, June 1998

EXECUTIVE SUMMARY

From 1997 to 1998, the Washington State Department of Ecology's (Ecology) Hazardous Waste and Toxics Reduction (HWTR) Program conducted a statewide technical assistance project for the paint and coatings manufacturing industry sector. The project was conducted in consultation with the Operating Committee of the North-west Paint Council (NWPC), a trade association for paint and coatings manufacturers. The project focused on pollution prevention and hazardous waste regulatory compliance, but it also addressed issues related to air quality, water quality and solid waste management. Ecology's Paint Sector Team sought input on the project's goals and objectives from the industry representatives on the NWPC Operating Committee. The technical assistance provided in this report and the five future "projects" listed in the last section is based on input from the NWPC, and on the site visits (conducted in March 1998) to eleven paint and coatings manufacturers throughout the state.

The Paint Sector Team and the NWPC drafted the following project vision statement:

> *"To engage in a collaborative effort with Washington's paint manufacturers to achieve measurable reductions in material consumption, toxicity, and/or releases, thereby reducing risk to human health and the environment. In doing so, we want to provide excellent service to this industry and foster action that is both good business and steps towards sustainability and global stewardship. We want to craft goals and project elements that are supported by the industry and Ecology, and to successfully complete these elements in the allotted time frame. We would like this project to be a positive example for other Ecology-Industry endeavors."*

The scope of the project included:

- ✓ Researching industry-specific pollution prevention practices.
- ✓ Conducting pollution prevention /regulatory compliance site visits at a cross-section of Washington's paint manufacturing facilities.
- ✓ Identifying pollution prevention and waste management issues that could and should be addressed consistently in the paint manufacturing sector, thereby "leveling the playing field."
- ✓ Highlighting and providing resources for future pollution prevention actions.
- ✓ Developing a strategy for Ecology's follow-up technical assistance efforts.

Site visits to a selection of 9 paint manufacturing and 2 distribution facilities in March 1998 resulted in the following observation and identification of technical assistance needs.

Pollution Prevention

Pollution prevention is considered any activity that reduces or eliminates pollutants entering the environment such as air emissions, water discharges, solid waste or

dangerous waste. Ecology also considers activities that reduce the quantity and/or the toxicity of the materials used as pollution prevention.

The facility visits revealed that the paint and coatings manufacturing industry is already doing a significant amount of pollution prevention. For example, most facilities reuse their wash solvent and wash waters in subsequent formulations, use dedicated equipment to reduce the need for cleaning, and are actively reformulating products to reduce their toxicity.

Even though nearly all the facilities indicated that they employed efficient materials management techniques, the Paint Sector Team found that there was a range of effectiveness in this area. Ecology believes that improved materials management could be a fruitful area for future waste reduction for most facilities.

Additional areas likely to have future benefit are:

- Increasing the use of reusable and recyclable containers (for raw materials and for finished product);
- An industry-specific materials exchange to encourage the re-use of off-spec, obsolete, or excess amounts of materials and products;
- Use of high-pressure tank and tote wash systems, including re-circulating systems to reuse the wash water;
- Use of counter-current rinse methods (e.g., using dirty solvent for first rinse, cleaner solvent for second rinse, virgin solvent for final rinse);
- Reducing the generation of materials and products that needs to be "re-worked" into future formulations or disposed of; and
- Use of "shower caps" to reduce evaporative losses on smaller process tanks.

See "Pollution Prevention" section (page 9) for more detail.

Solid Waste

A variety of containers are used to transport raw materials and product. Some of the drums are sent back to the raw material suppliers, and reused; some drums are sent to drum recyclers. A number of raw materials are delivered in bulk in large, re-usable totes (e.g., solvents, titanium dioxide, common resins). Some facilities use totes to package product for their larger customers. Using these reusable containers seems to be dependent on the supplier-manufacturer and the manufacturer-customer relationships, but Ecology encourages increasing the use of re-usable and bulk containers where possible. In addition, there is a need to find ways to recycle 5-gallon buckets (metal and plastic). Ecology provides some recycling vendor information in this report.

Dangerous Waste

Regarding compliance, we did not find any substantial dangerous waste regulatory violations. The most common minor violation was small containers of new solvent and waste solvent left open or not tightly closed. For the most part, dangerous waste was stored, managed, and disposed of appropriately. In this report Ecology provides clarification on pertinent dangerous waste regulations. Counting recycled solvent is an area that needs particular clarification.

Orphan Waste

Paint wastes being abandoned or "orphaned" on a manufacturer's property by the public turned out not to be a significant problem for most facilities. Only one facility had some recurring problems. The rest of the facilities have secured property, limiting access to disposal areas. Orphan waste may be more of an issue for distributors or retail paint stores.

Process Water Discharges

Although four facilities discharged some process water (wash water) to the sewer, most manufacturers reincorporate process water into subsequent product batches. In the few cases where more wash water was generated than could be reworked, the facilities either evaporated the wash water, or sent it off-site for disposal.

Stormwater

There was a significant range in how facilities were handling the outdoor storage of materials and wastes exposed to precipitation and run-off. Because of the potential for environmental impact and because stormwater is outside of the purview of the Hazardous Waste and Toxics Reduction Program, we recommend that:

1) Paint and coatings manufacturers with *any* questions regarding compliance with stormwater requirements contact Ecology's staff (see "Stormwater" section, page 20), or

2) Request a technical assistance visit from Ecology's Stormwater staff (in the Water Quality Program) for in-depth assistance.

At a minimum, cover and containment should be provided for all materials stored outdoors (containment is *required* for *hazardous waste*, whether stored indoors or outdoors). Pertinent best management practices are outlined in this report.

Spills

Evidence of spills was observed at only one facility. This does not appear to be a significant issue for the industry at this time.

Air

Manufacturers addressed air concerns by keeping lids on tanks, and using minimal solvent to wash tank walls during product let-down (dispensing into product containers). Ecology does, however, recommend that "shower cap" covers be used in conjunction with the wooden lids to reduce evaporative losses. Operations and maintenance procedures for emission reductions during tank clean-out were not verified during the visits.

Possible Technical Assistance Follow-up Efforts for Ecology

In addition to the assistance and resources provided in this report, Ecology identified five potential activities/services that could be valuable to and effective for the industry:

1. A paint and coatings-specific materials exchange; the Pollution Prevention Resource Center in Seattle is planning to design and implement the materials exchange.
2. A paint and coatings manufacturing environmental/pollution prevention website; the Pollution Prevention Resource Center will be lead on this effort as well.
3. Paint industry briefings for dangerous waste inspectors (internal to Ecology); the Paint Sector Team member in each Ecology regional office will share the findings of this project with their respective dangerous waste inspectors.
4. Providing technical assistance visits to the remaining 10 coatings manufacturers in Washington State; Ecology management has agreed to extend the resources of this project in order to conduct these visits, which are being planned for October-November 1998.[1] Assisting facilities in disseminating compliance and pollution prevention information from this report/project to their production workers; this potential service will be evaluated after this report has been submitted to the industry.

[1] *Visits to these ten manufacturers were completed on schedule.*

BRIEF PROJECT HISTORY

A. Ecology and Sector Projects

In 1995, the Department of Ecology began an effort to provide Washington businesses with statewide industry-specific pollution prevention assessments and technical assistance. Pollution prevention is any activity that reduces or eliminates pollutants entering the environment such as air emissions, water discharges, solid waste or dangerous waste. Ecology also considers activities that reduce the quantity and/or the toxicity of the materials used as pollution prevention.

Ecology's technical assistance focused on reducing the use of hazardous substances, reducing the generation of hazardous wastes, and compliance with the *Dangerous Waste Regulations*. By choosing specific industry sectors for short-term focused assistance, Ecology hoped to provide better service to business and make some long-term environmental gains by reducing hazardous substance use and hazardous waste generation.

To date, Ecology has conducted sector projects with the electroplating, fiberglass, and printed circuit board manufacturing industries. In 1998, sector projects will be completed with the paint and coatings manufacturing industry and facilities providing national security defense. This report provides a project summary and the findings of the Paint and Coatings Manufacturing Sector Project as well as recommendations, information and resources for paint manufacturers.

B. How Paint and Coatings Manufacturing was Selected

The environmental impacts associated with the management of paint and paint related wastes are a continuing concern for Ecology. Also of concern is the potential environmental and human health effects of hazardous chemicals used in the production, application and clean up of paints and coatings. As a result, Ecology's Hazardous Waste and Toxics Reduction Program chose to address paint and paint waste issues by starting with paint manufacturers, with an eye toward possibly assisting paint distributors, applicators, and contractors in the future. For the purpose of this project, the paint manufacturing sector includes manufacturer's of coatings such as paints, stains, sealers, varnishes, lacquers, and a variety of specialty industrial coatings.

C. Initial Research

The Paint Manufacturing Sector Team initially identified 30 facilities in the state that reported their industrial activity as paint and allied products manufacturing under the Standard Industrial Classification (SIC) code 2851. Verification efforts trimmed that list to 19 facilities that were actually manufacturing paint and/or coatings (see Appendix A, page 31 for the list of Washington facilities). Ten facilities manufacturing paint or related products were in Ecology's database of hazardous waste generators. Collectively, these

facilities had reported generating a total of over 345,000 pounds of hazardous waste and 50,300 lbs. of toxic air emissions in 1995.

D. Feedback from Northwest Paint Council (NWPC)

To better understand paint manufacturing needs and issues, Ecology's Paint Sector Team attended a meeting with the Northwest Paint Council (NWPC) on September 10, 1997, in Kelso, WA. The Council brought to our attention the following issues:

1. **Government Specifications—**Some government specifications limit product use (e.g., a specification requires the use of solvent-based coatings although qualified water-borne coatings are available).
2. **Level The "Playing Field"—**Pro-active paint companies are already doing pollution prevention. Transfer these practices to smaller, and/or less compliant manufacturers by:
   - Developing and distributing information about reduction practices, and
   - Ecology conducting site visits to these facilities.
3. **Develop Markets for Recyclable Materials**
   - Paper
   - Cans, drums, containers
   - Un-sellable paints
   - Plastics
4. **Address "Single-Use" Issue—**A Department of Transportation regulation that restricts the re-use of containers by requiring integrity-testing, etc.
5. **Orphan Waste—**Paint waste illegally dropped off at a paint manufacturer's site.
6. **Contractor Paint Waste—**Re-use and recycling, interface with distributors and manufacturers.

E. Initial Scoping Efforts

The Ecology Paint Sector Team received these comments and developed an initial project scope to visit a representative sample of paint and coatings manufacturers to verify the technical assistance needs (listed in Section D above), identify the level of on-going pollution prevention activity, and assess the level of regulatory compliance.

The project vision statement that was collaboratively developed was:

> *"To engage in a collaborative effort with Washington's Paint Manufacturers to achieve measurable reductions in material consumption, toxicity, and/or releases, thereby reducing risk to human health and the environment. In doing so, we want to provide excellent service to this industry and foster action that is both good business and steps towards sustainability/global stewardship. We want to craft goals and project elements that are supported by the industry and Ecology, and to successfully complete these elements in the allotted time frame. We would like this project to be a positive example for other Ecology-Industry endeavors."*

Ecology's responses to the NWPC issues raised in Section D, are:

1. **Government Specifications—**Ecology is working with the Washington State Department of Transportation (DOT) through the Pollution Prevention Planning process to modify coating specifications to allow the use of more environmentally friendly materials. Lobbying the federal DOT is beyond this project scope.

2. **Level the Playing Field—**Ecology responded to this request by visiting a selection of facilities to gain an understanding of "playing field' issues and by sharing the results of those visits with the industry statewide through this report. Ecology and the NPWC are evaluating the possibility of visiting the remaining 10 manufacturers to share project results such as common and future pollution prevention opportunities, compliance issue clarifications/guidance, and vendor information. Stormwater management and material management were two areas that showed the greatest variability.

3. **Develop Markets for Recyclable Materials—**Developing markets for recyclable materials is not within Ecology's current capabilities, however, information to help facilitate reuse and recycling of the solid wastes of concern is included in this report.

4. **Work on DOT's Single-Use Regulations—**Again, Ecology believes that lobbying to change federal DOT regulations is beyond the scope of this project.

5. **Orphan Waste—**Ecology did assess the extent of this issue by conducting site visits and found that it is not a significant issue for most manufacturers.

6. **Contractor Paint Waste—**Ecology assessed the climate for paint waste recycling during site visits. At this point, paint waste recycling is a case-by-case arrangement between the manufacturer and its customers. Trying to organize and institutionalize customer paint waste recycling is a very complex endeavor with many barriers to overcome. Consequently, given our current limited resources, Ecology is focusing instead on promoting ways to reduce the need for paint waste recycling.

SITE VISITS

A. Purpose of Visits and Site Selection

The purpose of the 11 site visits (9 manufacturers, 2 distributors) was to assess the pollution prevention activity level and evaluate some of the issues raised by the NW Paint Council. Ecology focused on both pollution prevention and environmental compliance.

The facility selection was based on size and nature of operation, and was conducted with input from the NW Paint Council. Consequently, the site visit group had representation from national, large regional, local, small specialty, and industrial coatings manufacturers. Six of the facilities were located in the Seattle/King and Pierce County area, and five were located in eastern Washington in the Spokane, Yakima and Tri-Cities areas.

Participating Facilities in the Project

Facility Name	Location	Distributor or Manufacturer	Type of Coatings
Columbia Paint	Spokane	NW Regional Mfr	Architectural, industrial, stains, traffic
Daly's Inc.	Seattle	Small specialty Mfr	Specialty wood coatings
Daniel Boone	Seattle/ Tukwila	Small local specialty Mfr	Architectural, traffic paint, industrial
Kelly-Moore Paint	Seattle	Large Regional Mfr	Architectural, preservative, industrial enamels
Lilly Industries	Seattle	Large National/ International Mfr	Industrial wood coatings – stains, finishes, primers, top
Perfection-Letz	Kennewick	Small Mfr	Architectural, industrial, agricultural, metal primer
Rudd Company	Seattle	NW Regional Mfr	Industrial wood coatings for doors and cabinets, floors
United Coatings	Spokane/ Greenacres	Regional industrial Mfr	Industrial, architectural, roofing paving coatings
Wasser High-Tech	Seattle	Industrial specialty Mfr	Architectural, industrial
Sherwin Williams	Spokane	Distributor/blender	Architectural, industrial
Standard Paint	Yakima	Distributor	Architectural, industrial

B. Site Visit Objectives and Approach

For recording the status of the many issues and concerns, Ecology used three survey forms: one for pollution prevention activities, one for dangerous waste compliance, and one called "supplemental survey." The supplemental survey covered many of the questions/items that the NW Paint Council identified. The pollution prevention survey is discussed in the "Pollution Prevention" section (page 9). Copies of the dangerous waste compliance checklist and the supplemental survey can be found in Appendix B (page 33). The site visit objectives were:

1. To assess the "level playing field" issue with respect to both pollution prevention and environmental compliance.
2. To identify new pollution prevention opportunities Ecology should be promoting in this industry.
3. To assess whether distributors warrant attention/inclusion in this project.
4. To assess paint recycling issues.
5. To assess solid waste issues (paper, plastic, containers).
6. To assess orphan waste issues.
7. To identify possible project success measurements.

8. To document current and improved practices (camera – photos to illustrate practices).
9. To identify air and water issues.
10. To find out whether facilities would use an Internet website for information.
11. To determine what form facilities would like their technical assistance to be in (e.g., checklist, pamphlet, visits, etc.).
12. To identify additional research needs.

Since the questions and checklists were fairly extensive, and the Paint Sector Team wanted to document some of the practices with photographs, it was decided to have teams of three on-site: two staff completing the surveys and one photographer. The Paint Sector Team mailed invitations to all the facilities three weeks before the visits began, and made appointments. The invitations included an endorsement letter from the NW Paint Council, and a letter from Ecology's Hazardous Waste and Toxics Reduction Program Manager stating these were technical assistance visits, not for enforcement. The visits were voluntary, and all the selected facilities accepted our invitation to meet with them.

The entire Paint Sector Team began with a group visit to one facility to verify our approach to conducting the site visits. Ecology is most grateful for Rudd Company's generous offering of their site, time, and assistance for this initial team visit. The eleven visits were completed within the month of March 1998, and although they were time-consuming (average on-site time was 3 hours), the visits were productive and the manufacturers were very helpful.

POLLUTION PREVENTION
—visit results, recommendations & resources

Ecology's objectives in evaluating pollution prevention activities were to identify common industry practices, and the pollution prevention actions that represent the most beneficial future opportunities.

The practices described below are based on 18 sets of data: 11 site visit surveys and 7 mailed-in surveys from unvisited facilities (data can be found in Appendix C, page 39).

A. Common Industry Practices

Listed in this section are practices common to most of the facilities surveyed, which are likely to be valuable to most paint and coatings manufacturers. They should be considered baseline practices. In other words, facilities that are not following these practices (where applicable) are not practicing pollution prevention at the same level as their peers. These practices include:

Blending Off-Spec Materials Into New Product

This is an on-going effort for all facilities and is driven more by economics than environmental regulation—it's expensive to turn product into waste.

Elimination of Heavy Metals and Chlorinated Compounds

Chromium, lead, mercury-based bactericide, and methylene chloride have virtually been eliminated. Other metals and chlorinated compounds are being aggressively targeted and reduced. Appendix E (page 53) contains information about the toxicological effects of these compounds.

Reformulation Into Water-Based Products

Many solvent-based products have been reformulated to be water-based. This has greatly reduced the industry's use of hazardous chemicals.

Materials Management

Though all companies are doing some level of materials management to reduce waste and costs, Ecology believes this is an area that could provide worthwhile reductions in the future as well.

Offering Mistints and Off-Spec Products to Non-Profit Organizations

Schools, low-income developments, community projects and organizations often seek out material donations such as paint from businesses in the community.

Giving or Selling Overages on Custom Products to the Customer

Rather than keeping small overages of custom products, or trying to find another customer or use for them, many manufacturers are making an effort to give or sell small overages to the customer who ordered the product.

Using Re-Usable and Recyclable Containers

Some manufacturers actively pursue using recyclable containers for raw materials and finished product to reduce the generation of solid waste. (A common practice to some degree, it remains an area for future opportunity. See "Solid Waste" section, page 16).

Formulator Works With the Paint Maker

When manufacturing a new product for the first time, the formulator will work with the paint maker to limit the production of off-specification product.

Clearly Indicating/Highlighting Formula Changes

To prevent producing off-spec products due to human error, manufacturers are taking steps to call attention to formula changes through highlighting or other indicators.

Using Re-Usable Bag, Metal, or Vortisieve Screens and Filters

A common practice for the reduction of solid waste from paint filtering is the use of re-usable rather than disposable filters.

Use of Sandmills

Instead of ballmills, use sandmills for grinding and mixing ingredients. Sandmills are more efficient and they require less solvent for cleaning. Also, by dedicating mills to specific colors or color-ranges, less cleaning is required.

Scheduling From Light-to-Dark Products

To minimize the amount of cleaning needed between batches or similar formulations, milling is scheduled to start with light colors and progress toward dark colors.

Dedicating Equipment

To reduce the need for cleaning and the generation of wash solvent or wash water, equipment is dedicated to a particular product or family of products.

Wash the Tanks As They are Being "Let-Down"

Paint can dry on the tank walls as the product is gradually transferred/pumped (let-down) into final packaging. Continuously washing the tanks walls with solvent during let-down prevents the paint from drying on the tank wall and significantly reduces the solvent needed for cleaning when the tank is empty. The solvent is calculated to be incorporated into the final formulation.

Re-Work Wash Solvent and Wash Waters

Wash solvent and wash water is worked into future product formulations rather than being disposed.

Manually Cleaning Tanks

Cleaning tanks manually with a wiper or squeegee rather than solvents scored highly on the survey and appears to be a common practice, but Ecology did not see that many manufacturers actually doing this. It could have just been that site visits did not occur when tanks were being cleaned.

Solvent Distillation

Instead of disposing of waste solvent, distill the liquid for re-use. All the facilities are distilling solvent; about half are distilling on-site, and the rest are sending solvent to off-site recyclers.

Maximize Batch Size

To reduce clean-out waste, batch sizes are maximized.

B. Future Pollution Prevention Opportunities

Based on survey results and observations the pollution prevention opportunities listed below should be considered the "next steps." A complete list of pollution prevention opportunities is provided in Appendix D (page 47). Manufacturers can use this as a checklist for periodic self-auditing.

Materials Management and Housekeeping

During the site visits it became evident that housekeeping was an important factor in reducing wastes. There was wide variability in how successful the different facilities were at maintaining an organized operation. The facilities with a focus on house-keeping and tracking were more organized and efficient in managing their materials.

Housekeeping is how the materials are handled, stored, and maintained at a facility, and is one of the easiest and least expensive ways to reduce waste, increase efficiency, and reduce liability. Some examples of good housekeeping are:

- Labeling and dating all containers.
- A management policy and actions that maintain a well-organized facility.
- Uniformity of practices (for formulating-blending, cleanup, etc.).
- Training for all employees on the established practices and protocols of materials management, including storage, cleanup, and handling of materials.
- Good communication between workers.
- Routinely inspecting/checking the facility.
- Documenting plant operations with flow diagrams and process specifications.
- Establishing simple names/codes for materials.

For housekeeping to be successful, it must be the effort of the entire company. The efforts of the production team must be backed by a real commitment by management.

Materials Tracking

Paint and coating manufacturing involves materials-intensive batch production processes. The ability to accurately and efficiently track and manage raw materials inventories is a key to successful production management. Most of the manufacturers visited use *Batchmaster* ™ software to track production and raw material use. Users were uniformly frustrated with the amount of effort required to use *Batchmaster* ™ data to generate hazardous waste and emissions reports.

Ecology team members recognized the importance and value that enhanced materials management capabilities would add to paint and coating facility operations. However, Ecology does not at this time have the expertise to provide this type of technical assistance. As an alternative, Ecology recommends that the manufacturers contact environmental software companies that have developed products with hazardous materials management capabilities and have their current needs and existing materials management systems evaluated. A listing of these software companies is included in the vendor information in Appendix F on page 57.

Paint and Coatings Manufacturer's Material Exchange

A material exchange is a service that most of the visited facilities thought would be useful. Through a materials exchange program, one manufacturer could sell or give away unused resins, pigments, and other raw materials to another manufacturer for use as product. The Pollution Prevention Resource Center, an independent, not-for-profit organization in Seattle, has grant funding to provide technical assistance to the paint and coatings industry, and is planning to assist NWPC in establishing a material exchange system in the Northwest, possibly in conjunction with King County's Industrial Materials Exchange (IMEX). Ecology will provide PPRC with appropriate support (see "Possible Technical Assistance Projects by Ecology" section, page 26).

High-Pressure Wash Systems

A potential future opportunity is to use pressurized water to clean tanks. The pressure affords mechanical energy that removes coating product from the tank wall thus reducing the quantity of liquid required and waste liquid generated. One facility is successfully using pressurized solvent and is considering a similar system for water. Because of potential fire hazard, we recommend consulting with the local fire officials before pursuing a pressurized solvent system.

Pressure wash equipment is available from a number of vendors. Pressure wash systems which include water-recycling components are listed on the "Thomas Register" Internet site under the headings "water recycling" and "pressure washer water recycling equipment" (see Appendix F, page 57 for vendor listings).

Wash Water Recirculation/Filtration

The concept here is to filter or centrifuge wash water for continued re-use. Rinsing tanks that have been used to formulate water-borne products, and to rinse raw material totes and containers generates wash water. Though many facilities are able to successfully reincorporate the rinse/wash water into subsequent formulations, sometimes the rate of wash water generation exceeds the rate at which wash water can be reworked. A closed-loop, recirculating, pressurized wash water system could significantly reduce cleaning water generation and reduce water discharge or need to re-work wash water. Pressurized water is sprayed through a nozzle, used to rinse the container, and the rinsate is collected in a reservoir. The rinsate is filtered and transferred to the feed tank and is used again (see Appendix F for vendor listings).

Counter-Current Rinsing

Counter-current rinsing is the process of matching a rinse solution to the rinse job, based on the initial level of contamination in the solution. In other words, using "dirty" (but not spent) solvent for first rinse, followed by a slightly cleaner solution for the second rinse, ending with final rinse of clean or virgin solvent. This method significantly reduces the volume of solvent or water needed for cleaning, and is particularly effective with at least three stages.

Shower Caps and Tank Covers

"Shower cap" tank covers for covering in-process tanks or tanks of product awaiting packaging, are available from a number of vendors (see Appendix F, page 57). These elasticized, disposable covers fit a variety of tank sizes and are often used in conjunction with the standard plywood lids. If a more customized or more durable cover is desired, there are many manufacturers of custom plastic and composite products. The "Thomas Register" Internet site lists many of these companies under the heading "tank covers."

Reducing Re-work Materials Including Off-spec Coatings

Off-spec coatings and other re-workable materials are a burden for paint manufacturers. It takes valuable time and attention to manage inventory and create

opportunities to re-blend these materials back into products. It is important for facilities to continue identifying causes of re-work materials and implementing solutions. Some causes of rework include: customer returns of excess paint, mis-tints, bad batches, and out-of-date products.

Manufacturers can reduce the amount of re-work materials by:

- Selling/giving away part-gallon overages to customers on custom products.
- Selling/donating off-spec product to non-profit organizations, schools, theater groups, etc.
- Not accepting customer returns on custom-tinted products.
- Requiring customers to supply a substrate sample with their color-match requests.
- Clearly indicating and highlighting formula changes.
- Quality control methods to reduce formulation mistakes.
- Providing employee training on custom tinting procedures.
- Computer-supplemented tinting procedures.
- Good material tracking capabilities to identify low-use stock items.
- Providing employee training on quantity estimation (to help customers accurately calculate amount of paint/coating needed for a particular job).

Testing Raw Materials

This practice prevents off-spec material from ruining product batches. Although testing raw materials before accepting from the supplier is already being done successfully by some of the facilities, at least five manufacturers indicated this was a potential future opportunity.

Purchasing Pre-Dispersed Pigments

This practice reduces solvent waste generated from mill wash-out. A few facilities are purchasing pre-dispersed pigments, however, this remains a viable future opportunity for many facilities.

Re-Using Baghouse Dust

A few manufacturers are successfully reincorporating baghouse dust into product, thus preventing it from becoming waste. Dedicating baghouses and re-using baghouse dust in formulations is a potential future opportunity for some facilities.

Increased Automation

Automation tends to reduce wastes generated because of operator error. At least four manufacturers indicated that increasing automation is a viable future pollution prevention opportunity.

Increased Dedication of Filling Units

Increased dedication of filling units is a potential opportunity for several facilities. Dedicating equipment to a particular product or line of products reduces the need for cleaning solvent (clean less frequently and thoroughly).

Pre-Determine Re-Work Potential

A practice that several facilities indicated could be a future opportunity is that laboratory and management determine re-work potential before releasing experimental products. This prevents the product from becoming waste should it fail to meet performance/quality criteria.

Totes for Large Customers

Using totes for large customer orders reduces packaging wastes and costs. Though some facilities are providing totes for large customer orders, this is an area that many manufacturers are working on and continues to afford opportunity.

Tanks With 1:1 Diameter to Height Ratio

Designing tanks with a 1:1 diameter to height ratio would reduce surface area to be cleaned. While this was a high-scoring future opportunity in Ecology's survey, more compelling variables determine tank dimensions such as motor size, impeller diameter, efficiency of mixing, and physical space constraints. Because of these limitations, Ecology doesn't see this as a big future opportunity, but encourages facilities to do this where feasible.

Automated Tank Cleaner

This is a viable future opportunity, particularly when employee health impacts from manual tank cleaning are considered, but none of the facilities were using such a device. This practice could be particularly effective if pressurized wash fluid (solvent or water) is used, thereby reducing the amount of fluid needed per tank cleaning (see Appendix F, page 57 for vendor listings).

Employee Incentives

Several manufacturers indicated that providing bonuses, rewards, or incentives for employees to reduce wastes is a future reduction opportunity. This has a low implementation cost, but could result in significant reductions and encourage teamwork.

Laboratory and Manufacturing Personnel Rotations

Rotating laboratory personnel into manufacturing positions, or vice versa, is a practice that received a significant positive response from manufacturers. A low-cost opportunity, rotating personnel should be relatively easy to implement, yet have a positive impact on communications between laboratory and manufacturing personnel, and reduce batch-making errors and inconsistencies.

SOLID WASTE
—visit results, recommendations & resources

The major solid waste streams are **drums** (steel, plastic, and fiber), 5 gallon **pails** (metal and plastic), dry-ingredient **paper bags**, and **wood pallets**.

In general, solid waste streams can be reduced by switching to reusable packaging; using packaging which is recyclable; or minimizing the amount of packaging (i.e., designing more efficient containers). The following reusable containers are in use at several facilities: *Super Sacks* -1000 & 2000 lb. sizes (manufactured by B.A.G. Corp. 800-331-9200, *www.bagcorp.com)*, collapsible totes, and cardboard totes (330 gal. size). The cardboard totes use disposable latex bladders/liners. The cardboard can be recycled when the tote is no longer usable.

Drums

Most facilities are recycling metal and plastic drums through local vendors. The vendors are charging $2 - 3 per drum and may require a minimum number of drums for pickup service. Some steel or plastic drums may have deposits associated with them or the vendor may have a leasing arrangement with regular customers. Fiber drums are less commonly used and are being disposed as solid waste. If fiber drums are in use, encourage the supplier to switch to reusable drums (metal or plastic) or reusable totes. Consult the vendor listings in Appendix F on page 57, access King County's IMEX catalogs on their website at *http://www.metrokc.gov/hazwaste/imex/*, or call 1-800-RECYCLE for new contacts.

Five-Gallon Pails & Dry Ingredient Bags

Pails and paper ingredient bags are currently being disposed by all facilities. Metal pails are difficult to clean to the satisfaction of metals recyclers. Consult vendor listings in Appendix F (page 57) or call 1-800-RECYCLE. There are often listings in the IMEX catalog for plastic pails (under the heading "Wanted – Plastics/Rubber"). If pails are clean, in good condition, and with handles, they might be donated to paint retailers or thrift stores (Goodwill, Salvation Army, etc.) for resale. There may also be a market for recycling HDPE buckets into pallets, new buckets, or other recycled content plastic products. Investigate alternative packaging with your supplier. For recyclers of dry ingredient bags, consult King County's IMEX catalog on their website at *http://www.metrokc.gov/hazwaste/imex*, consult the listings in Appendix F, or call 1-800-RECYCLE and ask for recyclers of "mixed paper."

Pallets

Only a few facilities reported problems when recycling pallets. These were due to lack of a local vendor/pickup route or non-standard sizes. See listings in Appendix F, or access King County's IMEX listings on their website *http://www.metrokc.gov/hazwaste/imex/* under "Wanted – Wood/Paper").

DANGEROUS WASTE
—visit results, recommendations & resources

In general, Ecology did not witness substantial dangerous waste violations. Violations Ecology would consider "significant" include such practices as spilled hazardous substances that are threatening health or environment, improper or illegal disposal, improper designation of wastes, and waste containers that are open, leaking, incompatible, or handled in a manner that could cause damage.

A. Corrections to Common Mistakes

There were, however, a few areas that require attention. These are listed below, along with a description of the correct practice according to the *Dangerous Waste Regulations:*

- *Accumulation tanks or containers for waste solvents or paint sludge were left open or not tightly closed.*

  Correct Practice:
  A container holding dangerous waste must **always be closed**, except when it is necessary to add or remove waste (WAC 173-303-630). In addition, tank systems holding dangerous wastes which are acutely or chronically toxic by inhalation must be designed to prevent escape of vapors, fumes, or other emissions into the air (WAC 173-303-640).

- *Some facilities had not established accumulation areas for their dangerous wastes to be temporarily stored while waiting for final disposal.*

  Correct Practice:
  Dangerous waste **must be stored in a designated accumulation area** before being recycled or disposed of off-site. Designated dangerous waste accumulation areas must have a containment system that is capable of collecting and holding spills and leaks (WAC 173-303-630(7)). In other words, you must have a special, clearly marked area for waste storage, and this area must be able to contain leaks and spills.

- *Improper labeling of dangerous waste containers.*

  Correct Practice:
  While being accumulated on site, each container or tank must be labeled or **marked clearly** with the words **"Dangerous Waste"** or **"Hazardous Waste."** The date upon which each period of accumulation begins is also marked and clearly visible. (WAC 173-303-200(1))

- *At one facility, dangerous wastes from retail centers were being treated at the main manufacturing facility.*

Correct Practice:

Some paint manufacturers have local retail outlets that generate hazardous wastes. These retail outlets are typically small quantity generators, and although it would make sense for the manufacturer to handle waste from its retail outlets, the problem is that paint manufacturers typically are **not legally allowed to do this.** A facility must have a "RCRA Part B" permit before it can treat or recycle waste generated from another location – in other words, you must be a permitted Treatment, Storage and Disposal facility. Therefore, the retail outlet must contract with an off-site transporter/recycler, or haul their wastes off-site to permitted waste disposal facilities.

- *At least two facilities had "dangerous waste counting" problems (WAC 173-303-070).*

Correct Practice:

The correct counting of dangerous waste determines what size generator the facility is (either a small, medium, or large-quantity generator). It can be confusing to know when to "count" a material or not. See the following sections on wash solvent and wash water. Another good resource is "*Counting Dangerous Waste Under the Dangerous Waste Regulations*, August, 1998" (see Appendix G, page 63).

B. Clarification of Pertinent *Dangerous Waste Regulations*

The following paragraphs clarify specific segments of the Washington State *Dangerous Waste Regulations* relevant to paint and coatings manufacturing.

1. Wash Solvent

In most cases, spent wash solvent is a dangerous waste. Therefore, it must be managed in compliance with all the requirements under the State *Dangerous Waste Regulations.*

a) Total amount of spent solvent generated from paint manufacturing process has to be counted as dangerous waste, and included in the Dangerous Waste Annual Report (WAC 173-303-070).

b) If spent solvent is *immediately* recycled without accumulation (i.e., closed loop: hard-piped directly to distillation unit, no storage of waste solvent), then this amount is not counted or reported in the Annual Report (WAC 173-303-070(7)(c)(iv)).

c) If spent solvent is accumulated prior to off-site recycling, then this accumulated amount has to be counted and reported in the Annual Report. This spent solvent can be accumulated on-site no longer than 90 days for large quantity generators or 180 days for medium quantity generators.

If the spent solvent is recycled on-site (distillation), the waste is counted according to the reference in Appendix G, page 63, "Counting Dangerous Waste Under the *Dangerous Waste Regulations*"(refer to Discussion #5, page 71). Basically, you count one "batch" of waste per month, plus still bottoms, plus make-up solvent (WAC 173-303-070(7)(d)(iii)).

2. Wash Water

Before wash water is discharged, it must be tested in accordance with the requirements under the State *Dangerous Waste Regulations* (WAC 173-303-090, and -100). If the wash water designates as dangerous waste, the manufacturer has to follow the counting methods described in the "Wash Solvent" section, page 18 (B.1). There are some discharge options for wash water that may apply:

a) If wash water is not a dangerous waste, then the wash water can simply be discharged to sewer system upon the local sewer district's approval.

b) If wash water is a state-only waste or highly diluted federal listed waste and treatable by the local POTW, this wash water can be discharged to sewer system by obtaining an appropriate permit issued by the Department of Ecology or local sewer district (WAC 173-303-071(3)(a)) (see Ecology Publication #94-136, *Domestic Sewage Exclusion,* revised 6/97). This wash water is excluded from dangerous waste counting requirements unless any treatment is involved before discharge.

c) If wash water is a characteristic waste, the Domestic Sewage Exclusion does not apply. This wash water has to be managed as dangerous waste. There may be treatment-by-generator options, such as elementary neutralization or evaporation that apply (see Ecology Publication #96-412 – *Treatment by Generator*).

3. Returned Materials or Off-Spec Materials

a) If returned or off-spec materials designate as dangerous waste, and are disposed of or reclaimed through appropriate treatment, these materials are dangerous waste. Therefore, these materials have to be managed as dangerous waste and accumulated in a designated dangerous waste accumulation area until disposed or reclaimed. Total amount of these materials has to be included in the Annual Report (WAC 173-303-070). If these materials are donated as products to non-profit organizations or low-income housing, or through IMEX to be used as-is, the materials will be excluded from dangerous waste counting requirements.

b) If returned or off-spec materials are reused in a manufacturing process without any treatment involved, these materials are not dangerous waste (WAC 173-303-016).

4. Speculative Accumulation

Off-spec paints, returned paints, and old or off-spec raw materials are not dangerous waste if they are reworked back into product, provided that these materials are not reclaimed prior to reuse. In other words, the materials must be used/reworked as-is. Blending, filtering, and tinting do not constitute reclaiming. However, Ecology staff has come across materials that have been stored for several years without any attempt to use them. When this happens, it is important to ask a series of questions to decide if the materials are still useable or if they have become dangerous waste (see Ecology newsletter *Shoptalk*, Summer 1997, Vol. 7, No. 3 in Appendix H, page 81).

Generators must show that 75 percent of an accumulated material has been legitimately recycled over the course of a calendar year. If this is not possible, the material becomes

a solid waste and possibly an illegally stored dangerous waste. All dangerous waste must be properly managed under the conditions of the *Dangerous Waste Regulations*.

ORPHAN WASTE
—visit results, recommendations & resources

Only one manufacturer reported a problem with clandestine dropping off or dumping of paint-related waste. Distributors and retail stores tend to have more occurrences of orphan waste. County Moderate Risk Waste (MRW) paint collection programs have reduced the orphan waste problem in areas where they are in effect. Some preventative measures that can reduce such unwanted deliveries include:

- Fencing the facility (particularly shipping & receiving areas);
- Locking and/or screening the dumpsters;
- Improving lighting;
- Installing fake video cameras; and
- Instituting a "returned goods" authorization procedure that allows return of products under certain circumstances for exchange or partial refund may help.

SPILLS
—visit results, recommendations & resources

Minimal evidence of actual spills was observed during the site visits. However, potential for outdoor spills (and discharges) did exist and are addressed in the Stormwater section, below.

STORMWATER
—visit results, recommendations & resources

One of the potential environmental issues examined at each facility was the possibility of introducing pollutants to the environment through the storage of raw materials, products and wastes in outdoor, exposed areas. Spills, leaks of products or waste exposed to rainfall can contaminate stormwater that runs off the property and often drains directly to a surface water body or storm drain.

Industrial facilities with stormwater discharges to surface waters (including storm drains) are required to implement Best Management Practices (BMPs) to prevent pollution of surface waters or groundwater. A General Industrial Stormwater Permit from the Department of Ecology is required for industries with certain Standard Industrial Classification codes that store raw materials, products or wastes outdoors.

Ecology noted several problems or potential problems related to stormwater protection during the site visits. Although several of the facilities have a Stormwater Permit, the problems noted occurred both at facilities with and those without a Stormwater Permit. The problems include:

- Containers of liquid materials with unsecured lids that are exposed to the rain and stored so that stormwater runoff has direct access to a storm drain
- Solid wastes, raw materials and paint wastes stored outside and uncovered
- A fill pipe for an underground storage tank located adjacent to a storm drain
- Bulk raw material filling sites without spill containment and stormwater protection
- Outdoor tote cleaning with the wash water going directly to the storm drain

The variety and extent of these problems combined with the fact that problems are occurring at permitted facilities as well as those without a permit, indicates that the paint manufacturing industry needs some guidance and technical assistance with stormwater management. It would be difficult, if not impossible, to adequately address these issues in a facility-specific manner through this report. Rather than attempt to do so, Ecology has chosen to provide some basic guidance on covering and containing materials stored outdoors (see below) and strongly encourages facilities with *any* questions on stormwater management to contact Ecology's stormwater compliance staff listed below.

A. Cover and Containment

To prevent pollution from stormwater runoff, industrial facilities should, at a minimum, follow these guidelines for materials stored outdoors:

- Containers (including dumpsters) must have covers or lids that are secured
- Loading and unloading areas and storage areas (including transfer areas for above and below ground tanks) must be designed to prevent run-on and run-off of stormwater and containment of spills, i.e., secondary containment
- Liquids in drums or other containers must be stored in a lean-to (roofed) type structure to prevent rainfall from reaching the drums
- Pallets or other materials must be stored in a lean-to (roofed) type structure or covered with plastic sheeting to prevent rainfall from reaching them

B. Permitted Facilities

Facilities that currently have or are determined to need a Stormwater Permit must prepare a Stormwater Pollution Prevention Plan that identifies potential sources for stormwater pollution to be in compliance with the permit.

This Plan includes development of Best Management Practices (BMPs) for source control and operational activity to reduce or eliminate those sources and an action plan that addresses spill response and clean up. In addition to the Cover and Containment guidelines listed above, BMPs for stormwater management include pollution source control for:

- Fueling stations
- Equipment cleaning
- Loading and unloading liquid materials
- Liquid storage in above-ground tanks

Ecology staff trained in stormwater management can provide assistance in the development of BMPs or the Stormwater Pollution Prevention Plan.

C. Ecology's Stormwater Compliance Staff

By taking the initiative to contact Stormwater staff at Ecology you can be assured that you will get the help you need that is specific to your facility in a non-enforcement oriented environment. However, should a water quality violation from stormwater mismanagement be linked to your facility and you are not taking action to correct the situation, an enforcement action may result. Seeking assistance from Ecology to determine if there is a potential problem or to fix an existing problem will help you to avoid an enforcement action or a third party lawsuit. Contact the Ecology stormwater staff person in your region if:

- You are uncertain if your facility needs a Stormwater Permit.
- Any of the issues listed above apply to your facility.
- You have any questions about current practices and possible stormwater impacts at your facility even if your facility currently has a Stormwater Permit.

Northwest Regional Office - Bellevue
(425) 649-7000

Southwest Regional Office - Olympia
(360) 407-6300

Eastern Regional Office – Spokane
(509) 456-2926

Central Regional Office - Yakima
(509) 575-2490

AIR QUALITY
—visit results, recommendations & resources

Local air quality regulations require that paint manufacturers have operations and maintenance procedures in place that minimize VOC emissions from mixing tanks while they are in service or being cleaned. They also require that tanks have 90% of their rims covered while in use.

All visited facilities had sturdy, removable covers on their tanks (usually made from plywood). Emissions can be minimized by assuring that tanks remain covered not only during blending, but afterwards as well - while waiting to be transferred into packaging. Use of durable materials for cover fabrication will help insure a tight fit to the tank (one facility was using cardboard tank covers - which is not advisable). Use of Plastic "shower cap" covers even further minimizes VOC emissions.

Many of the pollution prevention measures listed in Appendix D on page 47, will reduce VOC emissions, particularly those that reduce solvent use. Most obvious perhaps, is reformulating coatings into low-VOC products. Another example is mechanical scraping prior to tank rinsing to reduce the amount of wash solvent used and associated evaporative losses. Most facilities have a clean-as-you-go policy (immediate cleaning), which reduces solvent needed for removing heavy build-up. The use of epoxy-lined tanks to reduce adhesion, and thus cleaning effort, is very effective for water-borne products, but apparently the durability of epoxy coatings when exposed to solvent-based products is an issue. In a number of facilities, baghouses collect dust particulates which may then be recycled into future coating batches. We recommend looking through the prevention measures listed in Appendix D with an eye towards air quality improvement.

ADDITIONAL ISSUES
—visit results, recommendations & resources

Besides the pollution prevention and environmental compliance arenas covered in the sections above, Ecology investigated a number of other topics. These are detailed in the subsections below.

A. Paint Distributors

Paint manufacturers market directly to original equipment manufacturers, industrial accounts, agricultural accounts, and contractors. Some market through their own

distribution centers or retail stores or through regional independent distributors, via the independent's retail stores. One manufacturer sells directly to the general public. Export markets make up a significant portion of sales for several manufacturers.
Wastes are generated at the distribution level from custom tint returns, spray equipment rental and cleanup, and routine brush or container cleaning. These wastes include wash water, wash solvent, off-spec or mistinted paint, and rags. Technical assistance on pollution prevention and waste management practices for distributors and contractors are being considered for an up-coming technical assistance project. The NWPC felt distributors should be addressed in conjunction with contractors

B. Paint Recycling

During initial project scoping, Ecology was interested in the links between paint and coating manufacturers and painting contractors. One such link is waste paint. Because a key wastestream for contractors is leftover paint, Ecology was curious to assess the manufacturer's ability to recycle this paint back into useable product. A pilot project in Portland, OR and surrounding areas is providing paint recycling services to *homeowners* through a selection of local paint distributors with some success. However, region-wide, organized paint recycling for contractors (a much larger undertaking than homeowner waste) is a remarkably complex issue and developing such a system is beyond the scope of this project.

Most manufacturers prefer not to recycle their customer's paint, but will do so on a case-by-case basis in order to maintain positive customer relationships. Seven of the eleven manufacturers visited indicated they recycle paint returned by their customers. Such returns may be the result of paint ordered in excess of actual need, "mistints," or quality problems. The paint is recycled by:

- Reworking of paint for resale as another product.
- Reworking for resale or donation to low income housing projects or schools.

Those manufacturers who did not recycle customer paint cited the following barriers to recycling:

- Short pot-life or shelf-life products.
- Colors that are hard to convert.
- Materials mixed with dissimilar products.
- Belief that partially used product must be handled as dangerous waste.

C. Measuring Environmental Success

Measuring reductions in environmental impact helps a facility determine the effectiveness of their pollution reduction efforts. During the site visits, companies reported a variety of methods used to measure environmental success. The list below addresses a number of different environmental facets, and Ecology encourages manufacturers to track as many of these variables as appropriate:

- Reduction in amount of toxic ingredients used.
- Increase in amounts recycled.
- Increase in amounts of water-based coatings produced.
- Compliance with federal VOC standards.
- Reduction in amount of hazardous waste shipped off-site.
- Success in implementing pollution prevention opportunities identified in their pollution prevention plan.
- Amount of solid waste reduced.
- Reduction in pounds of waste or emissions per gallons manufactured.

D. Internet Use

Five of the eleven facilities visited had connections to the Internet; an additional facility was planning to connect soon. Two other facility managers used the Internet at home. One facility has its own website; another was planning to have one on-line soon.

Three facilities had accessed the Department of Ecology website in the past. Another uses the National Paint and Coating Association website.

E. Preferred Forms of Technical Assistance

During the site visits Ecology asked manufacturers their preferences for different forms of technical assistance. The most preferred items were:

- Checklists
- Web page
- Case studies
- Site visits

Least desirable forms of assistance were:

- Workshops
- Pamphlets
- E-mail

MEASURING PAINT & COATINGS SECTOR Project Success

The project mission statement articulates the desire to achieve "measurable reductions in material consumption, toxicity, and/or releases" ("releases" refers to wastes, emissions, discharges). Obtaining numerical data on actual reductions has historically been a remarkably challenging undertaking.

One way to measure whether this project achieved such reductions would be to conduct a survey in the first half of year 2000 to determine what activities manufacturers implemented as a result of this assistance project and then estimate the numerical reductions these activities amounted to. If numerical estimates are too difficult to come up with, Ecology could measure the number of pollution prevention opportunities implemented (behavior changes) within the year. The survey must be "low-impact;" in other words, Ecology must be sensitive to the paperwork burden to the industry. It may be possible to link data collection to Pollution Prevention Annual Reporting requirements already in place.

Other goals of the project were to provide "excellent" service to the industry and to craft project elements that were supported by both industry and Ecology. These goals could also be measured by some form of a survey.

POSSIBLE TECHNICAL ASSISTANCE PROJECTS BY ECOLOGY

The five projects/services described below emerged as needing resources beyond this phase of the project. They are presented below for Ecology management's review and for review by the NW Paint Council. We will collaboratively make the decision which items to move forward on. The Ecology Paint Sector Team recommends that items 1-4 be implemented, and that item 5 be evaluated with the industry.

1. Paint & Coatings Manufacturer's Materials Exchange

The concept here, as mentioned earlier in the report, is to create a materials exchange specific to the paint/coatings manufacturing industry to promote off-spec material re-use. At this point, the Pollution Prevention Resource Center (PPRC) in Seattle has agreed to be lead on this project/service. However, the success of this effort will hinge on the active participation of the Northwest Paint Council and its members. The project should also be coordinated with the Seattle-King County IMEX (industrial materials exchange) service.

Ecology should provide PPRC some support such as project review regarding DW rules, types of information listed, and exchange design. Help the NW Paint Council market the exchange service to non-paint-council members in Washington and Oregon.

Benefits: 1) Insure product quality.
2) Increased membership will likely divert more "waste" material.
3) Increased membership will make the material exchange more viable.

Budget: 50 hours

2. Paint and Coatings Manufacturer's Environmental WebSite

Eight of eleven facility managers said they would be interested in a paint manufacturers' website. The managers indicated this type of information would be valuable to them:

- Links to the National Painting and Coatings Association, environmental regulations, waste exchanges.
- Case studies of pollution prevention for paint manufacturers.
- Pollution prevention methods for paint manufacturers.
- Ability to ask questions and share answers.
- Short checklist of "To Do's" for customers.

Other possible website features:

- Copy of this report.
- Summaries of pollution prevention opportunities, Best Management Practices, and operations and maintenance procedures.
- Connection to Envirosense and paint manufacturer's sites.
- Information on electronic reporting of environmental data.
- Links to other related sites: e.g., chemical toxicology information for evaluating product ingredients.

The PPRC is lead on this project as well – they have grant funding for this specific purpose. Ecology should support this effort by providing materials and results from the Paint Sector Project such as the complete pollution prevention opportunities table, compliance issue summaries, photos of pollution prevention practices, an electronic version of the Paint Sector Project Report, etc. Ecology probably should also provide some website feedback and "design review." Provide long-term on-going support and feedback (e.g., 2 hours per month)[2].

Benefits: 1) Increased (nation-wide, global, actually) distribution/impact of information gained in the Paint Sector Project.
2) Insure product quality.

Budget: 60 - 80 hours

3. In-House Ecology Compliance Inspector Briefings

The intent of this option is to communicate the project pollution prevention and DW compliance findings with Ecology's DW compliance staff in order to share knowledge and promote consistency within in the agency. Given the small number of paint manufacturing

[2] *Website was established:* www.pprc.org/pprc/sbap/painting.html

facilities in the state and the availability of this sector report, it is recommended that each Paint Sector Team member provide a short (an hour or less) briefing to the compliance staff in their regional office highlighting salient aspects of our findings[3].

We also recommend that the report be made available electronically via a Paint and Coatings Manufacturing page on Ecology's internal "Pollution Prevention Toolbox." The page should include:

1. Executive Summary of this report.
2. Links to PPRC's Paint and Coatings Manufacturing website.
3. Top compliance issues and pollution prevention opportunities to look for.

Benefits:
1) Statewide consistency in applying and implementing regulations as they apply to this sector (improved public perception of Ecology).
2) Promoting pollution prevention in this industry via the inspectors.
3) Provide consistency and communication between Toxics Reduction staff and compliance inspectors.

Budget: 4 briefings at 1 hour each = 4 hours

4. Technical Assistance Visits to Remaining Manufacturers

An effective way to provide consistent technical assistance and promote a "level playing field" to the industry, statewide, would be to conduct site visits to the remaining 10 paint manufacturers. There would be environmental and business benefit to offering this service. Ecology's concern is the resources necessary to provide quality visits.

Like the survey visits, these would be voluntary, but Ecology would be actively promoting and scheduling. Ecology should take the time to cover pollution prevention and compliance items in some detail, thus the visits will probably take 2-3 hours each. Because of the amount of information to cover, it would probably be most effective for teams of two to conduct the visits[4].

Benefits:
1) Pollution prevention and compliance information delivered consistently.
2) Whole industry will have been informed statewide.
3) Industry prefers hands-on site visit mode of info-transfer = quality of service.
4) Gain support for the materials exchange and for the PPRC website.

Budget*:* Site visit preparation/logistics = 80 hours
10 sites x 2 people x 5 hours/site = 100 hours
Site visit follow-up: 11 x 3 hours = 33 hours

TOTAL 200 – 300 hours

[3] *These briefings were completed by spring of 1999.*
[4] *These visits were conducted in October and November 1998.*

5. Information Transfer to Production Staff

Ecology has some concern that the information and resources contained in this report be accessible to manufacturing-level employees. Once this report is distributed to the manufacturers, Ecology should ask the manufacturers if it would be helpful to have information in another form for line-staff (e.g., one-page fact sheets on waste compliance do's and don'ts, a fact sheet on re-work reduction, or a summary of top pollution prevention options, etc.). We need industry interest and support to make this project worthwhile and to define the scope of this effort[5].

Benefits: 1) Promote further understanding/implementation of pollution prevention.
2) Increase effectiveness of the project.

Budget*:* 70 – 100 hours

[5] *This project was rejected due to budget constraints.*

APPENDIX A

PAINT AND COATINGS MANUFACTURERS IN WASHINGTON STATE

MANUFACTURER NAME	LOCATION
Asahipen America	Seattle
Best Paint, Inc.	Seattle
Cardinal Industrial Finishes	Woodinville
Cook Composites and Polymers	Arlington
C & C Paint	Seattle
Daly's Inc.	Seattle
Daniel Boone	Tukwila
Eco Chemical Inc.	Seattle
Farwest Paint Mfg. Co.	Tukwila
Gaco Western	Tukwila
Kelly-Moore/Preservative Paint	Seattle
Lilly Industries	Seattle
Rudd Company	Seattle
Skanvahr	Woodinville
System 3 Resins	Seattle
Tex Enterprises	Auburn
Wasser High-Tech Coatings	Seattle
Perfection-Letz	Kennewick
Columbia Paint	Spokane
United Paint Mfg.	Greenacres
Adams Industrial Coatings	Woodland
Burke/Cascade Paint	Washougal
Parker Paint Mfg. Co.	Tacoma

APPENDIX B

Survey Forms: Compliance Checklist and Supplemental Questions

Compliance Indicator Checklist

FACILITY:_____

Recorder:_____ Date:_____

Violation	>>>	If you see…	Examples	References	Comments
Spills or Discharges	WAC 173 -303- 145(3)	Hazardous substances or wastes spilled AND threatens health or environment, AND no or inadequate mitigation or control.	Dip tank solution flowing to storm drain. Leaking drum of paint waste on bare soil.	Spills Notification FOCUS Sheet, 8/92. Small Spill Cleanup Guidance, 6/95.	
Improper or Illegal Disposal	-141(l) or -150, or -950(2)	DW not offered to TSDR, illegal disposal of DW; division, dilution, or accumulation to evade DW requirements.	DW in dumpster. Mixing used oil with carb cleaner.	HW Services Directory, Shoptalk, Spring, 1997. Product or HW?	12/94
Designation	-170(l)(a) & -070	Wastes are generated and treated, stored, disposed or recycled without designation, or without following proper protocols.	What's this purple stuff in this drum? "I don't know." Sand blast grit used as fill.		
Container Management	-200(l)(b) & -630(2)	DW in containers that leak or are in poor condition.	Wet and deteriorating fiber drum holding DW. Bulging drum of paint waste.		
	-200(l)(b) & -630(4)	Container or liner holding DW is not compatible with the hazards presented.	Corrosive DW in unlined fiber drum.		
	-200(l)(b) 7 -630(5)(a)	Container holding DW is not kept closed.	Any open container of DW.		
	-200(l)(b) 7 -630(5)(b)	Container holding DW is opened, handled or stored in a manner that may cause ruptures or leaks.	Haphazard stacking of containers of DW.		

SUPPLEMENTAL SURVEY QUESTIONS
March 1998

1.) Pollution Prevention Table of Opportunities
2.) Compliance Indicator Checklist

3.) **Distributor**s: how is paint distributed, what are the levels and functions of distribution? How might waste be generated at the distribution facilities (and how much)?

4A.) **Paint Recycling**: **In-House** (what are current paint recycling practices, what works, what are some problems?)

4B.) **Paint Recycling**: **External** (is customer paint waste being recycled, what are the opportunities and barriers to customer paint waste recycling?)

5.) **Solid Waste:** What types and quantities of solid waste are being generated? What are the problems regarding solid waste reduction or recycling? Recycling/disposal costs?

6.) **Orphan Waste:** What types and quantities of orphan waste have been received? What is the cost of handling these wastes? How might they be prevented?

7.) **Solvent Recycling/ Waste Counting**: What is average still batch size? How many batches per month? What is waste amount reported on Dangerous Waste Report?

8.) How does facility **measure** their environmental success?

9.) We would like to document "current/ conventional," "good," and "best" practices, for educational purposes. Do we have your **permission to take photos**? (Verbal permission or signature).

10.) **Air**: (list top three APCA concerns)
a. Mixing Tanks must have 90% of rim covered?
b. Minimize VOC emissions while cleaning tanks?
c. Have O+M procedures for cleaning/using tanks?

11.) Cleanup/ **Spills** (any evidence of spills outside?):

12.) **Stormwater** – Are they storing "product", materials, or machinery outdoors – exposed to rain? If so, they need a permit. If not, they don't need a permit.

13.) **Domestic sewage exclusion** – Discharging wastestream into sewer? If so, has this wastestream been designated? If it's DW, then need a specific permit.

14.) **NPDES permit**? Any discharge to water body? (unlikely for this industry…)

15.) **Treatment by Generator** (describe)

16.) **Website Information**

- Do you currently have access to the Internet?
- Have you ever accessed Ecology's Web page?
- Would you be interested in a Paint Sector Web page?
- What kinds of information would need to be on the Web page to make it meaningful to you?

Examples:

- Pollution Prevention Opportunities for Paint Manufacturing
- Case Studies of Best Management Practices
- Links to Paint Associations, Equipment Vendors, or Other Pollution Prevention Sites

17.) What **form of technical assistance** would the facility use/prefer:

- Checklists
- Pamphets
- Site Visits
- Workshops
- Case Studies
- Information provided over the Internet via E-mail
- Information from a Web Page

18.) *(optional)* Trade Journal subscriptions:
Association Memberships: (NWPC, other?)
Internet Listserves:

19.) *(optional)* Additional **Research Needs**:

20.) **Production Data**
Product mix: architectural, industrial, etc.
# of gallons produced in 1997:
# of gallons or % solvent-based product:
# of gallons of % water-based product:

21.) How are **materials tracked**? (especially residues, leftovers, off-spec materials, etc.)

Appendix C
Pollution Prevention Results

The pollution prevention survey results are tabulated from 18 data sets (11 site visits and 7 surveys). The list of pollution prevention opportunities was modified after the initial surveys. Therefore some options were added and combined in the list. The opportunities are classified by three columns: Yes, No and Maybe. The "Yes" column indicates the number of facilities currently implementing the opportunity. The "No" column indicates the number of facilities that are not implementing the opportunity but have tried it in the past. Lastly, the "Maybe" column denotes possible or future opportunities that a facility is considering to implement.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Product Formulation	Hazardous Chemicals and Pigments	Eliminate chromium compounds (e.g., sodium chromate)	12	0	1	Viable alternatives have been available for the last few years (e.g., metaborate for rust, organics for color).
Product Formulation	Hazardous Chemicals and Pigments	Eliminate lead driers and colorants	13	0	2	Virtually eliminated industry-wide. Less than 0.06% lead required by federal law.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate xylene	7	1	3	Alternatives are alcohols or methylene amyl ketone but chemical substitution is customer-driven.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate ethyl benzene	7	0	0	Many facilities able to eliminate.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate methylene chloride	10	0	2	Many facilities able to eliminate. Still used in some aerosol products.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate ethylene glycol	5	2	5	Alternatives still being developed. Used in waterborne paints. Partial success replacing with propylene glycol which is less toxic.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate n-butyl alcohol	5	0	4	Limited success eliminating it. Less common ingredient.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate toluene	5	1	4	Some companies have successfully eliminated their toluene use. Substitutes still being developed.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Product Formulation	Hazardous Chemicals and Pigments	Eliminate mercury-based bactericides	14	0	0	Basically eliminated industry-wide. Alternatives have been available for at least 10 years.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate crystalline silica	6	1	1	Switch to non-crystalline silica. Crystalline silica is an inhalation hazard to paint workers.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate zinc	4	2	1	Carefully evaluate, some alternatives are more hazardous. Zinc is used mainly in primers.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate methanol	1	1	3	Hard to eliminate because they are used in waterborne paints and lacquers as substitutes for aromatic solvents.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate MEK	1	2	3	Alternatives are available. Used mainly in lacquers.
Product Formulation	Hazardous Chemicals and Pigments	Eliminate ammonia	0	1	3	No apparent success in eliminating it. Ammonia is a key ingredient in many waterborne coatings.
Product Formulation	Hazardous Chemicals and Pigments	Reformulate solvent-based products into water-based products	14	0	0	Nearly all facilities are doing this, but limited by market acceptance. Waterborne paints should be aggressively marketed as replacements to solvent-based coatings.
Product Formulation	Hazardous Chemicals and Pigments	Reformulate into U.V. cured products	2	1	2	Some coating manufacturers are currently researching this option. May not be viable for certain applications.
Product Formulation	Hazardous Chemicals and Pigments	Reformulate into powder coatings	2	2	0	Limited to very specific applications (primarily for metal substrates).
Product Formulation	Hazardous Chemicals and Pigments	Reformulate into high-solids formulations	13	0	2	Market driven.
New Product Initiation	Off-spec Product	Laboratory and management coordinate efforts to determine re-work potential before releasing experimental products	8	0	5	Several facilities trying to do this. Important during the development of new coatings.
New Product Initiation	Off-spec Product	Formulator works with paintmaker when manufacturing a new product for the first time	15	0	0	Common practice.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Inventory Management	Raw Materials	Establish a centralized purchasing program	13	1	1	Fairly common practice; though an opportunity for some.
Inventory Management	Raw Materials	Use improved inventory management practices	16	0	1	Valid opportunity for most facilities – materials management and housekeeping. Ongoing potential for improvement.
Inventory Management	Raw Materials	Test raw materials before accepting them from supplier. (Send product samples back to vendors to avoid disposal as waste)	6	2	5	Some success with this. Usually done on selected raw materials.
Inventory Management	Raw Materials	Use "just-in-time" inventory control	12	1	2	"Just-in-time" inventory means matching arriving shipments of materials to manufacturing schedule. Minimizes shelf time for feedstocks. Many facilities have limited storage space and cannot stock excess materials.
Inventory Management	Raw Materials	Use containers with removable liner	10	0	5	Mixed success with liners. Some dissolve in solvent.
Inventory Management	Raw Materials	Inspect packaging for tears, repair immediately	11	1	1	Alleged common practice. Reduces materials loss due to spills.
Inventory Management	Raw Materials	Simplify inventory, combine and standardize where possible	14	0	1	Fairly common practice. Reduces human error and the number of ingredients being used.
Inventory Management	Raw Materials	Certification program for raw material suppliers	8	1	5	Some facilities successful with this (e.g., pre-approved/ certified vendors for selected raw materials, or require "certificate of analysis" before shipment.
Inventory Management	Raw Materials	Sell or give away obsolete raw materials for reuse (e.g., to manufacturers, wholesalers, or through material exchange)	12	1	2	Or, if possible, return to vendor.
Unloading Materials into Mixing Tanks	Spilled Raw Materials	Prevent tanks from overfilling (e.g., by installing high-level cutoff and flow totalizers with cutoff)	3	0	8	Most facilities rely on operator observation. Sometimes filling hose contains check-valve. One facility uses "programmable" meters. One facility actually has cutoff and alarm on bulk solvent tanks.
Inventory Management	Packaging/Solid Waste	Purchase pre-weight hazardous ingredients or design formulas to use whole bags whenever possible.	6	2	4	Some facilities doing this. Must negotiate with supplier and customer. Try to design formula to nearest full-bag.
Inventory Management	Packaging/Solid Waste	Use packaging that can be sent back to suppler (e.g., recyclable or reusable drums)	12	0	3	Many facilities are using some recyclable drums; must negotiate with suppliers. Sporadic success.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Inventory Management	Packaging/Solid Waste	Order common materials in bulk to reduce packaging.				For example, use super sacks for bulk quantities of dry pigments instead of paper bags or totes/tanks for liquids.
Unloading Materials into Mixing Tanks	Pigment Dusts	Use pigments in slurry/paste form	5	1	7	
Unloading Materials into Mixing Tanks	Pigment Dusts	Re-use baghouse pigment dust (e.g., install dedicated baghouse systems	12	0	2	Some manufacturers doing this successfully. May not work with transparent products.
Production, (grinding, mixing, blending)	Excess Product	Sell or give away part-gallon overages to customers on custom products	12	1	3	For example, have verbal agreement with customer to accept up to 10% overage.
Production, (grinding, mixing, blending)	Off-spec Product/ Excess Product	Sell or offer off-spec product or excess product to non-profit organizations, schools, theater groups, or IMEX	14	2	1	Fairly common practice.
Production, (grinding, mixing, blending)	Off-spec Product	Blend into new products	17	0	0	Very important. An inventory system should track off-spec material and be included on batch tickets.
Production, (grinding, mixing, blending)	Off-spec Product	Test batch formulation in lab before going to manufacturer	14	0	0	Standard operating practice for most paint manufacturers.
Production, (grinding, mixing, blending)	Off-spec Product	No returns on custom-tinted products	13	2	1	Most trying to do this, but strongly depends on customer relationship.
Production, (grinding, mixing, blending)	Off-spec Product	Have customers supply a substrate sample with their color-match requests	13	1	2	Common practice. Another option, have customer test a small amount before ordering.
Production, (grinding, mixing, blending)	Off-spec Product	Laboratory use brush-out and draw-down sample methods instead of using spray equipment	16	0	0	Standard practice.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Production, (grinding, mixing, blending)	Off-spec Product	Clearly indicate or highlight formula changes	15	0	0	Reduces human error. Standard practice.
Production, (grinding, mixing, blending)	Off-spec Product	Install timers on mixing tubs to prevent over-mixing and reduce adjustment with additional raw material	3	2	6	Potentially viable for select manufacturers. Usually checked by paint maker during blending/grinding. Most mixing isn't time-based, it's quality-based.
Production, (grinding, mixing, blending)	Spills	Increase use of automation	6	1	4	Effectiveness increases with increasing production.
Production, (grinding, mixing, blending)	Spills	Recycle as much of spill into product as possible	15	0	1	Common practice.
Production, (grinding, mixing, blending)	Spills	Clean remaining spill with dry methods (not with water or solvent)	12	0	1	Common practice. Valid option after recycling as much of the spill as possible (see above option).
Production, (grinding, mixing, blending)	Spills	Purge pipelines before disconnecting				Standard practice. One facility uses air valve to flush lines.
Production, (grinding, mixing, blending)	Solvent Evaporate	Cover all vessels with lids and covers	18	0	0	Standard practice, but must be rigorously enforced. Plastic covers (shower caps) are an excellent first layer.
Milling	Wash Solvent	Change from ballmill to disperser, don't have to use as much solvent to cleanout	9	0	2	Ballmills generally obsolete. Sandmills and dispersers are common practices.
Milling	Wash Solvent	Schedule milling from light to dark colors	12	0	1	Fairly common practice.
Milling	Wash Solvent	Dedicate a mill for light and bright colors	11	0	1	Fairly common practice.
Milling	Wash Solvent	Install more efficient mills that do not require multi-pass dispersions	6	0	4	Potential opportunity for some manufacturers. Alternative: purchase pre-milled pigments/colorants that meet your specifications.
Filtering	Spent Filters	Use as small a cartridge as possible	3	1	2	

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Filtering	Spent Filters	Use reusable bag or metal mesh filters (e.g., vortisieve screens)	16	0	0	Common practice.
Filtering	Spent Filters	Clean out filters regularly (or use self-cleaning filter system)	10	0	2	Once paint manufacturer uses a self-cleaning system (Roninger-Pedingter filter system) that avoids the use of filter bags. This system paid for itself in a year. The captured solids are recycled into later batches.
Filtering	Spent Filters	Improve pigment dispersion to reduce lumps	12	0	1	Many manufacturers working on this.
Product Packaging	Wash Solvent	Increase dedication of filling units				
Product Packaging	Waste Drums and Barrels	Provide totes to customers with large orders				
Product Packaging	Solid Waste	Purchasing raw materials in totes and bulk to reduce drum use				
Product Packaging	Solid Waste	Can crusher to crush cans to EPA recyclable standard				
Equipment Cleaning	Wash Solvent/ Water	Maximize batch size to reduce clean-out waste				
Equipment Cleaning	Wash Solvent/ Water	Dedicate equipment to single product or family of products to reduce need for cleaning				
Equipment Cleaning	Wash Solvent/ Water	Schedule production to minimize need for cleaning: (e.g., light to dark colors, similar formulations)				
Equipment Cleaning	Wash Solvent/Water	Re-use equipment cleaning wastes: collect was solvent/water and use in next compatible batch of paint as part of formulation.	15	0	0	Common practice to extent possible. One manufacturer evaporates excess washwater. Key is to use the minimum of water/solvent required for the job.
Equipment Cleaning	Wash Solvent/Water	Clean equipment immediately before paint dries. (Prevent paint from drying in tanks.)	16	0	0	Important practice. Usually a standard operating procedure, but it must be continually stressed.
Equipment Cleaning	Wash Solvent/Water	Use high-pressure was systems and efficient nozzles.	7	3	3	One facility successfully uses high pressure solvent wash to clean tanks. Potential future for many facilities.
Equipment Cleaning	Wash Solvent/Water	Mechanically clean with squeegees or wiper blades before washing tanks.	12	0	3	Common practice. High impact in reducing solvent wash.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Equipment Cleaning	Wash Solvent/Water	Use non-stick tanks (e.g., stainless steel, or lined with Teflon or epoxy).	4	3	5	Valid opportunity – but proceed with caution; mixed reports from site-visits!! Liner coatings need annual maintenance. Epoxy lining only worked for water-borne products. Coating lost adhesion due to penetration by solvent in solvent-based formulations. United Coatings made a tank coating from isocyanates and epoxy – in use 5 years. Costs $50/gal.
Equipment Cleaning	Wash Solvent/Water	Use foam or plastic "pigs" to clean out lines.	0	5	6	Caution: pigs have a tendency to get stuck in pipes especially where lines bend. Better to dedicate lines – don't need as much cleaning.
Equipment Cleaning	Wash Solvent/Water	Purge lines with compressed air/gas.	7			Reduces need for solvent wash.
Equipment Cleaning	Wash Solvent/Water	Collect solvent and re-distill (on- or off-site).		2	4	About half the manufacturers distill on-site. Some facilities are able to re-work ALL their wash solvent!
Equipment Cleaning	Wash Solvent/Water	Use still bottoms in formulation of product.	3	4	4	A challenging opportunity. One company has been able to use still bottoms in the formulation of its primers.
Equipment Cleaning	Wash Solvent/Water	Use counter-current rinse methods (First wash with dirty solvent, then rinse with clean).	7	0	4	Several facilities doing this with wash solvent. Less common with water which is not economical.
Equipment Cleaning	Wash Solvent/Water	Increase spent rinse settling time or use de-emulsifiers on spent rinses for continued use.	6	1	3	The objective of increasing the settling time is to allow solids to fall to the bottom of the solvent container, allowing the top fraction of the solvent to be reused.
Equipment Cleaning	Wash Solvent/Water	Filter or centrifuge wash water so it can be reused (especially for tote washing).	0	1	5	Valid opportunity – filtering and re-using washwater (not sludge) could be a good way to reduce washwater consumption and generation.
Equipment Cleaning	Wash Solvent/Water	Design tanks with length-to-diameter ratio of 1:1 (minimizes surface area to be washed per batch).	2	0	6	Should be one of the design criteria for new tanks, however, many other factors are involved.
Equipment Cleaning	Wash Solvent/Water	Automated tank cleaners.	1	1	4	Negative comments are that automated tank cleaners are too expensive and require too much space. Remains a future opportunity.
Equipment Cleaning	Wash Solvent/Water	"Clean as you go" policy – rigorously enforced.	7	0	1	Common practice, need reminders. One of the most successful waste elimination procedures.
Equipment Maintenance, Testing	Wash Solvent	Use abrasive blasting for removing paint on equipment.	5	1	4	A few manufacturers doing this, several consider it a future opportunity.

Process	Waste/Substance Reduced	Reduction Method	Yes	No	Maybe	Comments
Equipment Maintenance, Testing	Wash Solvent	Use needle gun for removing paint on equipment.				The only waste generated is paint chips (eliminates volumes of blast grit.
Equipment Maintenance, Testing	Wash Solvent	Only strip the area needed for repair.	7	0	2	Several manufacturers do this as common practice.
Equipment Maintenance, Testing	Wash Solvent	Use water whenever possible for testing or demonstrating.	9	0	2	Common practice.
Employee Training, Supervision	Inefficiencies, spills	Operation of equipment to minimize energy use and material use.	9	0	2	Ongoing training – common practice.
Employee Training, Supervision	Inefficiencies, spills	Detecting and minimizing material loss to air, land or water.	12	0	1	Ongoing. Common practice. For example, use mass balance measurement techniques.
Employee Training, Supervision	Inefficiencies, spills	Proper materials handling to reduce wastes and spills.	16	0	0	Ongoing training. Common practice. Should be part of hazmat training requirements.
Employee Training, Supervision	Inefficiencies, spills	Emergency procedures to minimize material loss during accidents.	13	0	0	Training in spill response and operation is essential in minimizing material loss. Information regarding spill procedures is available from NPCA “Coatings Care” program.
Employee Training, Supervision	Inefficiencies, spills	Laboratory personnel rotate into manufacturing positions to understand process (vice versa).	3	1	6	Helps with formulating and recipe-making. More common for factory personnel to rotate into lab positions. Viable future opportunity.
Employee Training, Supervision	Inefficiencies, spills	Provide incentives, bonuses, rewards for employees to reduce wastes.	5	0	6	Some successful programs. Viable future opportunity.

APPENDIX D

Pollution Prevention Opportunities Checklist

Process	Waste/Substance Reduced	Reduction Method	Comments
Product Formulation	Hazardous Chemicals and Pigments	Eliminate chromium compounds (e.g., sodium chromate)	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate lead driers and colorants	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate xylene	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate ethyl benzene	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate methylene chloride	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate ethylene glycol	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate n-butyl alcohol	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate toluene	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate mercury-based bactericides	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate crystalline silica	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate zinc	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate methanol	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate MEK	
Product Formulation	Hazardous Chemicals and Pigments	Eliminate ammonia	
Product Formulation	Hazardous Chemicals and Pigments	Reformulate solvent-based products into water-based products	
Product Formulation	Hazardous Chemicals and Pigments	Reformulate into U.V. cured products	
Product Formulation	Hazardous Chemicals and Pigments	Reformulate into powder coatings	
Product Formulation	Hazardous Chemicals and Pigments	Reformulate into high-solids formulations	
New Product Initiation	Off-spec Product	Laboratory and management coordinate efforts to determine rework potential before releasing experimental products	
New Product Initiation	Off-spec Product	Formulator works with paintmaker when manufacturing a new product for the first time	

Process	Waste/Substance Reduced	Reduction Method	Comments
Inventory Management	Raw Materials	Establish a centralized purchasing program	
Inventory Management	Raw Materials	Use improved inventory management practices	
Inventory Management	Raw Materials	Test raw materials before accepting them from supplier (send product samples back to vendors to avoid disposal as waste)	
Inventory Management	Raw Materials	Use "just-in-time" inventory control	
Inventory Management	Raw Materials	Use containers with removable liner	
Inventory Management	Raw Materials	Inspect packaging for tears, repair immediately	
Inventory Management	Raw Materials	Simplify inventory, combine and standardize where possible	
Inventory Management	Raw Materials	Certification program for raw material suppliers	
Inventory Management	Raw Materials	Sell or give away obsolete raw materials for reuse (e.g., to manufacturers, wholesalers, or through material exchange)	
Inventory Management	Packaging/Solid Waste	Purchase pre-weight hazardous ingredients or design formulas to use whole bags whenever possible	
Inventory Management	Packaging/Solid Waste	Use packaging that can be sent back to supplier	
Inventory Management	Packaging/Solid Waste	Order common materials in bulk to reduce packaging	
Unloading Materials into Mixing Tanks	Spilled Raw Materials	Prevent tanks from overfilling (e.g., by installing high-level cutoff and flow totalizers with cutoff	
Unloading Materials into Mixing Tanks	Pigment Dusts	Use pigments in slurry/paste form	
Unloading Materials into Mixing Tanks	Pigment Dusts	Re-use baghouse pigment dust (e.g., install dedicated baghouse systems	
Production, (grinding, mixing blending)	Excess Product	Sell or give away part-gallon overages to customers on custom products	
Production, (grinding, mixing blending)	Off-spec Product/Excess Product	Sell or offer off-spec product or excess product to non-profit organizations, schools, theater groups or IMEX	
Production, (grinding, mixing blending)	Off-spec Product	Blend into new products	
Production, (grinding, mixing blending)	Off-spec Product	Test batch formulation in lab before going to manufacturer	

Process	Waste/Substance Reduced	Reduction Method	Comments
Production, (grinding, mixing blending)	Off-spec Product	No returns on custom-tinted products	
Production, (grinding, mixing blending)	Off-spec Product	Have customers supply a substrate sample with their color-match requests	
Production, (grinding, mixing blending)	Off-spec Product	Laboratory use brush-out and draw-down sample methods instead of using spray equipment	
Production, (grinding, mixing blending)	Off-spec Product	Clearly indicate or highlight formula changes	
Production, (grinding, mixing blending)	Off-spec Product	Install timers on mixing tubs to prevent over-mixing and reduce adjustment with additional raw material	
Production, (grinding, mixing blending)	Spills	Increase use of automation	
Production, (grinding, mixing blending)	Spills	Recycle as much of spill into product as possible	
Production, (grinding, mixing blending)	Spills	Clean remaining spill with dry methods (not with water or solvent)	
Production, (grinding, mixing blending)	Spills	Purge pipelines before disconnecting	
Production, (grinding, mixing blending)	Solvent Evaporate	Cover all vessels with lids and covers	
Milling	Wash Solvent	Change from ballmill to disperse, don't have to use as much solvent to cleanout	
Milling	Wash Solvent	Schedule milling from light to dark colors	
Milling	Wash Solvent	Dedicate a mill for light and bright colors	
Milling	Wash Solvent	Install more efficient mills that do not require multi-pass dispersions	
Filtering	Spent Filters	Use as small a cartridge as possible	
Filtering	Spent Filters	Use reusable bag or metal mesh filters (e.g., vortisieve screens)	
Filtering	Spent Filters	Clean out filters regularly (or use self-cleaning filter system)	
Filtering	Spent Filters	Improve pigment dispersion to reduce lumps	
Product Packaging	Wash Solvent	Increase dedication of filling units	
Product Packaging	Waste Drums and Barrels	Provide totes to customers with large orders	
Product Packaging	Solid Waste	Purchasing raw materials in totes and bulk to reduce drum use	

Process	Waste/Substance Reduced	Reduction Method	Comments
Product Packaging	Solid Waste	Can crusher to crush cans to EPA recyclable standard	
Equipment Cleaning	Wash Solvent/Water	Maximize batch size to reduce cleanout waste	
Equipment Cleaning	Wash Solvent/Water	Dedicate equipment to single product or family of products to reduce need for cleaning	
Equipment Cleaning	Wash Solvent/Water	Schedule production to minimize need for cleaning (e.g., light to dark colors, similar formulations)	
Equipment Cleaning	Wash Solvent/Water	Re-use equipment cleaning wastes: collect waste solvent/ water and use in next compatible batch of paint as part of formulation	
Equipment Cleaning	Wash Solvent/Water	Clean equipment immediately before paint dries (prevent paint from drying in tanks	
Equipment Cleaning	Wash Solvent/Water	Use high-pressure wash systems and efficient nozzles	
Equipment Cleaning	Wash Solvent/Water	Mechanically clean with squeegees or wiper blades before washing tanks	
Equipment Cleaning	Wash Solvent/Water	Use non-stick tanks (e.g., stainless steel, or lined with Teflon or epoxy)	
Equipment Cleaning	Wash Solvent/Water	Use foam or plastic “pigs” to clean out lines	
Equipment Cleaning	Wash Solvent/Water	Purge lines with compressed air/gas	
Equipment Cleaning	Wash Solvent/Water	Collect solvent and re-distill (on- or off-site)	
Equipment Cleaning	Wash Solvent/Water	Use still bottoms in formulation of product	
Equipment Cleaning	Wash Solvent/Water	Use counter-current rinse methods (first wash with dirty solvent, then rinse with clean)	
Equipment Cleaning	Wash Solvent/Water	Increase spent rinse settling time or use de-emulsifiers on spent rinses for continued use	
Equipment Cleaning	Wash Solvent/Water	Filter or centrifuge wash water so it can be reused (especially for tote washing)	
Equipment Cleaning	Wash Solvent/Water	Design tanks with length-to-diameter ratio of 1:1 (minimizes surface area to be washed per batch)	
Equipment Cleaning	Wash Solvent/Water	Automated tank cleaners	
Equipment Cleaning	Wash Solvent/Water	“Clean-as-you-go” policy – rigorously enforced	
Equipment Maintenance, Testing	Wash Solvent	Use abrasive blasting for removing paint on equipment	

Process	Waste/Substance Reduced	Reduction Method	Comments
Equipment Maintenance, Testing	Wash Solvent	Use needle gun for removing paint on equipment	
Equipment Maintenance, Testing	Wash Solvent	Only strip the area needed for repair	
Equipment Maintenance, Testing	Wash Solvent	Use water whenever possible for testing or demonstrating	
Employee Training Supervision	Inefficiencies, Spills	Operation of equipment to minimize energy use and material use	
Employee Training Supervision	Inefficiencies, Spills	Detecting and minimizing material loss to air, land and water	
Employee Training Supervision	Inefficiencies, Spills	Proper materials handling to reduce wastes and spills	
Employee Training Supervision	Inefficiencies, Spills	Emergency procedures to minimize material loss during accidents	
Employee Training Supervision	Inefficiencies, Spills	Laboratory personnel rotate into manufacturing positions to understand process (vice versa)	
Employee Training Supervision	Inefficiencies, Spills	Provide incentives, bonuses, rewards for employees to reduce waste	

APPENDIX E

TOXICOLOGY OF HAZARDOUS CHEMICALS & PIGMENTS

The following information is directed primarily toward personnel involved with health issues related to paint, such as industrial hygienists, writers of Material Safety Data Sheets, and others familiar with medical terminology. Additional toxicological data on hazardous chemicals can be found at http://www.wa.gov/ecology/hwtr

Ammonia: Irritating to the skin, eyes, and mucous membranes of the respiratory tract. Dangerous at high concentrations: causing severe burns due to corrosivity.

Chromium compounds (e.g. sodium chromate): CAS # 7775-11-3. Carcinogenic (group 1, human carcinogen ->lung cancer). Soluble salts of hexavalent chromium are corrosive and have produced skin ulceration, dermatitis, perforation of the nasal septum, respiratory sensitization and lung cancer. Acute poisoning with soluble salts usually results in local tissue necrosis and severe kidney damage. Electroplaters and paint pigment workers who expressed symptoms of cough, indigestion and dermal itching were found to have urine chromium concentrations of 91-1116 ug/l.

Ethyl benzene: CAS# 100-41-4. Ethylbenzene is an eye, skin, and mucous membrane irritant. Exposure to ethylbenzene may cause profuse lacrimation, conjunctivitis, nasal and respiratory tract irritation, skin sensitization or burns, chest constriction, vertigo, headache, irritability, functional nervous system disturbances, hematologic disorders (leukopenia, lymphocytosis), and liver enlargement.

Chronic exposure in humans has caused fatigue, sleepiness, headache, and irritation of the eyes and respiratory tract. In experimental animals, exposure to ethylbenzene has caused eye, skin, and mucous membrane irritation; changes in liver and kidney weights; hematologic changes; CNS depression; pulmonary edema; and respiratory failure.

In young children, developmental defects including learning disabilities, lowered IQ, and behavioral abnormalities, can occur without symptoms at blood lead levels above 10 micrograms/deciliter. At higher levels of exposure headache, fatigue, irritability and malaise may occur. At high levels, encephalopathy, seizures and focal neurologic findings with imminent risk of death, permanent mental retardation, and motor deficits may occur.

Ethylene glycol: CAS#107-21-1. Exposure to ethylene glycol may occur through inhalation, ingestion, or eye contact. PHASE ONE: CNS and metabolic abnormalities occur within minutes to hours following ingestion and include ethanol-like inebriation, ataxia, slurred speech, seizures, coma, cerebral edema, anion gap metabolic acidosis associated with tachypnea, and Kussmaul's respiration.

PHASE TWO: Occurs 12 to 36 hours post ingestion. Progressive tachypnea, cyanosis, pulmonary edema, and cardiomegaly. Death is most common in this phase.
PHASE THREE: Occurs 2 to 3 days post ingestion. Signs of renal insufficiency may occur as soon as 36 to 48 hours post ingestion. Renal injury may vary from proteinuria, hematuria, and crystalluria with a mild increase in BUN to prolonged anuria and azotemia. Chronic exposures to the vapor may cause unconsciousness, nystagmus, and lymphocytosis. Even a small amount of ethylene glycol may have toxic effects on the kidney.

Lead: CAS# 7439-92-1. Animal carcinogen, probable human carcinogen. Toxic by ingestion and inhalation of dust or fume. Lead is poisonous in all forms. Systemic lead poisoning can result from the inhalation of airborne lead particulate matter or fumes, or from the ingestion of lead in its ionic form from water, food, etc. In homes built before 1980, lead-containing paint may be the source. The hazard of exposure to lead is particularly severe in small companies/operations, often employing no more than three or four workers, engaged in radiator repair, leaded or stained glass production, laboratories, or ceramics.

N-butyl alcohol: CAS# 71-36-3. Acute exposure to higher alcohols (alcohols with a 3,4,5 carbon chain) usually results in CNS depression, hypotension, nausea, vomiting, and diarrhea. Butanols and amyl alcohols are irritants. If aspirated, hemorrhagic pneumonitis may be noted. Vapor or splash contact exposure may cause burning, lacrimation, blurring of vision, and vacuolar keratopathy. Hypotension and cardiac arrhythmias may occur. Inhalation causes pulmonary tract irritation and rarely pulmonary edema. Severe respiratory depression or death has not been reported after inhalation. Headache, dizziness, giddiness, ataxia, sedation and coma may occur.

Mercury: CAS# 7439-97-6. Adverse effects chiefly result from vapor inhalation. The respiratory system is primarily affected. Pneumonitis, necrotizing bronchiolitis, pulmonary edema, and death can result. Central nervous system effects, renal damage, gingivitis, and stomatitis can develop.

Nervous system manifestations predominate with chronic exposure. Personality changes, hallucinations, delirium, insomnia, decreased appetite, irritability, erethism, headache, memory loss, altered sense of taste and smell, and digestive disturbances may occur. Bilateral fine tremors, ataxia, exaggerated reflexes, paresthesias, excessive perspiration, and blushing may occur.

Chronic mercury exposure may also cause rashes, and corneal and lens changes with visual impairment. Children and some adults develop acrodynia, which is associated with severe leg cramps, irritability, and peeling erythematous skin on the fingers, hands, and feet. Allergic dermatitis may occur. Renal dysfunction has been reported in some persons exposed to mercury vapors. Chronic mercury poisoning ("mercurialism") usually results from inhalation of elemental mercury vapors or particles. Evidence of chronic poisoning may occur within weeks of an extreme acute exposure or may develop insidiously over many years. Children are more susceptible than adults to mercury poisoning.

Methanol: CAS# 67-56-1. Methanol is highly toxic, producing severe metabolic acidosis, blindness, and death. The onset of symptoms may be delayed for 18 to 24 hours after ingestion. Toxicity is related to the degree of acidosis produced and thus the time interval between exposure and specific treatment.

Ingestion or inhalation of methanol-containing substances may cause severe toxicity. Dermal exposure to methanol may also cause significant toxicity. Methanol cannot be made nonpoisonous. Acute methanol poisoning usually causes initial confusion and ataxia, followed by a 6- to 12-hour latent period with nonspecific malaise, headache, vomiting, severe abdominal pain, and visual changes. Later stages, if untreated, progress to coma, metabolic acidosis, and finally respiratory or circulatory arrest.

The most common permanent sequel following severe acute methanol poisoning are optic neuropathy with bilateral blindness, Parkinsonism, and limb polyneuropathy. Persons with existing skin, kidney, liver, or eye disorders may be at an increased risk when exposed to methanol. Methanol is teratogenic in mice and rats.

Methylene chloride: CAS# 75-09-2. Probable human carcinogen (2B). Methylene chloride may be absorbed following inhalation, ingestion, or dermal exposure. Acute exposure causes mucous membrane and respiratory tract irritation, headache, and at high concentrations central nervous system (CNS) depression and respiratory failure. Dermal contact may cause irritation and burns. In humans exposed by ingestion or inhalation, paresthesias, somnolence, altered sleep patterns, convulsions, euphoria, and change in cardiac rate may occur. Combustion of methylene chloride or use around open flames or heated surfaces may evolve hydrogen chloride, phosgene, and chlorine.

Methyl Ethyl Ketone (MEK): CAS# 78-93-3. Acute inhalation may result in eye, nose and throat irritation, nausea, headache, vertigo, uncoordination, CNS depression, narcosis and cardiorespiratory failure. If splashed in the eyes it may produce painful irritation and corneal injury. Short exposure of workers to 500 ppm in the air provoked nausea and vomiting. The common symptoms of short-term exposure are fatigue, headache, nausea, sleep disturbance, and alteration in memory. Reduced psychomotor performance and adverse effects on intellectual or memory functions are demonstrated with psychological test batteries after long-term occupational exposure.

Toluene: CAS# 108-88-3. The nervous system appears to be the most sensitive to the effects of toluene. CNS excitation (euphoria, giddiness, tremors, nervousness, insomnia) followed by CNS depression (headache, dizziness, fatigue, muscle weakness, drowsiness, confusion, vertigo, decreased reaction time); metallic taste, and nausea are common after exposure to 400 to 800 ppm. Toluene appears to produce reversible effects upon liver, renal, and nervous systems. High-level toluene exposures produced lack of coordination, ataxia, unconsciousness and eventually, death.

Ataxia, severe fatigue, and seizures lasting up to several days have been reported after exposure to 800 ppm. Rapid general anesthesia follows exposure to 10,000 ppm or greater.

Chemical pneumonitis and respiratory failure have occurred after sniffing paint or toluene. Among painters exposed to toluene in concentrations ranging from 100-1000 ppm, findings include enlargement of liver, macrocytosis, moderate decrease in erythrocyte count & absolute lymphocytosis, but no leukopenia. Toluene causes defatting of the skin with subsequent danger of dryness, fissuring and secondary infection. Sudden death among "sniffers" may be attributed to lethal cardiac arrhythmias following sensitization of the myocardium.

Xylene: CAS# 1330-20-7. Xylene is irritating to the eyes, skin, and mucous membranes. Exposure may cause dyspnea, anorexia, nausea, vomiting, dermatitis, fatigue, headache, dizziness, lack of coordination, irritability, changes in reaction time, narcosis, partial paralysis of the hands and feet, and anemias. In severe cases, unconsciousness and death can occur. Chronic exposure to xylene may cause defatting dermatitis, reversible eye damage, dyspnea, confusion, dizziness, apprehension, memory loss, headache, tremors, weakness, anorexia, nausea, ringing in the ears, irritability, thirst, mild changes in liver function, renal impairment, anemia, and blood dyscrasias. Aspiration of xylene or IV injection can cause pneumonitis, pulmonary edema, hemorrhage and respiratory failure. Inhalational exposure to 1000 ppm is considered immediately dangerous to life or health.

Zinc: CAS# 7440-66-6. BRONZE-POWDER - A severe necrotizing bronchitis and bronchopneumonia can follow inhalation of bronze-powder (70% copper, 30% zinc stearate). ZINC STEARATE is present in commercial talcum powders and can cause severe irritation of the respiratory tract if aspirated by infants. Ingestion of corrosive zinc salts may produce gastroenteritis. Symptoms are characterized by intense gastric and substernal pain, violent vomiting, diarrhea, shock, circulatory collapse, and possible death. (Example: Zinc phosphide.) Chronic anemia unresponsive to iron in 3 children was attributed to zinc poisoning. The urine contained 1.8-3.65 mg of zinc/l. Each of the children chewed metal toys made of zinc containing alloy. When the toys were withdrawn the anemia responded to continued treatment with iron.

Appendix F

Vendor Contact Information

Automated Tank Cleaners			
Vendor	**Location/City**	**Phone/Fax Website/E-Mail**	**Products/Description**
C.B. Mills Division of Chicago Boiler	Gurnee, IL	(800) 522-7343 Fax: (847)-662-4003 www.cbmills.com sales@cbmills.com	User friendly, micro-processor controlled, high pressure spray to clean tanks, totes, and drums with minimal operation attention.
Cloud Co.	San Luis Obispo, CA	(805) 549-8093 Fax:(805) 549-0131 www.cloudinc.com gb@cloudinc.com	Manufacturer of tank cleaning equipment.
Disti-Kleen, Inc.	Irvington, NJ	(800) 453-4784 Fax: (973) 372-8311 http://www.disti.net disti@disti.net	Tank, drum, and container high pressure/brush washing equipment for portable and stationary containers.
Woma Corporation	Everett, WA	(800) 258-5530 Fax: (732)-417-0015 www.womacorp.com womacorp@bellatlantic.net	High and ultra high pressure water blasting pumps and systems for tank cleaning.

Environmental Software (including hazardous materials management)			
Vendor	**Location/City**	**Phone/Fax Website/E-Mail**	**Products/Description**
Contemporary Technologies	Pittsburg, PA	(412) 642-2222 Fax: (412) 642-2223	Enviroware integrated waste management software package includes materials tracking and bar coding capabilities.
Corbus, Inc.	Kennett Square, PA	(800) 524-7096 (610) 444-5691 (610) 444-6461 (Fax) *www.corbus.com* *sales@corbus.com*	Environmental, health and safety, compliance software.
Essential Technologies, Inc.	Rockville, MD	(800) 999-5009 Fax: (301) 284-3001 *www.essentech.com*	Environmental, health and safety information systems.
Jordan Systems.	Cedar Rapids, IA	(800) 859-3023 Fax: (719)535-8245 *www.jordansystems.com* sales@jordansystems.com	Environmental software solutions for today's environmental health and safety manager.
Logical Technology Inc.	Peoria, IL	(800) 266-7591 Fax: (309) 689-2911 *www.logicaltechnology.com*	Regulatory compliance software for MSDS and hazardous material management and reporting.
Logical Data Solutions, Inc.	Palm Beach Gardens, FL	(561) 694-9229 (561)694-9131 (Fax)	Application modules that can be used in a stand-alone mode or fully integrated to form a comprehensive environmental information management system.

Environmental Software (including hazardous materials management)			
Vendor	**Location/City**	**Phone/Fax Website/E-Mail**	**Products/Description**
Canadian Center for Occupational Health and Safety	Hamilton, Ontario Canada	(800) 668-4284 Fax: (905) 572-2206 www.ccohs.ca/ clientservices@ccohs.ca	Promotes a safe and healthy working environment by providing information and advice about occupational health and safety
Chemical Safety Co.	Emeryville, CA	(888) 594 1100 Fax (510) 594 1100 www.chemicalsafety.com/ie.htm ems@chemicalsafety.com	Comprehensive technology and services for environmental and safety compliance, management, planning and reporting
Earth Soft	Denver, CO	(800) 649-8855 Fax: (850) 478-6904 www.earthsoft.com info@earthsoft.com	Environmental Quality Information System
Environmental Support Solutions	Tempe, AZ	(800) 289-6116, ext. 1 Fax: (480) 346-5599 www.environ.com/ sales@environ.com	Integrated software for Environmental, Health, & Safety management and Emergency Response.
EnviroWin Software	Old Saybrook, CT	(800) 454-0404 Fax: (860) 510-7225 www.envirowin.com/ info@Envirowin.com	Software re: environmental & industrial hygiene.
Hazmat Control Systems, Inc.	Long Beach, CA	(562) 597-7994 Fax (562) 985-0645 www.hmcs.net/ sales@msdssurfer.com	Applications provide tools to surf the web for MSDSs, harvest the documents to a local machine or server, and distribute the documents on a company network.
Vertical Suite	Half Moon Bay, CA	(888) 424-7336 Fax: (650) 712-7479 www.VerticalSuite.com info@verticalsuite.com	Web-based software for Title V compliance, integrated to a large Environmental Health and Safety database. Provides facilities real-time access to all data needed to meet compliance requirements of Title V of the Clean Air Act.
Micromedex	Greenwood Village, CO	(800) 525-9083 Fax: (303) 486-6464 www.micromedex.com info@mdx.com	Software "suites" re: U.S. and international regulations including the Federal Register, chemical listings, and related safety programs and standards, & detailed data for the safe use, management, & reporting of regulated chemical substances.
Pacific Environmental Services	Raleigh, NC	(919) 941-0333 Fax: (919) 941-0234 http://home.pes.com/comp.html i-STEPS@rtp.pes.com	Environmental engineering and industrial hygiene software and computer consulting.
Softrak Systems	Bethlehem, PA	(610) 868-2448 www.softraksystems.com/ softrak@aol.com	Regulatory software: MSDS and label compliance, SARA 313,CAS numbers of substances found on both lists, TSCA.
Telstar Associates Inc.	Boise, ID	(208) 343-3894 Fax: (208) 342-6244 www.telstarinc.net telstarinc@telstarinc.net	Environmental software that tracks Compliance hazardous materials and Environmental software that tracks Waste hazardous materials.
Terralink Software Systems Inc.	Portland, ME	(800) 343-5143 Fax: (207) 772-6552 www.terralink.com/ support@terralink.com	For creating manifests, tracking waste streams through inventory, enhancing communication in the hazardous waste system. Enables regulatory compliance.

Environmental Software (including hazardous materials management)			
Vendor	**Location/City**	**Phone/Fax Website/E-Mail**	**Products/Description**
Wixel Inc.	Englewood, CO	(800) 685-5813 www.ilikethatsite.com/wixel/ sales@wixel.com	Software applications for managing environmental compliance requirements, supported by ongoing regulations research and programming, regularly updated to maintain compliance with regulations via regular revisions and upgrades.

High-Pressure Wash Systems/Water Recycling Systems			
Vendor	**Location/City**	**Phone Number**	**Products/Description**
Aaladin Industries	Elk Point, SD	(800) 411-4261	Hot/cold water pressure washers, steam cleaners.
AAR Boss	Aberdeen, NC	(800) 982-1988	Self-contained pressure spray/ vacuum units for washdown and hazardous material recovery.
Acme Cleaning Equipment, Inc.	Houston, TX	(800) 231-9708	Hot and cold water pressure cleaning equipment, steam cleaners, water reclamation equipment.
Alcota Cleaning Systems, Inc.	Veradale, WA	(800) 255-6823	Surface cleaning and waste water treatment.
B&M Enterprises	Midlands	(253) 536-770	Steam cleaners, pressure washers, wastewater treatment systems, closed loop recycling systems.
The Hotsy Corporation	Englewood, CO	(800) 525-1976	Hot and cold water pressure washers, steam cleaners, and wastewater recycling systems.
Landa Water Cleaning Systems	Camas, WA	(800) 792-6174	Hot and cold water pressure systems, steam cleaners, wash water recycling systems, wastewater treatment.
Niagara National Corporation	Atlanta, GA	(800) 635-8342	High pressure washers and wash water treatment and recycling systems.
RGF Environmental Systems	Palm Beach, FL	(800) 842-7771	Advanced water treatment/ recycling systems.
Spartan Mfg Corp	Kernersville, NC	(336) 996-5585	Portable pressure washers & steam cleaning equipment, wastewater capture systems, all industries.

Drum & Barrel Recylers			
Vendor	**Location City**	**Phone Number**	**Service Description**
American Recycling Corp.	Spokane, WA	(509) 535-4271	Takes most metal barrels if triple rinsed.
Denton Plastics/ Pickup	Portland, OR	(503) 257-9945	Plastic pickup depending on volume and quantity.
Earthworks Recycling	Spokane, WA	(509) 534-1638	Takes metal and plastic barrels. Call first.
Eastbury Salvage	Marysville, WA	(360) 659-1540	Metal drums have to meet standards; will pick up.
Flotation Services	Bellevue, WA	(425) 453-1139	Accepts only large 5-55 gal plastic drums; Drums need to be triple rinsed; call for pick up.
Interstate Plastics	Vancouver, WA	(360) 694-1753	Will pay for plastic if over 1000 pounds; pickup depends on quality; commercial customers only.

Drum & Barrel Recylers

Vendor	Location City	Phone Number	Service Description
Palex Container Co	Seattle, WA	(800) 451-3471	Drum recycling; mostly metal barrels.
Northwest Plastic Recovery	Tacoma, WA	(253) 274-8294	Takes 55-gallon plastic barrels, crates and totes.
Waste Control Recycling Inc.	Longview, WA	(360) 425-4302	Will accept 55-gallon metal barrels if triple rinsed.

Recyclers of Five Gallon Pails

Vendor	Location/City	Phone Number	Products/Description
Denton Plastics/Pickup	Portland, OR	(503) 257-9945	Plastic pickup depending on volume/quantity.
Interstate Plastics	Vancouver, WA	(360) 694-1753	Will pay for plastics over 1,000 lbs. Pickup depends on quality. Commercial customers only.
Nature's Marketplace	Vancouver, WA	(360) 695-8878	Accepts #2 and #5 plastic pails.
Northwest Plastic Recovery	Tacoma, WA	(253) 274-8294	Takes 4 or 5 gallon HDPE buckets.

Recyclers of Paint Cans

Vendor	Location/City	Phone Numbers	Products/Description
Seattle Barrel Co	**Seattle, WA**	**(206) 622-7218**	**Recycle used paint cans.**

Recyclers of Pallets

Vendor	Location/City	Phone Numbers	Products/Description
Cascade Pallet	Ellensburg, WA Pasco, WA	(800) 962-4213	Takes wood. Cleaner wood eventually used to make paper. Pays for 48-40 reusable pallets.
Earthworks Recycling	Spokane, WA	(509) 534-1638	Takes pallets.
Girards' Wood Products	Puyallup, WA	(800) 532-0505	Handles pallets in any condition.
National Pallet Service	Orting, WA	(360) 897-8132	Purchase of pallets depends on quality and size. Reconditions pallets for reuse.
Nepa Pallet & Container Company	Snohomish, WA	(360) 586-3185	Will take pallets in good condition and may pay.
Pallet Services	Mt Vernon, WA Pasco, WA Tacoma, WA	(800) 769-2245 (800) 769-2252 (800) 872-5069	Buys if in good shape. Call for prices & appointment.
Rainier Pallets	Auburn, WA	(253) 813-0770	Payments negotiable depending on condition of the pallets. Will pickup large amounts.
Waste Management	Seattle, WA	(206) 762-3000	Accepts pallets and crates, various wood materials.
Triangle Resources	Cama, WA	(360) 834-7253	Wood waste, pallets, clean lumber. Call first.

Recyclers of Paper Sacks

The Department of Ecology compiles a list of companies that provide recycling services for mixed paper in Washington State. The services provided by any particular company are subject to change. Contact Ecology for an up-to-date list of companies in your area. (800) RECYCLE or (800) 732-9253

Recyclers of Shower Caps/Tank Covers

Vendor	Location/City	Phone Numbers	Products/Description
Canvas Specialty	Los Angeles, CA	(900) 659-7000	Industrial fabric products, custom covers.
Detroit Tarp	Romulus, MI	(734) 955-8200	Covers, tents, and curtains.
Hendee Enterprises	Houston, TX	(800) 231-7275	Process tank covers.
John Johnson Co	Detroit, MI	(800) 991-1394	Canvas/synthetic, coated and uncoated covers.
Reef Industries	Houston, TX	(800) 231-6074	Specialty plastic films, covers, liners, and tarps.

Recyclers of Super Sacks

Vendor	Location/City	Phone Numbers	Products/Description
B.A.G. Corporation	Dallas, TX	(800) 331-9200	Super sacks, bags, and equipment.
Hosokawa Bepex Corporation	Minneapolis, MN	(800) 607-2470	Equipment and systems for packaging dry solids into bags, boxes, drums, totes, and super sacks.
Weyerhaeuser Corporation	Montgomery, AL	(800) 239-4464	Packaging: bulk (super sacks, boxes, totes)

Appendix G

DEPARTMENT OF ECOLOGY

August 8, 1998

TO: Hazardous Waste Staff

FROM: Thomas Cusack, Hazardous Waste Specialist
Hazardous Waste and Toxics Reduction Program

SUBJECT: Counting Dangerous Waste Under the *Dangerous Waste Regulations*

Introduction

This document provides guidance on counting dangerous waste as it applies to the *Dangerous Waste Regulations*, Chapter 173-303 WAC. This memo replaces TIM No. 89-1, dated 11/14/89, titled Counting Spent Solvents and the Closed Loop Exclusion and the previous version of this memo dated April 1, 1996. It is not intended to replace state or federal regulations or to explain how to designate waste. Counting refers to adding the total weight of dangerous waste generated during a calendar month in determining generator compliance status.

How to Use This Document

This memorandum is not meant to function as a stand-alone document and may not cover every possible situation readers may find themselves in. It will help the reader understand the *Dangerous Waste Regulations* and when to count dangerous wastes. Due to the complexity of regulations involved and terms used, it is suggested the reader have a recent copy of the *Dangerous Waste Regulations*. Flow diagrams and an attached counting matrix have been provided to help explain counting dangerous waste in relation to recycling and to treatment. Attached, as part of this memo, is a series of short counting discussions associated with the Domestic Sewage Exclusion (DSE), storage or accumulation, Treatment by Generator (TBG), Permit by Rule (PBR), the Multiple Counting Exclusion, and recycling in general.

Reasons to Count

Reasons for counting dangerous waste include:

- To determine generator compliance status (i.e., small, medium, or large quantity generators).
- To comply with generator requirements associated with submitting Dangerous Waste Annual Reports.

- To determine if a pollution prevention plan should be submitted. (Those requirements are clearly outlined in Chapter 173-303 WAC and will not be covered by this paper.)

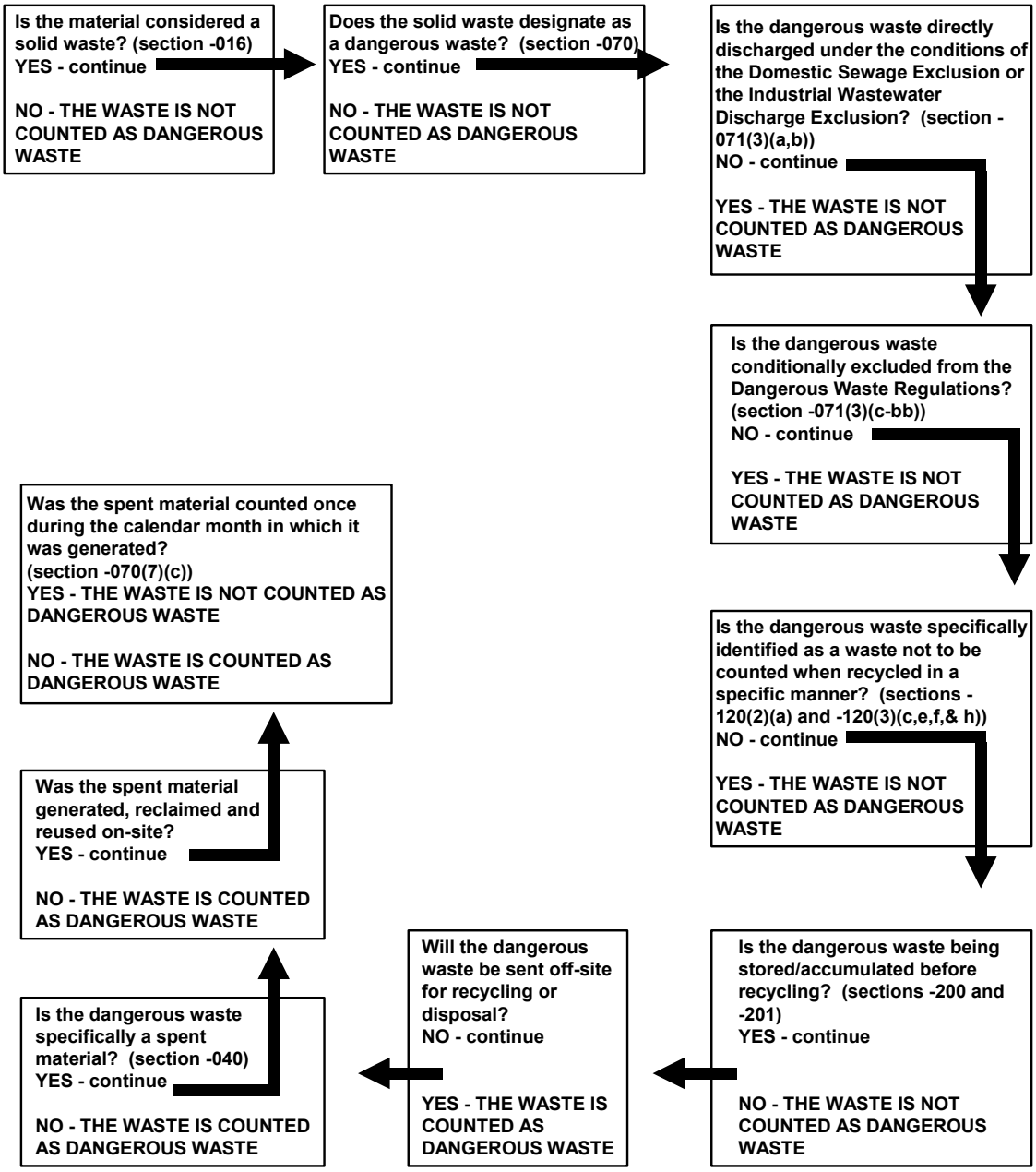
Counting Frequency

Generators must count their waste each calendar month. Significant changes in the monthly totals can cause a change in the generator's status.

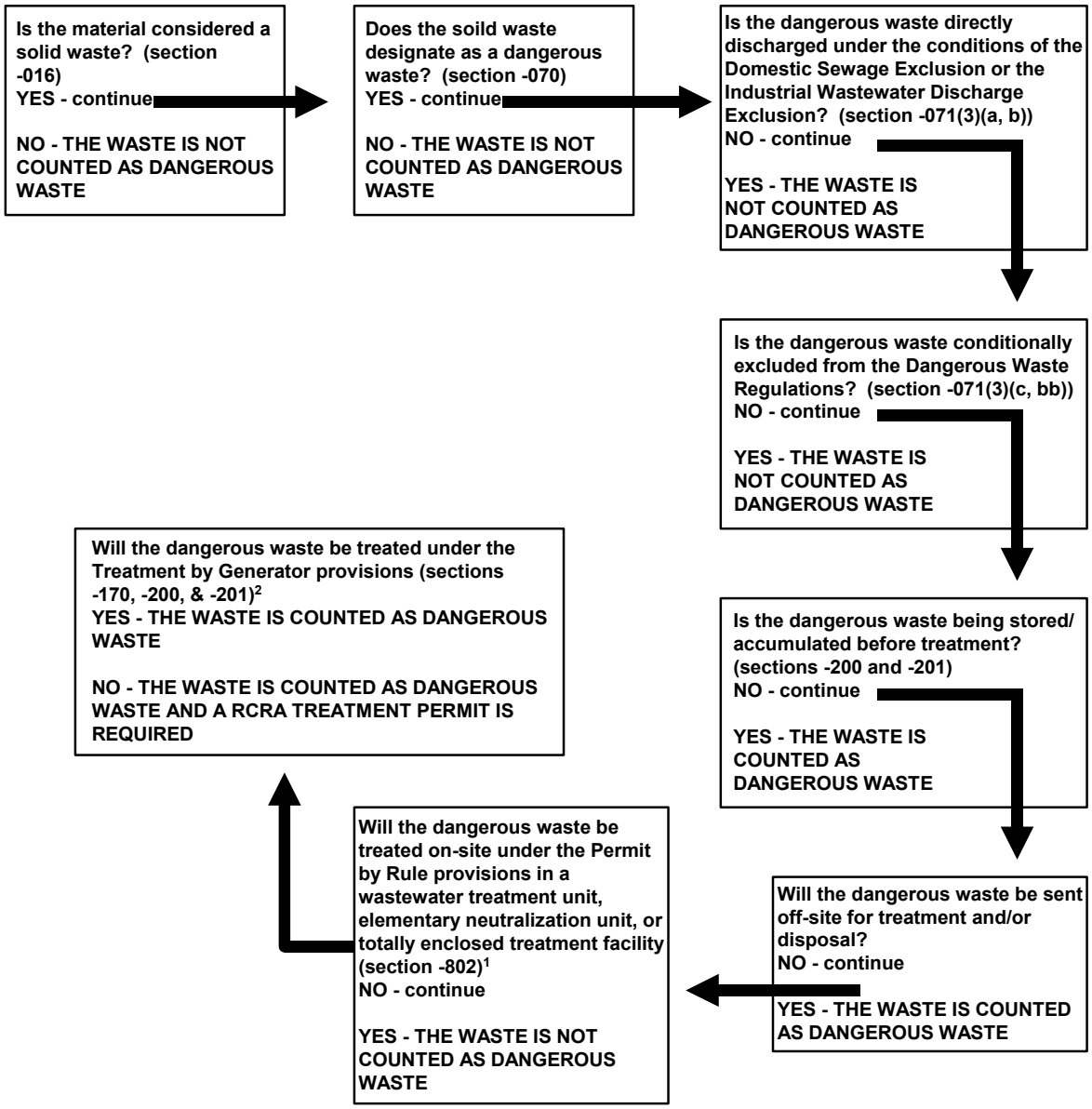
Attachments (11)

Flow Chart 1: Counting Dangerous Waste in Relation to Recycling
Flow Chart 2: Counting Dangerous Waste in Relation to Treatment
Counting Discussion 1. Counting and the Domestic Sewage Exclusion
Counting Discussion 2. Counting and Storage or Accumulation
Counting Discussion 3. Counting and Recycling/Excluded Wastes in General
Counting Discussion 4. Counting and Recycling Without Prior Accumulation or Storage
Counting Discussion 5. Counting and the Multiple Counting Exemption
Counting Discussion 6. Counting and Treatment By Generator
Counting Discussion 7. Counting and Permit By Rule
Counting Discussion 8. Counting and Annual Reporting Requirements
What to Count Matrix

FLOW CHART 1: Counting Dangerous Waste In Relation To Recycling



FLOW CHART 2: Counting Dangerous Waste in Relation to Treatment



[1] Dangerous waste residues from the on-site Permit by Rule treatment of dangerous waste are counted if disposed outside the Permit by Rule provisions.

[2] Dangerous waste residues from the on-site treatment of dangerous waste under the Treatment by Generator provisions are counted.

Counting and the Domestic Sewage Exclusion (DSE)

The Domestic Sewage Exclusion allows dangerous waste to be discharged to a publicly-owned treatment works (POTW) only when such wastes are treatable at the POTW, and the discharger has a permit which authorizes the discharge of certain waste described in the permit. The dangerous waste is only excluded from the *Dangerous Waste Regulations* after it enters the sanitary sewer system. For additional guidance on the Domestic Sewage Exclusion, refer to Ecology's Technical Information Memorandum (TIM) titled "Domestic Sewage Exclusion," publication number 94-136 and WAC 173-303-071(3)(a).

Dangerous Waste Counted Under The DSE:

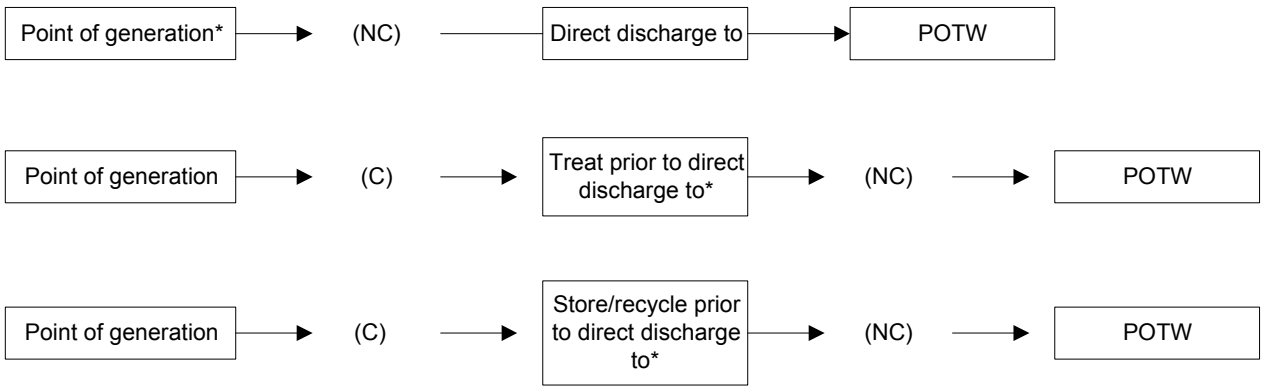
Dangerous waste managed prior to being directly discharged under the DSE to the sanitary sewer system is counted. This means dangerous waste stored, treated, or recycled prior to the point of direct discharge is counted.

Dangerous Waste Not Counted Under The DSE:

As a policy, Ecology will not require dangerous wastes mixed with domestic sewage to be counted when the waste is being directly discharged into the POTW system in compliance with the domestic sewage exclusion (WAC 173-303-071(3)(a)).

The following flow diagrams are intended to help explain when counting is applicable under the DSE:

Diagram for Discussion 1



* means when the DSE applies.
(C) means count dangerous waste.
(NC) means do not count dangerous waste.

Counting Discussion 2

Counting and Storage and/or Accumulation

"Storage" means the holding of dangerous waste for a temporary period and is commonly subject to RCRA storage permit requirements. "Accumulation" of dangerous waste, by the generator on the site of generation, is not storage as long as the generator complies with the applicable requirements of WAC 173-303-200 and 173-303-201. However, the terms "storage" and "accumulation" are used interchangeably. For additional guidance on storage and on satellite accumulation refer to the following TIMS: • "Effective Date of the 90-Day Storage (Accumulation) Requirement," TIM 82-5 (Revised 10/93); • "Satellite Accumulation," publication number 94-120.

Dangerous Waste Counted Under The Accumulation Regulations:

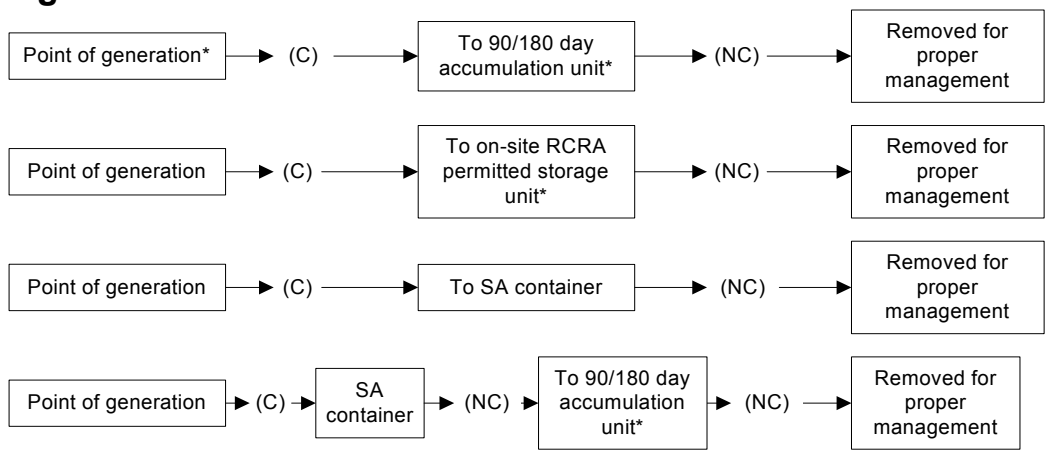
Dangerous waste is counted at the point of generation prior to storage or accumulation in the generator's 90 or 180-day accumulation area. Likewise, dangerous waste accumulated under the satellite accumulation (SA) provisions (WAC 173-303-200) is also counted toward the generator's status on a monthly basis (Flow Chart number 2).

Dangerous Waste Not Counted Under The Accumulation Regulations:

It is not necessary to count the dangerous waste again when it is moved from satellite accumulation to the generator's 90 or 180-day accumulation area.

The following flow diagram is intended to help explain when counting is applicable when storing or accumulating waste:

Diagram for Discussion 2



*unit means tank or container.
(C) means count dangerous waste.
(NC) means do not count dangerous waste.
(SA) means satellite accumulation.

Counting Discussion 3

Counting and Recycling/Excluded Wastes in General

As a general "rule," dangerous waste stored, disposed of, treated, recycled, or manifested are counted. However, there are exceptions to this "rule" where some dangerous wastes are not counted. These exceptions involve wastes being recycled a certain way or when a waste or management activity fulfills the requirements of a conditional exclusion.

"Recycle" means to use, reuse, or reclaim a material. "Use or reuse" means to employ a material as an ingredient in an industrial process or an effective substitute for a commercial product without first being reclaimed. Dangerous wastes may be used/reused, as described above, in such a way that they are removed from the status of a solid waste (WAC 173-303-017 (2 & 3)) and not counted (refer to Flow Chart 1). The reason for this is that certain waste materials can be used/reused in ways that are not considered to involve waste management and become exempt from the *Dangerous Waste Regulations.*

Some dangerous wastes hold conditional exclusions from the *Dangerous Waste Regulations*. When specific terms of an exclusion are met, Ecology conditionally excludes the waste. This is because the materials are not dangerous waste, are regulated under other state and federal programs, or are recycled in ways which do not threaten public health or the environment. When the specific terms of an exclusion are met, the dangerous waste may become conditionally excluded from rule and not counted (WAC 173-303-071). A few examples include treated wood waste, polychlorinated biphenyls (PBCs) waste generated in a product or raw material storage tank until removed, and waste reclaimed and reused in a closed loop system (refer to Flow Chart 1).

The *Dangerous Waste Regulations* list certain wastes that are not counted when recycled in a certain way. Like the excluded categories of waste, recyclable materials must be recycled following specific conditions. When the conditions are met, the waste is not counted toward the generator status. Refer to WAC 173-303-070(7)(c & d) and Flow Chart 1. Examples of wastes having recycling conditions include used oil, spent CFC and HCFC refrigerants, spent lead acid batteries, used batteries, scrap metal, spent antifreeze, waste recycled without prior storage or accumulation (see Counting Discussion 4), and waste recycled under the "multiple counting exemption" (see Counting Discussion 5).

NOTE: There is no flow diagram to accompany this discussion.

Counting Discussion 4

Counting and Recycling Without Prior Accumulation or Storage

Under this counting exclusion there can be no storage or accumulation prior to the recycling activity. The advantage to the generator, then, would be no counting of the dangerous waste entering the recycling unit. "Without prior storage or accumulation" means that as soon as the waste is generated it immediately enters the recycling unit. Wastes could be carried in containers, for example, only if the waste is transferred immediately upon generation to the recycling unit. For more detail refer to WAC 173-303-070(7)(c)(iv).

Dangerous Waste Counted With No Prior Storage or Accumulation

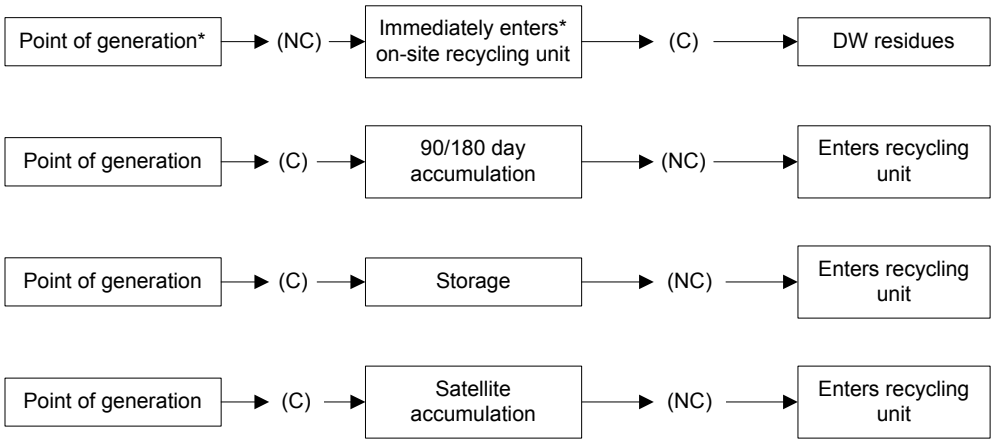
Dangerous waste residues generated from the recycling activity are counted.

Dangerous Waste Not Counted Without Prior Storage or Accumulation

Dangerous waste is not counted when it can be recycled on-site, without first being stored or accumulated, only in an on-site process subject to regulation under WAC 173-303-120(4)(a).

The following flow diagram is intended to help explain when counting is applicable when storage or accumulation does not occur prior to on-site recycling:

Diagram for Discussion 4



*"immediately enters" means without first being stored or accumulated.
(C) means count dangerous waste.
(NC) means do not count dangerous waste.

Counting Discussion 5

Counting and the Multiple Counting Exemption

Businesses that do on-site solvent recycling must count spent solvents as dangerous waste when they are stored or accumulated prior to distillation. Again, the reasons for counting these wastes are to:

1. Determine generator status for the month, and
2. Report the combined monthly amount on the Dangerous Waste Annual Report. (See Counting Discussion 8.)

The multiple counting exemption provides a benefit to generators by eliminating the over-counting of solvents that are reclaimed and reused multiple times during that month. By potentially reducing the countable quantity of dangerous waste, this exemption may help businesses decrease their regulatory requirements. The exemption becomes beneficial when spent solvents are recycled at least twice per month. Recycling more often increases the benefits from this exemption.

The *Dangerous Waste Regulations* state that spent materials which are generated, reclaimed, and reused (all occurring on-site) are counted only once during the month the material became spent [WAC 173-303-070(7)(d)(iii)]. This means that generators don't have to count every single batch of spent solvent that is distilled. They are required to count these materials once per month, and the following text explains what this means and how it is done.

When are the spent solvents counted?

When the still is hard-piped directly to the production process, and the reclaimed solvent is returned (also hard-piped) to that process, the spent solvents do not need to be counted. There is no accumulation or storage occurring.

Spent solvent would be counted when there is storage or accumulation. After solvents have become too contaminated for further use, they are accumulated in a container (or containers) until the shop is ready to operate the still. This accumulated quantity should be recorded on a Monthly Generator Status Form on Column 2 (see example on page 10). Every time these solvents are accumulated and recycled during the month, the quantity accumulated prior to recycling would be recorded on the form. At month's end, select the largest amount in column 2 as the countable quantity of solvent waste.

It is important to realize that this accumulated quantity of spent solvent may be considerably larger than a single batch run through the still, depending on size of still, volume of material and recycling frequency. It may require two or more still runs to

process the total amount collected. Keep careful track of each accumulated quantity of spent solvent in order to properly record the amount.

Each month the generator will count the largest amount of spent solvent accumulated prior to on-site recycling. This largest accumulated amount may not actually be recycled before the end of the month, but it would still be counted as the month's largest accumulated quantity. Solvents accumulated and not recycled by the end of the month should be carried over into the next month.

In this new month, the carried over amount would be added to any additional spent solvents accumulated prior to recycling. This combined amount may very well be the largest amount accumulated in the second month. To avoid an apparent double-counting situation in the second month (of the material carried over from the previous month), it would be to the generator's advantage to recycle often. The generator may consider recycling at the end of the month so that there would be no accumulated solvent to carry over into the following month.

Any dangerous wastes generated through mishandling or spills do not fit the requirements of the "multiple counting exemption" and therefore is counted toward determining the generator's monthly generation status. Also, all dangerous waste residues (for example, still bottoms) produced from the recycling process are counted each month (refer to page 2, Flow Chart 1).

It is necessary to convert gallons to pounds when submitting annual report information. One way to do this is to collect a representative gallon of waste and weigh it. Another method would be to multiply the solvent's specific gravity by 8.34 (the weight of water in pounds) to convert gallons of spent solvent to a weight amount. Refer to the solvent's material safety and data sheet for its specific gravity.

Don't count solvent evaporative loss from cleaning process

During production and cleaning processes, solvents may be "lost" through evaporation or because they cling to the cleaned parts. These solvents lost to the atmosphere would not be counted towards the generator's status. Virgin solvent is added to the reclaimed solvent as "make up" for this loss. Counting the virgin solvent before use, or counting make-up added after reclamation, is not necessary and may result in over-counting.

Assess evaporative loss from still operation

Evaporative loss from operating the still is a waste that should be counted. However, if a still is operating efficiently, this loss should be negligible and does not need to be reported. If the still appears to be working poorly, an Ecology inspector may require the facility to calculate evaporative loss for the month and include it as part of the total dangerous waste generated. Stills should be well maintained. For example, seals and gaskets should be replaced when needed.

Example
The following is an example meant to clarify this exemption using the accompanying generator status form and flow diagram. Keep in mind that this is ONLY an example, and is not meant to cover every situation or counting method in relation to the "multiple counting exemption."

Application: A fiberglass shop recycles their acetone on-site. In this example, spent solvent is accumulated and distilled three times during the month.

1. On January 10 the shop starts distilling 160 pounds of collected spent solvent (counting from January 1). They may or may not distill all 160 pounds in a single still run, depending on the capacity of the still.
2. Meanwhile, they are starting to generate more spent solvent. They accumulate 150 pounds, and they start distilling this amount on January 17.
3. Again, they generate and collect 180 pounds of solvent. On January 28 they begin distilling this amount.

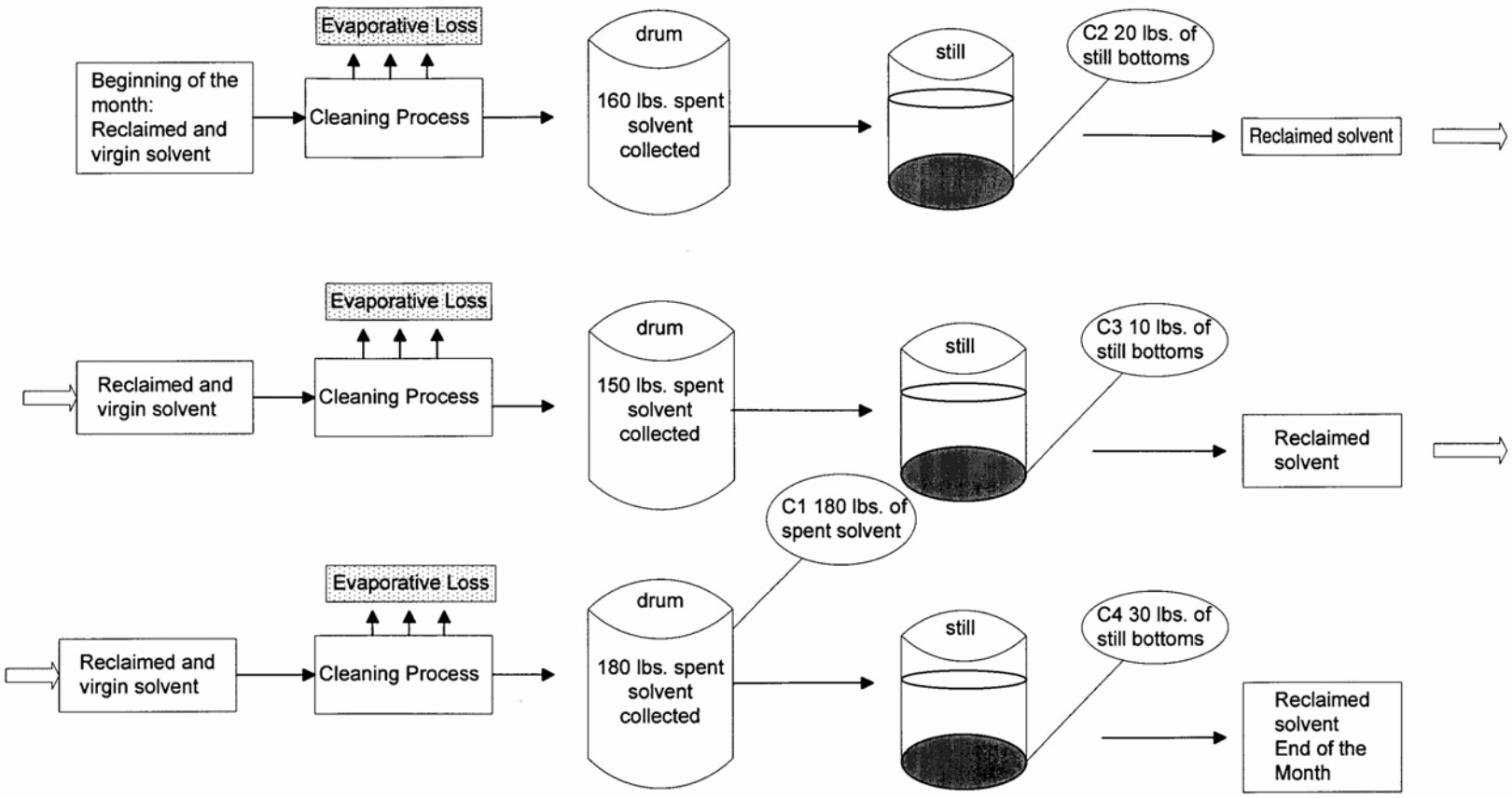
The quantity of spent solvent (not including still bottoms) reported for the month is 180 pounds. To clarify, the generator will report the largest amount of spent solvent accumulated prior to on-site recycling.

*Monthly Generator Status Form

Column 1	Column 2	Column 3
Distillation Start Date	Amount collected prior to recycling (pounds)	Still bottoms generated (pounds)
Jan. 10th	160	20
Jan. 17th	150	10
Jan. 28th	180	30
	Largest value = 180	Total = 60
**This is an example form that may be helpful for determining the monthly reportable quantity of spent solvent, however its use is not required.*		

Calculating solvent waste for January:
1) Largest number in column #2: 180
2) Total of column #3: 60
Total: 240 = amount of solvent waste generated during January

Diagram 5: Example of the Multiple Counting Exemption for One Month's Activity



Monthly Counting of Dangerous Waste	
C1	180 lbs spent solvent
C2	20 lbs still bottoms
C3	10 lbs still bottoms
C4	30 lbs still bottoms
Monthly Total	240 lbs of dangerous waste

Note 1: Without the multiple counting exemption, a generator would have counted 550 pounds instead of 240 lbs.

Note 2: In this example, evaporative loss from the still is zero, with inefficient stills this loss may need to be calculated and added to monthly dangerous waste total. (See text discussion.)

Additional Business Examples

A small paint shop paints steel objects, all within their shop. They use one five-gallon container to collect all the spent cleaning solvent. When the container is full, they transfer the spent solvent into a five-gallon still. This recycling process is repeated 10 times during the month. Five gallons of spent solvent (converted to pounds) would be reported for the month, plus the total still bottoms from all 10 still runs.

A large auto body paint shop has three different painters each generating five gallons of spent solvent from paint mixing and clean-up activities. When their individual containers are full, they combine them in a drum for a total of 15 gallons. The 15 gallons is then distilled, one batch at a time, in a still with a five gallon capacity. The generator would need to count the whole 15 gallons on column two of the Generator Status Form, not just the five gallons that ran through the still one time.

The paint shop continues to generate and accumulate 20 gallons of additional spent solvent for the rest of this month. They would count a total of 20 gallons spent solvent for the month, whether it was recycled or not. If this additional amount was not recycled on January 31, it would be counted again prior to the next recycling event.

Column 1	Column 2	Column 3
Distillation Start Date	Amount collected prior to Recycling (gallons)*	Still bottoms Generated (pounds)**
January 15	15	X
January 31	20	X
	Largest value = 20	

**For simplicity, numbers are in gallons. Remember to convert to pounds for reporting purposes.*

***Still bottoms are ignored in this example.*

Counting Discussion 6

Counting and Treatment by Generator (TBG)

The "Treatment by Generator" provisions found in WAC 173-303-170(3) and –200 allow generators to treat their own dangerous waste on-site without obtaining a RCRA "TSD" treatment permit. For additional guidance, refer to TIM Number 96-412 (revised May 1999), titled "Treatment by Generator."

Dangerous Waste Counted Under TBG

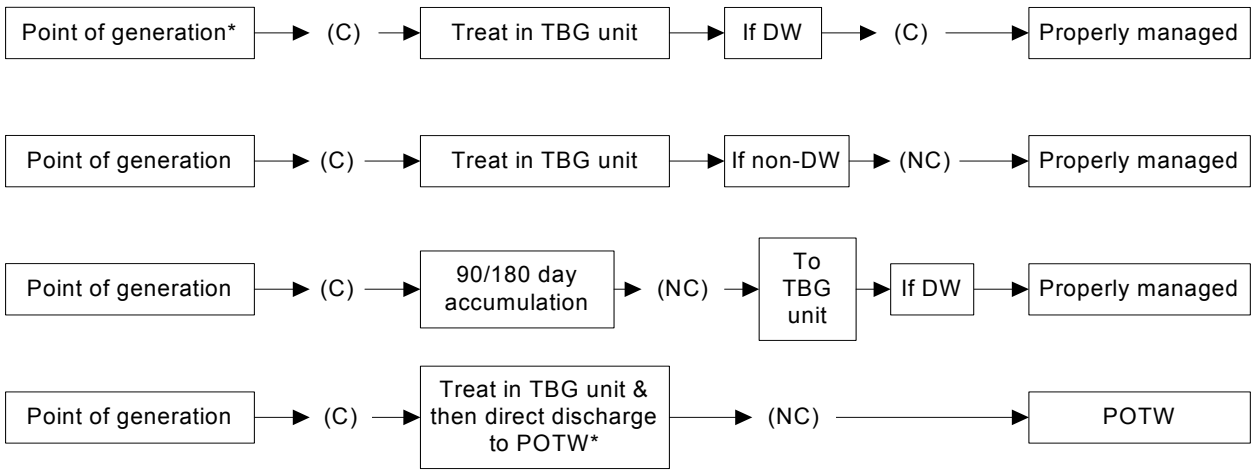
Dangerous waste intended for treatment under the TBG allowance is counted toward the generator's status before it is treated (see Flow Chart 2). A TBG activity is considered a separate activity from the production or cleaning process originally generating the dangerous waste. Therefore, dangerous waste-derived (generated) from a TBG activity is also counted toward the generator's status.

Dangerous Waste Not Counted Under TBG

Waste not counted under TBG includes waste derived from the TBG activity which does not designate as dangerous waste. Also, dangerous waste from TBG activities that are directly discharged into the POTW system in compliance with the domestic sewage exclusion (WAC 173-303-071(3)(a)) are not counted.

The following flow diagram is intended to help explain when counting is applicable when treating waste under the TBG provisions.

Diagram for Discussion 6



*When the DSE applies.
(C) means count dangerous waste.
(NC) means do not count dangerous waste.

Counting Discussion 7

Counting and Permit By Rule (PBR)

The Permit-by-rule provisions allow on-site treatment of dangerous waste without a written RCRA "TSD" treatment permit under certain conditions. For PBR to apply, generators must treat their waste only in a wastewater treatment unit, elementary neutralization unit, or totally enclosed treatment unit. Details are outlined in Flow Chart 2, as well as in WAC 173-303-040 and –802(5).

Dangerous Waste Counted Under PBR

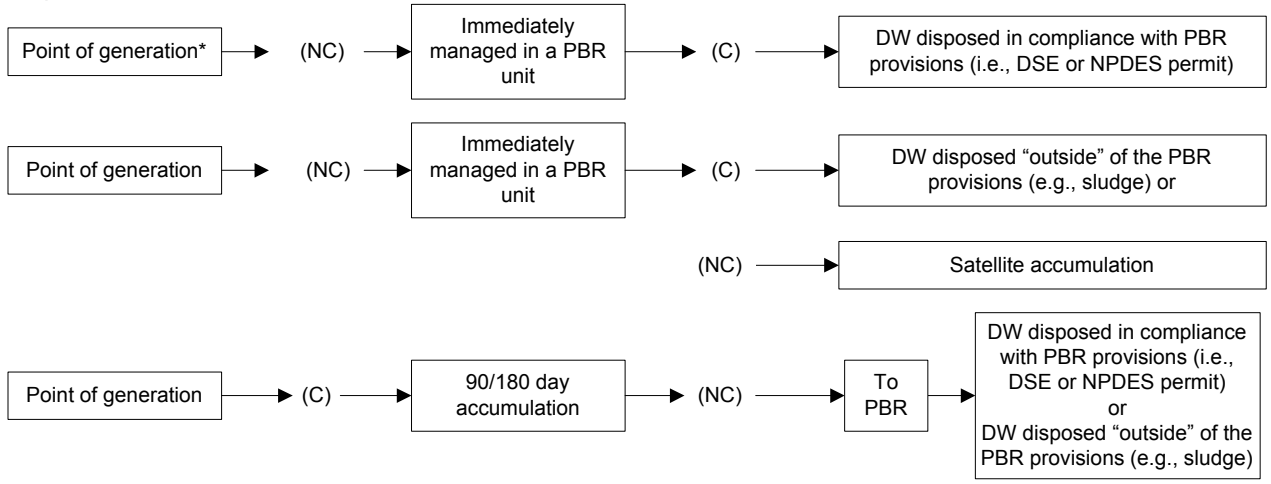
Dangerous waste removed from the PBR unit and no longer covered by the PBR provisions, such as sludge removed for land disposal, are counted.

Dangerous Waste Not Counted Under PBR

Waste managed immediately upon generation in an on-site PBR unit is not counted. The key term in this provision is "immediately," which means as soon as the waste is generated it must directly enter a PBR unit. There is no temporary storage, accumulation or other type of management of waste between the point of generation and the PBR unit. Also, dangerous waste discharged in compliance with the PBR provisions are not counted. For example, wastes discharged in compliance with the unit's NPDES discharge permit.

The following flow diagram is intended to help explain when counting is applicable when treating waste under the PBR provisions.

Diagram for Discussion 7



(C) means count dangerous waste.
(NC) means no counting of dangerous waste.

Counting Discussion 8

Counting and Annual Reporting Requirements

The second reason to count hazardous waste under the *Dangerous Waste Regulations* is to comply with annual reporting requirements associated with submitting a Dangerous Waste Annual Report. All generators, transporters, TSDs and recycling facilities with a RCRA Identification Number are to complete the annual report for each calendar year in which their ID number is active.

A generator must count and record the amount of dangerous waste generated, accumulated and recycled each month for the reporting year. The generator's status for the purpose of completing the Annual Report forms is defined based on the greatest quantity of dangerous waste generated in any one calendar month or accumulated at any time during the year.

The generator must know whether they are a small (SQG), medium (MQG), or large (LQG) quantity generator to know which annual report forms to fill out. For example, if a generator is an SQG for most of the year but becomes an MQG for one month, the generator would fill out the reporting forms required for an MQG.

Annual Report Book 1

The "Annual Report Book 1" contains forms and instructions. Worksheets are available to help the annual reporter select their correct reporting status and determine which forms to fill out. SQGs and transporters fill out limited information. Refer to the Dangerous Waste Annual Report instructions for further details.

APPENDIX H
SHOPTALK ARTICLE ON SPECULATIVE ACCUMULATION

(Summer 1997, Volume 7, No. 3)

Is It A Product Or A Waste?

Are the materials described below products or wastes?

- ✓ A large painting contractor has over forty containers of unused paint and used thinner. He stores them outside his main shop and says he plans to remix them or use them "as is" on future jobs.

- ✓ A chrome plating company keeps eight drums of spent hydrochloric acid in its storage area. The manager says they can regenerate the acid and use it again for parts cleaning and stripping.

- ✓ Seventeen various-sized containers of lube oil, cutting oils, machine coolant and paint are kept behind a machine shop. The operator bought them as a "lot" at an auction. He uses some of the cutting oils, but has not yet found a use for the rest.

Normally, it is relatively easy to tell when something is a waste—the business operator says it is. In the examples above, the operators plan to eventually use the materials. The Dangerous Waste Regulations allow generators to reuse or recycle materials without calling them dangerous wastes.

Ecology staff occasionally come across materials that have been stored for several years without any attempt to use them. When this happens, inspectors ask a series of questions to decide if the materials are still useable or if they have become dangerous wastes.

1) **Are there signs of spills or releases?**
   Spills and leaks indicate containers have been neglected, attacked by the weather or are corroding.

2) **Does the owner know what the materials are?**
   Product labels, Material Safety Data Sheets, and sales brochures list what materials are as well as their age, hazards and if they can be reused or recycled.

3) **Are the materials managed in the same way as other products kept on-site?**
   Materials should be kept indoors in sealed, labeled containers. This shows that the owner values them.

4) **How old are the materials and what condition are they in?**
   Materials can deteriorate with age and exposure to the elements. They should not be past the product shelf life or contaminated with rust or water, which makes reclamation difficult and expensive.

5) **Can the business show that it has the ability to use or recycle the materials?**
   A business shows a pattern of use or recycling by having the equipment or contracts in place, or by keeping records showing that reuse occurs. Generators must show that 75 percent of an accumulated material has been legitimately recycled over the course of a calendar year. If this is not possible, the material becomes a solid waste and possibly an illegally stored dangerous waste. All dangerous waste must be properly managed under the conditions of the *Dangerous Waste Regulations*.

The answers to these questions can uncover a situation that could threaten the environment. If there is little evidence to support a claim that materials can or will be used as products, Ecology may declare them to be wastes. The owner of the materials must then determine whether they are dangerous wastes and manage them accordingly.

Questions? Call your local Ecology regional office and ask for a Hazardous Waste Specialist.